HE LEADING UK CONSUMER ELECTRONICS TECHNOLOGY MAGAZINE

SERVICING.VIDEO.SATELLITE.DEVELOPMENTS

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AIREED BUSINESS PUBLICATION



Zener diode tester Cable and Satellite Show Toshiba service briefs

Servicing the Mitsubishi Euro 6 chassis

Aerial rigging requirements

Fault Reports TVs, VCRs, Camcorders and Satellite



Philex have been supplying replacement remotes for over 6 years. Sin and the designs continuously impre

The new designs for replacement remotes, pictured below (4&6), are based on the very popular of preprogrammed range. The range of replacements now stands at over 200 covering more than a including TV, Video, Satellite and CD. As a guide we produce a comprehensive catelogue with record Most of the range is still exclusive to independents who have appreciated the late-ocel margins and features such as the freefone helpline. ed on the very popular styling of our Decovering more than 18,000 models nsive catalogue with receiver induces

The 8 Way - the most popular of the preprogrammed types, replaces up to 8 remotes including TV, Video, Satellite and Cable TV with teletext and fastext functions.

The Optimum 8 preprogrammed with learning capability. Same coverage as the 8way but has learning apability and will operate HiFi.

The Visual 8 · preprogrammed with learning capability plus LCD. Has the same coverage as the Optimum 8 and the LCD display makes setting up even easier.

The Mini-mate - preprogrammed for TV basic functions. Up to 36 key case replacement control. Standard case replacement control.



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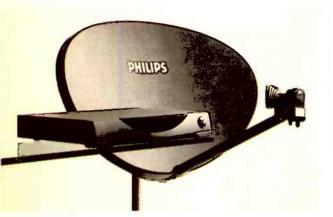
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Cable and Satellite Show 632 The emphasis this year was very much on digital receiving equipment. George Cole reports.



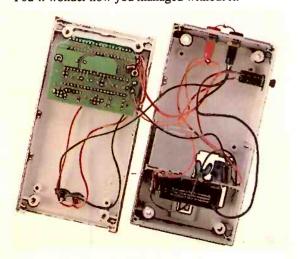
CD/Mini Disc Casebook

Aerial Rigging

This can be a worwhile addition to your servicing work. John Pitt-Francis on precautions to take and what you will require.

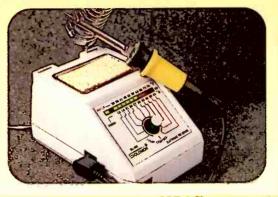
Zener Diode Tester

Zener diodes are responsible for many faults in electronic equipment and cannot be tested conventionally with a multimeter. This tester, devised by Michael Dranfield, uses a digital voltmeter module to give a direct reading of the zener breakdown voltage. You'll wonder how you managed without it!



SPECIAL OFFER

The Vann Draper SL-20, a temperaturecontrollable soldering station with bargraph temperature display and 150-420°C control range, is available to readers at the special offer price of £55 inclusive.



TV Fault Finding

What a Life!

Servicing the Mitsubishi Euro 6 Chassis

John Coombes on the technology used in this chassis and fault-finding procedures, with full circuits and description of the dual-chopper power supply arrangement.

Satellite Notebook	5	2	
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Toshiba Service Briefs 654

VCR Clinic

Inside the Pace MSS1000 Satellite Receiver

In this instalment J. LeJeune deals with the complex signal selection systems used in the receiver, the microcontroller arrangement and the front panel display.

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Cover Photography by Trevor Bailey. Triax aerial kindly supplied by Aerial Techniques of Poole.

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Note that we are unable to answer technical queries over the telephone and cannot provide information on spares other than given in our Spares Guide.

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TRANSISTORS / LINEAR ICs

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Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
AAY32 AC107	9p 40p	BD246A BD265	60p 45p	BFY64 BFY90	25p 45p	MJ15004 MJ2501	300p 100p	2N1613 2N1711	24p 24p	3.276 4.0	115p 110p	BR84D 2A/400V	37p	6502A 65C02	360p 930p	AN7156 AN7168	240p 200p	HA13108 HA13412	350p 600p
AC125 AC126	30p 30p	BD267 BD269	45p 45p	BLY48 BR100	85p 14p	MJ2955 MJ3000	55p 100p	2N1893 2N2102	30p 50p	5.0 10.0	130p 140p	BR86D 2A/600V	43p	6522 6800	280p 210p	AN7178 AN7222	180p 75p	HA13432 HA17524	400p 250p
AC127 AC128K AC141K	30p 40p	BD278 BD311 BD314	50p 100p 100p	BR103 BR303	37p 85p	MJ3001 MJE29A	100p 30p	2N2218A 2N2219 2N2221	24p 24p	11.0 12.0 14.756	250p 120p 200p	8R88D 2A/800V BR32	43p 43p	6802 680 36808	220p 500p 500p	AN7254 AN7256 AN7310	150p 250p 60p	ICL7106 ICL7660 KA2102	650p 240p 150p
AC176 ACY18	45p 22p 48p	BD315 BD317	150p 150p	BSS74 BSX20 BT100A	33p 15p 70p	MJE30A MJE340 MJE350	30p 25p 80p	2N2222 2N2369	23p 23p 15p	15.0 24.0	150p 250p	2A/200V BR34	43p	6809 6810	500p 150p	AN7311 AN7410	90p 150p	KA2130 KA2206	150p 150p
ACY19 AD149	48p 60p	BD331 BD332	40p 40p	BT106 BT109	180p 90p	MJE520 MP8112	30p 45p	2N2484 2N2646	15p 40p	VOLTAG		2A/400V BR36	44p	6818 6821	380p 130p	AY3-1015 AY3-1270	290p 800p	KA2209 KA2210	125p 230p
AF125 AF139	50p 30p	BD361 BD362	60p 60p	BT119 BT146	100p 99p	MPSA05 MPSA06	15p 15p	2N2904 2N2905	20p 20p	REGULA		2A/600V BR62	80p	6840 6845 6850	290p 200p	AY3-1350 AY3-8910 AY3-8912	450p 360p 400p	KA2212 KA2213 KA2214	80p 130p 150p
AF239 BB105B BB205B	30p 18p 24p	BD370 BD371 BD410	30p 30p 50p	BTY79 BU105 BU108	140p 80p 100p	MPSA13 MPSA20 MPSA42	15p 15p 15p	2N2906 2N2907 2N3019	18p 18p 28p	7805 7806 7808	25p 25p 25p	6A/200V BR64 6A/400V	72p	8085A 8086	90p 300p 500p	BA301 BA311	55p 80p	KA2261 KA2263	100p 100p
BC107 BC108	8p 8p	BD433 BD434	28p 30p	BU109 BU110	80p 90p	MPSA43 MPSA70	15p 15p	2N3053 2N3054	18p	7812	25p 25p	BR251 25A/100V	150p	8088 8156	480p 300p	BA313 BA333	80p 80p	KA2264 KA2284	100p 100p
BC109 BC109C	8p 10p	BD435 BD436	31p 30p	BU111 BU124	100p 80p	MPSA92 MPSA93	20p 20p	2N3055 2N3055H	38p 50p	7818 7824	26p 25p	BR252 25A/200V	165p	8224 8226	240p	BA401 BA402	60p 50p	KA2401 KA2412	150p 350p
BC140 BC141 BC142	20p 20p 20p	BD437 BD438 BD439	28p 36p 40p	BU126 BU180 BU184	65p 100p 100p	MR510 MR856 OC28	35p 38p 350p	2N3442 2N3702 2N3703	85p 9p 9p	7905 7906 7908	25p 30p 30p	BR254 25A/400V BR256	185p 200p	8250 8251 8253	750p 200p 160p	BA511 BA514 BA516	145p 150p 150p	KA2912 KA2914A LA1130	125p 300p 240p
BC143 BC147	20p 8p	BD440 BD441	40p 40p	BU204 BU205	65p 70p	OC29 OC35	250p 350p	2N3704 2N3705	90 90	7912 7915	30p 30p	25A/600V BR258	240p	8257	220p 3400p	BA521 BA524	100p 240p	LA1150 LA1185	240p 150p 150p
BC149 BC159	8p 8p	BD533 BD534	50p 38p	BU206 BU208	100p 70p	OC36 OC45	250p 50p	2N3706 2N3707	9p 9p	7918 7924	30p 30p	25A/800V BR351	185p	8279 8283	270p 400p	BA526 BA527	180p 95p	LA1201 LA1210	75p 140p
BC160 BC171 BC172	30p 10p	BD535 BD536	38p 38p	BU208A BU208A1		OC200 R2008B	180p 100p	2N3710 2N3711	12p 12p	78L05 78L08 78L12	24p 24p	35V/100V BR352 35V/200V	200p	8284 8287 8288	440p 260p 650p	BA532 BA534 BA536	100p 220p 150p	LA1222 LA1230 LA1364	80p 130p 200p
BC177 BC178	10p 14p 14p	BD537 BD538 BD643	40p 40p 50p	BU208D BU209 BU225	130p 90p 120p	R2010B S2000A3 S2000AF	100p 175p 175p	2N3771 2N3772 2N3773	85p 90p 100p	78L15 78L18	24p 24p 24p	BR354 35V/400V	220p	8748	700p 800p	BA546 BA612	160p 120p	LA1365 LA1368	120p 220p
BC179 BC182	14p 7p	BD645 BD647	50p	BU226 BU312	120p 90p	S2055A S2055AF	175p 200p	2N3799 2N3819	18p 29p	78L24 79L05	24p 35p	BR356 35V/600V	230p	8T26 8T28	95p 110p	BA656 BA658	110p 350p	LA1385 LA2000	170p 150p 270p
BC182L BC183	7p 7p	BD649 BD675	50p 40p	BU325 BU326A	55p 75p	S2530A S2800M	100p 72p	2N3903 2N3906	11p 11p	79L08 79L12	35p 35p	BR358 35V/800V		LINEAR	I ICe	BA684 BA685 BA1310	400p 400p 160p	LA2101 LA2200 LA3160	270p 190p 120p
BC183L BC184 BC184L	7p 7p 7p	BD676 BD677 BD678	40p 38p 40p	BU406 BU406D BU407	60p 85p 55p	TIP29 TIP29A TIP29C	15p 22p 25p	2N4031 2N4401 2N4403	25p 12p 12p	79L15 LM309K LM317T	35p 100p 100p	BY164 1. 100V BY176 1.	40p	AN203 AN210	210p 165p	BA1320 BA1330	75p 120p	LA3210 LA3300	65p 140p
BC212 BC212L	7p 7p	BD679 BD680	40p	BU407D BU408	75p 60p	TIP29E TIP30	40p 25p 25p	2N5061 2N5088	20p	LM323K 78H08KC	350p 800p	800V	40p	AN2140 AN228	170p	BA1360 BA4403 BA5101	160p 220p	LA3301 LA3361	110p 100p 300p
BC213 BC213L	7p 7p	BD681 BD682	45p 45p	BU408D BU409	75p 85p	TIP30C TIP31A	ZZp	2N5192 2N5241	50p	79H12KC 79HGKC	700p 800p	TRIACS	60m	AN252 AN259	150p 250p 140p	BA5101 BA5102 BA5204	350p 140p 200p	LA3375 LA4030 LA4031	300p 180p 140p
BC214 BC214L BC237	7p 7p 7p	BD705 BD707 BD709	50p 50p 50p	BU426A BU500 BU505	70p 100p 90p	TIP31C TIP32 TIP32A	27p 24p 21p	2N5245 2N5294 2N5296	45p 30p 30p	VALVES		4A/400V TIC225D	60p 69p	AN262 AN271 AN274	230p 250p	BA5402 BA5406	160p 180p	LA4032 LA4051	140p 150p
BC238 BC239	7p 7p	BD711 BD736	50p	BU505D BU505DF	90p	TIP32C TIP33	28p 50p	2N5448 2N6107	12p 40p	DAF96 DY87	100p 80p	6A/400V TIC226D	68p	AN301 AN303	330p 250p	BA5408 BA6104	180p 250p	LA4100 LA4101	85p 60p
BC300 BC301	20p 20p	BD826 BD828	50p	BU506 BU506D	100p 70p	TIP33C TIP34	60p 50p	2N6292 2N6385	40p 120p	EBF80 ECC84	80p 80p	8A/400V TIC236D	85p	AN304 AN315	360p 210p	BA6208 BA6209	175p 85p 120p	LA4102 LA4110 LA4120	100p 120p
BC302 BC303 BC304	20p 20p 25p	BD839 BD897 BD899	55p 50p 50p	BU506DF BU508A BU508AF	70p	TIP34C TIP35C TIP36C	60p 65p 65p	2N6403	160p	ECH84 ECL84 EF183	90p 100p 75p	12A/400V TIC246D	1050	AN316 AN360 AN362	350p 100p 140p	BA6304 BA6305 BA6410	140p 220p	LA4120 LA4140 LA4160	270p 60p 100p
BC327	7p 7p	BD977 BDX33	50p 60p	BU508D	90p	TIP41A	20p 22p	RECTIFI		EF184 EL500	85p 100p	16A/400\ TIC253D 20A/400\	/	AN366 AN610	150p 160p	BA6411 BA6993	250p 150p	LA4182 LA4190	160p 300p 140p
BC328 BC337 BC338	7p 7p	BDX65 BDW24	60p 55p	BU508V BU508VF	110p 100p	TIP42A TIP42C	20p 22p	BY127 BY133	8p 8p	EY86 EY87	70p 70p	TIC263D 25A/400	205p	AN3312 AN3821	K 600p	BA7001 BA7004	150p 200p	LA4192 LA4200	140p 130p 120p
BC441 BC446 BC477	28p 8p 18p	BDW93 BDW94 BDY92	50p 50p 100p	BU526 BU536 BU546	75p 100p 125p	TIP47 TIP48 TIP50	40p 60p	BY164 BY179 BY184	40p 35p 32p	EY88 PC97 PCC85	80p 100p 60p	THYRIS	TORS	AN3822 AN3990 AN3991	K 300p	BA7007 BA7021 BA7022	200p 180p 350p	LA4201 LA4260 LA4261	230p 300p
BC516 BC537	22p 25p	BF137 BF167	35p 30p	BU608 BU626	120p	TIP51 TIP52	80p 80p	BY206 BY207	11p 20p	PCF80 PCF801	100p	2N5061 0.8A/60V	20p	AN5025 AN5033	250p 400p	BA7751LS BA7752	150p 250p	LA4270 LA4420	300p 140p
BC546 BC547	8p 8p	BF181 BF183	18p 20p	BU705 BU706DF	130p 175p	TIP54 TIP105	85p 65p	BY227 BY228	19p 28p	PCF806 PCH200	115p 100p	TIC116C 8A/300V	59p	AN5132 AN5150	400p	BA7755 BA7767A	150p 6 155p	LA4422 LA4430 LA4440	130p 130p
BC548 BC549 BC550	8p 8p 8p	BF195 BF199 BF200	7p 8p 16p	BU706F BU801 BU806	150p 70p 70p	TIP106 TIP107 TIP110	65p 65p 40p	BY298 BY299 BY448	15p 18p 20p	PCL81 PCL82 PCL84	65p 80p 60p	TIC116D RAV400V TIC126D	70p 75p	AN5151 AN5215 AN5256	100p	CA3011 CA3048 CA3052	110p 190p 190p	LA4445	200p 200p 120p
BC556 BC557	8p 7p	BF225 BF240	30p 16p	BU807 BU902	60p	TIP111 TIP112	40p 350	BYX10 BYX55/60	15p	PFL200 PL36	110p 120p	12A/400V TIC126M	1	AN5262 AN5265	175p 80p	CA3054 CA3085	95p 135p	LA4461 LA4500	120p 120p 200p
BC558 BC559	8p 8p	BF245 BF254	25p 15p	BU903 BU920	110p 100p	TIP112H TIP115	50µ- 30p	BYX70/50 OA47	0 32p 10p	PL83 PL84	60p 60p	12A/600\ C106D	28p	AN5352 AN5411	450p	CA3088E CA3089E	200p 150p	LA4505 LA4508	220p 200p
BC560 BC637 BC639	8p 20p 20p	BF255 BF256 BF257	12p 18p	BU922 BU930	110p 130p 130p	TIP116 TIP117 TIP120	30p 30p 37p	OA91 OA202 IN4001	10p 10p 3p	PL95 PY81 PY500A	180p 100p 190p	4A/400V BR103 BR303	37p 85p	AN5421 AN5429 AN5512	150p 420p 100p	CA30900 CA3130S CA3134E	250p 100p 280p	LA4510 LA4520 LA4550	100p 170p 200p
BC640 BCY33	20p 200p	BF259 BF262	18p 18p 25p	BU2508/ BU2508/ BU25080	F 130p	TIP121 TIP122	35p 30p	IN4002 IN4003	3p 3p			BT106 BT119	160p 100p	AN5515 AN5520	160p 550p	CA3140E CA3160	38p 85p	LA4555	120p 130p 200p
BCY34 BCY70	200p 16p	BF270 BF273	18p 15p	BU25080 BU2520A	F 150p	TIP125 TIP126	30p 40p	IN4004 IN4005	3p 3p	LED: 3mm		17088 17089	200p 200p	AN5521 AN5612		CA3189E CA3193E	230p 230p	LA5112 LA5523	1500
BCY71 BCY72 BD115	16p 16p	BF311 BF336 BF337	21p 20p	BU25200 BU2525A BUH515	F 325p	TIP127 TIP130	35p 30p	IN4006 IN4007 IN4148	3p 4p	RED YELLOW GREEN	5p 8p 8p	17127 15/80H 15/85R	200p 230p 230p	AN5613 AN5615 AN5620	300p	CA3260E CA3290E CX108	170p 150p 950p	LA5527 LA5700 LA7011	150p 300p 220p
BD124P BD131	30p 50p 25p	BF338 BF362	20p 20p 30p	BUT11AI BUT12	200p 55p 80p	TIP131 TIP132 TIP141	30p 30p 65p	IN5400	20 90 80	5mm	5p	SG264 SG613	800p	AN5622 AN5625	275p	CX136 CX139A	600p 750p	LA7033	400p 280p
BD132 BD133	25p 50p	BF367 BF371	13p 17p	BUT56A BU18	100p 80p	TIP142 TIP145	75p 50p	IN5402 IN5403	8p 8p	YELLOW GREEN	8p 6p	COMPU		AN5712 AN5722	180p 140p	CX141 CX145	750p 725p	LA7046	300p 150p
BD135 BD136 BD127	20p 20p	BF421 BF422	18p 21p	BU18AF BUX10	80p 150p	TIP146 TIP147	70p 80p	IN5404 IN5405	8p 11p	RECTAN	GULAR	Z80ACPL Z80ADM	J 100p	AN5730 AN5732 AN5753	120p	CX150B CX175 CX187	325p 325p 825p	LA7505 ' LA7507 LA7520	250p 250p 200p
BD137 BD138 BD139	20p 20p 20p	BF423 BF455 BF458	25p 12p 19p	BUX11 BUX12 BUX20	200p 150p 350p	TIP150 TIP151 TIP2955	90p 60p 50p	IN5406 IN5407 IN5408	12p 12p 12p	LEDs 5mm × 2	5mm	Z80ACTO Z80ASIO	1400	AN5763 AN5790	450p 240p	CX804A CX867	775p 575p	LA7620 LA7800	500p
BD140 BD144	20p 90p 38p	BF462 BF471	50p 28p	BUX21 BUX22	450p 450p	TIP3055 TIPL763A	50p 50p 200p	RGP15 RGP30	25p	RED	5p 8p	Z80ASIO 75107	-2 210p 65p	AN5791 AN5836	225p 450p	CX868 CX877	525p 300p	LA7801 LA7802	100p 300p 260p 250p
BD157 BD166	300	BF472 BF479	28p 30p	BUX37 BUX40	2100	TIPL791A TIS61	80p 15p	SKE4F2/0 SKE4F2/0	6 60p	GREEN	8p	75110	75p 100p	AN5900 AN6135	120p	HA1125 HA1197 HA1199	120p 130p	LA7806 LA7808 LA7820	260p 250p 100p
BD175 BD177 BD179	30p 30p 32p	BF494 BF495 BF595	16p 16p 16p	BUX41 BUX42 BUX47A	200p 200p 220p	TIS90 TIS93 VK1010	15p 20p 88p	SKE4F2/1 SR2M	0 100p 60p	OPTO COUPLE	RS	75122 75154 75162	110p 100p 700p	AN6247 AN6270 AN6300	400p	HA1319 HA1338	130p 200p 300p	LA7823	2000
BD181 BD182	45p 60p	BF596 BF615	16p 30p	BUX48A BUX80	150p 180p	VN10KM ZTX107	60p 11p	1.C. 50C	KETS	4N37 4N38	48p 68p	75182 75183	95p 95p	AN6306 AN6320	380p 160p	HA1339A HA1377	350p 120p	LA7940 LC7131	150p 200p 260p 400p
BD184 BD187	60p 30p	BF617 BF760	30p 40p 40p	BUX84 BUX85	50p	ZTX108 ZTX109	11p 12p	8 PIN 14PIN	5p 6p	AN203	210p	75195	185p 150p 200p	AN6332 AN6341 AN6344	320p 200p 440p	HA1388 HA1389 HA1392	320p 210p 120p	LC7132 LC7137 LF347	400p 450p
BD201 BD202 BD203	33p 38p 42p	BF763 BF870 BF871	40p 22p 22p	BUX86 BUX87 BUX98A	30p 50p 350p	ZTX212 ZTX300 ZTX301	20p 10p 16p	16PIN 18PIN 20PIN	7p 10p 12p	BRIDGE RECTIFI	RS	2532 2716 2732	200p 100p 200p	AN6350 AN6359	610p	HA1392 HA1394 HA1397	170p 200p	LF353 LF355	450p 110p 48p 60p 70p 300p 26p 35p
BD204 BD222	42p 31p	BF960 BF961	38p 35p	BU69A BUY71	200p 250p	ZTX302 ZTX303	10p	22PIN 24PIN	13p 14p	W005 1A/50V	16p	2732A 2764	220p 150p 200p	AN6360 AN6362	320p 400p	HA1398 HA11219	240p 280p	LF357 LF398	70p 300p
BD225 BD232	31p 31p	BF964 BFR90	38p 85p	BUZ11 BUZ71	200p 75p	ZTX304 ZTX320	10p 20p	28PIN 40PIN	18p 18p	W01 1A/100V	18p	27C64 27128	150p	AN6371 AN6387 AN6884	480p	HA11221 HA11225 HA11235	180p 130p 120p	LM301 LM311 LM319	26p 35p 165p
BD233 BD234 BD235	30p 32p 28p	BFR91 BFT43 BFX29	99p 30p 20p	BUZ80 BY448 BYT11	200p 20p 25p	ZTX501 ZTX502 ZTX503	13p 10p 18p	ZENERS		W02 1A/200V W04	19p 21p	27256-25 27512 4116	300p 40p	AN7105 AN7110	170p 75p	HA11251 HA11423	190p	LM324 LM335Z	30p 120p
BD236 BD237	30p 21p	BFX84 BFX85	20p	C106D IRF630	28p 150p	ZTX504 2N696	25p 26p 22p	400 mWa 2V7 to 39	V 5p	1A/400V W06	23p	4164-15 4164-12	80p 90p	AN7114 AN7115	120p	HA11724 HA12002	650p 220p	LM339 LM348	35p 50p 45p
BD238 BD239	24p 30p	BFX87 BFX88	15p 15p	J174 J300	38p 50p	2N697 2N698	22p 40p 22p	1.3 Watts 2V7 to 39		1A/600V W08	28p	41256-15	80p	AN7116 AN7120	90p 100p	HA12003 HA12005	250p 180p	LM358 LM380 LM381	45p 80p
BD240 BD241A BD243A	40p 40p 50p	BFX89 BFY50 BFY51	60p 14p 14p	MJ900 MJ1000 MJ1001	200p 200p 200p	2N78 2N914 2N930	22p 28p 18p	CRYSTA	LS	1A/800V BR81D 2A/100V	33p	41256-10 41464-12 6116	110p 150p 80p	AN7130 AN7140 AN7145	170p	HA12017 HA13001 HA13002	100p 110p 200p	LM381 LM382 LM386	80p 150p 130p 60p
BD243A BD244 BD245	50p 50p 50p	BFY52 BFY56	14p 14p 25p	MJ10012 MJ15003	300p	2N930 2N1131 2N1132	18p 28p 28p	Freq in N 2.4576		BR82D 2A/200V	33p	6264-10 62256-12	210p	AN7146 AN7154	210p	HA13006 HA13007	400p 400p	LM387 LM393	100p 45p
-																			

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							62	1.0			JEO									
Part	Pric	e I	Part	Price	Part	Price	Part	Price	Part	Price	Part I	Price	Part	Price	Part	Price	Part	Price	Part	Price
LM431		Op S	STK441	680p	STK5422	375p	STR30115		TA7784	250p	TDA1574	125p	TDA3586	750p	TDA8170	170p	UPC1158H	70p	2SA937	20p
LM710 LM723	. 4	0p	STK443 STK457	700p 470p	STK5431 STK5434	550p 570p	STR30120 STR30123	450p	TA8132AN TA8205	250p	TDA1576 TDA1578A	170p 210p	TDA3590 TDA3591	300p 360p	TDA8172 TDA8173 TDA8174	250p 280p 300p	UPC1178H UPC1180C UPC1185H	200p	2SA939 2SA940 2SA942	140p 50p 60p
LM7410 LM741	MET 4	5p	STK459 STK460	560p 660p	STK5436 STK5441	500p 400p	STR30125 STR30130	250p	TA8210 TA8215	300p 300p	TDA1579 TDA1596	200p 200p	TDA3592/ TDA3640 TDA3651	350p 350p 200p	TDA8175 TDA8175	300p 400p	UPC1186 UPC1187	80p 150p	2SA949 2SA950	70p 18p
LM747 LM1889	30	Op Is	STK461 STK463 STK465	620p 950p 720p	STK5451 STK5461 STK5462	390p 500p	STR40090 STR41090 STR44115	400p	TA8216H TA8227 TA8691N	375p 250p 550p	TDA1598 TDA1600 TDA1670A	250p 275p 230p	TDA3652 TDA3652T	500p	TDA8185 TDA8190	300p 200p	UPC1188H UPC1197	350p 140p	2SA952 2SA953	30p 60p
LM3900 LM3909) 4	Op S	STK501 STK561	550p 450p	STK5464 STK5466	500p 300p 500p	STR45111 STR50020	550p	TA8718N TA8550	550p 25p	TDA1675 TDA1701	250p 300p	TDA3653 TDA3654	150p	TDA8191 TDA8192	425p 275p	UPC1198H UPC1222	200p 130p	2SA954 2SA958	30p 60p
LM3914 LM3915	1 16	0p	STK563 STK583	415p 500p	STK5467 STK5468	400p 300p	STR50092 STR50103	550p	TBA120S TBA396	40p 70p	TDA1771 TDA1870A	250p	TDA3710 TDA3720	300p	TDA8195 TDA8214	150p	UPC1225H UPC1230	220p 200p	2SA963 2SA965	120p 40p
LM3916	5 27	Op S	STK760	600p	STK5471 STK5473	330p	STR50113 STR50115	500p	TBA520 TBA530	120p	TDA1872A TDA1904	275p 80p	TDA3724 TDA3725	500p 500p	TDA8215 TDA8303		UPC1238 UPC1270H	120p 250p	2SA966 2SA968	35p 55p
M491B M494B	B1 60 1 70	0p 5	STK772B STK780	480p 575p	STK5476 STK5478	350p 380p	STR51041 STR50213	500p	TBA540 TBA560	90p 90p	TDA1905 TDA1908A	80p 90p	TDA3730 TDA3740	400p 480p	TDA8304 TDA8305	600p 500p	UPC1274V UPC1277	250p 240p	2SA970 2SA979	25p 35p
M50115 M50117	7P 50	Op IS	STK1039 STK1040	460p 640p	STK5479 STK5481	300p 520p	STR53041 STR54041	350p	TBA800 TBA810A5		TDA1910 TDA1940	225p 180p	TDA3750 TDA3760	400p 350p	TDA8340 TDA8341 TDA8380	200p 250p 200p	UPC1278 UPC1288V UPC1298V	240p 230p 320p	2SA984 2SA985 2SA988	25p 60p 25p
M50119 M50784	4 30	Op S	STK1049 STK1050	700p 650p	STK5482 STK5483 STK5486	285p 440p	STR55041 STR56041	550p	TBA820 TBA820M	55p 35p	TDA1941 TDA1950 TDA2002	300p 175p 50p	TDA3771 TDA3791 TDA3800	460p 300p 350p	TDA8390/ TDA8390/		UPC1318	300p 320p	2SA992 2SA993	30p 50p
M50786 M50790 M51161) 60	Op [S	STK1060 STK1070 STK1080	700p 850p 940p	STK5488 STK5490	450p 480p 450p	STR58041 STR59041 STR60001	350p	TBA920 TBA950 TBA990	100p 100p 60p	TDA2003 TDA2004	65p 150p	TDA38034 TDA3810		TDA8415 TDA8417	650p 550p	UPC1350 UPC1363	115p 190p	2SA999 2SA1006	30p
M51381 M51387	IP 20	0p	STK2025	620p	STK5632 STK5725	450p	STR61001 STR80145	550p	TC5020 TC5081AF	200p	TDA2005 TDA2006	150p 70p	TDA3825 TDA3840	225p 300p	TDA8421 TDA8245	500p	UPC1363C UPC1364C	300p 350p	2SA1008 2SA1009	125p 200p
M51544 M51848	1 15	Op S	STK2029 STK2038	480p 700p	STK5730 STK6316	450p 300p	STR81145 STRD1206	600p	TC9106 TC9125BP	500p	TDA2007 TDA2008	120p 100p	TDA3843 TDA3845	200p 325p	TDA8432 TDA8433	550p 600p	UPC1365 UPC1370C	250p 300p	2SA1010 2SA1011	225p 80p
M54523 M54563	3P 20 3P 20	0p 5 0p 5	STK2048 STK2110	950p 550p	STK63241 STK6431	3 500p 850p	STRD1406 STRD1706	600p	TC9134 TC9142	750p 320p	TDA2009 TDA2010	160p 150p	TDA3856 TDA3857	400p 350p	TDA8440 TDA8442	300p 200p	UPC1373 UPC1377C	85p 200p	2SA1012 2SA1013	100p
M58484 M51516	5 26	0p S	STK2125 STK2129	580p 750p	STK6722 STK6732	725p 1000p	STRD1806 STRD1816	6 400p	TC9143 TC9145	300p 150p	TDA2020 TDA2030	120p 80p	TDA3950 TDA4050	225p 150p	TDA8443 TDA8451	350p 400p	UPC1378 UPC1382	180p 110p	2SA1015	30p
M51518 MB3712	2 14	0p S	STK2139 STK2155	675p 900p	STK6822 STK6922	900p 500p	STRD3035 STRD4412	2 500p	TC9148 TC149	200p 225p	TDA2040 TDA2048	140p 600p	TDA4092 TDA4100	350p 225p	TDA8452 TDA8453	200p 350p 350p	UPC1384 UPC1387C UPC1394		2SA1018 2SA1020 2SA1021	30p
MB3713 MB3714 MB3715	4 27	0p [S	STK2230 STK2240 STK2250	470p 740p 650p	STK6932 STK6962 STK6972	525p 275p 490p	STRD4512 TA7054 TA7061	2 400p 190p 115p	TC9150 TC9152 TC9153	425p 425p 300p	TDA2054M TDA2107 TDA2148	110p 250p 350p	TDA4180 TDA4190 TDA4200	145p 180p 360p	TDA8490 TDA8702 TDA8703	275p 500p	UPC1394 UPC1397 UPC1403C	120p 350p A 650p	2SA1023 2SA1023 2SA1026	60p
MB372 MB373	2 28	0p	STK3041 STK3042	370p 375p	STK6981 STK6982		TA7066 TA7089	120p 300p	TC9156 TC9163	300p 375p	TDA2151 TDA2151	375p 260p	TDA4280 TDA4280 TDA4282	320p 360p	TDA8708 TDA8732	900p 400p	UPC1420C UPC1421C	A 450p A 650p	2SA1029 2SA1036	60p 60p
MB373 MB3756	1 22	0p]5	STK3044 STK3062	500p 500p	STK7216 STK7217	420p 400p	TA7119 TA7120	150p 55p	TC9164 TC9172P	400p 300p	TDA2220 TDA2270	200p 250p	TDA4290 TDA4400	200p 175p	TDA9045 TDA9080	400p 550p	UPC1423C UPC1470	200p	2SA1037 2SA1038	40p
MB3759 MB8719	9 20 9 36	Op S Op S	STK3082 STK3102	550p 530p	STK7225 STK7226	500p 600p	TA7137 TA7140	60p 100p	TCA9940 TCEP100	100p 100p	TDA2320 TDA2501	80p 400p	TDA4420 TDA4421	120p 300p	TDA9403 TDA9503	180p 150p	UPC1488H UPC1505C	150p 400p	2SA1048 2SA1051	300p
MC145	6 6	5p	STK3152 STK3156	500p	STK7251 STK7308	500p 350p	TA7157 TA7193	100p 320p	TD62308A TD62382	2000	TDA2503 TDA2504	200p 200p	TDA4426 TDA4427	170p 200p	TDA9513 TEA1002	300p 650p	UPC1514C UPC1515C	A 250p	2SA1060 2SA1069	150p
MC340 NE555	2	0p	STK4017 STK4019	400p 480p	STK7309 STK7310	400p 470p	TA7200 TA7205	200p 110p	TD62506 TD62705	200p 250p	TDA2505 TDA2506	300p 500p	TDA4431 TDA4437	150p 300p	TEA1007 TEA1009 TEA1017	120p 100p 280p	UPC1520C UPC1536C ZN423	A 250p 550p 100p	2SA1076 2SA1077 2SA1081	300p
NE556 NE558 NE565	8 11	0p s	STK4021 STK4024 STK4025	380p 550p 530p	STK7348 STK7356	400p 425p 440p	TA7207 TA7208 TA7214	150p 125p 220p	TD6304AF TD6306P TD6350P	300p 350p 200p	TDA2510 TDA2514A TDA2515	450p 500p 450p	TDA4439 TDA4440 TDA4442	220p 180p 240p	TEA1019 TEA1024	130p 150p	ZN424 ZN425	100p 320p	2SA1082 2SA1084	80p
NE567 NE571	11	5p S	STK4026	480p 550p	STK7358 STK7402 STK7404	560p	TA7217 TA7220	145p 220p	TD6359P TDA1001	300p 200p	TDA2530	450p 120p	TDA4443 TDA4445	250p 220p	TEA1045 TEA1060	300p 225p	ZN426 ZN427	260p 560p	2SA1085 2SA1091	75p
NE592 NE5532	P 14	5p 5	STK4032II STK4036		STK7406 STK7408	650p 675p	TA7222 TA7223	90p 210p	TDA1002 TDA1003	200p 150p	TDA2540 TDA2541	85p 120p	TDA4450 TDA4452	225p 250p	TEA1067 TEA1080F	150p	ZN429 ZN459	215p 190p	2SA1094 2SA1095	190p 300p
SAA100 SAA100)6 30)8 45	0p 5 0p 5	STK4038 STK40401	680p 650p	STK7410 STK7554	900p 600p	TA7225 TA7226	300p 290p	TDA10054 TDA10104	175p	TDA2542 TDA2543	110p 210p	TDA4453 TDA4480	275p 280p	TEA1087 TEA1101	40p 425p	ZN1040 ZNA134H	640p 2150p	2SA1096 2SA1102	130p
SAA101 SAA102	24 25	Op IS	STK40421 STK4044	800p	STK7561 STK7562	650p 1000p	TA7227 TA7230	170p 100p	TDA1011 TDA1012	75p 120p	TDA2545 TDA2546A	120p 200p	TDA4482 TDA4500	350p 300p	TEA1330 TEA1511	65p 150p	JAPANES		2SA1103 2SA1104 2SA1105	140p
SAA102 SAA107 SAA112	75 354	0p S	STK4046 STK4048 STK4060	950p 1280p 510p	STK7563 STK8050	800p 750p	TA7232 TA7233	95p 120p	TDA10134 TDA1015 TDA1016	110p 85p 140p	TDA2549 TDA2555 - TDA2556	300p 175p 230p	TDA4501 TDA4502 TDA4503	400p 550p 300p	TEA2000 TEA2014/ TEA2018/		TRANSIS	TORS 29p	2SA1106 2SA1106	160p
SAA125	50 28	Op IS	STK4065 STK4101	650p 500p	STK8250 STK8260 STK8280	500p 1200p 1850p	TA7237 TA7238 TA7240	300p 400p 160p	TDA1020 TDA1022	110p 330p	TDA2557 TDA2558	225p 500p	TDA4505 TDA4510	300p 270p	TEA2114 TEA2117	200p 450p	2SA490 2SA496	45p 30p	2SA1112 2SA1115	150p
SAA127 SAA129	74 2R	0p is	STK4111 STK4112	500p 500p	STK73410 STK73410) 350p	TA7241 TA7242	165p 190p	TDA1023 TDA1024	130p 150p	TDA2575A TDA2577A	100p 200p	TDA4555 TDA4556	400p 370p	TEA5114/ TL431	A 200p 45p	2SA505 2SA509	120p 35p	2SA1123 2SA1124	60p
SAA300 SAA500	4 40 0 20	0p S	STK4121 STK4122	480p 560p	STK73605 STR370	375p 300p	TA7243 TA7245	320p 225p	TDA1025 TDA1028	320p 175p	TDA2578A TDA2579A	200p 250p	TDA4557 TDA4560	450p 270p	TL061 TL064	40p 80p	2SA537 2SA544	170p 650p	2SA1127 2SA1133	120p
SAA501 SAA501	2 40	0p S	STK4131 STK41321	480p 600p	STR371 STR380	400p 350p	TA7267 TA7269	220p 260p	TDA1029 TDA1035	200p 160p	TDA2582 TDA2590	130p 170p	TDA4600 TDA4600I		TL071 TL074	38p 80p	2SA550 2SA562 2SA571	150p 30p	2SA1141 2SA1142 2SA1145	100p
SAA502 SAA503 SAA504	30 44	Op S	STK41411 STK4142 STK4151	420p 530p 680p	STR381 STR383 STR384	390p 410p	TA7270 TA7271 TA7272	170p 220p 260p	TDA1041E TDA1041F TDA1044		TDA2593 TDA2594 TDA2595	110p 300p 200p	TDA4601 TDA4605 TDA4610	120p 220p 370p	TL083 TL084 TMS1000	55p 70p	2SA603 2SA606	650p 100p 200p	2SA1152 2SA1156	150p
SAA504	10B 40	0p S	STK4152 STK4161	650p 650p	STR440 STR450	350p 700p 520p	TA7273 TA7274	300p 210p	TDA1047 TDA1048	200p 200p	TDA2600 TDA2611A	250p 100p	TDA4660 TDA4800	370p 350p	TMS1000N TMS100-2	LPM 200p	2SA608 2SA614	15p 150p	2SA1162 2SA1169	30p
SAA523 SAA524	31 30 3PE 80	0p S	STK4162 STK4171	550p 900p	STR541 STR452	600p	TA7280 TA7281	190p 200p	TDA1053 TDA1054	300p 180p	TDA2630 TDA2640	300p 220p	TDA4935 TDA4940	300p 325p	TMS1024 TMS1025	300p 350p	2SA634 2SA636	50p 50p	2SA1170 2SA1175	30p
SAB301 SAB303	5 60	06 IS	STK41721 STK4181	680p	STR453 STR454	500p 400p	TA7282 TA7283	160p 200p	TDA1059E TDA1060	140p	TDA2653A TDA2654	225p 200p	TDA4950 TDA53301		TMS3617 TMS3701	BN 300p	2SA640 2SA642	60p 50p	2SA1184 2SA1186	500p
STA301 STA401 STA403	A 22	Op is	STK41821 STK4191	700p	STR455 STR456	500p 470p	TA7288 TA7299	220p 200p	TDA1062 TDA1072	140p 150p	TDA2670 TDA2690 TDA2730	150p 100p 200p	TDA5600 TDA5660F TDA5700	450p 250p 200p	TMS3712 TMS3891 TPU2732	350p 550p 1200p	2SA673 2SA677 2SA678	15p 35p 26p	2SA1198 2SA1208 2SA1208	60p
STA405 STA405 STA431	A 28	00 8	STK4192 STK4231# STK4241	700p 700p 1050p	STR457 STR470 STR1096	600p 400p 275p	TA7310 TA7312 TA7313	100p 120p 70p	TDA1074 TDA1077 TDA1082	280p 250p 275p	TDA2760 TDA2780	400p 600p	TDA5706 TDA5709	400p 450p	TPU2735 U111B	900p 250p	2SA683 2SA684	25p 25p	2SA1209 2SA1210	100p
STA432 STA434	A 22	0p s	STK4241\ STK4272		STR1195 STR1229	350p 325p	TA7314 TA7315	175p	TDA1083	95p 170p	TDA2791 TDA2795	275p 200p	TDA5800 TDA5820	600p	U211B U254B	300p 150p	2SA699 2SA708	100p	2SA1215 2SA1216	600p 550p
STA435 STA441	A 27	Op S Op S	STK4273 STK4301	550p 500p	STR2005 STR2012	400p 400p	TA7317P TA7324	120p 75p	TDA1087 TDA1092	60p 100p	TDA2822M TDA2840	60p 200p	TDA5850 TDA6200	175p 750p	U318M U321M	350p 450p	2SA711 2SA715	280p 50p	2SA1217 2SA1220) 75p
STA456 STA471	21	Op s	STK4311 STK4332	650p 365p	STR2013 STR2015	300p 550p	TA7325 TA7328	90p 110p	TDA1097 TDA1151	475p 40p	TDA3047 TDA3048	100p 130p	TDA7000 TDA70101		U329M U338M	350p 300p	2SA719 2SA720 2SA725	50p 20p	2SA1232 2SA1242 2SA1244	80p
STA901 STK002 STK002	5 42	Op IS	STK4352 STK4362 STK4372	500p 450p 490p	STR2105 STR3113 STR3115	600p 225p 400p	TA7335 TA7336 TA7341	85p 180p 250p	TDA1154 TDA1170 TDA1180	50p 85p 120p	TDA3082 TDA3083 TDA3190	200p 200p 100p	TDA7050 TDA7052 TDA7053	200p 120p 200p	U420B U427B U664B	70p 70p 175p	2SA726 2SA733	80p 20p 15p	2SA1240 2SA1249	6 80p
STK002 STK003	9 60	0p [5	STK4392	500p 600p	STR3123 STR3125	400p 480p	TA7343 TA7357	120p 340p	TDA11804 TDA1190	190p 80p	TDA3300B TDA3301B	480p 280p	TDA7056	200p 175p	U2401B U2829B	125p 130p	2SA747A 2SA748	425p 60p	2SA1261 2SA1262	150p 110p
STK004 STK005	9 510 0 44	0p S	STK4773	820p 800p	STR3135 STR3212	250p 275p	TA7358	85p 250p	TDA1200E	80p 75p	TDA3310 TDA3330	120p 500p	TDA7077 TDA7211	175p 150p	U4606B UC3842N	600p 125p	2SA764 2SA769	200p 80p	2SA1263 2SA1264	280p 280p
STK005 STK006	9 62	0p 15 0p 15	STK4803 STK4813	640p 800p	STR3214 STR3215	275p 275p	TA7607 TA7608	200p 360p	TDA1235 TDA1236	300p 240p	TDA3410 TDA3420	150p 200p	TDA7220 TDA7222	100p 200p	UC3844 ULN2002	100p 70p	2SA770 2SA771	200p 90p	2SA1265 2SA1283	50p
STK007 STK008	0 58	0p 9	STK4833 STK4843	700p 720p	STR3315 STR4090/		TA7609 TA7611	170p 210p	TDA1251 TDA1270	150p 150p	TDA3501 TDA3502	340p 450p	TDA7230/ TDA7233	150p	ULN2003 ULN2068	69p 270p	2SA777 2SA778 2SA781	35p 100p 150p	2SA1284 2SA1286 2SA1290	60p
STK011 STK015 STK016	44	Op Lá	STK4853 STK4863 STK4873	730p 700p	STR4142 STR4211	450p 370p	TA7612 TA7614	300p 170p	TDA1327 TDA1410	200p 220p	TDA3504 TDA3505 TDA3506	300p 275p	TDA7240 TDA7241 TDA7250	175p 250p 500p	ULN2804 UPC20C UPC554	170p 220p 130p	2SA786 2SA794	25p 50p	2SA1294 2SA1295	450p
STK025 STK050	65	Op S	STK48/3 STK4893	850p 1000p 900p	STR4512 STR5015 STR5100	400p 500p 550p	TA7616 TA7621 TA7622	300p 300p 420p	TDA1412 TDA1510 TDA1512	35p 170p 180p	TDA3506 TDA3507 TDA3510	260p 450p 350p	TDA7250 TDA7255 TDA7256	500p 500p	UPC555 UPC556H	60p	2SA798 2SA814	30p 60p	2SA1301 2SA1302	260p 300p
STK077 STK078	52	0p 😫	STK5314 STK5315	475p 500p	STR5214 STR5315	475p 575p	TA7628 TA7629	110p 220p	TDA15144 TDA15154	450p	TDA3520 TDA3530	650p 350p	TDA7272 TDA7273	170p 80p	UPC571 UPC574	220p 60p	2SA817 2SA836	20p 20p	2SA1303 2SA1304	400p 110p
STK080 STK082	55 54	Op S Op S	STK5322 STK5324	500p 450p	STR5412 STR6020	350p 325p	TA7630 TA7632	200p 400p	TDA15160 TDA1517	1 350p 250p	TDA3540 TDA3541	200p 175p	TDA7274 TDA7275	60p 75p	UPC575C UPC577	2 90p 64p	2SA839 2SA844	110p 20p	2SA1306 2SA1307	110p 100p
STK084 STK085	60 90	0p 15 0p 15	STK5325 STK5331	370p 300p	STR9005 STR9012	400p 450p	TA7640 TA7641	90p 140p	TDA1519 TDA15194	200p	TDA3560 TDA3561	260p 300p	TDA7284 TDA7350	100p 650p	UPC592 UPC595	95p 190p	2SA872 2SA872A	25p 50p	2SA1309 2SA1316	100p
STK086 STK010	0 90	Op S	STK5332 STK5333	1000p	STR10006 STR11006	i 450p i 400p	TA7658 TA7668	100p 100p	TDA1520 TDA1521	275p 250p	TDA3561A TDA3562	300p 260p	TDA7359 TDA7360	300p 700p 225p	UPC596 UPC1001	190p 220p 170p	2SA886 2SA899 2SA907	45p 40p 650p	2SA1317 2SA1318 2SA1321	20p
STK010 STK420 STK430	40	Op IS	STK5335 STK5337 STK5338	350p 500p	STR12006 STR13006	5 500p	TA7680AF TA7688 TA7698	150p	TDA1522 TDA1524	110p 200p	TDA3562TF TDA3563 TDA3564	K 300p 350p 325p	TDA7770 TDA8114 TDA8115	225p 225p 200p	UPC1018 UPC1020 UPC1023	200p 60p	2SA907 2SA909 2SA913	500p 100p	2SA1329 2SA1329 2SA1346	200p
STK433 STK435	40	0p [5	STK5338 STK5339 STK5342	295p 400p 245p	STR15006 STR16006 STR20005	5 500p	TA7698 TA7699 TA7705	450p 600p 300p	TDA1540 TDA1541 TDA1542	420p 750p 250p	TDA3565 TDA3566	275p 280p	TDA8140 TDA8143	200p 200p 160p	UPC1025 UPC1026	230p 95p	2SA916 2SA921	30p 40p	2SA1352 2SA1353	100p 100p
STK436 STK437	43	Op S	STK5361 STK5372	375p 260p	STR20012 STR20015	450p	TA7750 TA7757	200p 200p	TDA1543 TDA1571	300p 300p	TDA3567 TDA3570	350p 375p	TDA8145 TDA8153	120p 250p	UPC1028 UPC10311	90p H 150p	2SA933 2SA934	30p 30p	2SA1356 2SA1358	100p 130p
STK439	50	0p S	STK5421	450p	STR30110		TA7769	130p	TDA1572	175p	TDA3580	400p	TDA8160	125p	UPC1032	60p	2SA935	40p	2SA1370	50p

					JA	PA		ESI	ET	RA	NS	SIS	ТО	RS					
Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
2SA1371 2SA1380	100p 75p	2SC1008 2SC1010	20p 225p	2SC1730 2SC1735	10p 70p	2SC2270 2SC2271	60p 30p	2SC2750 2SC2751	300p 270p	2SC3277 2SC3280	280p 200p	2SC3893 2SC3895	225p 400p	2SD836A 2SD837	60p 55p	2SD1279 2SD1288	600p 175p	2SD1815 2SD1825	100p 60p
2SA1381 2SA1382 2SA1385	100p 120p	2SC1012 2SC1013 2SC1014	75p 170p	2SC1739 2SC1740	800p 10p	2SC2274 2SC2275	15p 50p	2SC2752 2SC2767	140p 300p	2SC3281 2SC3284	200p 600p	2SC3897 2SC3907	400p 250p	2SD838 2SD841	300p 110p	2SD1289 2SD1291	250p 400p	2SD1843 2SD1846	100p 350p
2SA1385 2SA1386 2SA1423	180p 400p 30p	2SC1014 2SC1030 2SC1047	140p 150p 20p	2SC1741 2SC1755 2SC1756	35p 90p 35p	2SC2278 2SC2290	70p 1800p	2SC2769 2SC2773	400p 700p	2SC3293 2SC3298	85p 50p	2SC3927 2SC3950	250p 120p	2SD844 2SD845	200p 250p	2SD1292 2SD1297	60p 300p	2SD1849 2SD1850	325p 325p
2SA1489 2SA1491	300p 300p	2SC1050 2SC1060	280p 70p	2SC1758 2SC1775	30p 10p	2SC2291 2SC2295	40p 60p	2SC2774 2SC2785	500p 60p	2SC3299 2SC3300	120p 400p	2SC3953 2SC3973	60p 210p	2SD850 2SD856	170p 48p	2SD1302 2SD1308	20p 80p	2SD1858 2SD1877	40p 175p
2SA1493 2SA1516	500p 280p	2SC1061 2SC1070	85p 65p	2SC1781 2SC1789	20p 100p	2SC2298 2SC2307	35p 300p	2SC2786 2SC2787 2SC2791	20p 10p	2SC3303 2SC3306	100p 130p	2SC3987 2SC3996	220p 1200p	2SD858 2SD863	250p 23p	2SD1309 2SD1310	140p 140p	2SD1878 2SD1879	230p 275p
2SA1535 2SB324	175p 40p	2SC1096 2SC1098	40p 120p	2SC1809 2SC1810	40p 250p	2SC2308 2SC2312 2SC2314	10p 300p	2SC2792	500p 220p	2SC3307 2SC3309	600p 150p	2SC4006 2SC4020 2SC4023	100p 280p	2SD864 2SD866 2SD866A	200p 120p	2SD1313 2SD1326 2SD1328	1000p 200p	2SD1884 2SD1886	300p 450p
2SB546 2SB560	45p 25p	2SC1106 2SC1114	180p 415p	2SC1815 2SC1819	10p 70p	2SC2314 2SC2316 2SC2320	70p 150p 10p	2SC2793 2SC2808 2SC2810	700p 40p 360p	2SC3316 2SC3317 2SC3323	280p 350p 480p	2SC4023 2SC4056 2SC4106	325 p 350 p 200 p	2SD868 2SD868	140p 260p 190p	2SD1328 2SD1347 2SD1348	60p 70p 65p	2SD1887 2SD1910 2SD1911	450p 280p 300p
2SB561 2SB562	50p 25p	2SC1115 2SC1116	280p 290p	2SC1826 2SC1827	60p 60p	2SC2324 2SC2329	120p 480p	2SC2812 2SC2812 2SC2814	40p 40p	2SC3327 2SC3331	60p 25p	2SC4123 2SC4124	450p 250p	2SD871 2SD879	300p 60p	2SD1350 2SD1376	150p 125p	2SD1913 2SD1929	50p 60p
2SB566 2SB595 2SB596	90p 55p 50p	2SC1124 2SC1161 2SC1162	270p 110p 30p	2SC1829 2SC1833 2SC1834	500p 40p	2SC2331 2SC2333	50p 200p	2SC2824 2SC2825	75p 900p	2SC3333 2SC3345	120p	2SC4169 2SC4236	60p	2SD880 2SD882	40p 25p	2SD1379 2SD1380	100p	2SD1939 2SD1941	75p 500p
2SB598 2SB600	30p 500p	2SC1164 2SC1165	600p 750p	2SC1844 2SC1845	50p 50p 15p	2SC2334 2SC2335	80p 75p	2SC2826 2SC2827	200p 200p	2SC3352 2SC3353	200p 280p	2SC4237 2SC4242	650p	2SD892A 2SD894	75p 35p	2SD1384 2SD1390	50p 350p	2SD1959 2SD1961	280p 50p
2SB646 2SB647	40p 20p	2SC1166 2SC1170	100p 180p	2SC1846 2SC1847	35p 45p	2SC2344 2SC2347	150p 60p	2SC2832 2SC2834	300p 400p	2SC3355 2SC3356	50p 120p	2SC4301 2SC4742	550p 275p	2SD895 2SD896	100p 200p	2SD1391 2SD1392	250p 150p	2SD1978 2SD1984	50p 450p
2SB648 2SB649	45p 35p	2SC1172 2SC1173	150p 40p	2SC1855 2SC1856	85p 25p	2SC2353 2SC2360	120p 120p	2SC2837 2SC2839	250p 40p	2SC3358 2SC3361	50p 50p	2SC4769 2SD198	300p 140p	2SD900 2SD905	400p 450p	2SD1395 2SD1396	150p 120p	2SD2012 2SD2125	50p 225p
2SB688 2SB703	90p 90p	2SC1195 2SC1212	210p 35p	2SC1865 2SC1870	700p 700p	2SC2361 2SC2362	150p 50p	2SC2853 2SC2877	70p 120p	2SC3376 2SC3377	300p 50p	2SD199 2SD200	195p 180p	2SD916 2SD917	130p 300p	2SD1397 2SD1398	120p 120p	2SD2333 2SJ48	200p 425p
2SB705 2SB707	200p 200p	2SC1213 2SC1214	15p 15p	2SC1875 2SC1881	220p 70p	2SC2365 2SC2369	280p 100p	2SC2878 2SC2879	20p 3200p	2SC3378 2SC3383	120p 80p	2SD201 2SD257	260p 195p	2SD921 2SD923	320p 360p	2SD1399 2SD1400	300p 280p	2SJ49 2SJ50	425p 425p
2SB716 2SB718 2SB727	20p 60p 200p	2SC1215 2SC1216 2SC1222	25p 200p	2SC1890 2SC1904 2SC1906	15p 125p	2SC2371 2SC2373	25p 210p	2SC2883 2SC2898	60p 200p	2SC3387 2SC3393	550p 80p	2SD313 2SD315	25p 75p	2SD946 2SD947	120p 100p	2SD1402 2SD1406	150p 60p	2SJ56 2SJ74	700p 60p
2SB754 2SB755	200p 80p 310p	2SC1222 2SC1226 2SC1252	15p 75p 850p	2SC1906 2SC1907 2SC1909	15p 20p 250p	2SC2383 2SC2389	50p 45p	2SC2899 2SC2909	50p 60p	2SC3399 2SC3400	50p 35p	2SD325 2SD330	30p 65p	2SD950 2SD951	300p 290p	2SD1407 2SD1408	60p 125p	2SJ75 2SJ76	280p 220p
2SB772 2SB774	25p 50p	2SC1252 2SC1278 2SC1279	110p 30p	2SC1909 2SC1913 2SC1921	90p	2SC2407 2SC2408	110p 120p	2SC2911 2SC2912	80p 120p	2SC3401 2SC3402	50p 40p	2SD348 2SD357	300p 40p	2SD957A 2SD958	520p 60p	2SD1409 2SD1412	170p 75p	2SJ77 2SJ79	350p 225p
2SB775 2SB791	100p 280p	2SC1306 2SC1308K	90p 350p	2SC1923 2SC1929	10p	2SC2412K 2SC2440	200p	2SC2921 2SC2922	650p 480p	2SC3409 2SC3412	400p 800p	2SD358 2SD371	40p 240p	2SD965 2SD970	35p 170p	2SD1413 2SD1415	60p 190p	2SJ103 2SJ108	75p 60p
2SB795 2SB825	60p 135p	2SC1312 2SC1317	40p 15p	2SC1940 2SC1941	110p 27p	2SC2458 2SC2459	10p 50p	2SC2928 2SC2929	550p 280p	2SC3416 2SC3417	30p 90p	2SD380 2SD381	650p 50p	2SD973 2SD973A	60p 70p	2SD1417 2SD1425	125p 260p	2SJ115 2SJ117	525p 550p
2SB861 2SB882	110p 180p	2SC1318 2SC1325	10p 400p	2SC1942 2SC1944	350p 350p	2SC2470 2SC2481	65p 120p	2SC2934 2SC2937	75p 250p	2SC3419 2SC3420	120p 80p	2SD388 2SD389	150p 60p	2SD985 2SD986	120p	2SD1426 2SD1427	160p 180p	2SJ119 2SJ161	700p 650p
2SB886 2SB950	90p 180p	2SC1327 2SC1328	20p 15p	2SC1945 2SC1946	350p 1500p	2SC2482 2SC2483	20p 120p	2SC2938 2SC2939	235p 400p	2SC3422 2SC3423 2SC3446	75p 60p	2SD400 2SD401 2SD402	14p 50p	2SD1012 2SD1020 2SD1021	40p 40p	2SD1428 2SD1429 2SD1430	220p 410p	2SJ162 2SK19 2SK40	680p 45p
2SB951 2SB1009	110p	2SC1342 2SC1345	15p 15p	2SC1947 2SC1957	450p 70p	2SC2484 2SC2491	185p 200p 1900p	2SC2944 2SC2958	300p 50p 800p	2SC3446 2SC3447 2SC3456	150p 200p 200p	2SD402 2SD415 2SD424	120p 55p 350p	2SD1021 2SD1022 2SD1024	120p 400p	2SD1430 2SD1431 2SD1432	280p 250p	2SK40 2SK49 2SK55	50p 50p 100p
2SB1077 2SB1109 2SC182	55p	2SC1346 2SC1358 2SC1359	100p 270p 15p	2SC1959 2SC1967 2SC1969	10p 1300p 160p	2SC2495 2SC2498 2SC2500	50p 25p	2SC2962 2SC2979 2SC2987	160p 250p	2SC3456 2SC3457 2SC3459	125p 180p	2SD424 2SD426 2SD427	150p 350p	2SD1024 2SD1030 2SD1031	130p 75p 70p	2SD1432 2SD1433 2SD1438	400p 750p 140p	25K68 25K73	100p 100p 75p
2SC372 2SC380	25p	2SC1360 2SC1364	70p 25p	2SC1909 2SC1970 2SC1971	100p 400p	2SC2502 2SC2502	200p	2SC2988 2SC2995	150p 60p	2SC3460 2SC3461	130p	2SD438 2SD467	35p 15p	2SD1046 2SD1047	200p	2SD1439 2SD1441	165p 280p	2SK106 2SK107	40p 40p
2SC382 2SC388A	50p 60p	2SC1383 2SC1384	25p 20p	2SC1972 2SC1973	600p 150p	2SC2527 2SC2534	300p	2SC2999 2SC3001	50p 1400p	2SC3466 2SC3468	225p 70p	2SD468 2SD471	15p 20p	2SD1051 2SD1060	130p	2SD1445 2SD1450	200p 60p	2SK118 2SK125	50p 100p
2SC394 2SC403	60p 25p	2SC1393 2SC1394	20p 15p	2SC1983 2SC1984	75p 150p	2SC2535 2SC2538	300p	2SC3012 2SC3019	300p 320p	2SC3481 2SC3482	300p 275p	2SD525 2SD526	50p 70p	2SD1062 2SD1063	150p 200p	2SD1451 2SD1452	260p 350p	2SK133 2SK134	650p 415p
2SC454 2SC458	15p 10p	2SC1398 2SC1400	55p 50p	2SC1985 2SC1986	100p 100p	2SC2540 2SC2542	1900p 300p	2SC3025 2SC3026	500p 550p	2SC3486 2SC3502	275p 100p	2SD545 2SD549	18p 120p	2SD1064 2SD1065	250p 160p	2SD1453 2SD1455	140p 250p	2SK135 2SK147	415p 160p
2SC460 2SC461 2SC495	15p	2SC1403 2SC1407	500p 50p	2SC2001 2SC2002 2SC2003	15p 15p	2SC2545 2SC2546	55p 25p	2SC3030 2SC3037	300p 125p	2SC3503 2SC3504	50p 120p	2SD551 2SD555	300p 500p	2SD1069 2SD1071	150p 450p	2SD1457 2SD1459	165p 120p	2SK150 2SK163	150p 40p
2SC495 2SC496 2SC497		2SC1413 2SC1419 2SC1429	150p 50p 50p	2SC2003 2SC2004 2SC2021	20p 20p 10p	2SC2547 2SC2550	65p 50p	2SC3038 2SC3039	125p 80p	2SC3505 2SC3506	240p 250p	2SD560 2SD571	50p 20p	2SD1073 2SD1088	350p 150p	2SD1468 2SD1479	60p 200p	2SK168 2SK176	40p 800p
2SC515 2SC535	100p	2SC1444 2SC1446	275p 55p	2SC2022 2SC2023	110p 180p	2SC2551 2SC2552	70p 60p	2SC3040 2SC3042	260p 300p	2SC3507 2SC3509	650p 750p	2SD575 2SD600	530p 30p	2SD1094 2SD1110	520p 225p	2SD1487 2SD1491	225p 100p	2SK192 2SK195	45p 150p
2SC536 2SC558	20p 275p	2SC1447 2SC1448	70p 100p	2SC2026 2SC2027	30p 200p	2SC2553 2SC2555	200p 120p	2SC3057 2SC3058	150p 2500p	2SC3518 2SC3519	120p 250p	2SD601 2SD602	40p 60p	2SD1111 2SD1113	20p 225p	2SD1494 2SD1496	300p 350p	2SK197 2SK214	140p 170p
2SC563 2SC605	100p	2SC1449 2SC1450	120p 200p	2SC2028 2SC2029	75p 120p	2SC2562 2SC2563	90p 200p	2SC3068 2SC3070 2SC3074	60p 35p	2SC3531 2SC3549	225p 200p	2SD612 2SD613 2SD636	50p 70p	2SD1128 2SD1133 2SD1135	200p 100p	2SD1497 2SD1497-0 2SD1505		2SK216 2SK218 2SK240	200p 400p
2SC619 2SC641	80p	2SC1454 2SC1470	250p 120p	2SC2037 2SC2053	50p 120p	2SC2564 2SC2565 2SC2568	230p 260p 120p	2SC3074 2SC3075 2SC3077	200p 150p 120p	2SC3552 2SC3568 2SC3584	300p 200p 200p	2SD638 2SD637 2SD638	10p 15p 15p	2SD1135 2SD1138 2SD1140	75p 50p 40p	2SD1505 2SD1507 2SD1509	120p 60p 100p	25K240 25K312 25K315	140p 750p 70p
2SC644 2SC647 2SC681	300p	2SC1472 2SC1473 2SC1474	40p 15p 45p	2SC2055 2SC2058 2SC2060	150p 20p 60p	2SC2570 2SC2571	30p 350p	2SC3086 2SC3089	150p	2SC3595 2SC3605	220p 60p	2SD639 2SD640	20p 350p	2SD1142 2SD1148	350p 175p	2SD1503 2SD1511 2SD1519	100p 250p	25K320 25K323	120p 130p
2SC683 2SC708	35p	2SC1475 2SC1505	60p 80p	2SC2061 2SC2068	75p 60p	2SC2577 2SC2578	110p 170p	2SC3101 2SC3112	750p 35p	2SC3606 2SC3607	100p 150p	2SD655 2SD661	18p 60p	2SD1159 2SD1160	90p 150p	2SD1521 2SD1541	70p 350p	2SK386 2SK405	600p 450p
2SC710 2SC711	15p	2SC1507 2SC1509	45p 35p	2SC2071 2SC2073	140p 40p	2SC2579 2SC2580	110p 175p	2SC3114 2SC3116	40p 75p	2SC3636 2SC3657	280p 400p	2SD666 2SD667	25p 20p	2SD1163A 2SD1164	220p 75p	2SD1548 2SD1554	450p	2SK413 2SK415	500p
2SC730 2SC732	350p 40p	2SC1514 2SC1515	35p 60p	2SC2075 2SC2078	60p 95p	2SC2581 2SC2588	175p 600p	2SC3117 2SC3122	120p 50p	2SC3659 2SC3668	600p 120p	2SD668 2SD669	120p 35p	2SD1168 2SD1169	270p 280p	2SD1555 2SD1556	170p 400p	2SK429 2SK511	180p 450p
2SC733 2SC735	40p	2SC1520 2SC1541	45p	2SC2085 2SC2086	100p 60p	2SC2590 2SC2591	40р 50р	2SC3148 2SC3149	185p 180p	2SC3675 2SC3678	100p 280p	2SD673 2SD676	350p 250p	2SD1173 2SD1185	350p 400p	2SD1564 2SD1565	100p 75p	2SK513 2SK531	325p 350p
2SC738 2SC739 2SC761	150p	2SC1545 2SC1567 2SC1568	120p 40p 25p	2SC2092 2SC2094 2SC2097	100p 1200p	2SC2592 2SC2603	200p 10p	2SC3150 2SC3151	125p 230p	2SC3679 2SC3680	140p 380p	2SD716 2SD717	80p 180p	2SD1186 2SD1187	400p 250p	2SD1571 2SD1572	170p 100p	2SK534 2SK537	700p 900p
2SC762 2SC783	150p	2SC1568 2SC1569 2SC1570	35p 55p 40p	2SC2097 2SC2099 2SC2118	2300p 2500p 1100p	2SC2610 2SC2611	60p 30p	2SC3152 2SC3153	130p 175p	2SC3685 2SC3687	450p 600p	2SD718 2SD722	85p 240p	2SD1189 2SD1190	55p 150p	2SD1576 2SD1577	250p 250p	2SK538 2SK539	350p 1100p
2SC790 2SC792	50p	2SC1571 2SC1573	50p 25p	2SC2120 2SC2131	10p 550p	2SC2621 2SC2625	70p 190p	2SC3156 2SC3157	350p 200p	2SC3688 2SC3692	550p 150p	2SD725 2SD734	270p 15p	2SD1191 2SD1192	120p 90p	2SD1579 2SD1589	120p 60p	2SK555 2SK556	400p 500p
2SC805 2SC828	225p 20p	2SC1580 2SC1583	600p 25p	2SC2141 2SC2153	60p 40p	2SC2626 2SC2631	600p 20p	2SC3158 2SC3159	260p 200p	2SC3715 2SC3717	480p 120p	2SD741 2SD743	120p 130p	2SD1196 2SD1197	150p 150p	2SD1590 2SD1591	100p 310p	2SK557 2SK566	400p 475p
2SC829 2SC839	15p 20p	2SC1586 2SC1617	540p 340p	2SC2166 2SC2168	80p	2SC2634 2SC2636	10p 40p	2SC3164 2SC3169	350p 150p 300p	2SC3729 2SC3746	450p 100p	2SD756 2SD757 2SD758	100p 120p	2SD1207 2SD1210	40p 280p	2SD1593 2SD1595 2SD1608	125p 160p 210p	2SK695 2SK719	550p 300p
2SC870 2SC898	275p	2SC1623 2SC1624	50p 60p	2SC2188 2SC2200	70p 250p	2SC2637 2SC2640 2SC2653	120p 1800p 100p	2SC3170 2SC3173 2SC3175	180p 150p	2SC3747 2SC3752 2SC3781	120p 250p 150p	2SD758 2SD762 2SD763	140p 100p 140p	2SD1211 2SD1218 2SD1223	120p 75p 75p	2SD1608 2SD1609 2SD1632	210p 70p 500p	2SK724 2SK725	600p 600p
2SC930 2SC941 2SC943	15p	2SC1626 2SC1627 2SC1628	55p 15p 75p	2SC2221 2SC2228A 2SC2229	650p 60p 15p	2SC2654 2SC2655	180p	2SC3178 2SC3179	175p 70p	2SC3783 2SC3783 2SC3787	300p 100p	2SD768 2SD772	180p 200p	2SD1223 2SD1225 2SD1227	120p 40p	2SD1632 2SD1637 2SD1647	500p 50p 40p	2SK727 2SK735	800p 600p
2SC944 2SC945	140p	2SC1628 2SC1634 2SC1669	50p 100p	2SC2230 2SC2233	80p 100p	2SC2656 2SC2660		2SC3181 2SC3182	200p 120p	2SC3789 2SC3790	75p	2SD773 2SD774	20p 30p	2SD1229 2SD1237	250p 300p	2SD1649 2SD1650	260p	2SK758 2SK787	300p 900p
2SC950 2SC959	40p	2SC1674 2SC1675	15p 90p	2SC2235 2SC2236	60p 20p	2SC2665 2SC2668	200p 10p	2SC3199 2SC3209	40p 120p	2SC3795 2SC3798	175p 220p	2SD777 2SD784	400p 650p	2SD1246 2SD1247	20p 40p	2SD1651 2SD1663	150p 450p	2SK794 2SK872	500p 650p
2SC980 2SC982	40p 20p	2SC1678 2SC1683	80p 100p	2SC2237 2SC2238	540p 45p	2SC2671 2SC2681	100p 170p	2SC3210 2SC3211	550p 220p	2SC3807 2SC3811	120p 80p	2SD786 2SD787	100p 20p	2SD1248 2SD1251	270p 180p	2SD1666 2SD1667	90p 120p	2SK903 2SK1057	500p 600p
2SC983 2SC1000	20p	2SC1684 2SC1685	30p 30p	2SC2240 2SC2258	15p 30p	2SC2682 2SC2688	70p 27p	2SC3212 2SC3225	260p 50p	2SC3832 2SC3833	200p 250p	2SD788 2SD789	30p 20p	2SD1263 2SD1264	90p 55p	2SD1668 2SD1677	120p 300p	2SK1058 2SK1117	800p 250p
2SC1001	950p	2SC1729	900p	2SC2259	60p	2SC2690 2SC2705	60p	2SC3244 2SC3246	45p 50p	2SC3853 2SC3854	220p 250p	2SD792 2SD794	400p 33p	2SD1265 2SD1266	75p 180p	2SD1730 2SD1732	350p 400p	2SK1118 3SK45	225p 100p
S	E O	THE	R P	AGE	S	2SC2710 2SC2712		2SC3259 2SC3260	350p 220p	2SC3855 2SC3857	220p 500p	2SD795A 2SD811	140p 450p	2SD1267 2SD1271	55p 55p	2SD1739 2SD1740	275p 125p	3SK51 3SK59	100p 100p
						2SC2716 2SC2719	50p 25p	2SC3261 2SC3262	230p 280p	2SC3858 2SC3870	550p 200p	2SD819 2SD820	200p 250p	2SD1271A 2SD1272	225p 200p	2SD1748 2SD1760	90p 80p	35K74 35K77	50p 50p
		DR M				2SC2721 2SC2738	120p 200p	2SC3263 2SC3264	280p 390p	2SC3883 2SC3884A	280p 300p	2SD821 2SD822	550p 290p	2SD1273 2SD1275	50p 50p	2SD1762 2SD1773	50p 160p	3SK81 3SK85	50p 160p
GR/	ND	ATA	BAI	IGA	NS	2SC2740 2SC2749	450p	2SC3269 2SC3270	50p 50p	2SC3886A 2SC3890	400p 150p	2SD826 2SD836	30p 60p	2SD1276 2SD1277	60p 190p	2SD1783 2SD1796	100p	35K88 35K121	70p 150p

		REPL	ACE	MENT	VIDE	O HEA	DS		
Model	Price	Model	Price	Model	Price	Model	Price	Model	Price
AIWA AV66/AV77	1200p	VCR8103, VCR8107 VIP300A MKII	2200p 1900p	VR3833, 3912, 3913, 39 4913, VRP3833	650p	NVM1, NVM3, NVM5 AG2100, AG2200	4200p 700p	VHR1100, VHR1200 VHR1500, VHR2500	1500p 2100p
G700 G900	1100p 1500p	FISHER FVHP420, 510, 520, 530,		VR3986 VP3826, 3906, 3916, 39 3948	2000p 926, 3946, 1550p	NV430 NV730, NV770 4 HEAD NV366	1000p 1450p 1850p	VHR2700 VHR7900	2450p 3000p
AKAI VS105, 112, 115, 116, 12 205, 220, 240, 244, 245, 3		622, 710, 711, 715, 720, 7 905, 906, 908, 910, 911, 9	21, 722, 730, 830, 15, 916, 918,	VR3927 VR3976 VR3977	1400p 2300p 2700p	NV180, NVD48 NV788 NV810, NV830	2300p 2600p 2400p	SHARP VC390, VC393; VC496	2750p
303, 304, VSP8, VSP82 VP7100, VS9300, VS950	0, VS9800 650p	5000, 5001, 5005, 5050, 5 VBS3500, 7100, 7500, 76 VBR330	00, 9900, 1800p	VR3984, VR3994 VR3995, 3997	2300p 1800p	NV850, NV950 NV870, NV890, NV970	2750p 3600p	VC488 VC779 VC789, VC790	4200p 1800p 2900p
VP77, VP88, VP7100, VP VS9800 VS1, VS2, VS3, VS4, VS	1200p	VBS7000, VBS7100, VBS FVHP500, 711, 715, 721, 5100, FVHD720	9000 2000p 722, 730, 830, 1100p	VR3917 VR3730, VR3731, VR37 VR3918, VR3919, VR39		NVG33, NVG46, NVL23, NVL28 NVG10, 11, 12, 14, 16, 12	1450p	VC200, 220, 300, 381, 38 387, 388, 471, 477, 481, 4	3, 384, 385, 386, 182, 483, 486,
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VS512, VS515, VS516 VS465 VS11, VS12	2800p 2300p 1200p	FVHD40, FVHD140, FVHF FVHP20	P1, FVHP10, 1150p	VR3968	700p	NVG50, NVG300 NVG45	2650p 1800p 3600p	684, 402, 500, 571, 573, 5 693, 700, 772, 7810, 782,	580, 584, 600, 682, 7822, 7 83,
VS6, VS8, VS9 VSX9	2400p 2250p	FIDELITY HQS200, VCR600, VCR61	00, VR900,	HR2200, 3300, 3320, 33 3660, 3750, 3860, 4100	330, 3350, 3360, , 3292, 8900, 8901,	NVH70 NV688 NV600	2400p 1150p	8481 VC6000, 6200, 6300, 730 8000, 8300	1100p 0,7700,7750, 1800p
VSF600, VSF650 VS155, VS165 VS20, 22, 24, 25, 26, 27,	3600p 2300p 422, 426, 427,	VR9100 VCR100 VTR1000	1500p 1100p 1100p	8902, 8903, 8906, 8922 3V22 HR3660, 7600, 7610, 76	600p 650, 7700, HRD110,	AG6800, AH6810 AG6100, AG6200, AG630 NVG7, NVG9, NV230	1050p	VC793 VC473, 785, 786	3000p 2200p
VSF10, VSP9 VSR9 VS109, VS603, VS606, V	1250p 1300p (S607 2500p	GOLDSTAR 8000 3HSSDB	1900p	111, 120, 121, 220, 225 8923, 8924, 8925, 8929 8944, 3V16, 3V23, 3V24	. 8935, 8941, 8943.	NV780 NVG15, NVG400 NVM7, NVMC20	2400p 2600p 3800p	VC699, VCA501, VCA602 VC585, VC685 VC90ET	2 2800p 2000p 3900p
VS75	2500p	GVH51, GVH122, VCP40 VCP4200	00, VCP4100, 1100p	3V36, 3V38, 3V39, 3V4 BR1600, HRD140, 141,	9 625p 142, 143, 150, 152,	NVF70	5200p	VFH815	2800p
VCR4000, VCR5000, VCR	R6000 1650p	GHV1232, 1233, 1241, 12 1245, 1246, 1290, 1291, 1 8210, 8215, GVHP1240, 1	295, 1296, 1891, 241, 1247, 1248,	156, 157, 158, 160, 510 8948, 3V42, 3V44, 3V4 3V52, 3V54, 3V55, 3V5	5, 3V46, 3V47, 6, 3V57 1150p	N.E.C. N9011, 9012, 9013E, 901 9016, 901A, 902A, 2033, 5	9034, 9040, 9053,	SIEMENS FM350, FM352, FM355, I FM363	FM361, FM362, 1300p
VCR4500, VCR5200, VCP TVR1	900p	VCP400, VCP4130, 4300, 4306, 4310, 4311, 4315, 4 4326	4301, 4305, 316, 4320, 4321, 1100p	HRD154, 170, 171, 210 350, 521, 522, 525, 526 8951, 3V64, 3V65, FV10	, 211, 217, 320, 321, , 527, 550, 8950,	9054, 9055, 9063, 9065, 9 DX1000, 1600 N911A, 914C, 915A, 916A	1200p	FM364 FM391, FM392, FM461	1350p 1800p
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AUTHENTIC N850	800p	GRANADA CS1, DS2	1600p	3V00, 8902, 8903, 8909 FV31 FV37, FV43H, HRD860	8912,8922 1000p 1500p 3500p	8261, AH1 (for model DX N9610 N895	3000p 3150p	FM585 FM600	1425p 1900p
AWA ATVI	800p	VHSAH1 VHSAH3 VHSAN3	1100p 2400p 800p	BR7000E, BR7000S HR7200, 7300, 7350, 20 HR0455	2600p	N9052, N9530, DX2000 VCP1 PVC2300, 2400, 740, 744,	3400p 1700p	SONY DSR-19R (FOR SL-T 9ME	
BAIRD 8900, 8901, 8902, 8903, 8	8906, 8922,	VHSAY3 VHSBH1, VHSCH1	1200p 2100p	HRD520 HRD300, 400, 580, 600	, 620, 650 2300p	NORDMENDE	3500p	DSR-21R (FOR SLC 8-C9 DSR-35R (FOR C20, C30, SLF1UB, SLF1E) 2 PIN S	, C40,
8928 8904, 8923, 8924, 8925, 1 8944	650p	VHSBP1 VHSBY3 VHSD52	850p 2600p 1600p	HR4100 HRD750, HRD830 HRD250, HRD257	1000p 3300p 2500p	460, 9-460, V100, 140, 20 450, 550	700p	SLC33E, SLC44PS, SLF3 SLK85, SLT20ME, SLT30	OPF, SLF60PS, ME 1500p
8909, 8912 8930, 8931, 8933, 8940 8942	800p 800p 2300p	VHSEH2 VHSEY1, VHSEY2 VHSFG2, VHSFG4	1600p 1400p 1300p	3V32, 8942, HR7655 HRD180, 190, 230, 610 FV20B, 26, 30, 32, 33, V	2200p , 3V59, FV12L, /C141L 2250p	V1001, 1005, 1015, 1025, 1055, 1065, 1105, 2005 V110, V333	1250p 2000p	DSR-43R (FOR SLC7 RAI SL5100, SL3000) 1 PIN S SL36ES, SL37E	
8945 8947, 8948 8950	2000p 1600p 1700p	VHFS1, VHSFS2 VHSTJ1, VHSTJ2, VHST VHSYJ2	1300p J3, VHSWJ3, 700p	HRD370, HRD430, HRD FV13H HRD530, HRD700, FV1	0470, 3V58, 2300p	V101, 102, 103, 112, 141, 301, 302, 350, 500, 3005 V1205, V1215, V1235, V1	700p	SL3000, 8000, 8080, SLC SLT7ME	5E, 1600p
VC141L VH582	3000p 7000p	VHSVH4, VHSWH1, VHS VHSYH2	XH1, 1600p	GRC1, GRC2, 3V41 HRD330, 337, 440, 637	2800p	V1305 V380	2450p 2300p 3150p	SLV201, 202 SLK95, SLT50ME SLV373VB	2000p 2900p 2600p
BLAUPUNKT RTV100, 200, 202, 211, 2	14, 222, 224,	VHSWJ1, VHSXJ3 GRAETZ	700p	HRFC100, FV44L	2100p	V502, V503, V5005		TOSHIBA	
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707 RTV310, 311A, 312, 317, RTV324, RTV325	1650p	4935, 4943, 4963, 4985, 4 TR4935, TR4985, TR4993 4920, 4927, 4930	993, TR4833,	LOGIK VR960 VR950	1500p 1400p	PHILIPS VR6460, VR6520, 64VR60	0, VR6420 725p	V21, V31, V33, V50, V51, V9600	V53, 1450p
RTV328 RTV424	1850p 3500p	4946, TR4906, TR4916 TR4994	1600p 2300p	LOEWE		VR6711 4 HEAD 6920, VR6440 VR6441, VR6540, VR6541	1800p 2500p	V55, V57 V71, V73, V74, V75, V77, V83, V84, V85, V86, V87	700p V80, V81, V82, 1200p
RTV434, RTV444 RTX260, RTX720, RTV3: RTV454, RTV740	5000p	TR4995	3300p	OC410, OC420, OC440 OC50, OC55, OC60, OC		VR6642	1300p	V80, V93 V5470, V5480	1450p 1300p
RTV478 RTV520, RTV530 RTV535, RTV560, RTV53	3700p 1800p 70 2000p	VS410, 450, 460, 500, 509 530, 546 BARCELONA, MVS400, 4	1600p	LUXOR 9225, 9256 9245, 9251, 9254	1800p 1225p	RANK BV6900AS N830EA, RV300, RV310, I	1800p RV320, RV330,	V600 V880MS V700G	2350p 2600p 3700p
RTV635, RTV660, RTV67 CR1000, CR1200, CR150 CR1800	70, RTV730 3000p	SE5100, 6100, 6110, 9100 5510, VS400, 440, 500, 50 610, 5180, VS6190, 700, 50	0, TVR4500, 4510, 05, 510, 518, 600,	9270, 9271, 9273 9272, 928217 9252	1800p 2700p 2500p	RV340, RV350, RV380 REDSON	700p	V500G, V509G V9680	2500p 2900p
RTV321, RTV322 RTV338	1700p 2800p	MADRID, SE5140, VS540 MVS550, 620, VS550, 62	0, VS5480 3000p	928017, 928077, 92809 928117	7, 929107, 1700p	MR100 SABA	1700p	V300G, V301, V305, V30 V61, V63 V110, V120, V130, V140,	1700p
RTV348 RTV404, RTV414 RTV640	2700p 3000p 3000p	930, 940 VS120 VS680	2400p 2300p 4600p	9253 9281 9284, 9295, VR3701, V	2500p 2700p R3721, VR3731,	2A10, 2A70, 2B20 4A10, 4B20 6A10, 6A70	1400p 2450p 2300p		1500p
RTV750, RTV800, RTV90 RTV810 RTV910	00 3500p 4400p 4500p	VS160, VS740 VS170 MVS660, SE6160, VERO	4400p 4600p NA. VS660.	WR3761	2100p	8A10, VR6038 CVR6083, VR600, 66007,	3150p	VR9500, VR9501, VR952	5 1100p
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CANON VR10	1000p	VXL2, 3, 4, 20, 35 VXL5, V20H VXL6	1000p 1050p 1200p	MITSUBISHI		7730, 8011, 8014 VR6018, VR7018 VR6028	700p 2450p 2300p	610, 620, 640, 920, 1920 A930, 932, 935, VR2931, 4935, 4940, 4942, 4945, 1	
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DECCA	1800p	640, 5030, VTP10, 30 VT7, VT17, VT18, VT19 VT35, VT38, VT39	1000p 2200p 2400p	HS349, HSE31, HSE32 HS411 HSE30, HSB30	, HSB31 2250p 2900p 2100p	VR3800 VR3200, VR3500	1400p 1400p	VR2915 VR2970, VR7971, VR975	1100p
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VK2530, VK2532, VK263 VK2632 VK2637		VT640 VT168, VT150, VT260, V HEAD)	1200p	NV777, NV330 NV8050, NV8051 AG1000, AG1050, NV2	1150p 2800p 260, NV280, NV460,	VK770, VK8225 VM1560, VN1561	1900p 2200p	V430, 530, 4340 V450 VK300T, VK301T, VK302	2300p T, VK303T,
VKH2545 VKH2639, VKH2439	2450p 3300p	VT530 VT522, VTM620, VTM62	2050p 2, VTM720,	NV470, NV480 AG6010, AG6015 AG6840	1600p 2500p 2400p	SANYO VTC5000, 5400, 6000, 650 VTC1500, VTCM10, 11, 2	00, VPR5000,	VK308P VM10, VM20	650p 2700p
FUNAI E11, 1100, VIP1000, 140	0, 3000, 5000,	VTM722, VTM822 VT660E	1650p 2600p	NV100, NV200, NV370 NV630), NV380, 725 p	VTC2000, 5100, 5150, 53 5370, VTCNX10, VTCNX	00, 5400, 5350, 15, 20, 30,	CRANDA	
VCR4000, 4500, 4800, 53 6400, 6600, V1, V25 VCR4600, VCR5400, VCR	R5800 1200p	H.M.V. HV1000, HV2000, HV300 HV4000, HV7000, HV800	0 650р Ор	NVD80, NVH65 NVF65, NVH75 NVF51	3400p 3200p 4200p	VPR5800 VTC5500, 5550, 9100, 93 9455, 9500	1900p	GRANDA	
VCR5480, 5843, 8007, V 6000, 150 VCR4530, VCR6000, VCI	IP2500A, 3000A, 2000p R6100, VCR6800,	I.T.T. VR3605, 3905, 3935, 394		NVG19 NVJ30, NVHJ33, NVL 31, 40, 130	1450p	VHR1110, VHR1150, VHF VHR2300 VHR3200, 3270, 3100, 31	1200p 50, 3300, 3400,	Tel: 0181-9	
VCR6803	1300p	3985, 3993, 4993	650p	NVJ35, NVG46	2100p	3310, VHRD500	1500p	Fax: 0181-9	05 0120

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		PINCH	ROL	LERS /	VCF	R BELT	KIT	S	
Model	Price	Model	Price	Model	Price	Model	Price	Model	Price
AKAI VS 10, VS9300, VS9500 VP7100, VP77 VS1, VS2, VS3, VS4, VS VS9 VS105, 112, 115, 116, 1 244, 245, 247, 248, 250, VSX9	165p 5, VS6, VS8, 165p 26, 205, 220, 240,	VHSTJ1, VHSTJ2, VHSTJ VHSWJ1, VHSWJ3, VHS VBXYB3 VHSEH3, VHSES2 VHSF34 VHSF92	3 165p (J3 165p 165p 165p 165p 165p	N.E.C. N830, 831, 832, 833, 895 PVC2300, 2400, 740, 744 766 DX1000, 1600, 2000, 300 9014, 9016, 9033, 9034, 1 9055, 9066, 9110, 9120, 5 9610	4, 746, 760, 764, 165p 00, N9012, 9013, N9053, 9054, 9510, 9520, 9530,	FM556, FM558, FM560, FM574, FM578 FM601, 603, 605, 607, 60 621, 623, 625, 626, 628, 638, 639 SOLAVOX	165p 08, 617, 619, 620, 630, 632, 634, 636, 165p	FERGUSON 3292, 3V00, 3V01, 3V16, 31 8904, 8306 3V23, 8923, 8924, 8929 3V29, 3V30, 8930, 8931, 85 3V31, 3V32, 8941, 8942 3V35, 3V36, 3V38, 3V39, 31 8944	933, 8940 75p 75p
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Grounds for Optimism?

he UK's economy is in one of those strange states where it is very difficult to predict how things will turn out in the immediate future. The statistics we see tell conflicting tales. For example, the latest figures from the Chartered Institute of Purchasing and Supply indicate that manufacturing activity in May fell for the fourth month running. The decline was the largest for more than three and a half years. Yet high street spending seems to be holding up well, and Bank of England figures for the same month show that M0, the narrow measure of money supply (notes and coins in circulation), grew by 6.3 per cent compared with 6.1 per cent the previous month. That doesn't sound like much, but can represent a big difference to people's spending.

It's easy to be mislead by the statistics that pour out from government departments, banks, building societies and so on. Manufacturing activity has clearly been through a bad patch, going and businessmen talking together in such a situation tend to generate an atmosphere of pessimism. They sell to international markets however, so what is going on in the manufacturing field generally does not accurately reflect what is going on in the UK itself. What we do know is that manufacturers have been having difficulty clearing stock. When they see their shelves and warehouses filling up, they naturally cut back production. In this age of 'just in time' demand, with nobody wanting to hold more stock than is basically necessary, plants have to be able to match output to demand more precisely than in years gone by. Our sympathies to their managers.

But consumer goods don't seem to be so badly affected, and consumer demand appears to be either holding up or increasing. This shouldn't surprise us either. Most people have reduced their borrowings, house prices have stopped falling and, as a result of tax and other changes, people are finding that they have a bit more money in their pocket. Interest rates are low and unlikely to rise in the next few months. Inflation is holding steady. These are the conditions that create consumer confidence.

This could well mean good times ahead for the consumer electronics trade. A recent report from the well-know retail consultancy Verdict predicts that a genuine economic recovery is likely later this year. with the best trading conditions since the Eighties. The electrical sector is singled out as a main beneficiary, with a strong demand for PCs in particular - sales are likely to rise by 200 per cent by the year 2000. One of the nice things about selling computers is the fact that the buyer will require other things. Software and a printer of course, a modem quite possibly nowadays, a scanner maybe. A fax link may help, and of course the consumer electronics firms are anxious to link this lot up the domestic TV set and home entertainment system. One feels that this will not happen just yet - people can't compute and watch TV at the same time. But there will be an increased demand for TVs that can double as monitors, and once the public latches on to the idea of upgrading its electronic equipment the sales prospects should open out.

Upgrading and spending more on highspecification products sounds good, doesn't it, yet Sir Stanley Kalms no less has been complaining about the poor quality of today's products. There are those who would point out that Sir Stanley and the modern mass retailers must take some of the responsibility for this, because of their agressive pricing policies. They have sought out ever cheaper product from markets around the world, with the result that all manufacturers end up adopting Graham cost-reduction programmes. Knight, writing in our sister magazine Electrical and Radio Trading, mentions that the rental TV sets his firm installed five years ago have proved to be far more reliable than those installed last year. The faults seem to be the traditional ones faulty mains switches, defective line output transformer soldering, etc. - which, as he says, could easily be eliminated. Seems a long time since we were reading about the revolution introduced by Japanese manufacturing technology, with ever improving reliability. But the Japanese manufacturers have been badly affected by the recessionary conditions of the Nineties, and now do much of their manufacturing in satellite plants throughout SE Asia, where they obviously have to compete with the lost-cost (and, often, low-quality) locals. It's becoming increasingly clear that the current generation of VCRs, with their plastic mechanisms, have a lower build quality than those of a few years ago. One can't help but feel that PCs and monitors, which have so far proved more reliable than basic consumer electronics products, could go the same way. But there are grounds for optimism here - for those of us in the repair business. As long as the stuff isn't so grotty that it has to be thrown away when it fails, there will be a growing workload, which is just what we want! Time to invest, perhaps, in a nice new scope and soldering station, and bring back a smile to the faces of those poor old manufacturers.

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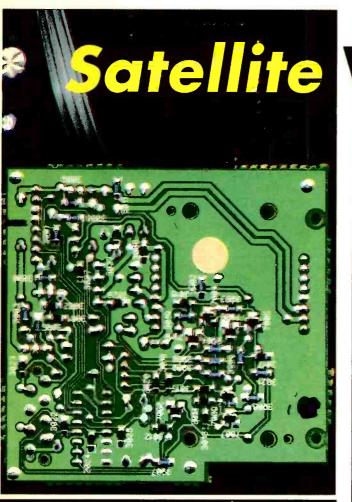
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Jack Armstrong

It was Good Friday and the population had split into two groups. One counted red-andwhite cones while sitting in stationary cars. The other half had donned gardening gloves.

Magic

When the phone rang I removed my gloves to answer it.

"My satellite's gone off" said an anonymous voice. "You advertise same-day repairs, so will you come and fix it? I was in the garden. When I went back it had gone off."

"Did you plug your lawnmower in next to it?"

Hesitation. She sensed the presence of a magician.

"How did you know?"

"Magic" I confirmed. "I'll come straight away."

The receiver was a Grundig GRD150. I took it back to the workshop and replaced the fuse, then tested the receiver which now worked perfectly. But I could hear a beep, beep from the TV set's loudspeaker when the smart card was inserted. This problem was solved by soldering the recommended 100nF capacitor

atellite WORKSHOP

between links J72 and J80. When I returned the unit the entire family had assembled , waiting to watch a satellite TV programme.

"I fixed the power supply but I also noticed a bleeping sound with the card inserted. Did you know about that?"

"Yes" she said, "but the man at the shop – part of a well-known high-street chain – said it was normal."

"Ah" I replied, "well it's not normal any more. I've fixed that too."

The lady was delighted and paid my charge without argument. I've made a mental note to visit the shop to offer my services.

SRD500 Problems

I very occasionally receive calls from other dealers who get my number from goodness knows where! Clive was having problems with an Amstrad SRD500. It took about half an hour to warm up before producing a picture and, even then, several audio channels were missing.

Now I remembered having had this problem previously, and had tackled the picture problem first. C13 in the power supply had been the cause. Then, by the time that I'd replaced all the brown-looking capacitors in the power supply the audio problem had been cured.

So I suggested this approach to Clive, who had spent two hours probing around in the audio section to no avail.

"Power supply" he said incredulously, "I'll ring you back!"

True to his word, Clive did. Replacing C13 and C14 had fixed both problems. Thanks Clive. If you are reading this, you didn't leave me your phone number.

I've had several faults with this model. Picture problems are usually caused by electrolytic capacitors. Try replacing those near the tuner first. Last week I had an SRD500 with no audio at all. It took me an incredible two hours to trace the cause of the trouble to invisibly cracked tracks at the rear of the board. If the owner had said that she'd dropped the receiver her bill would have been much less.

Tripping SAT1700

This Nokia receiver is generally one of the most reliable models around. A local dealer had problems with this one however. He brought it to me after replacing most of the components in the power supply.

I checked his work, which seemed all right, and could find no components that measured incorrectly. But the power supply made a rapid ticking noise. This is usually caused by a short-circuit diode on the secondary side of the chopper transformer or, if the tripping is much slower, by a dead TL431 adjustable zener diode.

On a hunch, I removed the decoder board. The receiver then worked perfectly. I was now faced with the problem of discovering precisely which component on the board was drawing too much current. I considered rigging up a separate power supply, but this was too much like hard work.

I'd recently fixed a couple of Thomson VideoCrypt decoders in which the sync separator chip had gone short-circuit. It was easy to trace the cause of the trouble in these decoders because the transformer power supply had burnt out the series resistor that feeds the chip. Anyway, I removed the TEA2029C chip on the Nokia decoder board and the short-circuit disappeared. A new chip cured the fault.

The dealer was quite surprised to hear that the power supply had not been to blame.

e-mail etc

As you may have noticed, my email address has changed. My technical advice service had become so popular that it was costing me a fortune to reply via CompuServe, whose local number is horribly unreliable. I asked them to sort it out, but all I received was promises.

A small, local company went out of its way to help me. I now have a lower-cost access point and, in return, have been recommending this company to friends. It's all about caring for customers. The big players find this very difficult. You may not care for the Internet,

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and I'm sorry if it bores you. I find it incredibly useful however. For example I can get information from repairers all over the world from the newsgroup called, cryptically, sci.electronics.repair. We all help each other to solve problems.

It works like a 'bulletin board'. You post a question and, sometimes within minutes, somebody posts a reply. One nice fellow who seems to be forever helping people with their problems is Nigel Cook. I've never met him, other than via the Internet, but he runs a shop called Diverse Devices that stocks obscure/obsolete components, second-hand test equipment, circuit diagrams and other stuff - I do manage to find them for you! Send Nigel two stamps for his catalogue. The address is Diverse Devices, 75 Priory Road, St Denys, Southampton SO17 2JQ.

There's a newsgroup for just about every type of hobby and business. Don't give up your subscription to *Television*, but you might find it useful to get connected.

Amstrad SRD510

Low level video is a common fault with this model. There are many

well-known causes. Here's another one that I've now had twice.

When I was carrying out scope checks on the first receiver with the fault I found that the video level was low quite soon after the tuner. I actually replaced the tuner, to no effect.

Further testing brought me to transistor TR42, which is at the back of the board. It clamps the incoming signal if a low LNB supply is detected. To add to my confusion the associated electrolytic C5 was also faulty. Replacing both items restored the video level to normal.

Another SRD510

This receiver was brought in because it was dead. After fitting the power supply kit and getting it up and running I found that there was no on-screen tuning menu – unless the LNB was disconnected to remove the signal.

I probed around with my oscilloscope for a time then resorted to the more basic process of measuring resistance values. This eventually brought me to R74, which was open-circuit. It seems that the resistors in this model are prone to this type of failure. Jack Armstrong is willing to try to sort out readers' satellite TV receiver problems via e-mail. You can reach him via the Internet at:

repairman@netcentral.co.uk

One model per message – state make/model and fault symptoms. If you have no e-mail facilities you can write to him c/o Television, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS: Please enclose two stamped envelopes.

A Puzzling Pace

"No E-E" was the unusual complaint with a Pace PRD800 receiver. It transpired that there was poor terrestrial TV loop-through via the RF modulator: the satellite pictures were fine, but the terrestrial TV pictures were decidedly grainy.

A quick look beneath the board revealed a nasty rust patch. Fortunately the only damage was to a surface-mounted transistor (Q10) whose legs had corroded away. After fitting a replacement and cleaning the board around it everything was OK. I advised the customer to have the TV aerial coaxial cable replaced without delay.

Test Case 403

Life isn't easy for a trainee technician in 1996! He faces such a wide variety of equipment, produced by so many manufacturers. Most of it uses high-level technology, and the faults are often obscure and puzzling. Add to this the need for rapid and efficient diagnosis and repair and it's no wonder that Cathode Ray often feels confused, sometimes overwhelmed. It's all right for Sage and Television Ted: they've had two decades or more to master things gradually. It is fortunate that they are around to offer help and guidance.

Ray decided to put aside for the moment the Sony CD player that skipped tracks. He put it back with the Amstrad satellite box that wouldn't decode VideoCrypt. Instead, he turned to an easylooking job – a ten-year-old Luxor 1101 TV set with no red in its display. Ray switched it on, and sure enough the red section of the colour-bar display was black.

Off with the rear cover and up to the tube's red cathode with an oscilloscope probe. There was no drive signal. Ray moved over to the R video output stage on the main chassis, where again there was no signal. He moved back one more step, to the TDA3562A colour decoder chip ICb1, which should produce an R output signal at pin 13. It didn't. For comparison he tried pins 15 and 17, where 2V peak-to-peak green and blue outputs were present.

So the cause of the fault appeared to be prior to pin 13 of ICb1, very probably within the chip. This was a reasonable conclusion, since the R signal is produced (from Y and R - Y) within the chip. The only relevant peripheral component that Ray could

discern was the 470nF R-channel clamp reservoir capacitor connected to pin 10. The voltage across this capacitor, about 5V, was way down on that across the corresponding G and B clamp capacitors connected to pins 21 and 20 (7.1V), but a replacement capacitor made no difference.

So the culprit had to be the decoder chip. Ray found that there was a TDA3562A in stock. He fitted it carefully, but to his amazement the picture still came up without any red. Once again a scope check showed that there was no red output at pin 13. Well, there has to be a reason for everything. Ray continued his investigation by interchanging the R and G outputs from pins 13 and 15 of the chip. This meant that the chip's R output was fed to the G video output stage while its G output went to the previously quiet R video output stage. There was still no red on the screen, and the chip's G output had now disappeared. The R output at pin 13 had perked up however, providing a drive for the G video output stage – there was a bright green bar where the red one should have been.

What was Ray to make of this strange state of affairs? What diabolical agency was at work? Is there nothing straightforward in the world of modern consumer electronics? Ray's friend Pete was earning better wages in the building trade ...

Television Ted was on hand to come to the rescue. It transpired that if Ray had adopted a simpler approach at the outset he would have gone straight to the cause of the trouble. So where was the fault, and why was our man so cruelly mislead? For the solution, turn to page 675. But think about it first!



Reports from David C. Woodnott and Brian Storm

Panasonic NVS7

This model is an S-VHSC palmcorder. The problem was that in the S-VHS mode a noise bar, about an inch from the top of the screen, would appear across the picture. It varied in intensity, almost cyclically, coming and going at will. The effect was more prominent with some tapes than with others. A JVC tape was worst, a Philips one best! The tape path alignment, tensions etc. were carefully checked, all to no avail. We eventually cured the fault by fitting a complete replacement drum assembly. Standard VHS pictures were at all times OK. **D.C.W.**

Siemens FA244G4/ Panasonic NVG1

"Cuts out in playback" was the reported fault. Record was OK. We checked the connectors around the main PCB and looked for dryjoints, all to no avail. Why playback

Camcorner

only? This wasn't so surprising when we'd realised how the cam/VTR switching works.

The slider on the VTR operation unit (top of camera) closes the cam/VTR switch contacts in the VTR mode. All that was wrong was a faulty switch. The contacts are open in the camera mode, thus no problem. In the VTR mode, intermittent contacts resulted in the unit defaulting to the camera mode. **D.C.W.**

Sanyo VMRZ1P

Playback and the VTR functions were OK, but there were no E-E pictures and no zoom/focus operation. The cause of the fault was the camera DC-DC converter, a replacement restoring normal operation. **D.C.W.**

Panasonic NVG3

As a result of a fall the cassette compartment wouldn't stay closed. We had been asked for an estimate for insurance, but this wasn't needed. All that had happened was that the cassette housing lock lever had become displaced. It was easily returned to its correct position. **D.C.W.**

Panasonic NVM10

This HiFi VHS camcorder was completely dead – the internal fuse R1701 had blown. A replacement (part no. VSF0059) was fitted, but the result was a brief puff of smoke and another blown fuse. The smoke had come from the HiFi audio PCB, where the 68μ F capacitor C4524 had died of old age. A new fuse and capacitor restored life to the camcorder. **B.S.**

JVC GR65

There was no sound at all, in either the record or the playback mode. After much checking we decided to replace the BA7757BK audio chip IC30. This cured the fault. D.C.W.

Sanyo VMD6P

The complaint, which is not common with this popular camcorder, was of tape chewing. It was obvious that the capstan motor was the cause of the problem. It turned very slowly, and in fact was almost seized. As cleaning and lubricating the bearing proved to be ineffective we had to fit a replacement. **D.C.W.**

Sony EVA300

Switching from LP to SP operation and back was the complaint with this camcorder. The cause was broken teeth on the supply and take-up reel assemblies. After fitting replacements we noticed that tape crinkling was evident in the rewind search mode. A new pinch roller put that right. **D.C.W.**

Canon E100E

There was no operation. We found that D409, which is part of the SS 5V supply to the syscon microcontroller chip, was shortcircuit. In this condition the always 5V supply at regulator IC406 was low – the reading was approximately 3V. D.C.W.

Panasonic NVG2

The reported fault symptom sounded innocuous enough – "powers up then off". Nothing unusual there. A check in the power supply section of the main board showed that the 2SD2210 transistor Q1008 had overheated and was open-circuit. We fitted a replacement and checked for shorts on the supply rails. As nothing showed up we switched on. The camcorder powered up for about a minute, then our new transistor succumbed.

Q1008 supplies various circuits, including the camera head section. When the latter was disconnected and a second 2SD2210 transistor had been fitted the VTR section worked, with all functions available. So clearly the cause of the fault was in the camera head section.

Again no shorts could be measured. To try to isolate the faulty PCB we decided to disconnect the various sections of the camera head in turn. A start was made by disconnecting the image sensor PCB. With the rest of the circuitry connected, we applied power. To our surprise power-up was achieved, with the camera unit producing CCD drive pulses and a sync pulse train with burst vectors. When the image sensor PCB was reconnected the original fault condition returned.

So the CCD image sensor was the cause of the fault, though cold checks failed to produce a measurable short-circuit reading. A replacement CCD unit from a scrap unit confirmed our diagnosis by providing E-E pictures. Unfortunately the customer declined, on cost grounds, to have the repair done. This would have been a disappointment in view of the time already spent on the camcorder, but by way of recompense the customer gave us the unit to avoid paying our estimate charge. D.C.W.

VC	RBE		rs / R	EPLACEM	EN	Т٧	IDEO	LAM	PS
Model	Price	Model	Price	Model	Price				rice
HRD520, 600, 620, 637, HRD540, 553, 580, 660, HRS5800	641, 650, 830 95p	VR6010, VR9010 VR6020, VR6022, VR60 VR7730	75p	Models & Description	Order Code	Price	0	N/OFF MA	
KENWOOD KV901 KV903	70p 90p	VR6024 VR6520, VR6540, VR65 VR6710, VR6720, VR6 VR6720, VR6730, VR6 VR6780	735, VR8720 130p	UNIVE <mark>RS</mark> AL VIDEO LAMP 9V 80mV (310mm WIRES)	VL01	<mark>25</mark> p	GRUNDIG PART NO: USED ON:	29703, 29102 C7500, C7500TT	
LOEWE OC11, OC40 OC410, OC420, OC440, OC50, OC55, OC60, OC	95p 0C460 130p	SAISHO VR2000, VHL3 VR3800	90p 75p	PANASONIC VIDEO LAMPS	VL <mark>02</mark>	<mark>3</mark> 5p	PRICE: £2.25	C8712, C8714, C M68-190/99, M7 ST66-1602, T55-	8894, M68-190, 0-195, P40-345,
0C75 LOGIK VR955	120p	SALORA SV6500 SV6600 SV8000	100p 150p 120p	SHARP VIDEO LAMPS	VL <mark>02</mark>	<mark>35</mark> p	ITT PART NO:	13/1074	
LUXOR 9245, 9251 9252	130p	SV8100 SV8500, SV8520, SV91 SV7400, SV8400, SV84 SV6700, SV8710, SV87 SV6800, 6900, 8810, 84	60p 500 150p 420, SV8550 120p 750, SV9700 120p	HITACHI 5381682 (VT63, VT64) VIDEO LAMPS	VL <mark>04</mark>	135p	USED ON:	CP0200, 0211F, (0341/14, 0345F,) 0361/1, 9350, CT 0500T	0351/1, 0361,
9253 9254 9255 9256 9270, 9271, 9273, 9274	140p 100p 130p 130p 130p 130p	8920, 8970 SV8600, 8620, 8700, 8 9810	95p	AIWA, AKAI, ALBA, AMSTRAD,	VL05	150p	PRICE: £3.00 PART NO: USED ON: PRICE: £2.00	LFC 005 CVC40	
9272, 9280 9281, 9284, 9285, 9292, 3731, 3761, 3781 MATSUI	140p VR3701, 3721, 95p	SAMSUNG SV716, 717, V1616, V1 VX617, VX619, VX626 VB520, 510, 610, 616, 1 627, 629, VI510, 520, 6	, VX627, VX629 85p 617, 619, 620, 626,	BLAUPUNKT, FERGUSON, FIDELITY, FISHER, FUJITSU, FUNAI, G.E.C., GOLDSTAR,			MATSUI/SAIS	MATSUI-2190, S	SAISHO-
WITSUBISHI	75p	VX510, 520 VB900, VB910, V1900, PX980, 981, 982, SE90 SVX307, 319, 322, VB3	V1910 110 01, SV9001,	GRANADA, GRUNDIG, HINARI, HITACHI, ITT, JVC (HRD			PRICE: £2.00	PST2130TX	
HS200 HS300, 301, 302, 307, 3 349, 411, 412, 421, HSB 20, 30, 70 HS303, HS304, HS306,	10, 20, 30, HSE10, 150p	V1770, 790, 8220, 8229 VX750, VX790, 8220, 8 SVX301, 303, 305, SX V1730, 710, VX712, VX	5, VK8220, VPX31, 3225 135p 7301, VB710, 971, (720, 730, 970, 971,	SERIES), MATSUI, MITSUBISH NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA,	ι,		PHILIPS USED ON: PRICE: £0.95	K30, <mark>K35</mark> , K40, K	Т3, КТ4
HS400, HS700 HS318, HS319, HS410	150p 130p	972 VX9880 SANYO VTC5000, 5150, 6000,	230p 110p	SAMSUNG, SANYO, SHARP, SIEMEN, SONY, TELEFUNKEN, THOMSON, TOSHIBA	,		SONY PART NO:	(POWER SWITC SWITCH) KV1612 MK1, KV	
N830, N831, N832, N83 N895 PVC2300, PVC2400 DX1000, 1600, 2000, 30 9014, 9016, 9033, 9034,	80p 180p 180p	20, 21, 30, 31, 50 VTC5300, VTC5350, V VPR5800 VTC5500 VTC9100, VTC9300	75p	AKAI, GRANADA (VHSTJ2),	VL01	<mark>2</mark> 5p	USED ON:	KV1614, KV2052 KV2062, KV2068 KV2216, KV2252	2, KV2056, 3, KV2212, 2, KV2256,
9066, 9110, 9120, 9510, 9610	9520, 9530, 95p	VTC1100, 1300, 1500, 1300, 1500 VHR2100, VHR2300, V VHR2700	1100, 1150, 1200, 90p HR2500, 150p	HITACHI (VT3000), ITT (VR3912 VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI	,		PRICE: £2.25	KV2704, KV2705 KV2752PE3, KX KX20PS2, KX27	20PS1,
NV300, NV332, NV333, NV366 NV777, NV788 NV2000, NV2010, NV30 NV7000, NV7200, NV7	125p 100p 000 130p 300 95p	VHR3100, 3300, 3310, VHRD500, 700 VHR4100, 4150, 4200, 5100, 5200, 5300, 5350 7500, 7530, 7540, 7800	110p 4300, 4350, 4770, 5700, 7100, 7200, 7810, 8100, 8200,	(HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON	,		PART NO: USED ON:	(POWER SWITC SWITCH) KV2022, KV2024	
NV8600, NV8610, NV8 NV230, 250, 280, 430, 4 465, 470, 730, 770, 810, 1050 NV370, NV380, NV480,	31, 433, 450, 460, 870, 890, AG1000, 125p	8250, 8500, VHRD4400 4610, 4710, 4890, 6700 SHARP VC200, 384, 385, 386, 3) <u>90</u> p	(3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 8912, 8922, 8925)			PRICE: £3.00 PART NO: USED ON:	(POWER SWITC KV1810 MK1, KV KV1820, KV1822	V1810 MK2,
NV830, NV850 NV600, NV688, AG601 NVG7, 10, 12, 14, 15, 18 NVH70	0, AG6015 110p	9500, 9700 VC7300, VC7700, VC7 VC8000 VC8300 VC300, 387, 471, 473, 4	750, VC7800, 150p 150p	BLAUPUNKT, ORION (VH1, 2A)), VL <mark>02</mark>	40p	PRICE: £8.00 PART NO: USED ON:	(POWER SWITC KV1400, KV1440 KV2060	
NORDMENDE V100, V140 V1000M, 1005M, 1205, 1305, 1403, 1405, V150	0P, 1503, 1505K,	488, 496, 8481 VC402, 500, 571, 573, 585, VCSF3 VC600, 651, 682, 684,	80p 581, 582, 583, 584, 80p 685, 693, 783,	NATIONAL (NV200, 2010, 3000, 7000, 8150, 8200, 8400, 8600, 8610, 8620), SHARP (VC2300,	,		PRICE: £2.00 PART NO: USED ON:	(POWER SWITC REMOTE SWITC KV2020	
1805K, 2000D, 2405, 25 V3405H, 3105, 4405H, 5 905 V1001, 1005, 1015, 102 1055, 1065, 1105, 3005	5000, 8005, 900, 65p 5, 1035, 1041,	VC6F3, VC6V3 VC772, 779, 781, 782, 7810, 7822, VCA100, V 140, 170, 202, 203, 234 VCD806, 810, 815, VC	CA102, 104, 131, 501, 602, 5011,	6000, 6200, 6300, 7300, 7700, 8000, 8300)		3	PRICE: £2.00 PART NO: USED ON:	2 <mark>PIN (FUNCTIC</mark> KV1612 MK1, K	V1612 MK2,
503 V101, V102, V103, V111 V301, V302 V110, V333 V1500T, V2000B, V200	80p 2, V <mark>141</mark> , V142, 90p 110p	VC51000, VCT310, 410 VCTS312	0, VCT1314, 115p	AKAI (VS10), GRANADA (VHSXJ3), ITT (VR3993, 3994),	VL06	40p		KV2052, KV2056 KV2215, KV2216 KV2256, KV2704 KV2706, KV275	6 <mark>, KV225</mark> 2,
V250, V460, V9460, V20 V20035543 V300, V303, V380 V500	0035542, 130p 75p 75p	FM350, FM352, FM35 FM484, FM485 FM391, FM392, FM39 FM461, FM464, FM46 FM361, FM362, FM36	55p 4, FM462 100p 8, FM561 150p	JVC (HR2650, 7600, 7610, 7650, 7655), TELEFUNKEN (VR530, 535, 539, 550, 630, 650),			PRICE: £0.35 PART NO: USED ON: PRICE: £0.50	(4 PIN FUNCTIC VARIOUS	IN <mark>SWITCH</mark>)
ORION COMBI15000, 16000, N 900MVH1012, VH1030,	1040, 1060, 1070,	SONY SLC6, SLJ10, SLT6ME SLC5, SLC7, SLJ7, SL	J9 140p	THOMSON (V309, 316, 357, VK309, 411, TX8000),				ACEMENT IDLER	TYRES
1100, 1120, 1440, 1500 2308, 2400, 2500, 2600 358, 360, 362, 4010, 40 4300, 5010, 5015, 530, 4 640, 730, 735, VP220, 2	, 2700, 2960, 300, 15, 4016, 4020, 535, 536, 630, 635,	SLC9, SL8000, SL8080 SL8000E, SL8080E, SI SLV255), SLT50 165p	FERGUSON (3V31, 8941, 8942)			GOLDSTAR	MZ366960J2 VXP0521 6861471	IT <mark>02</mark> IT17 IT03
2966, 2980, 821, 925, V NEVHL, VCP, VH1204, 3060, 4008, 400, 4012, 744, 774, 7905, 800, 820	XL25 30p 2004, 2204, 3050, 412, 512, 600, 666, 0, 900, 974, VP200,	TELEFUNKEN VR400, VR410, VR440 VR450, VR540, VR549 VR520, VR529, VR620 VR530, VR535, VR539	VR640 70p VR920 70p	AUTHENTIC (N850), DECCA (VR8300), GRANADA (VHSTJ3, WJ1, WJ3), ITT (VR3913, 3914,	VL07	40p	JVC/	6861482 6886971 PU 48967B	IT04 IT05 IT06
VR2949, 2956, 2957, VX VC150, 180, VH1000, 2 250, 254, 288, 300, 303, 3312, 404, 555, 700, 70 780, 844, 900, VHF2, VI	00, 201, 205, 212, 3030, 312, 33, 4, 708, 712, 770, 43 80 p	VR650 A940, VR1925, 1930, 1 925, 930, 940, 950 A920, VR1970, 1980, 2	75p 940, 1950, 2960, 90p 920, 2925, 2930,	3963), JVC (HT7200, 7300, 7350 7700), TELEFUNKEN (VR450, 520, 529, 540, 549, 620, 640, 920			FERGUSON	PU 51380 PU 51402A PU 55373 PU 55374	IT07 IT08 IT09 IT10
VH1, VH2A PHILIPS VR6460, VR6920 VR6540	150p 170p 100	2970, 7921, 7926, 793 970, 7981, 975, 980 A1200, 930, 932, 935, VR2931, 2935, 2941, 2 3950, 3965, 3975, 493	65p 960, 980, 990, 971, 3935, 3945, 5, 4940, 4942, 4945,	1920), THOMSON (V4100, VK308, 309, 312, 410), FERGUSON (3V23, 29, 30, 8923			NATIONAL PANASONIC	VXP 0329 VXP 0343 VXP 0344	IT11 IT12 IT13
DV186, 286, 291, 292, 4 761, VR201, 202, VR20 20RW7, 25BO1, 25BO2 VR30DV2, 35BO2, 35B	168, 471, 562, 571, DV1, 20DV2, 2, 302, 303, 305, O3, 635B7, 715B4,	496, 5VR4970, 6000, 7 VR1935 VR2915	932, 7959, 7979 65p 100p 90p	8924, 8929, 8930, 8931, 8940)	·,			VXP 0401 VXP 0433 VXP 0463 VXP 0521	IT14 IT15 IT16 IT17
715B5, 715B8, VR865B VR6180, 6185, 6285, 62 6367, 6390, 6391, 6393 6561, 6570, 6581, 6670 VR68SB4, 86SB1, 925B	290, 6291, 6293, , 6467, 6468, 6470, , 6676, 6760, 33 85 p	THOMSON SV1000, V410, 430, 45 540, 620, 630, 640, 424 TX8000, V309, V357, V TX8500, V342, 343, 35	40, SV5540 65p /K411 75p 51, 352, 353, 360,	GRANADA (VHSAY3), SHARP (VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700)	VL08	60p	SANYO SHARP	VXP 0581 1430662T15620 NIDL005GEZZ	IT18
VR6442, VR6542 VR2025, VR2580 VR445B9, BR445B920, BR6843 VR6548, VR6648, VR45	70p 100p VR445B922, 100p	364, 368, 4210, 4230, 4 6000, 8564 V320, V321, V323, V32 V4300 V333	4260, 4400, 5500, 90p 26, V4200, 90p 100p	PANASON			PRICE	NIDL003GEZZ NIDL0006GEZZ NPLY0107GEZZ	IT21
VR644869S SABA VR6420, 6435, 6440, 64	110p 460, 6480, 6620,	V340 V4100, VK308, VK309 VK300, VK301, VK302 VK3301 VK312	VK410 120p	MODE SWIT NV2000, 2010, 7000, 7200, 7800	CHES) £3.50		A PACK OF 5 FOR A PACK OF 10 FO	
6770, 7200, 8420, 2410 4A10, 4B20, 6A10, 6A7 VR6004, 6005, 6011, 60 7014, 8011, 8014, BERI VR2000, VR6000, VR60), 70, 2820, 3820, 0, 6820, 8820 65p 014, 7004, 7011, LIN 90p 012, VR7000,	TOSHIBA V55, V57 V33, V31, V51, V53, V	85p 9600, V9680 85p	NV230, 260, 430, 810, 870, 2300 (VSS0110) NV830 (VSS0091)		£2.25 £2.10	GR	ANDATA	LTD
VR7720, PVR6068 VR5005, VHR7000 VR6006, 6007, 6008, 60 9018, 6038, 7006, 7007 9006	130p 135p 009, 6015, 9016,	V61, V63, V65, V66, V6 DV80B, DV80D, V71, 7 86 V108, V109, V199, V20 V91G, V95G	67 13, 74, 75, 81, 83, 85, 120p	NV300, 333, 340, 366, 688, 777, (VSS0060) NVG21, 25, NVH65, NVD80 (VS		£3.75 £2.00		0181-900 0181-903	

TELEVISION JULY 1996

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VIDE	O SEF	RVICE KITS	
AMSTRAD VCR700 Contents BELT SET PINCH ROLLE Order Code: SK41	R REELI	DLER. VIDEO LAMP	£5.50
FERGUSON & JV 3V42/43 HRD455/HRD725	C		
Contents BELT SET. PINCH ROLLE CLUTCH MECHANISM. T BAND	ENSION	Economy Kit Contents BELT SET. PINCH ROLLER SUPPLY CLUTCH. TAKE U CLUTCH	Ρ
Order Code: SK37 3V58/59/64/65 HRD170/180/210/230/300	£16.00	Order Code: SK38	£9.00
HRS5000 Contents BELT SET PINCH ROLLE Order Code: SK44			£7.00
3V29/3V30 HR7200/7300/7350 Contents BELT SET, PINCH ROLLE Drder Code: SK05	R. TENSIC	ON BAND. IDLER TYRES	£5.00
3V35/36 38/39/49 HRD110/111/120/225 <i>Contents</i> BELT SET. PINCH ROLLE Order Code: SK04	r. Ten <mark>sic</mark>	ON BAND, IDLER TYRES	£5.00
N 31/3V42 IR7600/7610/7650/7655 Contents JELT SET. T/U REEL TAB IYRE PINCH ROLLER. R DERL T/U CLUTCH. T/U IENSION BAND. VIDEO I Irder Code: SK33	eel Idler	Economy Kit Contents BELT SET. T/U REEL TABLI TYRE, PINCH ROLLER, REI IDLER TYRE, T/U IDERL TY T/U CLUTCH Order Code: SK34	EL
3V35/36/38/39/49 HRD10/111/120/121/22 Contents SELT SET. T/U REEL TAB FYRE. SUPPLY REEL TAB FYRE. PINCH ROLLER. T. CULTCH. T/U IDLER. REE DLER. TENSION BAND DICH. CODE: SK35	LE BLE VU	Economy Kit Contents BELT SET. T/U REEL TABLI TYRE. SUPPLY REEL TABL TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER TYRE. IDLER TYRE Order Code; SK36	E
V29/3V30 IR7200/7300/7350 iontents IELT SET. T/J REEL TAB YRE. SUPPLY REEL TAB YRE. PINCH ROLLER. R JLER T/J CLUTCH. T/J ENSION BAND. VIDEO L Ider Code: SK31	eel Idler.	Economy Kit Contents BELT SET. T/U REEL IDLE TYRE. SUPPLY REEL TABL TYRE. PINCH ROLLER. REI IDLE TYRE. T/U IDLER TYR T/U CLUTCH Order Code: SK32	E EL
N44/45/48/53/54/55/57 IRP50/HRD140/150/158/ IRD250/257/565/566/755 <i>intents</i> SELT SET. PINCH ROLLE CUTCH MECHANISM. T	R.	Economy Kit Contents BELT SET. PINCH ROLLER	
BAND Inder Code: SK39	£15.00	Order Code: SK40	£9.50
TISHER VHP905/906/907/908/91 ontents ELT SET, PINCH ROLLE DLER, GEAR IDLER UNIT ENSION BAND	R	/918 Economy Kit Contents BELT SET. PINCH ROLLER IDLER TYRE	
rder Code: SK57	£13.00	Order Code: SK58	£5.00
/HP615/618/620/622/71 30/830/840 Ditents ELT SET. PINCH ROLLE DLER. GEAR IDLER UNIT ENSION BAND	R.	Economy Kit Contents BELT SET. PINCH ROLLER IDLER TYRE	
Irder Code: SK68	£11.00	Order Code: SK69	£3.00
T11/VT33		N BAND, IDLER TYRES	

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1/VT33 ntents LT SET T/UP REEL TABLE RE. SUPPLY REEL TABLE RE. PINCH ROLLER, FF/REW Economy Kit Contents BELT SET. PINCH ROLLER FF/REW IDLER TYRE. T/UP REEL TABLE TYRE. SUPPLY REEL ER. CLUTCH PLATE TABLE TYPE SION BAND er Code: SK45 £13.00 Order Code: SK46 52/61/62/63/64/65/85/86/640 Economy Kit Contents BELT SET. PINCH ROLLER. tents T SET. PINCH ROLLER. REW ARM_CLUTCH PLATE. FF/REW IDLER er Code: SK49 £14.00 Order Code: SK50 400/405/410/13/14/15/18/420/25/26/28/430/31/35/48/450/498/)/520/25/26/530/35/36/540/545/46/48/570/75/576/580/85/88 ntents Ming Belt, Pinch Roller, FF/Rew Arm, Clutch Base, SION RAND er Code: SK52 00/110/111/113/115/118/120/125/128/130/135/138/145/150/ /220/225/250/255/258/260/VTL30 itents T SET. PINCH ROLLER. FF/REW ARM, CLUTCH PLATE, ISION BAND er Code: SK51 NASONIC 2000/NV2010 NV7000/NV7200/NV7800 ntents Contents BELT SET. PINCH BOLLER. T SET PINCH BOLLER VSION BAND. IDLER TYRES ler Code: SK03 £5.00 TENSION BAND. IDLER TYRES Order Code: SK02 £5.00 300/NV330/NV333/NV340/NV366 tents T SET PINCH ROLLER. TENSION BAND, IDLER TYRE 2000/NV2010 Economy Kit Contents BELT SET, PINCH ROLLER. tents T SET, PINCH ROLLER, FF ER. PLAY IDLER TENSION ND. VIDEO LAMP IDLER TYRE. PULLEY TYRE er Code: SK13 £6.00 Order Code: SK14 7000/NV7200/NV7800 tents T SET, PINCH ROLLER. Economy Kit Contents BELT SET. PINCH ROLLER T SET PINUT HOLLE ER UNIT. PLAY IDLER. er Code: SK11 £8,50 Order Code: SK12 300/NV330/NV333 NV340/NV366 itents T SET. PINCH ROLLER. ER UNIT. PLAY IDLER. ISION BAND Economy Kit Contents BELT SET. PINCH ROLLER. IDLER TYRE. PLAY IDLER TYRE er Code: SK15 Order Code: SK16 £7.00 G7/NVG9/VNG10/NVG11/NVG12/NVG14/NVG15/NVG16/ G18/NVG30/NVG120/NVG130/NVG400/NVH65 (PX/AC)/ 810 (P/K) tents ADING BELT. CAPSTAN .T. PINCH ROLLER IDLER Economy Kit Contents LOADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER SION BAND TYRE er Code: SK27 £6.00 Order Code: SK28 332 Economy Kit Contents BELT SET. PINCH ROLLER. PLAY IDLER TYRE. FF/REW tents tents T SET. PINCH ROLLER. Y IDLER, FF/REW IDLER, ISION BAND, FF/REW TYRE er Code: SK29 £12.00 IDI FR TYRE Order Code: SK30 30/250/260/280/430/450/460/470/650/810/890/ 200PK/AG1500PK Economy Kit Contents BELT SET. PINCH ROLLER. IDLER TYRE tents LT SET. PINCH ROLLER ER TENSION BAND Ier Code: SK23 £ 6 00 33 Order Code- SK24 500/NV688 Economy Kit Contents BELT SET. PINCH ROLLER PLAY IDLER TYRE. FF/REW IDLER TYRE Order Serve tents T SET. PINCH ROLLER Y IDLER. FF/REW IDLER. SION BAND er Code: SK25 £12.00 Order Code: SK26 730/NV770 Contents SLOT IN BELT. LOADING BELT. PINCH ROLLER. IDLER UNIT. Economy Kit Contents SLOT IN BELT. LOADING BELT. PINCH ROLLER. IDLER TYRE TENSION BAND Order Code: SK19 £5.00 Order Code: SK20 NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK Economy Kit Contents BELT SET PINCH ROLLER. IDLER TYRE Contents BELT SET. PINCH ROLLER. IDLER. TENSION BAND Order Code: SK21 £ £5.00 Order Code: SK22 NV777/NV788 Contents BELT SET. PINCH ROLLER. IDLER UNIT. TENSION BAND Economy Kit Contents BELT SET. PINCH ROLLER. IDLER TYRE Order Code: SK17 £6.00 Order Code: SK18

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	VS3, 6, 12, 59, 59 V9700 VS125, 126, 155	IDLER IDLER ASSY	BV321979 MZ366960J2	600p 900p	JVC HR330, 3660, 4100 HR7200, 7600, 7650	T-UP IDLER SML T-UP CLUTCH
	VS125, 126, 155, VS165, 240, 244, 245, 247, VS22, 38, 105, 112, 115, 11				HR7655, 7300, 7350, 7610 HR7200, 7300, 7350	REEL IDLER
	VP7100, VS9300 VS9500, VS9800	T-UP IDLER	PU47752 PU46381	£4.50 £4.00	HR7600, 7610, 7650, 7655, 1 HR7600, 7610, 7650	7700 ROLLER ASSY
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	VP38	IDLER	BV336067	£5.00	HR7655, HRD110, HRD111, HRD110, HRD120-121,	HR7300, 7350, 76 T-UP CLUTCH
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	VCR7000 TVR1, VCR4500 VCR4600, VC5200, VCR90	IDLER CLUTCH	150280 150873	£1.50 £3.75	HRD140, 150, 157, 158 HRD160, 250, 257, 565, 566 HR3300, HR3330	755, HRP50 REW IDLER
	TVR1, VCR4500 VCR4600, VCR5200, VCR9	GEAR HOLDER	151284	£3.50	HR3660, HR4100 HRD140, 150, 157, 158 HRD160, 250, 257, 455, 565 HRD140, 150, 157, 158 HRD140, 250, 257, 455	TAKE UP CLUTC
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	VCR4500, VCR9000 VCR4500, VCR4600	CLUTCH MOD KIT	(TAPE CREASING)	£4.00 300p	MATSUI VX730, 735, 750, 755,	CLUTCH
	VCR4700 MOD KIT TAPE CREASING VCR4500, 4600, 4700	G FOR AMSTRAD		£3.00	VX810, 820, 850, 880, 990 VX730, 735, 750, 755	LIMITED POST L
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	8903, 8909, 8912, 8922	REEL IDLER 924, 8929, 8930, 8931, 8940, 8	PU48967	175p	MITSUBISHI HS306, 307, 318, 319,	GEAR ASSY
	3V31, 3V32, 3V35, 8923, 89 3V23, 3V31 3V29, 3V30, 3V31	ROLLER ASSY T-UP IDLER	PU49042A 51402	350p 100p	HS400, 410, 710 HS337, 338, 347, 349 HS411, 412, 421, HSB10, H	IDLER SB20, HSB30, HS
	3V32, 3V35, 3V36, 3V38, 3 3V29, 3V30, 3V31	V39, 3V49, 8930, 8931, 8940, T-UP CLUTCH		200p	HSE70 HS306, 307, 318, 319	IDLER
	3V32, 8930, 8931, 8940, 89 3V35, 3V36, 3V38 3V39, 3V49, 8943, 8944	A1, 8942 REEL IDLER	PU55374	200p	HS400, 410, 710 HS347, 349, 412 HSB10, HSB20, HSB30, HS	IDLER E10. HSE20. HSE
	3V35, 3V36, 3V38 3V39, 3V49, 8943, 8944	T-UP CLUTCH	PU55373	150p	HSB10, HSB20, HSB30, HS HS337, 338, 411, 421 HS200	TAKE UP IDLER
	3V58, 3V59, 3V64 3V65, FV10, FV11, FV12 FV FV30, FV32, FV33, 8950, V0	IDLER ARM /13, FV14, FV20, FV21, FV22,	PU58645 FV26	£2.25	HS200 HS200 HS306, 307, 318, 319	UNLOADING IDI REWIND IDLER SUPPLY REEL
	3V42, 3V43 3V43, 3V44, 3V45	CLUTCH ASSY CLUTCH ASSY	PU55822 PU57658	1200p 1050p	HS400, 410, 710 HS306, 307, 318, 319	DISK TAKE UP REEL
	3V48, 3V53, 3V54, 3V55, 3 3V42, 3V43, 3V44 2045, 3V43, 3V44	V57, 8947, 8948 T-UP CLUTCH V55, 3V56, 3V57, 8947, 8948	PU56043-1-4	240p	HS400, 410, 710 HS320 HS337, 338, 411, 421	DISK REEL DISK REEL DISK
	3V42, 3V43, 3V44	SUPPORT CLUTCH V55, 3V56, 3V57, 8947, 8948	PU56044-1-5	160p	HS300, 301, 302, 310 HS306, 307, 318, 319	PULLEY GEAR WHEEL
	3V00, 3V01, 3V16 3V22, 3292, 8900, 8901, 89	LOADING IDLER	PU43681	£4.00	HS400, 410, 710 HS306, 307, 318, 319	GEAR WHEEL
	8912, 8922 3V00, 3V01, 3V16 3292, 8900, 8901, 8904, 89	REW IDLER	PU46380	500p	HS400, 410, 710	
	3V16, 3V22, 8902 8909, 8912, 8922	IDLER	PU49281	£1,70	N830, N831, N832, N833 N830, N831, N832, N833 N830, N831, N832, N833	TAKE UP CLUTC TAKE UP IDLER REEL IDLER
	FVHP420, 520, 530	FF-REW PULLEY	HI638531	80p	N895 N911, N915, N916, N917	TAKE UP IDLER
	FVHP615, 618, 620 FVHP622, 710, 711, FVHP7 FVHP840,905, 906 FVHP9	COMP. IDLER ASSY 20, 721, 722, FVHP725, 730, 08, 910, 911, FVHP915, 916, 9	F11430420400300 830 918	£220p	N9012, 9013, 9014, 9016, 90 N9510, 9520, 9530, 9610	133, 9034, 9054, 9
	FVHP615, 618, 620 FVHP622, 710, 711, FVHP7	GEAR IDLER ASSY 20, 721, 722	FI1430490400900	380p	NATIONAL NV322, NV600, NV688,	IDLER UNIT
	FVHP725, 730, 830, FVHP8 FVHP615, 618, 620 FVHP662, 710, 711, FVHP7	REEL T-UP ASSY	FI1430410400900	£5.50	NV777, NV788, NV332, AG NV300, NV333, NV340 NV366	6100, 6200, 6800, IDLER ARM
	FVHP725, 730, 830, FVHP8 FVHP905, 906, 908,	GEAR IDLER ASSY	FI1430490402400	275p	NV300, NV330, NV333 NV340, NV366	IDLER UNIT
	FVHP910, 911, 915, FVHP9 FVHP975, 980, 990, FVHP999, 5000, 5005	IDLER	FI1430420400700	300p	NV300, NV330, NV333 NV340, NV366, NV8620	PLAY IDLER
	FVHP5050, 5075, 5100 FVHD40, 55, 140	REEL DRIVE ROLLER		£6.00	NV300, NV332, NV333 NV340, NV366, NV600, NV AG6010, AG6015	
	FVHP1, 10, 20 FVHP975, 980, 990 FVHP420, 520, 530	CLUTCH IDLER	F12430510404200	£9.50 £2.80	NV333, NV688, NV2000 NV3000, NV7800 NV300, NV332, NV333	LOADING GEAR
	FVHP420, 520, 530 FVHP990	TAKE UP IDLER LOADING GEAR		290p 90p	NV340, NV366, NV600, NV AG6010, AG6015	777, NV788, NV20
	VBS3500 VBS3500 VBS7000	REEL DRIVE PULLEY IDLER REW IDLER		£3.20 250p 95p	NV330, NV333, NV340 NV366, NV777, NV788 NV230, NV250, NV260	CAM GEAR
	COLDSTAR		435038A	£2.50	NV280, NV370, NV380, NV NV630, NV650, NV730, NV	430, NV450, NV46 780, NV810, NV83
	GHV1241, 1242, 1243, GHV GHV8200, 8210, 8215, GHV	CLUTCH GEAR V1244, 1245, 1246, GHV1247 VP51, VCP4100, 4130 IDLER	, 1248, 8000,		NVG7, NVG9, NVG10, NVC NVG30, NVG400, AG1000, AG2200, NVH65, NVH70	AG1200, 1500, 18
-	GHV1241, 1242, 1240 GHV1241, 1242, 1243, GHV GHV8200, 8210, 8215, GHV	IDLER V1244, 1245, 1246, GHV1247 VP51, VCP4100, 4130	, 1248, 8000,	110p	AG2200, NVH65, NVH70 NV370, NV430, NV870, NV730, NV830, NV850, NV	CAM GEAR G10, NVG12, NVC
	HINARI VXL3, VXL20	REELIDLER	4000009	110p	NV730, NV770 NV2000, 2010 3000 NV2000, 2010, 3000	IDLER UNIT IDLER UNIT IDLER UNIT
	VXL2 VXL4 VXL35	IDLER		110p £2.75	NV2000, NV3000 NV7000, 7200, 7800	CAM GEAR IDLER UNIT
	VXL4, VXL35 VXL4, VXL12, VXL25 VXL30, VXL35, VTV300	CLUTCH LIMITER POST		£6.50 £1.30	NV7000, 7200, 7800 NV8150, 8200, 8300, NV8400, 8600, 8610, 8620	CLUTCH IDLER UNIT
	VXL5, VXL6 VXL5, VXL6	CLUTCH GEAR HOLDER		£3.75 £3.50	NV8200, 8400, 8600 NV8610, 8620	PLAY IDLER
	VXL7, VXL8, VXL9 HITACHI	CLUTCH		£3.80	NV8620 NV332, NV600, NV688 NVG20, NVG21, NGV25	CLUTCH IDLER PULLEY UNIT
	VT11-33, VT63-64 VT14, 17, 19, 38, 57, 86, 88	CLUTCH ASSY 34, 35, 39, 52, 61	6879515	£7.50	NVG40, NVG45	
	62, 65, 85, 330, 640, VT165 VT120-220, 100, 110 111, 113, 115, 118, 200	CLUTCH ASSY	6886824 6886972	£7.50	NV230, NV250, NV280 NV430, NV450, NV460, NV NV870, NV890, AG1000 NV370, NV380, NV630	465, NV650, NV73 DLEB
	255, 258, 260, VTL30	5, 150, 175, 225, <mark>250</mark> ,			NV780, NV830 NV370	CLUTCH GEAR
	VT8000-8300, 7000 VT8500-8700 VT8000-8300, 7000	FF-REW IDLER	6413663 6414221	£2.80 290p	NVG7, NVG11, NVG12 NVG14, NVG15, NVG18, N	WORM WHEEL VG30, NVG120, N LOADING GEAR
1	VT8500-8700 VT8000-8300, 7000	FF-REW PULLEY	6383531	80p	NV2000, 2010, 3000 NV7000, 7200, 7800, 8050 NV230, NV250, NV370	LOADING GEAR
	VT8500-8700 VT9300-9500, 6500 VT680, 6800, 9700, 9900	FF-REW IDLER	8681471	250p	NV430, NV450, NV460, NV NV830, NV890, NVG7, NV0 NGV130, NVG400, NVH70,	630 NV730 NV77
	VT9300-9500, 6500 VT680, 6800, 9700	PLAYIDLER	6861482 6861481	230p		
	VT 9900 VT9300-9500, 9700	IDLER IDLER	681505	230p £3.80	NV280, NV430, NV450, NV NVG7, NVG10, NVG11, NV NCG120, NVG130, NVG40	G12, NVG14, NV 0, NVH70, AG100
- E	VT9900, 6500, 680, 6800 VT11-33, VT63-64 VT14, 16S, 17, 19, 34, VT35	FF-REW IDLER	687043 6886971	125p	NV230, NV250, NV260 NV280, NV300, NV333, NV	340, NV366, NV37
	VT65 95 96 99 220 640		6886792	240p	NV465, NV630, NV650, NV NV870, NV890, NV2000, N NVG14, NVG15, NVG18, N	/2010, 7200, 7800 VG30, NVG120, N
	V 1400, 405, 410, 413	FF-REW ARM 128, 130, 135, 138, 145, 150 258, 260, VTL30 FF-REW ARM	6897094	£1.30	AG1000 SAISHO	
	VT414 415 418 420 425	426 429 430 431 435			VR605, VR800, VR900 VR1100, 1200, 1600, 2500, 3 VR3500, 3600, 3800	LIMPTER POST
4	VT588, VTM625, 626, 630, VT400, 405, 410, 413	520, 526, 526, 530, 530, 535 570, 575, 576, 580, 585 635, 636, 640, 645, 646, VTS CLUTCH BASE	80, 85 6896951	£5.00	VR3500, 3600, 3800 VR1100, 1200, 1600, 2500, 3 VR605, VR800, VR900 VR2500, 3200, 3300, 3500, 3	3200, 3300, 3500, IDLER
	VT400, 405, 410, 413 VT414, 415, 418, 420, 425, VT438, 450, 498, 510, 518, VT536, 540, 545, 546, 548,	426, 428, 430, 431, 435 520, 525, 526, 530, 535 570, 575, 576, 530, 535			VR2500, 3200, 3300, 3500, 3 VR705, VR805, VR905	3600, 3800 IDLER
	V1588, V1M625, 626, 630, VT3000	635, 636, 640, 645, 646, V I S T-UP IDLER (LARGE)	80, 85	£4.50	SANYO VHR1110, 1150, 1200	
3	VT3000	REWIDLER		£6.00	VHR1300, 1500	

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BRAKE	6861505	230p	VTC5000, 5150, 6000 FF-REW IDLER 143-0-741T-20001 250p
			VTC6500, VTCM10, M11, M20, M21, M30, M31, M50 VTC9100, VTC9300 IDLER VTC9300, VTC9300 FF ROLLER ASSY 143-0-547T-00200 200p
		£5.50 £8	VTCM10, M11, M20, M21 REEL DRIVE PULLEY 143-0-662T-10350 £5.00
	01140000	GE EQ	VTCM30, M31, M50 VHR2100, 2300, 2500 IDLER 6130374899 300p
JP IDLER SML JP CLUTCH	PU49280 PU53462A	£5.50 220p	VHE2700 VTC5000, 5150, 6000 PULLEY 143-0-662T-01201 £5.20 VTC5500
ELIDLER	PU48967	175p	VTCM10, M11, M20, M21 PULLEY 143-0-662T-10350 £5.50
LLER ASSY	PU49042A	350p	VTCM30, M31, M50 VHR3100, 3300, 3310 REEL DRIVE 143-0-662T-15621 350p VHR3400, 3700, 3800 ROLLER
JP IDLER LRG JP IDLER	PU47752 PU51402A	£4.50 100p	VHRDS00, VHRD700 VPR5800, VTC5300 LOADING ROLLER 143-0-861T-03800 80p
7300, 7350, 7610, HRD12 JP CLUTCH	20-121, 225 PU55373	150p	VTC5400 VTC3000 FWD LIMITER £3.50
ER ARM	PU55374-3-8	200p	VTC3000 IDLER 750p
	PU58465	£2.25	SHARP IDLER ASSY NIDL0005GEZZ 110p IDLER NIDL0005GEZZ 110p
0, 700, 750, 950, 3000			IDLER NIDL00066EZZ 110p VC600, 651, 681, 682 IDLER ASSY NPLYV0107GEZZ £6.15 VC684, 685, 693, 699, 700, 783, VC6FR, VC6V3 NPLYV0107GEZZ £6.15
UTCH MECH UTCH MECH	PU558822 PU57658	1200p 1050p	VC7300, VC7700, 7750 PLAY IDLER KIT NPLYV0041+ NDA1V1007 £7.50
5, HRP50 WIDLER	PU46380	500p	
KE UP CLUTCH	PU56043-1-4	240p	FAULT FINDING GUIDE BOOKS
6, 725, 755, HRP50 KE UP CLUTCH	PU56044-1-5	160p	
6, 725, 755, HPR50			Satellite Fault Finding Guide Issue 1. Listing
UTCH	850A00005	420p	about 1,000 faults for over a range of 24
AITED POST LEVER		£1.30	different brands. Order Code: BOOK05.
LER REEL		6150	Price £8.50 - No VAT.
EL UNIT CLUTCH		280p	
ARASSY	522B00201	66.25	Video Recorders Edition 4
LER	552801701	325p	
20, HSB30, HSE 10, HSE2	0, HSE20, HSE30,		List more than 4500 faults
LER	641C34301	£2.00	for 43 different brands
LER), HSE20, HSE30, HSE70	522902002	£3.00	Price £12.75p Only, No VAT. Order Code: BOOK01
ler (Ke up idler (large)	552B01801	320p £4.50	
NLOADING IDLER		£4.00 £6.00	TELEVISION
JPPLY REEL SK	522A00101	£3.20	Edition 5
KE UP REEL SK	522A00102	£3.20	Lists more than 6,000 faults with 306 pages
EL DISK EL DISK	522C06301 522P00601	£3.00 £5.00 £2.25	covering 58 different brands
ILLEY AR WHEEL	522C05201 641D71101	£2.25 £1.50	Price: 1450p only - no VAT. Order Code: BOOK02
ARWHEEL	641D71001	£1.50	
			Satellite Repair Manual Edition 3
KE UP CLUTCH		150p 100p	
ELIDLER		200p 550p	A comprehensive guide to receiver reviewing,
EL DRIVE PULLEY , 9034, 9054, 9055, 9066,	9110	350p	featuring stock faults and installation tips.
, 3034, 3034, 3033, 3000,	5110		Price 1400p Only No VAT Postage 100p
LER UNIT	VXP0463	£2.75	Order Code: BOOK03
0, 6200, 6800, 6810 LER ARM	VXL0997	£3.60	
LER UNIT	VXP0401	60p	
AYIDLER	VXP0433	£2.75	SEMICONDUCTOR COMPARISONS 1996
TION GEAR	VDG0016	£0.60	Listing more than 29,000 Semiconductors
, NV788, NV2000, NV201			with suitable alternative complete with
ADING GEAR	VXP0325 VXG0017	£2.00 £0.65	descriptions and base information.
TERMEDIATE GEAR , NV788, NV2000, NV201		10.00	Price: £14.50 - No VAT. Order Code: BOOK04
M GEAR	VXG0158	£1.00	ANDED LIEAD OF FAMILIO OTIONO
LER ARM NV450, NV460, NV465,	VXP0521 NV470 NV480	110p	VIDEO HEAD CLEANING STICKS
, NV450, NV450, NV483, , NV810, NV830, NV850, , NVG12, NVG 14, NVG1 1200, 1500, 1810, 2100,	NV870		
1200, 1500, 1810, 2100,			
M GEAR), NVG12, NVG18	VDG0200	£1.20	
LER UNIT	VXP0581 VXP0331	£2.50. 80p	Order Code: SP14
LER UNIT	VXP0329 VDG0069	80p £1.00	Price 17p each 15P each pack of 10pcs
LÊR UNIT LUTCH	VXP0344 VXP0343	75p 300p	13P each pack of 25pcs
	VXP0245	90p	
AYIDLER	VXP0243 VXP0343	90p 250p	VIDEO MAINTENANCE TOOLS
UTCH LER	VXPO488	250p 300p	Set of 8 Allen keys packed in
ILLEY UNIT DRM WHEEL	VXP0767 VXP0604	400p 160p	a plastic wallet Order Code: TOOL9
, NV650, NV730, NV770,	NV810	ioop	Price 125p
LER	VXP0523	300 p	Specifically designed for video maintenance
UTCH GEAR ORM WHEEL	VXP0595 VXP0691	£1.00 £1.50	
30, NVG120, NVG130, N ADING GEAR	VG400, NVH70 VDG0035	£0.60	Solder Mop 1.2mm×10metres 400P
ADING GEAR	VXP0520	£1.50	Tubed Silicon Grease 50 gram 200P
, NV730, NV770, NV780, NVG12, NVG15, NVG30	NV810 0, NVG120		Tubed Heat Sink Compound 25 gram 150P
1000		£2.50	UNIVERSAL HEAD EXTRACTOR TOOL
, NV770, NV810, NV870, 2, NVG14, NVG15, NVG1	NV890 18, NVG30		Hand tool designed for
IVH70, AG1000 MITER ROLLER		£1.50	extracting hard to remove
NV386, NV370, NV430, NV780, NV810, NV780, NV810, NV780, NV810, NV780, NV	NV830 NV850		ful heads without damage to either the head or the
10 7200 7800 NVG7 N	VG10 NVG12		mounting assembly.
30, NVG120, NVG130, N			Adjustable so as to suit various brand heads.
30, NVG120, NVG130, N			various piditu tiedus.
30, NVG120, NVG130, N LUTCH	850A20000	420p	PRICE - £6.50
30, NVG120, NVG130, N LUTCH 0, 3300 MITER POST		420p £1.30	PRICE - £6.50
30, NVG120, NVG130, N UTCH 0, 3300			GRANDATA LTD
30, NVG120, NVG130, N UTCH 0, 3300 VITER POST 0, 3300, 3500, 3600, 3700 LER		£1.30	GRANDATA LTD
30, NVG120, NVG130, N UTCH 0, 3300 WITER POST 0, 3300, 3500, 3600, 3700 LER 0, 3800		£1.30 280p 110p	GRANDATA LTD Tel: 0181-900 2329
30, NVG120, NVG130, N 0, 3300 VITER POST 0, 3300, 3500, 3600, 3700 LER 0, 3300 LER)	£1.30 280p 110p	GRANDATA LTD

95p 200p £5.00

80p £3.50 750p

110p 110p £6.15

JUST ARRIVED!!! NEW ITEMS

Satellite PSU Repair Kits

Experience shows that 50% of all receiver power supplies 'bounce' unless the correct precautionary measures are taken when being serviced. A kit of all the recommended parts is supplied for the 4 most popular models, which when fitted should overcome this.

MAKE & MODE	_	ORDER CODE	PRICE
PACE PRD800	PRD900	SATPSU1	650p
PACE SS9000,	9200, 9010, 9020, 922	0 SATPSU2	650p
AMSTRAD SR	D510, SRD520	SATPSU3	650p
AMSTRAD SR	D500	SATPSU4	650p
Replaceme	ent Video Head	is	
MAKE	MODELS		PRICE
HITACHI	VT570, VT575, VT57 VT588, VTF70	6, VT580, VT585	3100p
I.T.T.	VR3761		3100p
JVC & FERGUSSON	HRD950, HRD960, H	RD980, FV46	5000p
LUXDR	VR3761		3100p
MITSUBISHI	HSE51		3000p
NATIONAL	NVFS200, NVFS90, 1	10008000	4600p
PANASONIC	NVHD100, NVHD101	, NVHF100	3100p
	NVSD		1400p
	AG7330, AG7350, AG	37355, AG7450	5000p
	NVFS100		5000p
N.E.C.	D5600		3500p
SANYO	TLS1000P, TLS1001	P, TLS1100	3100p
	VHR7800, VHR7810, VHR8801SP, VHRD4		3100p
SHARP	VCH80, VCH81, VFH8	315	2800p
	VCA33, VCA36, VCA VCA46, VCA49	13, VCA44,	1500p
	VCA55, VCA63		2200p
SDNY	SLV656, SLV715, SL SLV815, SLV825	757, SLV777,	4600p
	SLV353UB		3200p
	CCDF340E, CCDF500 CCDV95E, CCDSP5E	E, CCDV90E,	4800p
Original V	ideo Heads		
MAKE	MODELS		PRICE
NATIONAL PANASONIC	NVG20, NVG21, NVG NVG25, NVG28, NVG PART NO: VEH 0343		3000p
	NVG33, NVG45, NVG NVL25, NVL28 PART NO: VEH 0417	46, NVL23	2900p
	NVJ30, NVHJ33, NV NV G30, NVG31, NVG PART NO: VEH 0416		2700p

AMSTRAD ORIGINAL NO: 150751

 Josed on: AMSTRAD TVR1, 2, 3, VCR4600, 4600MKII, 4700,

 FUNAI VS2, VCR4600, 4800, 5200, 5600, 5600, VIP3000, 5000

 Also fits: FIDELITY, FUNAI, HINARI, PROLINE, SCHNEIDER,

 TOWADA, UNIVERSUM
 ORDER CODE: AMIP. PRICE: 1350p

 TOWADA, UNIVERSUM
 ORDER GUDE: ANUL FRIGE. 1030-F

 AMSTRAD ORIGINAL NO: 153134
 Used on: ANSTRAD D0800. 8904, VCR2000, 6000, 6100, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 8244

 Also fits: ANITECH, BONDSTEC, CASIO, CROWN, FIDELITY, GOLDHAND, GRANADA, HINARI, MARQUANT, OMEGE, PROFEX, SCHNEDIER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA, UNIVERSUM
 ORDER CODE: AH02

Replacement Audio Control Video Sound Head for National Panasonic

PART NUMBER	MODELS	PRICE
VBR 0091	NVG7 etc	875p
VBR 0050	NV300, NV340 etc	875p
VBR 0061	NV777 etc	875p
VBR 0103A	NV250, NV450 etc	625p
VBR 0125		625p

8 way Preprogrammed Universal Remote Control

A single remote control to operate Televisions, Videos and Satellite Receivers. Plus Auxilliary Options11 Replaces up to 8 remotes with one * Simple 4 digit setup routine * Controls 1000s of models * Teletext functions with Fastext * Clear (lerge key) layout * Code Search Facility * Stylish and easy to operate * Replace broken or lost remotes * Original Remote not required Order Code: 8 WAY Price 1450p + VAT

Replacement Video Cassette Housings

MAKE	MODELS	CODE	PRIC
AKAI	VS35, VS53, VS55, VS56, VS75	CH18	2600
GRANADA	VHSDP1	CH05	1100
	VHSYJ2	CH01	2800
GOLDSTAR	GHV1290P, 1291P, 1295P, 9400, 73401, GSE1295P, GSE1891P, 20001Q, 20051Q, VCP4200, 4300, 4301, 4305, VCP4306, 4311, 4315, 4316,4320, 4321, 4325	CH25	2000
	GHV51, 1221, 1232, 1240, 1241, 1242, 1244, 1246, 1248, GHV8000, 8200	CH26	2900
FERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, 3V49, HRD 110, 111, 120, 121, 225	CH01	2800
	3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD140, 141, 150, 157, 158, 160, 250, HRD257, 455, 565, 566, 725, 755	CH02	2800
	8948, 8950, FV10B, 12L, 13H, 14T, 20B, 21R, 22L, 26, 395, HRD230, 430, 530	CH03	2600
	3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRD370	CH04	2600
	FV31R	CH19	4300
	HRD515, 520, 527, 540, 550, 580, 600, 610, 620, 660, 670, HRD830, 840, 850, 860, 4050, 6600, FV37H	CH20	2400
	HRD540, 580, 830, 860, 910, 960, HRD970, HRDX20, FERGUSDN FV57H	CH27	2400
LT.T.	VR3605, VR3905	CH01	2800
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2800
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2800
NATIONAL PANASONIC	NV730	CH06	4300
N.E.C.	N830EG, N831EG, N832, N833EG	CH01	2800
	N895	CH02	2800
PHILIPS	CASSETTE LIFT ASSEMBLY (69120366) DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 6285, VR6290, 6291, 6293, 6362, 6367, 6393, 6467, 6468, 6470, VR6561, 6670, 6760, 6761, 6870, 6970	CH05	1100
	VR6443	CH22	2900
	VR6448	CH23	2500
	49SB6	CH24	2500
SHARP	VCA100, VCH851, VCH852	CH22	2900
	VCA103, 103GV, 106, 106 GVM, 254 GVM	CH23	2500
	VCS211, 244, 5055, 605, VCB230, VCD806 G, 810G, VCT212, 310, 410G, 610	CH24	2500
TELEFUNKEN	VR2970	CH02	2800
THDMSON	V320, 321, 323, 326, 4200, 4300	CH01	2800
	V342, 343, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, V5500, 6000, 8540	CH02	2800
TOSHIBA	V55, V57	CH01	2800
· · · · · · · · · · · · · · · · · · ·	V65, V66	CH02	2800

Service Aids

DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER	75ML	SP01	140
SWITCH CLEANER	176ML	SP02	150p
SILICONE GREASE	200ML	SP03	170
FREEZEIT	170ML	SP04	220
FREEZE IT	400ML	SP16	550p
FOAM CLEANER	400ML	SP05	170
ANTI STATIC	150ML	SP06	170;
AEROKLEANE	135ML	SP07	200
AERO DUSTER	150ML	SP08	220
AERO DUSTER	400ML	SP17	550p
PLASTIC SEAL	200ML	SP09	200
GLASS CLEANER	250ML	SP10	160;
COLDKLENE	250ML	SP13	200
EXCEL POLISH 80	250ML	SP18	150
ADHESIVE 120	400ML	SP19	190
LABEL REMOVER 130	200ML	SP20	240
REFURB 140	400ML	SP21	240
TUBE SILICON GREASE	50 GRAMMES	SP11	200
TUBE SILICON SEALANT WHITE	75ML	SP22	280
TUBE SILICON SEALANT CLEAR	75ML	SP23	280
TUBE HEAT SINK COMPOUND	25 GRAMMES	SP12	150
DRIVE CLEANER	200ML	SP24	150
SCREEN CLEANER	200ML	SP25	150
COMPUTER CARE KIT		SP26	2100

All the above items are manufactured by Servisol

If you purchase more than one Servisol Product, postage & package will be charged as follows: 300p for 5 cans 450p for more than 5 cans

CD Pick Ups

SONY OPTICAL PICK UP

PARTND: KSS210A SONY CDPC 301M, CDPC 305M 2200 Fits most Sony, Aksi & J.V.C. Portable HI-FI and Midi Systems 2200

PART NO: KSS210B

USED ON MODELS: CFD100, 105L, 120, 300, 440, 454, 455, 50, 500, 55, 58, 60

CFD68, 750, 755, 760, 765, 770, 775, 440S, W100, 100S

22000

MOTOR TYPE	_	-		2 H.	-	PRICE
6V MOTOR						170p
9V MOTOR						170p
12V CW MOTOR						170p
12V CCW MOTO						170p
13.2 CCW MOTO	_					290p
Cassette Ta	pe Hea	ds	_			10010000
HEAD TYPE	_					PRICE
MONO HEAD						90p
STEREO-HEAD						110p
AUTO REVERSE	HEAD					150p 200p
Soldering A		ries		_		
DESCRIPTION	_				CODE	PRICE
ANTEX SOLDERIN						
25 WATT 240 VA 15 WATT 240 VA					S101 S102	900p
25 WATT SPARE		.4UV)			S102 S103	900p 450p
15 WATT SPARE					S103	450p
OLDERING STAN						
SOLDERINGSTA SPARE SPONGE	ND (MADE	BYANI	EX)		S108	350p
SPARE SPONGE		_		_	S109	55p
18 SWG 500 GRA	MMES				S110	500p
20 SWG 500 GRA	MMES				S111	650p
22 SWG 500 GRA		-			S112	700p
DESOLDERING AID						
SOLDER MOP ST			.2mm x 1	.5M	S107	80p
SOLDER MOP 1.2 DESCLOERING R					S113	400p
DESOLDERING P SPARE NOZZLE	UMP				S105 S106	320p 60p
Fransistors	P. TCS	-	2		5100	005
		-				~= 0.0
BU 810 110	D MJE 1	8004	100p 125p	2SC 3	3885A 633	350p 70p
3UZ 90A 180	D STK 69	982H	6000	2SD	1680	2250
XA 1044P 550 A 13408 350	p STK 72 p TDA 20		450p 100p	2SK 2	793	400p 1400p
RFBC40 400	p TEA 20	019	200p	25K 25K 25K	1023	550p
.272 200	D TMP 4	7C434N	1250p	2SK	1342	750p
.6210 250 AC 3423P 100	p SAA 1: p 2SA 15		200p 55p	2SK 6800		600p 500p
AJ 15015 250	p 2SC 37	788	60p	82S1		450p
AJ 15016 350	p 2SC 38	185	350p			
C 1	RANE	TAC	A 1	TE		

Fax: 0181-903 6126

TELEVISION JULY 1996

630

REMOTE CONTROLS

Description	Order	Price	Description	Order	Price		VC
	Code			Code	1	CONTAIN	
GRUNDIG	50.407	000	PHILIPS (continued)	BC 201	750p	SE	T OF 7 H
TP160E	RC 107	900p	RC38	RC 301 RC 5301	750p	* RCA TYP	PE AUDIO
TP200, TP300	RC 380	800p	KT3 TEXT RC5352	RC 5352	800p	TOOL	
TP400 TP590-600	RC 401 RC 600	675p 850p	RC5375	RC 5375	850p	* RCA AD	
TP390,TP610	RC 610	850p	RC5 STANDARD	RC 5534	850p	* TENSIO	
TP621	RC 621	850p	RC5901	RC 5901	850p	+ VCR AD.	
TP630, TP650	RC 650	850p	RC5903	RC 5903	700p	3 Ret	versible !
TP660	RC 660	850p	SABA				Spring
TP661	RC 661	850p	T6772	RC 149	900p	Ord	er Co
HITACHI			TC319-320	RC 328	875p		
CLE800-CLE830	RC 140M	700p	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	800p	TC365	RC 365	800p	Malua	0.4
A5088470	RC 902	800p	SALORA			Value	Orde
A518612	RC903	900p	SERIES L	RC 190	875p	160mA	FU
SCL002	RC904	850p	86173	RC 882	850p	250mA 315mA	FU FU
C2096 A511940	RC 905 RC 906	850p 750p				400mA	FU
655602H	RC 907	800p	SANYO RC218, RC222, RC228, RC238	RC 140M	700p	500mA	FU
	110 307	0000	JXGE	RC 878	850p	630mA	FU
IFB13, 14, 15	RC 143	875p	JXDE	RC 884	850p	800mA	FU
FS4	RC 143	850p	VHR2300	RC 890	850p	1A	FU
RG305	RC 305	675p	RC628	RC 865	900p	1.25A	FU
RG306	RC 306	825p				1.6A 2A	FU FU
FS9/1-10/1	RC 307	850p	SHARP	DC 140M	9505	2.5A	FU
VS5 RUK	RC 308	825p	G0121CESA, 123CESA, 204, 251	RC 140M	850p	3.15A	FU
VS4-1	RC 310	850p	SIEMENS		2	4A	FU
MULTICONTROL (17C20)	RC 311	800p	FC616	RC 130	850p	5A -	FU
KORTING			FC631	RC 132	850p	6.3A	FU
18279, 18396, 18460, 18521 SE	RC 108	850p	FC742	RC 164	900p		
40540 VTS	RC 108	900p	SONY			0110051	
LOEWE		2	RM604, RM605, RM606	RC 140	700p	CURREI	VI KA
DC11	RC 146	850p	32 CHANNEL	RC 140M	700p	3A	
MATSUI			RM613	RC 141	750p	5A	
010270601	RC 889	850p	RM632, RM636	RC 160	675p	13A	
VX770	RC 892	850p	TATUNG				20
METZ			FXA	RC 877	850p	3.15A	
JAVA COLOR (6890)	RC 166	850p	RC70	RC 883	750p	4A 5A	
COLOR (7156)	RC 183	850p	FX70 FASTTEXT	RC 894	850p	6.3A	
JAVA (7180)	RC 184	850p	TELEFUNKEN			8A	
MITSUBISHI			FB632	RC 632 ST	850p	10A	
939P/03607, 939P/03609	RC 140M	850p	FB639	RC 639 ST	850p	8A	32M
NOKIA			THORN/FERGUSON			10A	
SATELLITE	RC 550	850p	3V35-42	RC 342	650p	15A	
NORDMENDE			21/21 22	RC 344	800p	20A	
TC2336	RC 351N	850p	21/57-58	RC 628	800p		38M
CMC1, TC3519	RC 356	875p	TX10 TEXT	RC 732	575p	10A	
OCEANIC			TX10 STEREO TEXT	RC 738	575p	ALL TH	
390C9500	RC 339	900p	TX9-90-100	RC 740	675p		LADU
ORION			3V55, FV11	RC 783	800p		1.0
RC53	RC 892	850p	TX100 FASTTEXT	RC 785	650p	ICPF1	
PANASONIC			TX100 STEREO FASTTEXT	RC 789	650p	ICPF1	5
EUR51200	RC 200	800p	PROFESSIONAL	RC 790	650p	ICPF2	20
TC2200	RC 201	850p			3	IGF72	
VSQ0357/NV730 TNQ1621	RC 202 RC 203	875p 900p	C1937	RC 950	850p	1	
	nc 203	auop	CT9117	RC 951	800p		Ai I on Am
Philco Carvel, Concorde,	RC 108	850p	201R4B	RC 952	800p	Funai V2 Also fits	S, VCR
MERCURY, TELESTAR	NG 100	0000			DO:	AISO IRS	
TC10	RC 152	900p	UNIVERSAL PROGRAMMABLE F	EMUTE CONT	RUL	1.	Ord
	110 100	coop	Controls up to 4 different devices remote controls including TV, aud	which use intr	areu	Used or	A Amst
PHILIPS	DC 124	850p		TC program	ienne,	8602,	
RC5002,5154 KT3 NON TEXT	RC 134 RC 135	825p		Price: 1		Aiso	its: Ant
69117032	RC 135	875p				Goidhe	ad, Gr
69117194	RC 180	875p	models. Ring for further details			Sch	eider, S
RC5991-UNIV	RC 300	580p			_		Ord

RALIGNMENT KIT SET OF 8 ALLEN KEYS HEAD & TAPE PATH AUGNERS DIO & CONTROL HEAD POSITIONING 0.77mm 1.27mr 1.50mr NENT TOOL FOR TAPE GUIDE POSTS K TENSION TOOL USTMENT TOOL FOR VARIOUS USES 2.40m ENT TOOL 3.00mr Consudations **Circlip Pilers** ng Hook Micro S VCR Head Extractor ode: TOOL10 Price: 2900p FUSES TIME LAG QUICK BLOW (20mm) (20mm) ler Code Price Order Code Price USE01 75P FUSE17 60P USE02 75P FUSE18 60P FUSE19 60P USE03 75P FUSE20 60P USE04 75P USE05 75P FUSE21 60P FUSE22 60P USE06 75P JSE07 60P FUSE23 60P USE08 60P FUSE24 60P 60P FUSE25 60P USEO9 FUSE26 60P USE10 60P 60P USE11 50P FUSE27 USE12 50P FUSE28 60P USE13 55P FUSE29 50P USE14 55P FUSE30 50P 50P FUSE31 USE15 60P 60P FUSE32 50P USE16 **FUSES** ATING ORDER CODE PRICE **CERAMIC PLUG TOP** FUSE33 FUSE34 100P 100P FUSE35 100P MM CERAMIC TIME LAG FUSE41 FUSE42 100P 100P FUSE43 100P FUSE38 100P FLISE39 100P FUSE40 100P MM CERAMIC SLOW BLOW FUSE44 210P FUSE45 210P FUSE46 210P FUSE47 210P MM CERAMIC SLOW BLOW FUSE48 875P VE PRICES ARE FOR PACKS OF 10 FUSES **C. PROTECTOR** ICPF38 ICPF50 ICPF75 ICPN5 ICPN10 ICPN15 ICPN20 ICPN25 ICPN38 ICPN50 ICPN75 Price: Only 30p each Price: Only sup each AUDIO CONTROL HEAD Amstrad Original No: 150751 mstrad TVR1.2.3, VCR4600, 4600MII, 4700 R4600, 4800, 5200, 5600, 6600, VIP3000, 5000 lity, Funai, Hinari, Proline, Schneider, Towada, Ultravox der Code: AH01 Price: £13.50 Amstrad Orlginal No: 153154 Amstrad Orlginal No: 153154 strad 008900, 8904, VCR2000, 6000, 8600, , VCR8604, 8700, 8704, 8714, 8800, 9005, 9244 Intitech, Boadstec, Casio, Crown, Fidelity, Granada, Hinari, Marguant, Omega, Protex, , SEG, Sentra, Shiptom, Tashiko, Tatung, Towada, Universum rder Code: AH02 Price: £14.50



TELEVISION JULY 1996





This year the emphasis was mainly on digital equipment George Cole reports

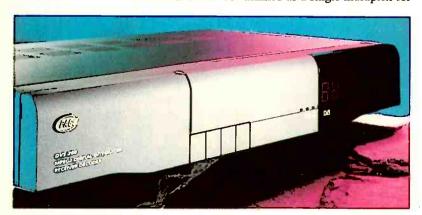
This year's Cable and Satellite Show was held at Earl's Court during April 15-17th. It's an interesting time for both these industries, not least because of the changeover in the broadcasting world from analogue to digital transmission.

Astra and Eutelsat

SES was celebrating the successful launch of its Astra 1F satellite on April 9th. The company announced that Viacom, the entertainment and publishing giant, has leased two of Astra 1F's transponders, bringing the total number leased to 12. Thus over half the total capacity of 22 transponders has now been booked. Viacom's channels include MTV Europe, VH1 and Nickelodeon. MTV Europe and VH1 Germany are moving from Astra 1E (transponder 71). The third Astra digital satellite, 1G, is to be launched in the summer of 1997. SES is now seeking new orbital positions for further satellites, to extend its coverage. The company demonstrated digital transmissions from NetHold and Canal Plus, including a near video-on-demand system.

Astra's rival Eutelsat, with its 13°E slot, is to launch a series of Hot Bird satellites for both analogue and digital broadcasting. The company announced that it has authorised Matra Marconi to start manufacture of Hot Bird 5, which will have 22 transponders and be launched in the spring of 1998. It will carry a digital multiplexing system, specified by Eutelsat and the European Space Agency, called Skyplex. This will enable digital TV and audio channels to be uplinked from a number of different locations and then downlinked as a single multiplex for

The Pace DVS200 MPEG-2 digital integrated receiverdecoder.



reception with an IRD and a 45cm dish. Hot Birds 2, 3 and 4 are under construction and will be launched in August 1996, the first quarter of 1997 and the autumn 1997 respectively.

Digital Receivers

Pace showed an interesting design intended for digital cable, satellite and terrestrial reception – Model DVST600. It enables the user to tune in digital transmissions from any source, avoiding the need for several set-top boxes. But the issue of conditional access has to be decided before Pace can go into full production. The view taken by Pace is that terrestrial digital TV should use the same conditional access system as other types of transmission.

Pace also launched the DVC200, an MPEG-2 digital cable decoder that was being demonstrated by pay-TV company Irdeto. NetHold, Irdeto's parent company, provided a digital feed via Astra 1E. Model DVC200 can download software off-air, and has a modem return path for interactive services. It has a high-speed digital output that runs at up to 50Mbits/sec, and an RS232 serial interface for connection to a PC. The unit provides an electronic programme guide (EPG). Other features include four AV phono sockets, infra-red remote control and a video mosaic system that provides multiple screen images. This can be used for programme selection or displaying multiple camera angles. A second-generation version, Model DVC600, will be launched later this year. It will incorporate an internal modem to provide the return path for pay-per-view and interactive services.

Pace and Telvés have developed a digital SMATV distribution system that the companies say could be used to upgrade analogue systems in blocks of flats. It distributes QPSK (quadrature phase-shift keyed) signals rather than the QAM (quadrature amplitude modulated) signals generally used by cable networks. The system combines the use of Televés' IF/IF channel processor and Pace's DVS200 IRDs. Satellite digital QPSK IF modulation is downconverted to the 48-860MHz spectrum, enabling the signals to be distributed via conventional coaxial cables. At each access point the VHF/UHF modulation is block up-converted for decoding by a DVS200 IRD.

Philips also showed working MPEG-2 DVB decoders, including a system capable of receiving both analogue and digital transmissions. The analogue signals are looped through the digital section to the analogue section then fed to the TV set. Philips points out that this enables users to view pictures from whatever source. One surprise was the disappointing MPEG-2 picture quality produced by some Philips equipment. It was not possible to ascertain whether the cause of this was poor encoding, transmission problems or a combination of these factors.

Echostar's DSB9600 MPEG-2 DVB receiver handles QPSK DVB-S digital satellite transmissions and QAM DVB-C cable signals. It also offers subtitling, teletext, an EPG, twin scart sockets, a high-speed data port and an RS232 interface.

As music services such as DMX and Astra's ADR increase, so more and more companies are launching equipment for their reception. TechniSat's Astrastar AX1 and AX2 receivers have 256 DMX and 256 ADR channel capability. Other features include an RS232 interface and an optical digital output.

Last year Nokia unveiled its Multimedia Terminal, which has been renamed the Mediamaster 9500S. It can receive signals with any bandwidth from 2-54MHz and decode video streams that are variable from 1.5-45Mbits/sec. The unit is DVB compliant and can handle MPEG-2, pan-and-scan, letterbox and non full-size picture formats.

The Mediamaster can be linked to a VCR, a hi-fi system, a CD audio, CD-ROM-XA, Photo CD or video CD player. It will also send and receive faxes and e-mail and gives access to the Internet. That's what I call versatile! The electronics include a Motorola 68340 16MHz processor, 1Mbyte of RAM with a 512Kbyte extension, and 1Mbyte of flash (non-volatile) memory. The unit can be used with PC cards (formerly PCMCIA) and smart cards.

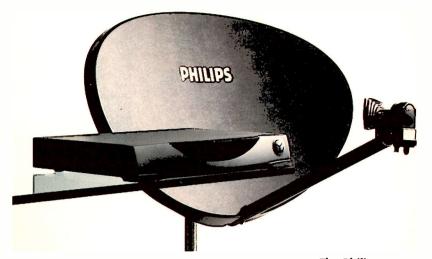
Nokia has invested £25m in Mediamaster production facilities and has recruited an extra 300 staff. Manufacture began in April, and there are two production lines. A billion units have been ordered by the German company Kirch. An agreement has also been signed with Irdeto: this gives Nokia a licence to manufacture and market MPEG-2 DVB set-top boxes that comply with Irdeto's conditional access system.

Looking farther into the future, Pace showed Concept 2000. This is a multimedia system that can be used for FM radio, Astra Digital Radio (ADR) and satellite TV reception. It also has a CD output. According to Pace future developments could include a unit with a read-write CD-ROM or DVD, a high-speed cable modem capable of sending or receiving around 4.2Gbits of data a second, and a keyboard and mouse for controlling entertainment services or playing games.

Analogue Equipment

Everyone I spoke to at the show was convinced that analogue services would continue alongside digital transmissions for some time. Five to ten years was the general estimate. So it wasn't surprising to see a number of new analogue receivers.

Nokia launched its Sat 8000 series, which includes the Sat 8001 with 600 preset channels, three category lists, four scart sockets and VideoPlus. The Sat 8000 is a midrange unit that offers 319 preset channels, favourite channel selection, parental lock and a VCR timer. Model Sat 800 Plus also has 319 channels, with selection of 36 favourite channels, Wegner Panda sound, 26 audio presets, three scart sockets and a VideoCrypt decoder with a single-card reader. Suggested price is £229, which includes a 60cm dish. Model Sat 1800 is an IRD with 600 preset channels (TV and radio), VideoPlus, a VideoCrypt



decoder and three scart sockets. This one has a suggested price of \pounds 300 including a 60cm dish.

Although MAC has been abandoned in most of Europe, it is still popular in Scandinavia. Nokia's Sat 8003CS is a PAL/MAC stereo receiver which has two smart card readers, 500 preset channels and Wegner Panda stereo sound.

Pace's Prima model has a wideband receiver, VideoCrypt decoder and 28-day, 4-event timer.

Philips had a new range of receivers on show, including the STU3510 which provides low- and high-band signal reception (up to 2,150MHz) and has automatic widescreen switching and dual LNB inputs. Model STU4310 has a twin tuner to enable the user to watch one satellite channel while recording a different one. Philips has introduced the Pye SB1191 for the budget end of the market. A range of Philips dish systems included an elliptical fibreglass model (SD8610).

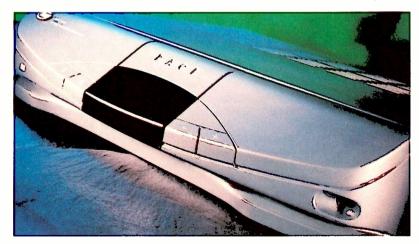
Multimedia

General Instrument had SURFboard on show. This is a cable modem that's designed to link high-speed multimedia services to the home. It offers speeds of up to 27Mbits/sec. To give you an idea of the speed, it would take a 28.8 telephone modem over four hours to download a 55Mbyte video file (enough for a six minute video clip), an ISDN connection over two hours, an Ethernet cable modem 44 seconds and SURFboard just 16 seconds.

We can expect to see even more digital equipment at next year's show now that BSkyB has announced plans to go digital.

The Philips STU3510 satellite receiver, shown with the Philips SD8610 elliptical satellite dish.

The Pace DVC200 MPEG-2 digital set-top box, which is designed for use with cable TV systems. It can download software offair and has a modem return path for interactive services.



AUDIO



CD/Mini Disc Player Casebook

Reports from Philip Blundell, AMIEEIE, Nick Beer, Graham Thompson, Robert Marshall, Chris Watton and John Edwards

Philips CDC586

Focusing occurred when a disc was inserted but the disc didn't spin. Checks showed that one of the spindle motor drive transistors, Tr6511 (BC328), was open-circuit. To be on the safe side I replaced the pair – Tr6510/6511. **P.B.**

Sony CDPM18

This unit was extraordinarily sensitive mechanically – it would skip if you went near it! The RF output from the laser was clean but well down. Cleaning the lens restored the amplitude to 1V peak-to-peak, just within specification. But the machine still skipped. Better results were obtained when a new laser unit was fitted. I used a pattern KSS210RP from CPC: it worked very well. **N.B.**

Sony MZR2

We've had problems with a couple of these Mini Disc players recently. The first one was dead when removed from the box. All outputs from the DC-DC converter power supply were found to be OK. We then discovered that the microcontroller chip's reset was permanently active. The cause of this was traced to the reset tact switch S805, which had been made with its knob stuck under its escutcheon and was therefore short-circuit.

The problem with the second one was that it would play premastered discs, also discs that had been recorded by another machine, but when it was used to make and play back a recording it went through the motions but the playback consisted of just snippets of the recording, as if there was mistracking. If the same disc was tried in another player it registered as a blank disc. This was because the faulty machine was erasing the TOC. As with a floppy disc, re-recording consists of erasing the TOC, leaving the data to be over-written. We traced the cause of the problem to the magneto record

head, which was in the wrong position because its support bracket was bent. Although this item is fixed to the chassis with a single screw, it's not available as a separate part: you have to replace the whole laser assembly (part no.A3300221A), which costs a fair bit. It transpired that the unit had been dropped.

I must say that these players are a delight to work on. **N.B**

Goodmans S2750

We've had two of these in recently. The first was dead with no +10V supply. Q403 was found to be opencircuit: it had failed because the clip that should secure it to a heatsink was missing.

The second one was also dead, with no AC at the bridge rectifier on the CD PCB. Checking back, we found that there was no output from the mains transformer. The secondary winding is centre-tapped, with the outputs taken via a couple of safety resistors. These are in the leads from the transformer, behind heat-shrink sleeving. Suitable replacements can be obtained from Farnell Electronic Components, Leeds – part no. PR01 2R2. As they are safety components, the correct type must be used. G.T.

Bush MS351CD

This player was totally dead. Even the drawer wouldn't open. The only sign of life was the LC display's back light, which was lit. We found that the 1N4148 diode D305 on the power supply/audio amplifier PCB was short-circuit. **G.T.**

Bush MC101CD Hi-Fi

The CD section of this unit produced an output on only one channel. First a word of warning. Before you remove the miniature plugs from the CD PCB, glue the sockets to the board. Otherwise the socket can remain attached to the plug, leaving only the pins on the board. This happened to us with the supply connector – although the wires were red and black, the red one was the earth line! Resoldering in the output circuitry solved the one-channel problem. **R.M.**

Samsung RCD1300 CD/cassette/radio

There was no CD operation with this portable equipment. The TOC wasn't being read, and when we opened the lid we found that the disc was rotating backwards. The laser lens somehow looked odd – shifted to one side. When the unit was dismantled, the thin plastic cover that encapsulates the focusing coils and the laser was found to be partly scrunched up. Fortunately we were able to reform the plastic and refit the cover. After some lubrication the unit worked remarkably well. **R.M.**

Toshiba XR9318

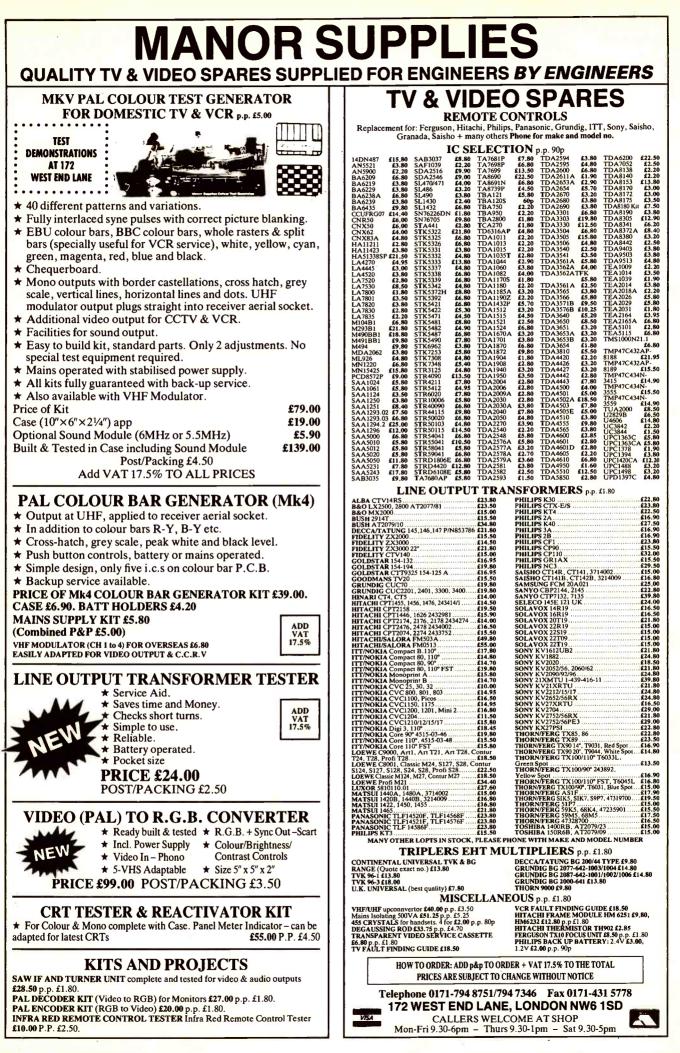
The disc motor ran out of control, the disc being just a blur. When we opened the drawer the disc clattered as it tried to go into orbit. The cause of the trouble was in the disc motor drive amplifier, where transistors Tr6511 and Tr6512 (BC337 and BC338) were both leaky and resistor R3570 (4.7Ω , safety type) was open-circuit. Replacing these items restored normal operation. C.W.

Akura DX9

The sound was audible but masked by a high-frequency hiss, while the lower frequencies suffered from an effect similar to crossover distortion in a conventional power amplifier. The cause of all this was the LC7881 DA converter chip IC10. **J.E.**

GoldStar CD621L

This machine remained lifeless. The display in the LCD panel read "00" with or without a disc inserted, because the disc-inserted leaf switch was bent and not being activated by the lid as this was opened and closed. We were able to cure the problem by carefully straightening and aligning the switch so that the lid made accurate contact with it. J.E.



AERIALS

Aerial Riggin Inders and on rooves is not

Climbing up ladders and on rooves is not everyone's cup of tea. But it can make the difference between solvency and business failure. John Pitt-Francis on the pros and cons and the equipment required

> Why do aerial rigging? Surely field and bench servicing constitute a trade in itself, and should give you enough to be getting on with. Perhaps, especially with a one-man business. But, particularly in a rural area like mine, some aerial work may make the difference between solvency and business failure – when you first start off at any rate. Remember that even when you've done a good repair you may not see the customer again with the same piece of equipment for a couple of years, if at all. And not all friends and relations will ask who did the work! The need for at least some new business is never ending.

> I started off by doing the odd loft or bungalow weatherboard aerial installation, and of course a few satellite dishes, because customers would ask me to. I soon realised that this was as well paid as TV/video servicing, with no call backs! It was also an opportunity to make the business better known, and gain reputation by doing a good job. In addition I found the work a pleasant change from the grind of 'bench nasties'. In my part of the world half a day spent on a roof can be just the tonic you need. But it's no good if you can't stand heights.

What You Need

Surprisingly little investment is required to add this extra string to your bow. The most obvious thing you'll need is a good set of ladders. Get the longest you are happy with. This will depend on whether you work solo or with assistance. I find that I can quite easily handle a 22ft, three-section ladder on my own, and that the extra cost in comparison with the two-section equivalent is well worthwhile. A stand-off attachment and a roofcrawling ladder are also essential.

Your ladders will determine the limits of what you

can do. There will always be some work that you'll have to turn down. Never push your limits: the consequences could be deadly. Safety is number one priority at all times. If you have any doubts about your ability, spend a day or two with someone who is competent and qualified in the use of ladders. I also follow the rule that this is good weather activity – when it's dry and calm.

If you don't have a local aerial supplier, you'll need a stock of aerial equipment so that you can carry out an installation at short notice. The equipment listed in the accompanying table will enable you to deal with most requirements.

A professional rigger would be happier to have a signal strength meter and other items not included in the list. But what's shown will get you along.

Reception Check

Your customer will look at the picture you get for him and accept it if it comes up to his idea of what should be present on the screen. For your own peace of mind however, connect a 6dB attenuator in series with the aerial lead and examine closely the results obtained with the weakest local channel. There should be no noticeable graininess. But the best test is with teletext: if errors can't be removed, you should tell the customer. You should also let him know if Nicam reception is less than perfect.

In Conclusion

What the above notes and my previous article haven't mentioned is that elusive quality called enterprise, probably because I lack enough of it! The situation is tough out there, but despite all the aggro it's only on very bad days that I would really want to do anything else.

What to stock

Two 10-element economy aerials for each local group.

Two 18-element economy aerials for each local group.

One high-gain aerial for the most-needed local group.

One top-of-the-range aerial for the next most-needed local group. One 'omni' FM aerial with two diplexers.

A small assortment of chimney brackets and lashings.

A small assortment of wall brackets and weatherboard fixings.

An assortment of straight and cranked poles.

A wideband mast-head amplifier (24dB gain) with power supply.

A self-powered indoor 'setback' amplifier (19dB gain). An assortment of two-, three- and four-way splitters, plugs etc. Reels (one each) of white, brown and black coaxial cable plus clips. At least one reel should be suitable for satellite dish use. A box of 8 x 60mm coach screws and plugs. Spanners, including a 13mm ratchet type. A hammer drill with 10mm masonry bit and an 8mm long reach wood bit: A headband torch.

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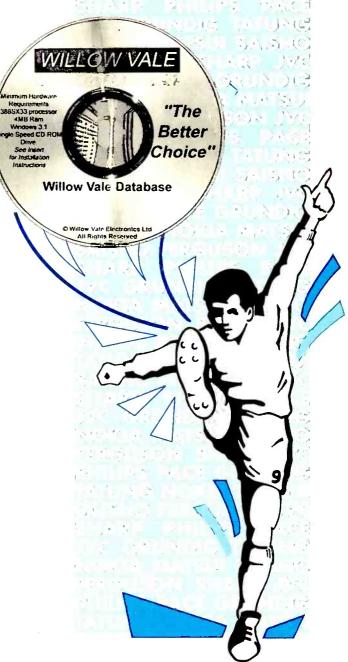
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A Zener Diode tester

Zener diodes are a common cause of faults in electronic equipment, so it's helpful to have a means of checking them. This simple meter, devised by Michael Dranfield, is a useful addition to your test armoury

> Inlike most semiconductor devices, zener diodes cannot be checked with a multimeter. A zener diode may seem to be OK when forward biased, but may stabilise at the wrong voltage or not at all. We recently had a Samsung SI3240 VCR in with tuning problems, and found that the voltage across the 33V stabilising device was only 25V. In this case the cause of the problem was easy to diagnose, and there was no other damage. Things can be more tricky when the faulty zener diode is part of a switch-mode power supply: the whole power supply might blow up at switch on, especially where DC coupling is used throughout. We've had this happen with the Ferguson FV31 VCR and ICC5 chassis.

> The tester described in this article applies a currentlimited, high-voltage supply across the zener diode under test, showing the breakdown voltage on a liquid-crystal display with an accuracy of 0.1V.

Circuit Description

The circuit of the tester is shown in Fig. 1. It employs a single-transistor oscillator that runs at approximately 3kHz. Mains transformer T1 is used in reverse: its centre-tapped 4.5-0-4.5V winding is the oscillator transistor's load, the 0-240V winding stepping up the voltage to feed bridge rectifier BR1. When pushbutton switch PB1 is pressed, a voltage starts to build up across the rectifier's reservoir capacitor C4. This build up continues until the zener diode being tested starts to conduct. The conduction point is the diode's zener breakdown voltage, and is displayed directly by the LCD panel. R2 limits the current flowing through the diode to about 5mA.

The display device is a digital LCD voltmeter module that's available from Maplin. It has a maximum read out of 199.9V, which is not a problem since zener diodes with a higher breakdown voltage are rarely used. R3 and R4 calibrate the meter: the LCD module has a built-in preset for fine adjustment.



Approximately 350V is developed across C4. If the unit is run without a zener diode in circuit the display will over-range, displaying a one. No damage will be done to the display, but if you wish you can limit the test voltage at approximately 200V by connecting a $1.2M\Omega$ resistor across C4.

Construction

Circuit layout is not critical. I etched my own board, but you could build the unit using tagstrip or Veroboard. The prototype unit is housed in a very professional-looking instrument case with a display window and a PP3 battery compartment. The case costs about $\pounds 8 + VAT$ from Farnell while the Maplin GW01B display unit costs $\pounds 11.95$.

Setting Up

Initial setting up is easy. Insert a known good zener diode with a breakdown voltage of say $9 \cdot 1V$. Connect a digital multimeter across the zener diode. Switch on and adjust the preset on the LCD panel so that the reading is exactly the same as that displayed by the multimeter. Don't rely on the zener diode alone for calibration, as most zener diodes have a $\pm 5\%$ tolerance and the breakdown voltage can also vary with temperature.

PROJECT

In view of the high voltage present, in-circuit testing is not recommended. Although the input impedance is very high, touching the test terminals with your finger could still make you jump!

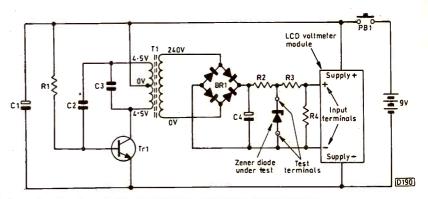
Use

Insert the suspect zener diode in the test socket. Push the button and hold it for a few seconds, until the reading stabilises. This is the diode's working voltage. If the meter reads 0.7V the zener diode is connected the wrong way round, with forward bias applied.

Happy testing!

Components	required
------------	----------

Tr1 2SC1815
C1 100µF, 25V
C2 0.047µF, 250V polyester
C3 0.047µF, 250V polyester
C4 2.2µF, 400V
BR1 400V, 1A bridge rectifier
R1 10kΩ
R2 10kΩ
R3 4.7MΩ
R4 4·7kΩ
T1 Farnell 432-684
PB1 Farnell 140-690 miniature pushbutton
switch
LCD Maplin GW01B digital LCD voltmeter
Case, Farnell 465-963
Test sockets Farnell 145-299 (red), 145-300 (black)
PP9 battery.



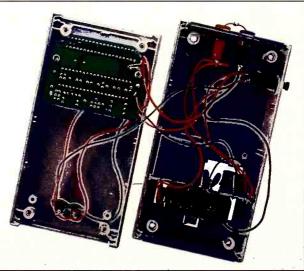


Fig. 1: Circuit diagram of the tester. Do not connect the negative side of C4 to the battery's negative terminal, as the LCD panel won't work in this condition.

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10000uf/35v	each 399p
2200uf/63v	each 299p
4700uf/63v	each 435p
1000/100v	each 350p
2200/100v	
220/200v	
330/200v	
470uf/200v	
10000uf/200v	
68uf/400v	
100uf/400v	
220uf/400v	
330uf/400v	

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TELEVISION July 1996

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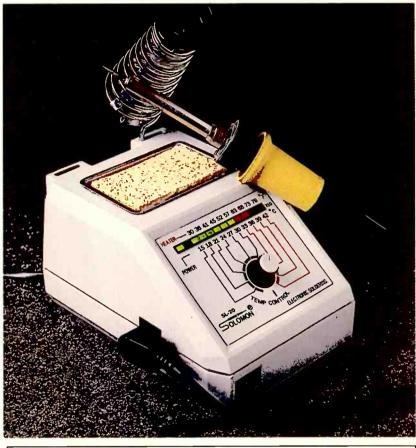
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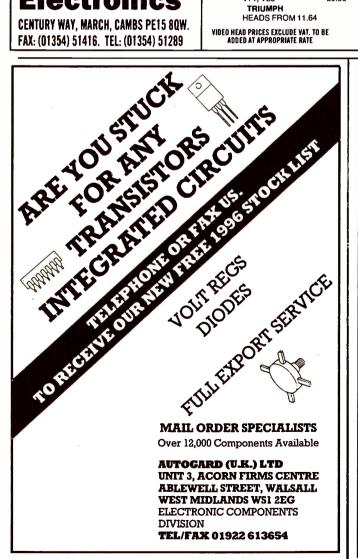
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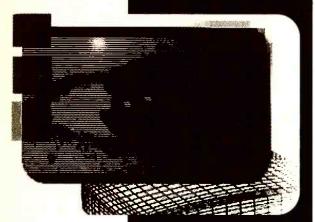
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Reports from Philip Blundell, AMIEEIE, Richard Flowerday, Brian Storm, Graham Richards, Shane Humphrey, Keith Evans, Michael Maurice, John Edwards, Graham Thomson and Giles Pilbrow

Grundig CUC4410 Chassis

One of these sets came to us after visiting another dealer. He had fitted a new line output transformer and, when this had failed to cure the problem, had given up. The first thing we found was that the BU508A line output transistor was short-circuit. We removed it and connected a dummy load across the HT supply. The voltage was OK at 159V, but the line output transistor's base drive (normally 6.7V peak-to-peak) was low. A new TDA8140 chip restored the drive to the correct level, and a new BU508A brought back the picture. But the width was excessive, with bowed verticals. We found that D7102 (ZPD30) in the EW module was short-circuit, removing the EW modulator drive. P.B.

Philips CP90 Chassis

If there is no line oscillator operation – the 95V supply is present but there's no EHT etc. – check the 19V supply. You'll find it marked 19V by C2691. If the voltage is low, check C2691 $(330\mu F)$ by replacement. **P.B.**

Hitachi C2118R

For intermittent or permanent loss of line output stage operation, check the HT supply (+B) at the line output transformer. If the voltage is

TV Fault Finding

above 112V, the $39k\Omega$ resistor R909 (part no. R349319) has probably gone high in value. **P.B.**

Philips CP110 Chassis

"Teletext fault" it said on the job card. When we selected text we found that most of the page was correct but the letter at the far righthand side of each row was wrong. After checking the supplies to ensure that the voltages were correct and free of ripple, we checked the RAM's data and address lines. No problems could be seen here, so we decided to try a new ROM chip (UPD4364). This cured the spelling errors. **P.B.**

Sharp D3000 Chassis

This set (Model DV5903H) had a colour fault: the luminance and colour were shifted with respect to each other, being two inches apart. Now the luminance/chroma delay can be adjusted in the service mode, but this moved them by only a small amount. A phone call to the nice man at Sharp Technical brought the suggestion that we replace the non-volatile memory chip IC1411 in the video unit. When we did this and switched on there was a loud bang – the field output chip had blown its top!

Another call to Sharp Technical confirmed that we had ordered and fitted the correct part. Maybe the new NVM was faulty? Another one and a replacement field output chip were obtained and fitted. This time the picture came back and the colour fault had gone. We spent a few minutes setting up the picture geometry then wrapped up the job. The sigh of relief in Manchester could almost be heard. **P.B.**

Sony **BE3B** Chassis

As a Sony ASC we have had several of these sets in for repair. The following fault notes are intended to supplement your recent article on the chassis (May/June issues).

Dead set: The most common cause is failure of the start-up resistor R600 (39k Ω , 5W) in the power supply.

'Not completely dead' set: Check the four circuit protectors PS600-603 adjacent to the chopper transformer T601. They seem to fail for no apparent reason.

Lack of width, bowed picture: Check whether the 2SC4793 EW modulator driver transistor Q801 is open-circuit.

Excessive width: There are two common causes of this fault. Either of the following two items could be open-circuit. Check fuse link PS801 (0.4A) and R813 (1k Ω , 1W) which provides Q801 with base bias.

No teletext: This fault had apparently been intermittent to start with. It was now permanent. The 13.875MHz teletext clock crystal X1001 had failed.

Poor colour: This was an unusual fault. A check with a test pattern showed that the B – Y colour-difference signal was missing. Colour decoding is carried out by

the TDA8366 jungle chip IC301, in conjunction with the TDA4665T delay line chip IC302. Scope checks showed that the B – Y signal was present at pin 44 (output) of IC301 and at pins 14 and 12 of IC302. It did not return to pin 46 of IC301 however. The 0·1 μ F chip coupling capacitor C323 was open-circuit. Normal operation was restored when we touched it with a soldering iron, but we replaced it to be on the safe side.

No sound or picture: This was another unusual fault. The timebases were working, and a video signal was present at the scart-1 socket. We also discovered that when we tried to tune the set to the output from our pattern generator it wouldn't, in the search tuning mode, stop at any channel. This suggested a problem with the BA7046F coincidence detector chip IC202, whose internal oscillator wasn't working. A replacement chip restored normal search tuning. **R.F.**

Panasonic TX25W3 (Euro 1 Chassis)

There was a dark, blank raster with no sound. After much checking of the data lines around the digital chips I resorted to my usual method with these sets: guesswork. The Nicam chip IC1401 has been responsible for a different set of symptoms nearly every time I've had to replace it. So I removed it and, surprise, surprise, up came a good clear picture. Yet another MSP2410 chip was called for. **B.S.**

Panasonic TX29AD1 (Euro 2 Chassis)

Dark, diagonal black lines, from the top left of the picture to the bottom right, would sometimes appear on the picture. On occasions the set would cut out and go into the standby mode. The main advantage of the Euro 2 over the Euro 1 chassis is the fact that there are considerably fewer chips in the guesswork equation. As a result the second chip I replaced cured the fault! It was the TPU3040-18 teletext processor chip IC1701. **B.S.**

Panasonic TX25A3 (Euro 1 Chassis)

The picture and sound would come on for about thirty seconds. Then the line drive would cut out and the set would relapse into the standby mode. Intriguingly, if the aerial was disconnected the set would continue to operate indefinitely, though with a noisy raster. What have I said before about the MSP2410 Nicam chip IC1401? Yes, it was again the culprit. **B.S.**

Panasonic TX25MD1 (Euro 2 Chassis)

The field scan would sometimes vary quite considerably, and occasionally the set would revert to the standby mode. After a lot of testing I found that the ST42C08CB1 EEPROM chip IC1203 was the cause of the trouble, a replacement restoring normal operation. **B.S.**

Matsui 2190

This digital TV chassis was dead. We found that the 115V HT supply was OK, measured at the cathode of D802. But a 5V supply was missing. It comes from the M78L05 regulator chip IC804, whose input voltage was OK. A new M78L05 put matters right. **G.R.**

Sharp C1491

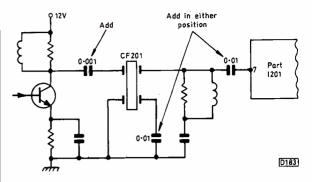
A blank raster with no sound was the complaint with this portable. Many of these sets were sold in the UK under the Rediffusion brand name, and it's a very common fault. The SAWF fails, and some suppliers used to provide a modification kit. It consisted of a replacement filter plus two capacitors to provide DC isolation, also a modification sheet. The 0.001µF capacitor is added to provide AC input coupling to the SAWF. The 0.01µF capacitor provides coupling/DC isolation at the output side of the SAWF and may be fitted in either of the two positions shown in Fig. 1. The idea is to improve the reliability of the SAWF. The Sharp kit part no. was VCK2PU1HB103K. We fitted the last one we had in stock, completely curing the fault. G.R.

Samsung CI5030AN

When this set was switched on from cold it produced the symptoms of being slightly off tune, i.e. a distorted monochrome picture with line pulling. In addition it was not possible to tune the set when it was first switched on because it wouldn't stop at a station. Once the set had warmed up (after fifteentwenty minutes) it worked perfectly and tuning was possible. After a considerable amount of heating and freezing we found that the culprit was C401. A replacement restored normal operation from cold. **S.H.**

Panasonic Alpha 4 Chassis

The on-screen display consisted of



only 'black boxes', with no colour content: the picture and teletext displays were perfectly normal. We found that C3304 (0.01μ F) was leaky. As a result R3309 (820Ω) had gone high in value, upsetting Q3301's biasing. Replacing these two components restored the onscreen displays. S.H.

Proline NV2400/NV2700 (Tatung180 Chassis)

The complaint with one of these sets was inability to tune in stations coupled with a delay in responding to channel change commands. We found that the 33V supply to the citac chip had disappeared because one of the two 10k Ω resistors (R005 and R006) that supply the 33V stabiliser had gone opencircuit. It's a good idea to replace them both – they are located next to the tuner. **K.E.**

Hitachi CPT1455

The problem with this portable was sporadic brightness variations. We found that the 200V HT supply was unstable because C761 (4.7μ F, 250V) was defective. **K.E.**

Ferguson 59P7 (ICC5 Chassis)

The customer said that when the set was taken out of standby the red light at the front went out but the set remained dead. An almost dead short across the HT line was caused by failure of the pincushion correction transformer LG11, something that's becoming common. Its demise had destroyed the EW correction chip IG01 and the 120 Ω and 56 Ω safety resistors (both marked RL44) in the HT feed to the transformer. It's worth checking the 330nF S-correction capacitor CL44. In this set one end was dry-jointed and the casing was bubbling up and split.

Before you switch on after replacing the above items, check the resistor in position J134 – this is the 22V feed to IG01. If it's opencircuit, the chip will immediately fail. The result will be severe EW distortion. In our set the value of the resistor was 220Ω (safety), not Fig. 1: Modification to the Sharp C1491 and related models to improve the reliability of the SAWF CF201. The 0.01µF capacitor can be fitted in either of the positions shown. 120Ω as shown in the circuit diagram. K.E.

Murphy M22501 (Fidelity ZX4200 Chassis)

This set's picture was a real mess. The top third was stretched, the horizontals were ragged, and there was a static hum bar in the centre of the screen. It looked like, and proved to be, a power supply problem. Visual inspection showed that C87 (47μ F, 200V) was in distress. Its replacement put matters right. **K.E.**

Hitachi CPT2174 (G6P Chassis)

This set was dead with a purr coming from the power supply. The cause of the trouble was eventually traced to the line driver transformer. Its body is used as an earth return, and one of the lugs was dry-jointed. Resoldering cured the fault. **M.M.**

Philips FL1.1 Chassis

When this set was switched on it went into standby. If you pressed the channel buttons on the remote control handset the EHT came up then died. After this the LEDs at the front started to flash. The cause was a dry-joint on L5521. Resoldering it put matters right. **M.M.**

Sony KVM2131

This set came from another dealer who had soldered all the joints in the IF can. When I got it there was no video input to the sync separator/timebase generator chip. Video went into the text board but didn't come out. The cause of the trouble was the N15 circuit protector L2 on the text board. Replacing it cured the fault. M.M.

Saisho CM250R

There was no sound or raster. If you turned up the first anode preset you could see that there was field. collapse. This was a bit of a red herring however. The field drive comes from the TA7698 chip, which requires 12V at pin 2. This supply was missing. We found that R408 was open-circuit because D408 read approximately 300Ω both ways. Replacing these items cured the fault. **M.M.**

Panasonic TXC74 (Alpha 1W Chassis)

The reported fault was "colour goes funny, worse when cold". As the set had been running for several hours, it was not possible to make a diagnosis at the customer's house. I took the set back to the workshop and, when it was nice and cold, the fault was certainly there. A whistling noise came from the set, and the picture was breaking up into horizontal lines.

Scope checks at the secondary side of the power supply failed to reveal anything amiss, so I treated the set to some freezer squirts on the primary side. When C808 $(10\mu F, 63V)$ was cooled the set went berserk. A new capacitor restored normal operation. **M.M.**

Saisho 1480

This set was dead. Checks showed that the surge limiter resistor was intact and that the start-up resistors read $330k\Omega$, as they should. The set uses an STR50103 regulator chip. Unusually for this device, it was open-circuit. A replacement restored normal operation. M.M.

Philips CTX-E Chassis

The fault description was "no picture and sounds like a radio". There was EHT, and when the first anode control was turned up I found that there was field collapse. It was obvious that the sync/drive generator chip was running from its start-up supply. The cause of the touble was loss of the 12V supply because the $2\cdot 2\Omega$ fusible resistor R3585 was open-circuit. A replacement restored normal operation. M.M.

Beon CTV1412R

The complaint with this portable was that the sound went off after twenty minutes. As flexing the board made the sound come and go it appeared that a dry-joint was the cause of the trouble. C105 ($4.7\mu F$, 160V) was going open-circuit however. **M.M.**

Tatung 140 Chassis

The owner complained that when he switched this set on there would be lots of crackling, and after about half an hour the picture might appear. He also said that the problem had been present for some time, and that he thought the switch was faulty! The power supply in this chassis is based on a TDA4600 chip. When you get a fault like this, look no farther than the electrolytics associated with this device. In this set they are C807, C808 and C810, all 100µF, 25V. Replacing all three restored normal operation at switch on. M.M.

Ferguson B49F (TX90E Chassis)

This set was dead. A scope check at

the collector of the chopper transistor showed that the set would try to start up then die. We could find no shorts on the secondary side of the chopper power supply, nor any fault on the primary side. Luckily we had another of these sets in for repair. Swapping over the chopper transformers proved that this item was the cause of the trouble. M.M.

Mitsubishi CT2525TX

Replacing R901 (4 7Ω , 5W), the 2SD1887 chopper transistor Q901 and the TEA2164 chopper control chip IC901 brought this set back to life. But when we switched it off then on again Q901 went short-circuit. The cause of the trouble turned out to be the 3V zener diode D909, which was short-circuit. J.E.

Grundig CUC3800 Chassis

There was no audio output, just hiss. The cause of this was a faulty U2829B sound IF demodulator chip (IC2110). It lives on the plug-in IF stereo board, next to the tuner. J.E.

ITT-Nokia Core 2 Chassis (110°)

This set could be switched on but as soon as the EHT came up there was severe arcing between the line output transformer's screened lead, which protrudes from the base of the transformer, and the body of a nearby electrolytic. The set would then shut down. Redressing the lead, which had a crack in the sleeving where it emerged from the transformer, provided a cure. I also renewed the capacitor, just in case. When the set was switched on again there was a good picture, but it was of reduced size both vertically and horizontally. The pictures also ballooned in and out depending on the brightness of the scene. This provided a clue. R536 (33k Ω). which is part of the anti-breathing and beam limiting network connected to pin 5 of the line output transformer, was badly burnt and open-circuit. Replacing it restored a perfect raster. This resistor is situated on the opposite side of the transformer, well away from the original fireworks, so how it was destroyed remains a mystery. J.E.

Network NWC1401

The complaint with this 14in. portable was no colour. A scope check showed that there was no oscillation at the 8.8MHz crystal X1 on the vertical plug-in colour decoder board. A new crystal produced an 0.5V peak-to-peak

644

waveform and normal colour. J.E.

Grundig CUC2410

There was sound and text but no channel picture. When the brightness was turned up fully only a blank raster was displayed. We found that there was no video input at pin 8 of the TDA3566 colour decoder chip because the BC548C video buffer/amplifier transistor Tr2523 was short-circuit collectorto-emitter. A replacement restored the picture. J.E.

Alba VTV14

There was no tuning voltage at pin BT of the tuner in this combined TV set/VCR. The cause was Q101 which was short-circuit. It's situated between the rear of the tuner and the chassis support rail. G.T.

Soundwave CTV2003R

According to the job ticket this set was a heavy smoker. C590 was the culprit, damaged because the PCB around pin 4 of the line output transformer had cracked. G.T.

Bush 2114T

This set had no picture or sound and there was a high-pitched whistle. We found that the HT was at 172.5V instead of 112V. Replacing C801, C802, C817 and C818 in the power supply cured the problem. Unusually, there was no other damage. **G.T.**

Ferguson TX100 Chassis

Intermittent low gain was the problem with this set. The tuner and various components in the IF strip had been replaced, but the cause of the fault turned out to be the SL1432 IF preamplifier chip. **G.P.**

Philips 14TVCR240/05

The power supply in this combined TV/video unit was tripping. Checks on the 110V supply showed that it rose to about 170V each time the power supply pulsed. So attention was directed at the regulation circuit, which consists of a winding on the chopper transformer with feedback to pin 1 of IC7310. There was no voltage at pin 1 of the chip because R3343 (5.6Ω safety) was opencircuit and D6335 short-circuit. The resistor's part no. is 4822 052 10568, the diode's part no. 4822 130 8330. G.P.

Matsui 1436

For low or no line drive, check the value of R756 (0.5Ω). This resistor

is connected between the base of the line output transistor and the secondary winding on the line driver transformer. **G.P.**

Philips CP90 Chassis

There was a herringbone pattern on the picture when this set was switched on from cold. Scope checks showed that there was ripple on the 19V supply. Replacing C2691 (330µF, 25V) cured the fault. **G.P.**

Matsui 209R/209T

If the set is dead with a barely audible whine coming from the power supply, examine capacitor C613 (4·7nF, 1kV disc ceramic). If split or burnt in any way, replace it. Before it finally fails, this capacitor can be responsible for intermittent cutting out. **G.P.**

Ferguson TX100 Chassis

There was no sound until the volume was turned right up. We wasted a lot of time on the remote control PCB before tracing the cause of the fault to the TDA2578 sync/line generator chip IC4, where the 'valid signal' voltage at pin 13 was slightly low. As a result, the sound was partially muted. A new chip put matters right. **G.P.**



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TELEVISION July 1996

What a Life!

A number of interesting TV faults came Donald Bullock's way between visits from Jeremy Hopsack, the opulent optician

smart new Range Rover drew up outside. It was driven by Jeremy Hopsack, a local optician. He works one day a week, when he does his eye tests and orders his stock. For the rest of the week his girl sits there taking his bookings. I've never come across anyone who is so expensively dressed, so relaxed and oozing such opulence. His set was a 26in. Loewe model. It would be.

"Can you get it from the car old chap?" he breathed. "Got a bad back you know. It's the darned polo."

The Loewe M124

As Jeremy departed for his club we struggled to get his M124 on to the bench. It was dead. When we removed the back we found that the 1.6AT mains fuse had blown and the power supply had gone up. The TDA4601 chopper control chip was short-circuit. This had all been caused by the failure of the small, blue thermistor in the start-up circuit.

Steven sat down to fit the replacements, then started the set up gingerly via our variac. It came on in standby. When he used the



remote control unit to switch it to fully on the standby light went out but there was no raster.

Steven's next step was to disconnect all the outputs on the secondary side of the power supply, adding a 100W bulb as a dummy load across the HT reservoir capacitor C652. It lit brightly, removing any suspicions about the power supply circuitry. A check on the BU508D line output transistor T539 then showed that, to our surprise, it had gone very high resistance base-to-collector. A new one restored the raster, but the HT was at 160V instead of 142V.

When the HT preset was used to reduce the HT voltage to the correct level the set squealed. C652 (47μ F, 250V) had dried up. So had the associated HT smoothing capacitor C653, which is also 47μ F. After fitting a couple of new electrolytics and setting up the HT voltage the set worked satisfactorily, though the tube was flat.

The next day a colourfully dressed huntsman called in, complete with whip and bugle. It was Jeremy. He looked utterly miserable.

"Look at this ridiculous get-up" he moaned. "The things I have to get up to, just to fill in the time." Tears almost welled up in our eyes. But not quite.

Snoddies Strikes Again

Wendy Whitstable brought in her Sanyo CBP2145 (E2 Chassis). "Gone to a line" she announced, "and the sound crackles and cuts out."

When we opened it up we saw that someone else had been there first. The field scan had collapsed all right. This part of the circuit was full of dry-joints, and two small capacitors in the power supply had each been replaced with a couple of huge ones for which there was insufficient room – wire had been used to extend their legs!

We attended to the dry-joints first, then checked with the circuit to find out what the capacitors should have been. The circuit told us that the value was 10μ F, 25V. They had been replaced with a pair of 3,300 μ F, 16V capacitors. When we'd put this right we had perfect field scanning.

We finally looked for the cause of the intermittent sound. In order to remove the chassis, someone had cut the speaker wires and afterwards simply twisted them together. Replacement leads were fitted.

We were curious to know who had previously 'looked' at the set, and asked Wendy when she returned.

"Snoddies" she said. "We got tired of waiting. They had it for six weeks. Said spares were difficult."

A Strange Display

Tricia Tripmeyer was clearly a lady in a hurry.

"Helloee . . . Got this set here. Akai I think. Yes. Can you fix it? Can't stop now . . ." Then she ran off across the green.

The set was an Akai CT2179N-UK. When we switched it on we found that the newsreader's face was severed from top to bottom. The right side was on the left-hand side of the screen while the left side was to the right.

"Line oscillator speed too fast" I said. Then I noticed that every set in the shop was displaying random interference. We opened the Akai up. The chassis is in two parts, the power supply and line timebase circuits sharing one panel. To the rear of this, behind the line output transformer, there's a blue, 222pF, 1kV capacitor – C416. One side is connected to chassis. This leg had been burning in its solder joint,

The things I

the time.

have to get up to just to fill in melting the panel support peg. As a result R412 (10k Ω , 0.5W) had gone open-circuit.

Replacing these two items cured the set. Pity we can't do anything about its owner.

Delayed Start Up

A Philips 21GR9752/25B (G90B chassis) was awaiting attention. The ticket said "no picture for the first five minutes". I switched it on and found that there was no raster, though the tube's heaters were alight. After marking its position carefully, I advanced the setting of the first anode preset, expecting to see field collapse. In fact a bright raster with flyback lines appeared, and the remote control unit had no effect on the set. So I wound the first anode control back to its original position and waited for the five minutes to elapse.

The screen suddenly flickered a few times, then a very good picture came up. In addition the remote control unit now worked. I reckoned that the delay was probably caused by a low-value reservoir/smoothing capacitor and, with the set now warmed up, got busy with the freezer.

The fault condition returned when C2660 was cooled. It's a 680μ F reservoir capacitor which, with D6660, produces about 9V to feed to the 5V regulator. We checked it and found that it read 400μ F when hot, almost open-circuit when cold.

An Amstrad TV/video

Neither I nor Steven felt like tackling the Amstrad TVR3 combined TV/VCR that someone had brought in for attention. In the end I tried it. The unit was dead, with a cassette jammed in it. While I was checking around Mr Dripp, the unit's owner, shuffled in.

"Ah. Gollimup then. Good. It's all caused by the tape. When you gets it out, the set'll be all right."

I removed the recorder and started to work on the TV chassis.

"You won't find nothing wrong there" said Dripp.

I immediately saw that C310, a pretty, Smarty-sized blue capacitor (3,300pF, 1kV) had cooked and split. So I snipped it out and handed it to Mr Dripp. The 4AT fuse had also blackened, and the STK7348 regulator was faulty. As I worked on I noticed that Mr Dripp had crept out.

I replaced these items, reconnected the recorder (this is necessary) and switched on. The unit chirped a few times but refused to switch on - the power supply wasn't oscillating. So I separated the two sections and got to work again. The value of the 1 μ F, 50V capacitor C307 in the feedback circuit had fallen to 0.002 μ F. I replaced it with a 105° type. Then I saw that C314 (470 μ F, 16V) had been leaking.

As I replaced these two capacitors Mr Dripp crept back in, holding a bank card and some blues. When I'd finished I reassembled the unit and switched on. Up came a picture with good sound. Mr. Dripp seemed to be pleased.

"There we are" I said, "that seems to be all right, doesn't it?"

"But what about the tape in the recorder?"

"Ah" I said, pressing the eject button. Out it came. I popped it back and pressed play. The recorder sprang to life, playing Dripp's tape in all its glory.

As I disconnected the unit Steven pulled out his pen and reached for the invoice pad. Mr Dripp started to say goodbye to his blues.

A Samsung Camcorder

I picked up the Samsung VPE808 camcorder that Steven had taken in. The playback was grainy. So I immediately pushed it to Steven's end of the bench.

He opened it and announced that the heads were worn. A check with CPC revealed that the part no. was SS69063-213-651, that it was available only to special order, and would take seven-ten days to arrive. It came rather sooner. While the invoice clearly referred to the upper drum assembly, a complete upper and lower assembly had been sent. This is, we supposed, the way it comes.

Steven fitted it by removing the camera's top casing then gently lifting out the deck/PCB assembly. The drum assembly is secured by a couple of flat plastic connectors and three screws. The trade price of the assembly is £57.14 inclusive of VAT, and I've never seen a head change done faster.

CPC

Mention of CPC reminds me that the company's new catalogue arrived the other day. It's quite the largest spares catalogue I've come across for our trade. CPC is to be congratulated on several counts: on the vast range of items stocked, on the prices, and on the speed and efficiency of the delivery service.

The catalogue's layout and presentation are wonderfully clear. Its indexing, which is the key factor, couldn't be better. And the catalogue is free to those in the trade. I also find CPC's frequent, well-produced 'flyers' with special offers welcome.

Well done CPC!

Return of the Range Rover

An angler, complete with oilskins and waders, climbed out of the Range Rover that pulled up outside. He walked to the back and pulled out fishing rods, baskets, nets and giant umbrellas. Then he came into the shop. It was Jeremy Hopsack again.

"Hello folks" he said. "Can you bring in the telly in my car? It wants putting right."

When we went out to get it we saw that it was a Loewe. Our hearts sank.

"So it's gone again" I said.

"Not art all" he replied. "It's my brother's set. He was so impressed with the job you did on mine that when his failed he asked me to bring it along."

Phew! We put it on the bench and noticed that it was exactly the same model.

"It works when the weather's warm" Jeremy said. "When it's cold it doesn't. Give us a ring." Then he looked himself up and down. "Look at this lot. I've to go off fishing, but don't really want to have anything to do with the slippery things."

We plugged the set in. The workshop was warm and the set worked, but it chirped as well. We felt that the suspect was probably in the primary side of the chopper supply. So we switched off and brought the freezer into play, spraying the electrolytics one at a time and trying the set whilst the selected capacitor was cold.

When we got to C624 (100μ F), which couples the drive to the base of the chopper transistor, we found that the set wouldn't come on until we warmed the capacitor with a soldering iron. We took it out and connected it to the capacitance _ meter. When it was hot the reading was 80µF. The reading dropped to about 5µF when the capacitor was cold. But fitting a replacement didn't clear the fault!

We persevered and found another electrolytic that behaved in much the same way, C638 (1 μ F). This is the reservoir capacitor for the feedback voltage to the control chip. It read 0.8 μ F when hot, open-circuit when cold.

When this one was replaced the set behaved perfectly. It ran well when both hot and cold, and didn't chirp any more.

Servicing the

Mitsubishi Euro 6

John Coombes on the main features of this 90° chassis and how to go about fault diagnosis

The Euro 6 chassis was used in a group of 90° Mitsubishi sets that were on sale during the period 1988-1990, including Models CT2145BM and CT2146TX, the latter with teletext. An M50439-563SP microcomputer chip, IC701, controls the operation of the chassis, working in conjunction with the M58630P EAROM chip IC702. The circuitry used in the chassis is straightforward, the main thing to bear in mind from the servicing point of view being the fact that there are two separate self-oscillating chopper power supplies. One provides 5V and -30V outputs to power the control system. The other provides a 122V HT supply, a 16V supply for the audio output chip and a 12V supply for the signals stages and the TDA2579 timebase generator chip IC501. The two chopper transformers T901 and T951 and the optocoupler PC951 provide mains isolation.

Main Power Supply Operation

Fig. 1 shows the circuit of the main power supply, which is based on the STR54041 chip IC901. Mains bridge rectifier D901-4 produces about 330V across its reservoir capacitor C907. This is fed to chopper transformer T901 and also to the subsidiary power supply (see Fig. 2). R906 and R972 provide base bias for the chopper transistor, which is incorporated in IC901. The circuit operates in the conventional blocking oscillator manner. C911 provides feedback to the base of the chopper transistor from a secondary winding on the transformer. When the chopper transistor saturates, C911 receives a negative charge and the transistor switches off. C911 then discharges via R906 and R972. When the chopper transistor's base is sufficiently positive, it switches on again.

The point at which the chopper transistor switches on is determined by the drive control system within the chip. This receives, at pin 1, a negative voltage which is produced by D909 and C908. Since this voltage is a measure of the output produced by the circuit, regulation is achieved. VR901 enables the output to be adjusted.

Q901 provides excess current protection by sensing the voltage developed across R903, which is connected in series with the chopper transistor's emitter. If the current is excessive Q901 will switch on, shorting out the chopper transistor's base.

The same technique is used for standby switching. When standby is requested, Q954 provides the base shorting action. The command comes from pin 10 of the microcontroller chip IC701, via Q953, optocoupler PC951 and the driver transistor Q955.

Subsidiary Power Supply Operation

The subsidiary power supply (Fig. 2) operates in a similar manner, but in this case discrete circuitry is used. Q951 is the

chopper transistor, which is biased via R973 and R952 from the 330V supply developed across C907. Feedback to its base is via C955 and R962, while D954 and C956 develop a negative bias voltage that varies with the circuit's output, thus providing regulation.

Power Supply Fault Finding

It's common to find that the 2AT mains fuse F991 has blown. Common causes of this are short-circuit bridge rectifier diodes (D901-4, type BYW56) or a faulty on/off switch (S991). If the fuse has blown, a replacement is fitted and the set then works, suspect the degaussing thermistor RP901 – it may however have blown itself apart so that the fuse will not blow. Shorted turns in the degaussing coils will also blow F991.

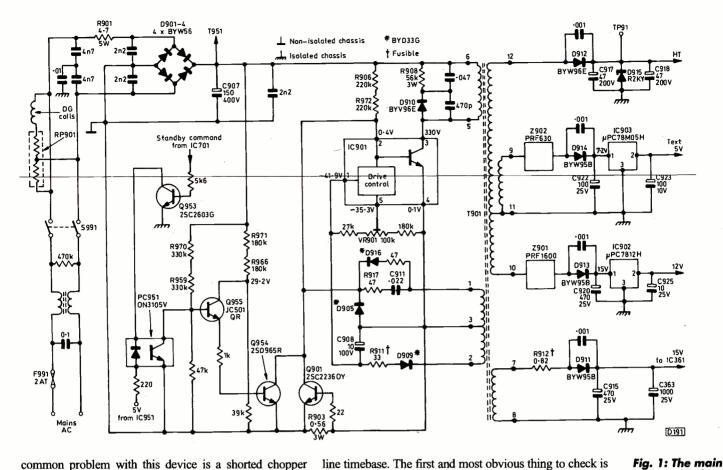
If the fuse is OK but there is no sound or raster, check whether there is about 330V at pin 3 of the chopper chip IC901. If this voltage is missing or low, check the bridge rectifier diodes D901-4 which could be open-circuit and their reservoir capacitor C907.

If IC901 is receiving its supply, check at the collector of the 2SC4004 chopper transistor Q951 in the subsidiary power supply. There should also be some 330V here. If this voltage is missing, check the continuity of winding 5-6 on transformer T951 and R975 (270Ω , 0.5W fusible) which could be open-circuit. If voltage is present but incorrect, replace Q951.

If these items are all OK, the next thing to check is the operation of the μ PC78M05H 5V regulator IC951. There should be about 7.3V at its input pin 1. If this voltage is missing, check whether R957 or D956 is open-circuit. If the voltage is present, check at output pin 2 where a 5V reading should be obtained. No or a low voltage here means that several things might have to be checked: IC951 itself, C709 which might be open- or short-circuit and the EAROM or microcontroller chips IC702 and IC701 respectively. It may be necessary to replace these chips to prove the point.

The next step if everything is OK so far is to ensure that the ON3105V optocoupler PC951 is receiving its 5V supply. Check whether the LED within the optocoupler is open- or short-circuit. If the optocoupler is functional, check at pin 10 of the microcontroller chip IC701 to see whether it goes high/low when the standby switch is operated. If necessary, check through the standby on/off switching path – via Q953 then Q955 and Q954 which can go open-circuit. There should be 29V at the collector of Q955: check R971 and R966 if this voltage is missing. If Q955 has no base voltage (should be 0.3V), check R970 and R959.

We have so far checked through the the subsidiary power supply and the standby switching. This brings us to the chopper chip IC901 in the main power supply. The most



common problem with this device is a shorted chopper transistor. Check at pins 2, 3 and 4. If the chopper transistor is short-circuit, check R903 which may have gone open-circuit. IC901 will not operate if either R906 or R972 has gone open-circuit, but in my experience these resistors seldom fail. R911 should also be checked if IC901 has to be replaced because of an internal short.

IC901 can also be responsible for intermittent loss of the sound and raster or intermittent HT voltage variations, which will alter the picture size.

I have never had to replace the main chopper transformer T901. But dry-jointed pins can cause many problems, from no sound or raster to no sound.

If the cause of loss of sound and raster is on the secondary side of the main chopper circuit there is very often a loud hum or noise. No HT voltage at TP91 could mean that the rectifier diode D912 (BYW96E) is open-circuit or, more likely, that its reservoir capacitor C917 is short-circuit. Another possibility is that the R2KY over-voltage protection diode D915 is short-circuit. IC901 is suspect if it has failed. D915 is not shown on the official circuit diagram – and is not in all sets. If the HT voltage is low, check whether C917 and/or C918 is open-circuit.

If the symptoms are a loud humming sound with no audio or picture, check whether the μ PC7812H 12V regulator chip IC902 is open-circuit or dry-jointed. No output from IC902 can also be caused by C925 being short-circuit. If there's no 15V input at pin 1 of IC902, check the PRF1600 circuit protector Z901, D913 and C920.

Here's a tip that might save you expense. A PRF1600 circuit protector is rated at 1.6A, a PRF5000 at 5A etc. Fuses are much cheaper than circuit protectors. If a fault condition necessitates a lot of replacement, use a fuse of the same value instead of a circuit protector – solder leads to the metal caps at the ends of the fuse.

Line Timebase Faults

No sound or raster can of course be caused by a fault in the

line timebase. The first and most obvious thing to check is whether the 2SD1878 line output transistor Q552 is shortcircuit. If it is, be sure to check for dry-joints at the driver transformer T551 before fitting a replacement and switching on.

If the line output transistor is OK but is not working, check whether L553, which is in series with its emitter, is dryjointed. Then check for about 120V at its collector. If this voltage is missing, check whether R556 (12 Ω , 10W) is opencircuit. If everything is OK so far, check for dry-joints at the driver transformer T551.

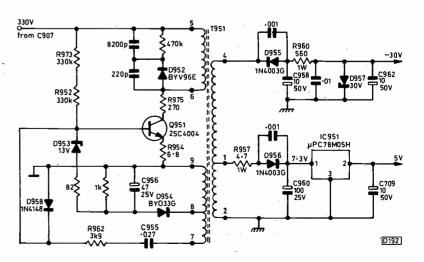
Loss of line drive can also be caused by R551 ($4.7k\Omega$, 5W) going open-circuit or a faulty BF419 line driver transistor (Q551).

The line output transformer T553 can also kill the line output stage when it has shorted turns. It can also be responsible for an intermittent bright raster and/or poor focusing.

I've had no sound and raster because the TDA2579

power supply circuit. The 5V supply fed from pin 9 on the chopper transformer is present only in teletext Model CT2146TX.

Fig. 2: The subsidiary power supply circuit, which is used to power the control system.



timebase generator chip IC501 didn't receive its start-up supply at pin 16. C509 (33μ F, 16V) was short-circuit and R516 (390Ω , 0.5W) open-circuit.

CRT Heaters Out

If there's no raster and the CRT's heaters are out, check for dry-joints at pins 9 and 10 of the tube's base socket. Alternatively R671 (0.82Ω , 2W fusible) could be opencircuit or there could be dry-joints at pins 9 and 10 of the line output transformer T553.

Field Collapse

In the event of field collapse the first thing to check is that the μ PC1378H field output chip IC401 is receiving its 24·5V supply at pin 6. If not, check D553 (BYW95B) and R563 (0·82 Ω , 0·5W fusible) which could be open-circuit, and C567 (1,000 μ F, 35V) which could be short-circuit. IC401 could be faulty – check it by replacement.

The cause of field collapse has also been traced to opencircuit field scan coils and a faulty TDA2579 timebase generator chip (IC501). Check the latter by replacement if necessary.

Tuner Faults

The tuner unit TU101 can cause several problems, i.e. low gain, no gain, intermittent loss of signals (stopped oscillator), also loss of signals because of a broken aerial socket or dryjoints. Check that the 12V supply is present at pin UB of the tuner unit. If missing, check C155 (330μ F, 16V) which could be short-circuit.

If there's no vision signal (a snowy raster) or sound (just



noise), check whether the μ PC574JK 33V regulator IC704 is short-circuit or its feed resistor R921 (15k Ω , 2W) is opencircuit.

If channels can be tuned in but not stored, check that the M58630P EAROM chip IC702 is receiving its 5V supply at pin 1 and its -31V supply at pin 2. If the latter is missing, zener diode D957 (EQA02-30AC) could be short-circuit and/or R960 (560 Ω , 1W) open-circuit, though the most likely cause is that winding 4-1 on transformer T951 is open-circuit. This latter fault can sometimes be repaired – if the lead is long enough to resolder. IC704 itself can of course be the cause of failure to store programmes.

Display/Picture Faults

Loss of the HT supply to the RGB output stages will produce a bright raster with normal sound. Check whether R559 ($2\cdot 2\Omega$, fusible resistor) is open-circuit and/or C565 (33μ F, 250V) short-circuit. If these items are OK, check on the tube base for faults/problems.

A blank screen gave the impression that the receiver was in the AV mode, but there were other symptoms – intermittent lines on the picture and flickering to dark. The JC501QR video buffer transistor Q104 was faulty.

Contrast problems have on a couple of occasions been traced to R215 ($100k\Omega$) being open-circuit. If the contrast is low but can still be varied, check the condition of the $100k\Omega$ subcontrast control VR201's carbon track.

If there's a bright green picture, check Q702/3 (JC501QR) in the character output/blanking circuit. They are connected to pins 44 and 46 respectively of the microcontroller chip IC701, and can go short-circuit.

Patterning can be caused by dry-joints at the 12V regulator IC902. If this is OK, check the 15V supply reservoir capacitor C920 (470μ F, 25V) by replacement. A 105° capacitor should be used in this position.

Loss of one colour is very often caused by dry-joints on the tube base. Alternatively the relevant 2SC2688MN output transistor (Q651 red, Q652 blue, Q653 green) could be opencircuit or dry-jointed. Less likely is a faulty TDA3565 colour decoder chip (IC252) – in the CT2146TX this is IC251, type TDA3561A.

No Sound

For no sound, first check that the AN5265 audio amplifier chip IC361 is receiving its supplies at pins 1 and 9. It requires 12V at pin 1 and 15.8V at pin 9.

If the 15.8V supply is missing, C363 $(1,000\mu F, 25V)$ or C915 $(470\mu F, 25V)$ could be short-circuit, or R912 $(0.82\Omega, 0.5W)$ fusible) or D911 (BYW95B) open-circuit. Alternatively IC361 itself could be faulty.

The 12V supply is derived from the 15 8V supply via two 0.5W, 100 Ω resistors (R368 and R371) and the EQA02-11CD/RD12EB2.BS zener diode D362. If it's missing, D362 is probably short-circuit and the two resistors open-circuit.

Other possibilities for no sound are failure of Q302 (JC501QR) or the M51496P IF chip IC101.

No Teletext (Model CT2146TX)

No teletext is seldom caused by a fault on the teletext PCB. Much more likely is loss of the 5V teletext supply. First check whether the 630mA circuit protector Z902 (type PRF630) is open-circuit. Alternatively the μ PC78M05H 5V regulator IC903 could be faulty or dry-jointed.

Remote Control Faults

If there's no remote control operation, check the handset's battery connections. The batteries could be low or leaky, with corrosion. The LED could be dry-jointed, or the leads to the crystal dry-jointed or broken. If all these items are OK, check the M50462P chip by replacement.

VIDEO IDLERS, CLUTCHES BELT KITS, PINCH ROLLERS BACK UP BATTERIES, TV SWITCHES, CD SPIN MOTORS FAULT FINDING BOOKS LOUIVALENT BOOKS JAPANESE TRANSISTORS RESONATORS, THERMISTORS HITACHI TH902 £2.00 96009 £1.30 TRIPLERS UNIVERSAL £4.99 WITH FOCUS £7.99 CUC2410 £16.99 POWER SUPPLY MOD KITS FUNCTION SWITCH 850 Image: Composition of the second Society of the second POWER SUPPLY MOD KITS FUNCTION SWITCH 850 ELC EAST LONDON COMPONENTS FUNCTION SWITCH 850 Image: Component 850 ELC EAST LONDON COMPONENTS, INSTRUMENTS, REPARK KITS, BOOKS & CABLES TO CHOOSE FROM ADD £1.50 P/P + 17.5% VAT ALL GOODS DESPATCHED SAME DAY PRICE SUBJECT TO CHANGE WITHOUT NOTCE VISA ACCESS ACCEPTED. MIN. DORDER 45.00 MILL GOODS DESPATCHED SAME DAY PRICE SUBJECT TO CHANGE WITHOUT NOTCE VISA ACCESS ACCEPTED. MIN. DORDER 45.00 MULL GOODS DESPATCHED SAME DAY PRICE SUBJECT TO CHANGE WITHOUT NOTCE VISA ACCESS ACCEPTED. MIN. DORDER 45.00 MULL GOODS DESPATCHED SAME DAY PRICE SUBJECT TO CHANGE WITHOUT NOTCE VISA ACCESS ACCEPTED. MIN. DORDER 45.00 MULL GOODS DESPATCHED SAME DAY PRICE SUBJECT TO CHANGE WITHOUT NOTCE VISA ACCESS ACCEPTED. MIN. DORDER 45.00 MULL GOODS DESPATCHED SAME DAY PRICE SUBJECT TO CHANGE WITHOUT NOTCE VISA ACCESS ACCEPTED. MIN. DORDER 45.00 MULL GOODS DESPATCHED SAME DAY PRICE SUBJIECT TO CHANGE WITHOUT NOTCE VISA ACCESS ACCEPTED. MIN. DORDER 45.00 MULL GOODS DESPATCHED SAME CONST Tektronk 455 Dual Trace 300HH CBay Seep Cristory MIN.	Overall Overallocation Ansatz Ansatz CT2570E 19.99 1420 16.99 ANS5 CT2570E 19.99 1420 16.99 ANS5 CTVARS 19.99 1480A 16.99 ANT5 CTV210 19.99 MITSUBISHI BASA CTV210 14.99 CT2528ETX 16.99 BASA Z2000 14.50 KT3 16.99 BASA Z2000 14.50 KT3 16.99 BASA TK38 19.99 G90.AE 16.99 BASA TK39 14.50 KT3 16.99 AANSA GTASA 16.99 CASA 16.99 AANSA GTASA 16.99 <td>51 6.99 LA7958 3.00 STK 6592 5.80 TDA1516 71 2.29 M45481 5.60 STK 7308 4.50 TDA1521 71 4.25 M45481 2.99 STK 7308 4.50 TDA1521 71 4.25 M454841 2.99 STK 7306 6.00 TDA1557 71 4.25 M454641 2.59 STK 7306 6.00 TDA1557 71 4.25 M5464641 3.99 TDA1557 TDA2003 723 M5464641 3.99 STR 40000 5.90 TDA2003 723 M5464641 3.99 STR 40000 5.90 TDA2003 723 M5464641 3.99 STR 40000 5.90 TDA2003 724 M546461 3.99 STR 40000 5.90 TDA2003 724 M54647 1.00 STR 40001 5.90 TDA2003 724 M547631 5.90 STR 40001 5.90 TDA2501</td> <td>DIGITAL MULTIMETER FROM 63.99 DIGITAL MULTIMETER FROM 63.99 C COMPONENTS 24hr Answering Service for out of hours ordering Home Computer Spares E. for list. SEMICONDUCTORS BCC4488 C C COMPONENTS SEMICONDUCTORS BCC4488 C C C C C C C C C C C C C C C C C C C</td>	51 6.99 LA7958 3.00 STK 6592 5.80 TDA1516 71 2.29 M45481 5.60 STK 7308 4.50 TDA1521 71 4.25 M45481 2.99 STK 7308 4.50 TDA1521 71 4.25 M454841 2.99 STK 7306 6.00 TDA1557 71 4.25 M454641 2.59 STK 7306 6.00 TDA1557 71 4.25 M5464641 3.99 TDA1557 TDA2003 723 M5464641 3.99 STR 40000 5.90 TDA2003 723 M5464641 3.99 STR 40000 5.90 TDA2003 723 M5464641 3.99 STR 40000 5.90 TDA2003 724 M546461 3.99 STR 40000 5.90 TDA2003 724 M54647 1.00 STR 40001 5.90 TDA2003 724 M547631 5.90 STR 40001 5.90 TDA2501	DIGITAL MULTIMETER FROM 63.99 DIGITAL MULTIMETER FROM 63.99 C COMPONENTS 24hr Answering Service for out of hours ordering Home Computer Spares E. for list. SEMICONDUCTORS BCC4488 C C COMPONENTS SEMICONDUCTORS BCC4488 C C C C C C C C C C C C C C C C C C C
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Satellite Notebook

Hugh Cocks on satellite TV Servicing problems

Pace SS9200 Problems

The owner of a Pace SS9200 complained that it "would sometimes go off". We ascertained that the red light light stayed on when the receiver went "off", but during our visit the receiver behaved impeccably. So it was back to the workshop with the receiver and the MTI LNB, which might have been to blame.

It was two days before the problem was seen, when we switched on from cold. The UHF modulator was producing no RF output – the scart output was OK, but this was not used by the owner.

I removed the PCB from the chassis and found that the modulator's supply was intact. Once a few dubious looking joints in the modulator had been resoldered normal operation was restored and no amount of switching off and on from cold would bring the fault back. To ensure a quiet life however I decided to replace the modulator with one from a scrap set. It was the type of problem that would reappear as soon as the receiver had been returned!

The 'Hwa Lin' modulator used in the SS9000/9200 will not be sadly missed in years to come! Some Grundig TV sets hate it to the extent that they can't cope with the slight frequency drift. If a Grundig set is in use, I try to ensure that wherever possible the connection is via a scart lead. If this is not practical, the TV set is left with three channels tuned to the Pace receiver's output, one centre tuned, one tuned low and the other high. This saves call-outs when the set produces a blurred black-and-white picture!

There was another problem with the SS9200 receiver however. Vague diagonal lines were present on the picture whether the connection was at UHF or via a scart lead. They were not unlike those caused by the infamous capacitor in the tuner (C416). I replaced this capacitor, also C29 which causes lines with VideoCrypt signals and, for good measure, the two 1 μ F capacitors in the power supply. As the PCB's colour was remarkably good for its age, I was confident that these measures would have cleared the problem. They hadn't of course – that would have been too easy for Monday morning!

Further investigation showed that the lines were present only with vertically polarised signals. When an external power supply was used, clear pictures were also obtained with the vertical channels. A scope check on the LNB supply at LK205, the PCB link adjacent to the tuner, showed that large spikes were present. They were larger with the vertical than the horizontal voltage supply. The culprit was C128, which is located next to the tuner's body. It decouples the LNB supply and had obviously been subjected to a lot of heat from the tuner over the years. Its near neighbour C133, which decouples the tuner's 5V supply, also looked vaguely discoloured. So this was replaced as well.

It is getting to the stage where most of the electrolytics in these receivers will have to be replaced as part of the standard repair procedure. Why the horizontal channels were not affected is strange: possibly the drying out 10μ F, 25V electrolytic (C128) was a bit more effective at the higher voltage.

A Dead Pace MSS100

This receiver appeared to be totally dead – the owner said that it had gone off in the middle of a programme. A quick check showed that the mains fuse FS1 was intact, also the 5V supply fuse FS2 on the secondary side of the supply.

The power supply in this model is

based on chopper chip U1, which on the circuit diagram is shown as a TOP200 though all the devices I've seen have been labelled TOP202. Fig. 1 shows the simple circuitry used on the primary side of the chopper transformer. There was HT at pin 3 of U1, and a small, varying voltage at pin 1. This pin receives feedback from a winding on the transformer, via D8 and the 15V zener diode D7. When the voltage at its cathode rises to about 21V D7 conducts, adjusting the chopper turn-on time. The varying voltage remained at pin 1 of U1 when D7 was lifted. The only other thing connected to pin 1 is the RC series network consisting of R2 and C4, which determine the loop response and start-up delay. Tests showed that they were both OK (C2 by substitution).

As I had a spare TOP202 in stock I fitted it, hoping for the best. But the results were exactly the same. I began to suspect the transformer but before checking this I did what I should have done much sooner – check the rectifier diodes on the secondary side of the circuit. D9 (BYV96D) in the 30V supply was short-circuit.

VideoCrypt Decoders

The original stand-alone VideoCrypt decoders, many of which are still in use here, are now more than five years old. One problem we get is cards being killed by spikes on the local mains supply. Receivers that have a switch-mode power supply don't seem to cause problems directly. What seems to happen is that the high voltage that's present at regulator TP05 (the front left regulator, fixed to the metal screening) suddenly sends a spike into the card.

The high voltage (card Vpp supply) is no longer used for any form of communication with the card. As a quick fix to prevent such disasters I cut TP05's centre leg, thus preventing any high voltage from reaching the card. One possible problem is that the supply may at some stage in the future be needed again. Hopefully the decoders will by then have reached the end of their useful life. My customers are more than happy with this solution.

The problem also occurs with the Amstrad SRD400, though I've not had it recently and have thus been unable to investigate ways of cutting off the Vpp supply. Fortunately there aren't many of them left now. They had great difficulty coping with supplies of less than 230V, and often needed a step-up transformer. Their threshold sensitivity seemed poor in comparison with other receivers, and the AFC preset under the decoder PCB required winter/summer adjustment.

Plug-fitting surge protectors may well help. The problem here in the Algarve is that house earth wiring is so poor. More often than not there's only two-pin wiring to work with. I learnt my lesson early on. A few years ago a customer's fridge had a fault as a result of which the cabinet became semi-live. The house earth was very high resistance/opencircuit. The cabinet was connected to the earth wire or course, and the plug was connected to a three-pin socket. Somehow the house earth was connected to the water pipes. As a result, the kitchen taps were sitting at quite a high voltage in relation to the sink, which seemed to be earthed through the waste pipe. It's true - I got a shock, fortunately before I turned the tap on and got wet hands!

Pace MSS100

1

Whenever an LNB was connected this brand new receiver produced a pink screen with the message "LNB Short Circuit". This caused some confusion, because the receiver was being installed as part of an IF distribution system and the initial checks were made on line. Receiver substitution produced normal results however. With just a line amplifier connected as the load the message still appeared. With no load, the $13/17\overline{V}$ supply was present at the LNB socket. The receiver worked correctly when fed with an independently powered IF signal.

The 20V and 17V supplies were present at L4 and L6. To prevent the short-circuit protection system working, I lifted the cathode end of the 8.2V zener diode D15 and connected it to D11, where a constant 17V is present. D15 is connected to Q4 to form the LNB supply monitoring circuit. When D15 is connected to a constant 13V or 17V supply the shut-down system won't work. This enables you to test the LNB supply.

When I'd done this I found that under load the collector of Q2 was at around 5V but the voltage at the collector of the FXT749 transistor Q1 was much higher. These two points should be linked! The track and soldered connections looked intact, but linking these two transistors and reinstating the shutdown circuit restored normal operation.

Watery Problems

The Italian manufacturer IRTE is well-known for its motorised dishes. A problem can occur with the feed when one of these dishes has been in use for a few years. The feed usually consists of a Teflon bulb that contains a metallised ring. It all works very effectively. But what can happen after heavy rain is that water gets past the polariser's O ring, filling up the bulb. This produces efficient signal attenuation!

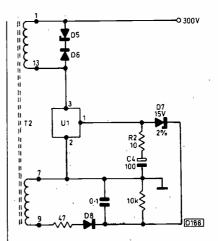
The first time I came across this I wasted a lot of time and effort changing the LNB and realigning the polar mount. Careful inspection of the Teflon bulb will reveal all – it's surprising how much water can get in. The solution is to make a couple of small drain holes at the bottom of the bulb to let the water out.

The signals may still be weak after doing this! The cause will be bad corrosion of the aluminium feed tube. Once the tube has been cleaned up everything should be OK.

Pace PSR800

This is the non-VideoCrypt version of the PRD800. A German gentleman appeared with one, complaining about "no pictures". It was an early version – Pace date codes are easy to read, the first number in the long row being the year and the next two the week. This one started 329, indicating 1993, week 29. So I replaced the electrolytics by the chopper control chip U1 (C5 22 μ F, C7 and C8 10 μ F) to ensure that the power supply was happy.

When I switched the receiver on only inverted video could be seen, with a C-band frequency display (3.6-4.2GHz), via a scart

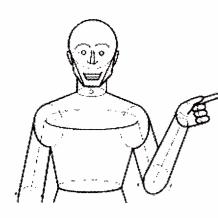


connection. This was soon put right by switching the LNB installation menu to FSS. I next pressed F then UHF on the remote control unit to see which channel was being used by the modulator. The receiver displayed 74. Something must be wrong, as it should go to only 69! When I entered a normal UHF channel number the modulator went to it and the receiver seemed to store the channel happily.

So far so good – however only the horizontal channels appeared, an attempt to change the polarisation mysteriously producing polarisation skew numbers next to H. This model doesn't cater for polarisers, and the option is not available in the menu! I eventually restored normal H/V polarisation selection by replacing the eight-pin EEPROM U6, and have subsequently found that reprogramming with a Pace Link cures the problem.

Another symptom can be incorrect menu background colours (not blue). Some of the software for other PRD/PSR models must be present, and the receiver somehow jumps to the wrong mode. I understand that there was an NTSC version called Model NSR800. The North American UHF channels extend to 83, so maybe this bit of software had jumped across. In retrospect, I should have checked whether the channels were moving in North American channel steps! Why the fault occurs is a bit of a mystery. The cause could be power supply spikes (not unlike the SS9000/9200 factory channel reset problem), in which case replacing the three electrolytics mentioned earlier will help. Replacing the 1µF electrolytic C9 in the SS9000/9200 stops the factory channel reset: leave it too long before this item is replaced and the symptom will be a dead receiver with a short-circuit BUT11A chopper transistor!

Fig. 1: Circuitry around the chopper chip U1 in the Pace MSS100 receiver. D5 and D6 prevent the pulse voltage at pin 3 of the chip rising above 200V.



The following notes are based on issues CDH58 and CDH59 of the Toshiba Service Bulletin

TOSHBA Service Briefs

TELEVISION

Model 261T4B

Vertical line, which varies with the brightness, down the right-hand side of the screen: Replace C449 (330µF, 16V).

Model 1720RB

Buzz on sound: Peaking coil L601 faulty. Replace with type TRF4120AJ, part no. 23238713.

Models 1720RB, 1721TB

Lack of contrast: CA16 PWM filter capacitor for contrast control leaky. Replace $(0.01\mu F, 50V \text{ disc} \text{ ceramic})$.

Models 2100RB, 2100TB, 2500TB

Tuning drift: CA23, CA24 or CA28 leaky. Replace as necessary $(0.1\mu F, 63V)$.

Model 2141TB

Intermittent loss of tuned stations: Can be caused by the AFT buffer transistor Q106 being faulty. Replace (type 2PC1815Y, part no. 23314794).

Models 2512DB, 2812DB

Lack of width – won't adjust in the service mode although the graphics change: Coil L423 in the DPC circuit faulty, though its DC resistance measures OK. Replace coil (type AT4043/60T, part no. 23211896).

No sound: Can be caused by DV07 being leaky. This puts a high on the mute line. Replace (type 1N4148, part no. 23115599).

Models 2152DB, 2552DB, 2555DB, 2852DB, 2855DB, 2857DB, 3357DB (C5 Chassis)

No line or field sync or a blank screen, with the OSD OK. Usually intermittent: Crystal XT01 (27MHz) in the teletext unit faulty. Replace (part no. 23153012).

Random display of the Channel number and the Nicam stereo symbol, often with noises on the sound: Cause is Nicam dropout. The problem occurs mainly with cable networks that remodulate the stereo sound signals on to their own Nicam carriers. The cure is to replace IF/Nicam unit H002, type MVGS43A. with the improved version type MVGS43B (part no. 23148249). Take great care when removing the original unit as the print is very fine and is easily damaged: do not use a plunger-type solder sucker.

The fault can also occur with terrestrial off-air signals where there is multipath reception, but this is rare.

Models 2535DB, 2835DB

Stuck in standby: Can occur when the TA8854AP EW correction chip IC302 is faulty – incorrect drive output at pin 2 turns the DPC amplifier QD03 hard on, also activating D471 (overvoltage/excess current protection) in the power supply. If this is the case replace IC302 (part no. B0384680).

Stuck in standby or tripping: Can be caused by circuit protector ZP31 going open-circuit. This unloads the 27V supply, with the result that D471 (overvoltage/ excess current protection) in the power supply operates. Replace ZP31 (part no. 23144452).

Note that there is a teletext circuit change in later versions of this chassis. A type SAA5281 chip is used in position ICF02 instead of type SAA5246. As the SAA5281 has an internal RAM, ICF03 (BR6265) is no longer needed.

Model 2857DB

With the receiver left in the Surround mode, the centre and Surround speakers are not muted when headphones are in use: The muting circuit is disabling only the woofer – it expects Surround off to be selected when using headphones, otherwise dialogue will be affected. A circuit change is required to deal with this. Details can be obtained from Toshiba Technical on 01276 694 555. Later receivers have been modified in production.

VCRs

Models V204B, V254B, V404B, V454B

Power shuts off when the machine is hot: The power supply overheats and the thermal protection operates. This occurs mainly when the weather is really hot. The curve is to remove and discard the cover on the component side of the PSU. This change has been implemented in production.

Starts to load a tape but stops half way - fault is

intermittent: Solder missed from connection to the 1N4001 diode DT102 in the capstan Vcc supply.

No display: Replace the 39Ω fusible resistor RP051 if it's open-circuit. Part no. 70041116.

Models V212B, V312B, V412B

Goes to standby intermittently – the power supply buzzes and the display goes out: Replace the BCP53-16 regulator transistor TP91 (part no. 70010941) and the 1.5Ω resistor RP91 (part no. 70041078).

Won't load a tape. Capstan 7V supply (BP03, pin 3) drops when a tape is inserted: Replace the 1N4001 diode DP31 (part no. 70010453) even though it might measure OK out of circuit.

Model V254B

Trips out intermittently in play: DT102 faulty.

No colour: ICV100 faulty.

No E-E audio: Reset the micro.

Poor picture, no colour: CV021 faulty. It's connected to pin 21 of IV001.

Model V513B

Blank E-E and playback screen: If a check on the 5V supply shows that it has fallen to 1 2V fuse FP02 (630mA) is open-circuit. Replace fuse.

Model V611B

Dead, no display: Cause can be no low reset at pin 16 of the M50957-226SP timer microcontroller chip ICX01 because of failure of transistor QX03. If so replace QX03, which is type 2SC2458Y – part no. A6332430).

Model V703B

Dead machine: Will occur if CP Z822 in the Ever 6V supply is open-circuit. Replace Z822 (part no. 23144480).

Model V705B

No E-E or playback sound: Can be caused by the 2.7V zener diode DW011 being leaky. As a result the MPX audio 9V supply on the audio PCB can be low at around 2V. Replace DW011, part no. 70010160.

E-E video overloaded with smearing, no playback colour: CV016 (1 μ F, 50V), which is connected to pin 16 of the main YC signal processor chip IV001 (LA7447M), was faulty.

White flashing picture: Cause was traced to RV011 (100Ω) being short-circuit. It's connected to pin 11 of the luminance processor chip.

Models V804B, V825B, V854B, V855B

Playback marred by a 2cm band of white noise across the screen, more noticeable with prerecorded tapes: Cause is a contact problem with slip-ring assembly G050 on the drum. Replace the slip ring assembly, part no. 70031451.

Model V855B

No playback colour: Cause was traced to C436 $(1\mu F)$ which was short-circuit. It's connected to pin 8 of the TL8843P chip IC431. The short produced a 0V reading at pin 8 of IC431.

AUTO SET-UP VCRs - CNI CODES

In order to provide a fully regional PDC service, the BBC is to change the CNI (Country, Network Identification) codes transmitted with the teletext signal. This change will not affect PDC operation. It will however prevent auto set-up models V255B, V425B, V825B and V855B identifying between BBC-1 and BBC-2 during auto set-up and auto clock set – Toshiba and other manufacturers use the CNI codes for broadcaster identification during search tuning. As a result, an auto setup will not put BBC-1 in position 1 or BBC-2 in position 2, storing them in positions 7 and 8 or higher instead. It will be necessary to tune BBC-1 and BBC-2 to positions 1 and 2 manually.

In addition, Toshiba uses BBC-1 (in position 1) to set and recheck the time and date (daily, at 0800 hours). Ensure that position 1 is tuned to BBC-1.

Models produced during 1996 have the new codes added to the microcontroller's software.

Stop press: The BBC has announced that the CNI code changes will not be implemented until 1998.

VCR SERVICE KITS

A mechanism service kit (part no. 70031719) has been produced for Models V212B, V213B, V312B, V412B, V423B and V513B (R2000 chassis). It contains a drive belt, head cleaner assembly, brake band subassembly, idler arm assembly, reel belt and pinch lever assembly. This is available to dealers at $\pounds11.18$, which is a considerable reduction on purchasing the items separately.

A washer kit (part no. 70031720) for the same models is available at $\pounds 3.73$. It contains six different types of washer used in this mechanism, with five washers of each type. Again there's an appreciable saving.

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Philips VR6761 etc

If the symptoms displayed by one of these machines look as if a video head has failed, check for the presence of the head switching pulses (HP) at pin 7 of plug L6 on the head amplifier module before ordering new heads. The HP pulses can go missing because of a broken wire from plug B15 on the lower logic/servo board P606 to plug S2 on the top signals board P303. The solid-cored wire takes exception to being flexed too often. **P.B.**

Toshiba V404

If the machine plays all right but there's no front display, check whether RP051 (39Ω , safety) in the power supply is open-circuit. A possible cause of its failure is that the ribbon cable to connector PK02 on the front panel is incorrectly routed, with the ribbon chafing on the cabinet top. The resistor's part no. is 70041116. **P.B.**

Samsung VIK310, 320, 350, 375 Series

These VCRs suffer from a serious problem in the fully-enclosed chopper power supply. C110

VCR Clinic

 $(100\mu F, 25)$, which provides negative bias for the error amplifier within the STR11006 chip IC101 to control the regulation, dries up. When it loses capacitance, the negative feedback at pin 1 of IC101 falls. As a result the chip thinks that the output voltages have fallen and attempts to increase them, causing a lot of damage.

When a customer brings in one of these machines never, whatever the complaint, plug it in without first replacing C110. If a machine goes off during say a power cut and is left off for any length of time the power supply can blow up (if you are lucky!) when power is restored. If you are unlucky, you can find yourself replacing endless components. In some cases the burnt up components can damage the main PCB.

In addition to replacing C110 it's advisable to replace C122 ($2\cdot 2\mu F$, 250V) and C109 ($47\mu F$, 100V). **M.Dr.**

Sharp VCA615 etc

In this range of VCRs the tape should shuffle backwards and forwards after loading. If this doesn't happen, the capstan motor is usually faulty. The small 10μ F, 25V capacitor leaks electrolyte that eats the print away. Don't despair: the damage can easily be mended with some fine wire. **M.Dr.**

Ferguson FV71

This machine had failed to come back on after a power cut. There were no dried up capacitors this time: TP91 (2SA1020) was shortcircuit collector-to-emitter. A replacement restored normal operation. **M.Dr.**

Memorex VR2150

Apart from fast forward/rewind this

machine worked normally. In the fast wind modes the torque was very low – the same as the play torque in fact. We suspected the mode switch, and managed to match it up with a Sanyo one stocked by Chas Hyde and Son Ltd. (part no. 11600CF). The only problems were that a fair amount of dismantling was required and to reassemble/align the mechanism we had to obtain a service manual from Tandy at £21. The new switch cured the trouble however. **M.Dr.**

JVC HRD750

These excellent machines are six or seven years old now. Thus some are suffering from dried up electrolytics in the power supply. If the problem is total loss of action, check C14 $(1\mu F, 50V)$ and C13 $(180\mu F, 16V)$ in the chopper circuit. **E.T.**

Panasonic NVG21

The fault with this machine was very intermittent and it took us a long time to track down the culprit. When the fault was present there was complete loss of action: even the clock display went out, leaving only the green cassette-in indicator (near the standby switch) alight to indicate that power was reaching the machine. The culprit turned out to be the STK5338 regulator chip IC1001 in the power supply can. E.T.

Toshiba V611B

This machine's fault would put in an appearance about once every three months. When it did appear the symptoms were no eject, no deck functions and a seemingly jammed tape-loading mechanism, culminating in shut down. Loading motor M003 was the culprit. In the fault condition it drew 600mA from the 5V supply with no mechanical load. So we also replaced its driver chip IC603. There was a clue, had we realised it: picture interference when the faulty motor was running. **E.T.**

Hitachi VTM112E

This machine wouldn't accept a cassette – the half-load lever would not retract. I partially stripped the mode gear assembly, half expecting to find the gear damaged. What I actually found was a split washer jammed in one of the cam-gear grooves. As no split washer seemed to be missing from the mechanism, I assume that it had fallen in during manufacture. I managed to get it out without having to dismantle the mechanism completely. **P.H.**

Hitachi VT5890E

I had no information on this machine and the customer was extremely vague about what the problem was. After some testing I found that a still picture would sometimes be displayed although the still command hadn't been used. This usually happened after a reverse search then going back to play. A tight capstan motor was the cause of the trouble. I took it to bits, cleaned and greased the bearings then reassembled it. This fixed the fault. **P.H.**

Sharp VCH81H

A cassette was jammed in the mechanism. After extracting it manually and confirming that there was no mechanical damage I inserted another cassette, but it wouldn't play and there was no capstan rotation. The supply voltages and control signals on the motor board were correct. A new motor assembly got the machine working again. Fortunately the assembly is not expensive and is easy to change. **P.H.**

Philips Charlie Deck

There was usually no forward motion (play, record or fast forward) once a cassette had been fully rewound. No apparent error showed up when the on-board diagnostic program was tried. A phone call to Philips technical produced the solution. As the brakes were inefficient, the entire length of the clear leader was drawn towards the supply spool. The slight forward tape movement after rewind was insufficient to wind the leader on to the take-up spool fully. As a result the leader was exposed during loading.

The solution is to replace the reel discs and brake parts as follows: counter force brake, item 209, part

no. 4822 403 52488; brake arm assembly, item 213, part no. 4822 403 10257; reel discs (two), item 207, part no, 4822 528 10523; brake rollers (two), item 232, part no. 4822 528 70638. The item numbers refer to the numbers shown on the exploded view of the mechanism in the manual. Replacing the reel discs is a fiddly job: the special removal tool part no. 4822 395 30243 helps. **P.H.**

Panasonic NVD48

This machine was dead. Checks in the power supply showed that Q3 and D12 were short-circuit. After replacing them D12 failed at power up. Another replacement was fitted, then the machine was powered up via the variac. This revealed that the power supply outputs were not being regulated properly. The cause was C12, which had fallen in value. In addition C19 was open-circuit. Once these two capacitors had been replaced the machine worked normally. **P.H.**

GoldStar RQ5041

After fitting a new drum we found that there was poor colour with prerecorded tapes. So we set the machine up as per the book, but the results were the same – the colour in the playback picture was still outof-phase. Advice was sought from GoldStar technical, who are very helpful. "Try another drum" was their recommendation, but again the results were the same.

Time for some head scratching. We had already checked the chroma signal path and had found no faults. The only thing that didn't match up with the measurements given in the manual was the FM envelope which was smaller than specified though beautifully formed. Fortunately a similar machine came in for repair, so we were able to carry out comparison checks. With the good machine the FM was not appreciably larger and wasn't as well formed as with the faulty machine. So we decided to change all the subassemblies, again without any improvement.

When a third new drum was fitted the machine worked perfectly. So was this two faulty new drum assemblies? Well, not actually faulty but incorrectly assembled. The upper drums were on the wrong way round. Correcting this produced perfect results. Should you get this sort of problem, note that the upper drum is coloured green on one side and white on the other. The upper face of the lower drum is coloured green. White goes to green, not green to green as with the faulty drums. C.W.

Goodmans GVR3000

If you have trouble tuning in one of these machines, or you get a number of the same channels grouped together, remove the front panel then look beneath the clock where you should find four holes in the board, marked TP4 and 5 and TP6 and 7. Short out 4 and 5 to empty the memory then short 6 and 7 to start full auto-tuning. **C.W.**

Grundig VS500

This machine was dead with no outputs from the power supply unit. The mains side was OK, but the primary side wasn't oscillating. A check at pin 6 of the chip produced a reading of 10V, which should have started the drive but didn't. So we replaced the chip. This was the wrong thing to do, as it made no difference. The cause of the problem turned out to be C1326 (47μ F, 25V), which was low in value. It's the reservoir capacitor for the chip's DC supply. C.W.

Matsui VX755/Saisho VR3600

This machine would run all right for a couple of hours. It would then appear to go into the pause mode for about a quarter of a second, run normally for a few seconds then pause again. When we looked in at the top we saw that the capstan motor was pausing, with the tape not stopping long enough to switch off the machine. Checks at the motor drive and supply pins showed no reason for the pauses, so we assumed that the motor was duff. In fact all that was required was a spot of oil in the motor's upper bush. C.W.

Akai VSF10

This machine was doing some nasty things to our customer's tapes. On examination we found that the casette tray didn't go down fully because the left-hand coupling cam and operating rack had slipped by one tooth. Willow Vale supply a modification kit, part no. 57550E, to cure the possibility of slippage. **K.E.**

NEC N9053K

Coloured noise on the picture and failure to erase previously recorded audio were the complaints with this machine. When you get this it's a safe bet that the cause of the problem is around the full erase head. On this machine a plug and socket arrangement is used here. When the plug was removed we found a fractured wire. It's best to remove the plug and hard wire the connections directly on to the head pins. **K.E.**

Samsung SI7220

The causes of intermittent servo faults can be frustrating and timeconsuming to trace. This machine was no exception. It came in with the complaint that the sound suffered from wow and flutter while tracking noise bars moved up the picture. After resoldering numerous suspect joints on the motor control/servo subpanel to no effect we decided to check back to the audio/control head. The screen on the connector plug from the head to the main PCB proved to be loose. **K.E**

JVC HRS4700

There were no functions at all. No power up, no nothing. Voltage checks showed that the display chip's reset port was at 2V, which is not a good thing. The fault persisted when this chip had been replaced. Doesn't it make you mad! Replacing the timer chip and, for good measure, the CAT chip got the machine going. **S.B.**

JVC HRS880

There was no front-control operation because the tuner/timer chip was faulty. A replacement restored normal control. **S.B.**

Amstrad VS1000

Fuse F01 in this combined satellite/VCR unit had ruptured violently and we found that IC7001, which is type STRD6008, was short-circuit. Amstrad Technical recommended that we also replace the main smoothing block C7510 to prevent further problems. **G.T.**

Samsung VI520T

This machine provided a choice of symptoms. Sometimes it worked. At other times it either locked up with an odd segment of the display lit, or various segments flashed along with random flashing of the function LEDs and the mechanism shuffling.

The power supply in this VCR consists of an STR type chip that provides a 13V output and a discrete-component chopper circuit that provides a 5V output. The normal cause of the sort of fault described above is that C3, which smooths the 13V supply, dries up – being covered with a screening can, the power supply runs warm. Access is also a test of patience.

After replacing C3 we carried out some checks around the microcontroller chip on the front PCB. When its 5V supply was scoped we found that a 1V peak-topeak squarewave was sitting on it. Back to the power supply, where C13 and C14 had dried out. A check on the rest of the capacitors in the power supply revealed that many of them were showing signs of stress. A blanket replacement of the capacitors in the power supply and the removal of carbonised glue from the PCB completed the repair. G.T.

Sanyo VHR3300E

This machine was dead. Replacing R1, which was open-circuit, in the power supply restored normal operation. G.T.

Philips VR6185/DMP decks

The symptom was very intermittent jamming when laced up in the play/record modes. After much investigation I found that a pivot lever (Philips ref. 260) hidden under the threading ring at the rear of the deck was worn/broken.

Replacement with one from a scrap machine provided a cure. **R.C.M.**

Panasonic NV430

If the tape loops after going from play to stop then eject, i.e. not after fast forward or rewind, the mode switch requires cleaning or replacement. **R.C.M.**

Ferguson FV62

The job card said "no E-E sound", but on test there seemed to be plenty. After a while the sound disappeared. The repair shop engineer had replaced the tuner, and was surprised that this hadn't cured the fault.

I traced the sound path from the main board to the little PCB that has the audio record/playback amplifiers on it. There was sound at the input to this board, but not at the input to the chip. C017 had never been soldered at one end. Resoldering it restored permanent sound. M.M.

Roadstar VCR7200PV

When a cassette was inserted the machine whirred a bit then ejected it. The customer had already had two quotes: one repairer told her that the lower drum had failed, the other that a new carriage was required. Now I had the machine and there was another fault: a loop of tape was left when the cassette was ejected.

I checked the machine in front of the customer. The capstan wouldn't rotate because the wrong screw had been fitted to the carriage, distorting the motor plate; wires to the carriage had been cut and twisted together; and it was clear that the machine had been thrown back together when the estimate had been refused. A replacement screw in the carriage got the capstan motor going again, and a new piece of wire replaced the lead that had been cut.

Now to the original fault. When a cassette was inserted the machine went into the rewind mode for a couple of seconds, laced up, went into rewind again, unlaced and ejected the tape. The culprit was the end-of-tape sensor, a replacement restoring normal operation. M.M.

Toshiba V110B

We were called to clean the heads but found that we couldn't tune the machine in to the TV set. It appeared that the cable installers had been a bit rough. The centre pin of the RF modulator/converter had been pushed in, and the preset for the RF tuning range was loose – the print around it had been cracked. When all this had been put right we were able to tune in the VCR and cable system. What should have been a twenty minute job (head cleaning) ended up taking an hour and a half! M.M.

Panasonic NVJ40

The customer's original complaint was about interference. She also complained that occasionally, during playback, the machine would stop and come back on again. As it looked as if the cause of trouble was ripple from the power supply, I took the machine back to the workshop – where it performed faultlessly. When it was returned to the customer both faults showed up almost immediately.

The switching on and off was a power supply fault: IC1102 was dry-jointed. The interference seemed to be caused by some form of interaction between the TV set and the VCR. Disconnecting the aerial from the VCR failed to cure it. Adding an attenuator made it worse. Slight adjustment of the RF converter frequency plus retuning the TV set eliminated the problem. **M.M.** SURVEILLANCE TELESCOPE Superb Russian zoom telescope adjustable from 15x to 60xl complete with metal tripod (Imposible to use without this on the higher settings) 66mm lense, corning case £149 ref BAR69 RADIATION DETECTOR SYSTEM Designed to be wall

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Inside the Pace MSS1000 Satellite Receiver

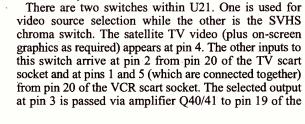
In this second instalment J. LeJeune describes the signal switching arrangements, the microcontroller system and the front panel circuitry.

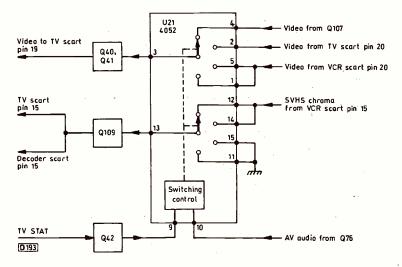
n Part 1 last month we provided a general block diagram of the receiver then went on to describe the power supply circuitry and the video signal path, starting at the LNB input to the tuner. This brought us to buffer transistor Q107, which was a convenient point at which to break off. Q107 provides feeds to the video source selection chip U21 and the modulator video source selection chip U30 (see Fig. 6 last month). We will now explore these paths.

AV Switching

Fig. 8 shows in block diagram form the signal paths and control arrangement associated with the 4052 chip U21, which directs feeds to/from the TV and VCR scart sockets. Before going any further, a correction is required: in Fig. 6 last month the switch pole was incorrectly shown as being connected to pin 5 instead of pin 3. Fig. 8 shows this correctly.

Fig. 8: Block diagram showing the video signal source selection arrangement.





TV scart socket.

Pins 9 and 10 are the control lines: the switch connections made depend on whether these are high or low - the following table shows the various conditions.

Selection table for U21		
Pin 9	Pin 10	Routing
Н	н	Pin 4 to 3, also 11 to 13
Н	L	Pin 2 to 3, also 15 to 13
L	Н	Pin 5 to 3, also 14 to 13
L	L	Pin 1 to 3, also 12 to 13

If pins 9 and 10 are both high, pin 4 (satellite TV) is connected to output pin 3: the satellite TV video plus any on-screen messages then pass via Q40/41 to pin 19 of the TV scart socket. At the same time pin 11 is connected to pin 13. This switches off Q109, removing 12V from pin 15 of the TV scart and decoder scart (AV1) sockets.

In passing, both the AV1 and AV2 (auxiliary) scart sockets have baseband video at pin 19 (see Fig. 6 last month). This is not suitable for feeding to a VCR. These sockets are intended for the connection of additional external decoders if required – for alternative transmission standards or scrambling systems.

Pin 9 is controlled by the TV STAT line via inverter transistor Q42. The TV STAT line comes from pin 23 of the microcontroller chip U22. Whenerever this line is high, pin 9 of U21 is low. In this condition, video from pin 20 of the VCR scart socket is passed to pin 19 of the TV scart socket. In addition, SVHS chroma from pin 15 of the VCR scart socket is passed to pin 13 and then via Q109 to pin 15 of the TV and pin 15 of the decoder (AV2) scart sockets.

When pin 9 is high, the inputs from the VCR scart socket are open-circuit. The status of pin 10, which is controlled by the AV AUDIO line (via inverter Q76), then determines whether the satellite TV input from Q107 is selected or the video from pin 20 of the TV scart socket is looped through. The AV AUDIO line originates at pin 13 of the shift register chip U25, which is used as an expander for U22. Note that the satellite TV video feed may consist of video from the AV1 or AV2 (auxiliary and decoder) scart sockets, selected by U26 (see Fig. 6 last month). Also that it's not possible to view satellite TV via the TV scart socket and send audio and video from the VCR scart socket to the modulator for an RF link to another room simultaneously.

When pin 10 of U21 is low, pins 19 and 20 of the TV scart socket are connected. With pin 8 (source switching) held high, this provides a simple loop through. If pin 10 of U21 is high, video from the tuner or from the decoder or auxiliary scart socket is fed to pin 19 of the TV scart socket.

In the TV loop-through condition (the AV AUDIO line low), audio signals are fed to the audio processor chip U18 and back to the TV scart socket. This enables Home Cinema effects to be applied to them. To achieve this the AV AUDIO line also controls the audio input preselector chip U20 (see Fig. 10).

Switching of the TV audio and video signals through the MSS1000 is controlled by the remote control unit's TV \rightarrow SAT key. In the TV loop-through mode, TV \rightarrow AV appears in the front panel display.

VCR and RGB

The VCR STAT line is a bi-directional one that runs between pin 32 of the microcontroller chip U22 and, via D71 and R222 (see Fig. 9), pin 8 (status switching) of the VCR scart socket. With a modern VCR set to play connected to this socket the line will go high, telling U22 that a VCR input is present.

Pin 32 of U22 controls pin 8 of the TV scart socket via Q37 and Q36. D71 prevents pin 8 of the VCR scart socket going high when pin 8 of the TV scart socket is high and the VCR is not in the play mode. It also prevents the VCR holding the VCR SAT line low.

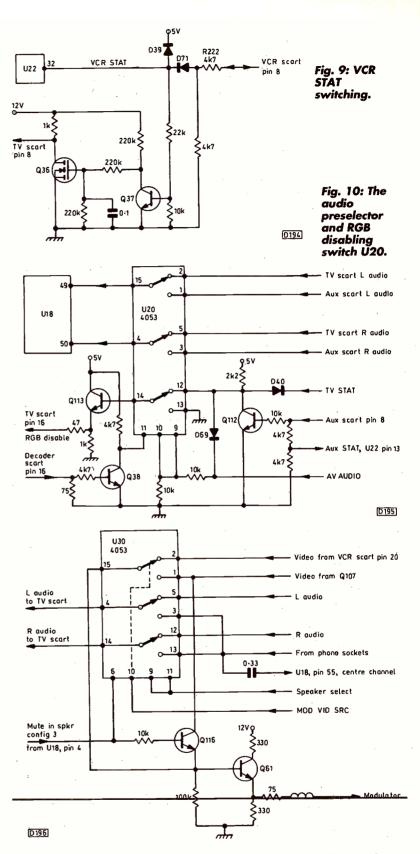
RGB loop through is normally enabled when pin 16 (fast blanking) of the selected AV scart socket is high. Selection is achieved by pressing the remote control unit's 0 key until the appropriate source is indicated in the display. A low at pin 16 of the decoder scart (AV2) or pin 8 of the AV1 scart disables the RGB mode.

One section (pins 12, 13 and 14, with pin 11 for control) of the 4053 switching chip U20 is used as the RGB disable switch – see Fig. 10. When pin 16 of the decoder scart AV2 goes high, Q38 is switched on and pin 11 of U20 goes low. If Q112 is off, pin 12 of U20 will be high and 5V will appear at the base of Q113 via pin 14. Since Q113 is an emitter-follower, this voltage will be fed to pin 16 of the TV scart socket. Q112 is switched on by the presence of a high at pin 8 of the auxiliary scart socket AV1. Input selection is then automatically switched to the AV1 socket via the AUX STAT line, which goes to pin 13 of U22. Pin 12 of U20 is now low, and RGB is disabled by taking pin 16 of the TV scart socket low.

Modulator Source Selection

Another 4053 chip, U30, controls modulator video source selection, see Fig. 11. It's also used for speaker configuration selection and muting. Pins 1, 2 and 15, controlled by pin 10, pass either the satellite TV video or VCR video via Q61 to the modulator. The control signal applied to pin 10 is the MOD VID SRC (modulator video source) line from pin 25 of the microcontroller chip U22. Under normal conditions this line is high and satellite video is selected. When it goes low the video from pin 20 of the VCR scart socket is selected. This can happen only when VCR PLAY or VCR \rightarrow AV is displayed on the front panel and the receiver is using speaker configuration 2 or 4. These configurations allow a UHF TV connection for





video and audio from selected sources.

Speaker configuration 3 disables the outputs from U30 to mute the sound to the TV scart socket. It makes use of one of the Surround (rear) speakers for the centre channel. The TV speaker should obviously be inoperative in this condition, because of its uncertain phasing with respect to the centre channel speaker. With U30 disabled however there's no video output to the modulator. An alternative route is therefore provided, via Q116 which is controlled

Fig. 11: The modulator video selector and speaker configuration selection and muting switch U30. by the mute speaker configuration line from pin 4 of U18 - the same line that controls the U30 disabling at pin 6.

The Modulator

Fig. 12 shows a block diagram of the modulator, which follows the usual pattern for the Pace family of satellite receivers. It's based on an SL5066 chip (U15). A smaller IC, U16 (SP4633), acts as a pre-scaler, sampling the local oscillator frequency and providing feedback to the phaselocked loop controller within the Nicky chip U26. The screened compartment for the modulator also contains a UHF loop-through amplifier and signal combiner.

Q61's video output is AC-coupled to pin 4 of the modulator chip U15. Audio from pin 14 of U19C is fed to the cathode of varicap diode D37, which is part of a 6MHz tank circuit connected to pins 15 and 16 of U15. The 6MHz carrier is thus frequency modulated.

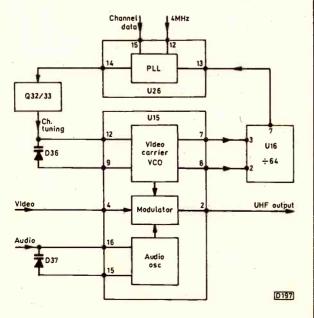
UHF output channel tuning is carried out by D36, which is part of another tank circuit connected to pins 9, 10, 11 and 12 of U15. Pins 7 and 8 of U15 feed a balanced signal to pins 2 and 3 of the pre-scaler U16. This divides the frequency by 64, delivering an HF signal in the range 7·2-13·4MHz to pin 13 of U26. The signal is divided further in U26, then compared to a reference 7·8kHz signal produced by division from the 4MHz clock signal fed to pin 12 of U26 – this is in turn derived by division by four from U22's 16MHz clock oscillator. The tuning output at pin 14 of U26 is taken via integrators Q32/33 to D36.

The UHF loop-through amplifier is a wideband circuit using two BFR193 transistors. Its gain is a nominal 6dB, enough to compensate for the loss in the following combiner circuit. This uses a balun transformer to prevent the modulator's output appearing at the wideband amplifier's output, with the possibility of reaching the UHF aerial input. It's basically a splitter used backwards, and introduces a nominal loss of 4dB.

The Microcontroller Chip

The microcontroller chip U22 is a Z8 device. In early models a ROM-less version was used, fitted on a small daughter board. This was subsequently replaced with a full-mask version when minor software bugs had been eliminated. U22 operates in conjunction with the shift register U25 (CD4094BCN), which is used as a port expander, and the 24C32 EEPROM U27 which stores information entered from the on-screen menus.

U22's clock oscillator, connected to pins 2 and 3, runs



at 16MHz. Another chip in this area, the 74LS74 U31, forms a divide-by-four circuit to provide a 4MHz clock for the Nicky chip U26.

U22 also communicates with U1, which drives the front panel display and decodes the IR remote control signals and front panel commands.

The control line arrangements are shown in Fig. 13. U26, U7 and U18 share a common bus with U22, U25 and U27: data on the bus is also supplied to U4, U6 and U9 on the Dolby Sound PCB.

The pin connections for U22 and U25 are shown in the following table.

Microcontroller and port

expa	nder pin connections
	ontroller U22
1 2 3 6 10	5V 16MHz clock
3	16MHz clock
6	Reset
10	Serial clock Chassis
12	VCR scart pin 12 via Q103
13	AUX STAT
14 15	LNB short AFC
16	VideoCrypt sense
17	U25 enable
18	VideoCrypt chip U8 enable
19 20	Serial clock 2 sound Serial clock 1 sound
	Nicky chip (U26) enable
22	22kHz tone on/off
21 22 23 24 25 26 27 28 29 31 32 33 34 35 36 37 38	TV STAT Speaker selection
25	MOD VID SRC
26	Card 1
2/	Card 2 OSD ship (UZ) anghla
29	OSD chip (U7) enable Common clock
31	DEC STAT
32	VCR STAT
34	Station ID input Dish pos data
35	VideoCrypt authorise
36	Surround clock
38	Data line Front panel data
39	Front panel interrupt
40	Front pan <mark>el clock</mark>
There are	no connections to pins 4, 5, 7, 8, 9 and 30.
Expand	ler U25
1	Latch
1 2 3 4	Data Common clock
4	Common clock LNB on/off
5	Standby
6	LNB select Bandwidth
8	Chassis
5 6 7 8 9 11	No connection
	U17, pin 10 C Band
12 13	AV AUDIO via Q76
14	H/V polarisation
15 16	5V 5V
10	34

Fig. 12: Block diagram of the modulator.

Front Panel

A feature of the MSS1000 is its comprehensive display panel. Fig. 14 shows the general arrangement. There are ten 7 x 5 segment alphanumeric character grids plus indicators for the LNB input selected, parental lock, 16:9, VCR, AV1, AV2, timer, C Band, Ku Band, AFC, VideoCrypt, six audio effects, stereo, simulated mode, Dolby PLSS and, finally, which card slot has been selected.

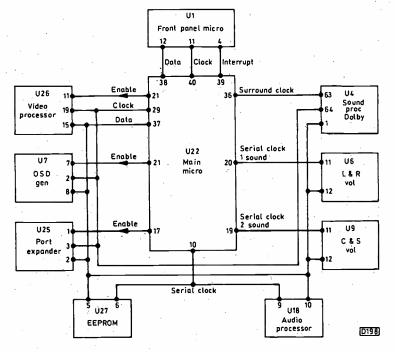
The fluorescent display tube is a vacuum device that uses positive ion emission from a heated filament - this can be seen as thin, horizontal wires that traverse the display. When a negative voltage, typically -21V, is applied to a segment positive ions from the filament are attracted to it and it lights up. Normally the segments are by the application of 5V from the 'off' held microcontroller chip U1. The filament is coated with barium salts, and is heated by applying to it an 8V peakto-peak squarewave. This squarewave is obtained from the 22kHz tone oscillator circuit (see Fig. 4 last month). The display microcontroller chip U1 is a 64-pin device that runs at 4MHz. It also decodes the IR remote commands, the rotary knob and pushbutton commands, and drives the channel and volume LEDs that indicate the mode of the rotary control knob.

U1 constantly monitors the state of switches SW1-4. SW1 sets the rotary knob's control mode to volume. SW2 selects the standby/operate mode. SW3 sets the rotary knob to the channel selection mode. SW4 is for home inema effects selection.

A ribbon cable connects the front panel to the main board, carrying the supplies and communications between he microcontroller chips. Transistors Q1-4 and 7 are suffer/inverters for ports P0-3 and 13.

n General

he receiver has given little trouble in service apart from the ccasional failure of C2 on the display panel – this blanks he display. Use of a multilayer ceramic instead of an lectrolytic capacitor in this position has solved the problem.



The receiver emits a fair amount of radio hash interference in certain situations. Remedies have been applied to calm this. With all the processing that goes on within the receiver, it's little wonder that some radiation occurs.

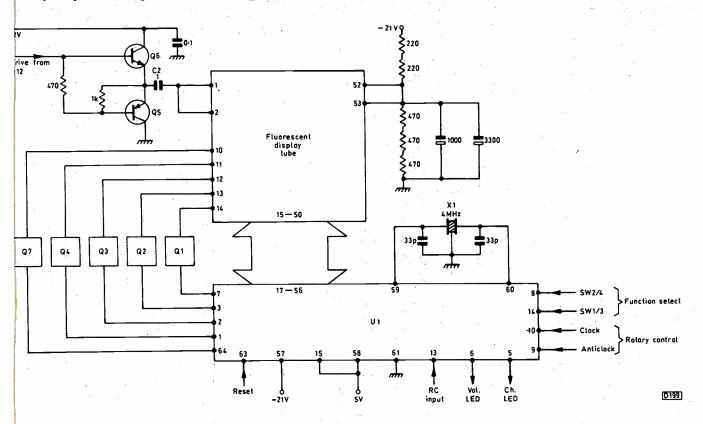
The performance with encrypted signals could cause problems with some early models. This situation seems to have been much improved, possibly because of the improved energy-dispersal clamp circuit now used.

As my own mains supply is overhead, there are more than the usual number of interruptions during the winter months. These do not seem to worry the MSS1000 in any way.

In the concluding instalment next month we'll deal with the audio side of the receiver.

Fig. 13: The bus control lines.



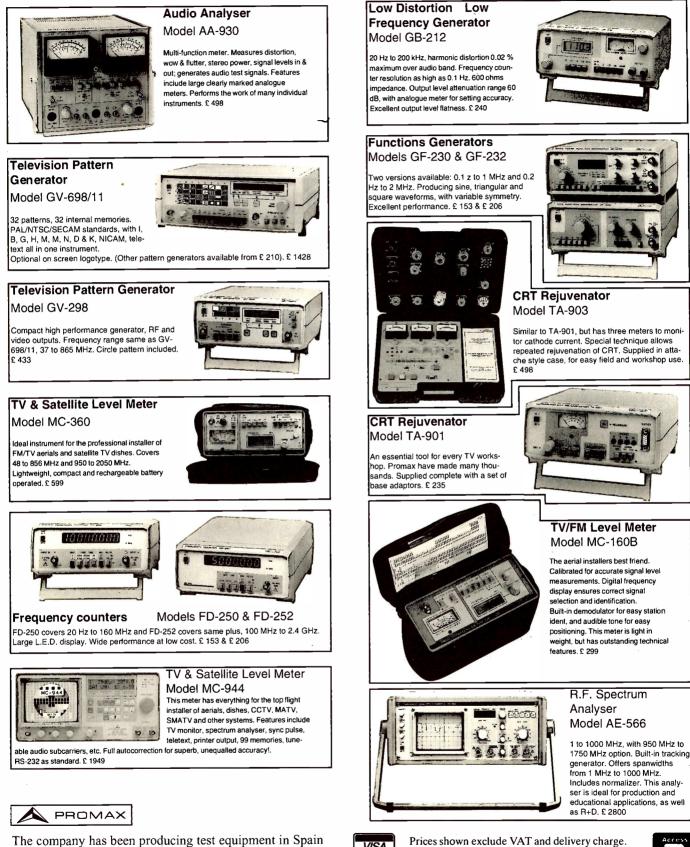




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TELETOPICS

Digital TV Plans

The BBC has announced plans for the start of digital TV services. Its DTV services will be made available via all distribution systems - digital terrestrial, digital satellite, cable and, later, telecommunications networks. BBC channels will be available in the widescreen format, with CD quality sound, and many new services will be launched - for example a 24-hour news channel. An optional 'video stream' will offer complementary or alternative programmes. There are plans for a series of thematic channels, based partly on archive material, to be provided on a subsciption basis. Director-general John Birt feels that all this can be achieved, while saving up to twenty per cent of its annual budget, through the use of digital technology to enhance efficiency and partnerships with the private sector.

TV/Video Equipment

Hitachi has launched several models that include the company's new 3D spatial sound system. Like JVC's 3D Phonic, this promises Surround-sound without the need for external speakers. The Hitachi 3DS system uses a digital signal The ITV companies have agreed in principle to launch joint digital terrestrial TV services. A new corporation, which has been dubbed 'ITV-2', may be set up to achieve greater efficiency than that offered by the present network system.

BSkyB plans to launch a digital satellite TV service in the autumn of 1997, offering between 200 and 500 channels - between 60 and 100 will be used to provide near instantdemand film broadcasting. BSkyB intends to work in partnership with as many broadcasters as possible to provide a diverse package. An eightchannel venture with Granada Television is to be launched later this year, and talks have been held with the BBC with a view to providing up to twelve channels. A substantial subsidy - how this might work has not been made clear - is proposed to

processor chip to provide signals for four front-facing speakers. The sets also have a Dolby Pro-Logic processor and four 10W amplifiers, which can be used with either optional IR- or wire-linked speakers.

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JVC has launched its DV (digital video) camcorder in the UK, as

keep the cost of the decoders required to around £200. In return for reduced rental fees, BSkyB proposes to meet half the cost of the launch of a new Astra digital TV satellite. BSkyB and British Telecommunications have also held discussions aimed at forming a joint venture to promote digital TV and interactive services in the UK.

The UK Digital TV Group has endorsed the DVB common interface for use in digital terrestrial equipment. This is a standard for connecting proprietary conditional access systems, allowing different CA systems to be used by different operators and for their replacement in time. The decision is being notifed to the government and the broadcast regulators concerned, including the DTI, the ITC, OFTEL and the European Commission.

Model GRDV1. Despite its tiny size ($43 \times 148 \times 88$ mm) the camcorder offers a range of functions including editing and multimedia possibilities – some of these are off-loaded on to a docking station that forms part of the package. Price is about £1,800 including the docking station.

• • • • • • • • • • • • • •



This in-built car TV will keep the kids amused while you are driving. The 6in. colour set can be used for video games as well as normal reception. So far the Clarion Car Multimedia System, which can also be used to obtain directions, is available only in the USA. A European launch is expected "soon".

Business Developments

The world's largest PC manufacturer Compaq Computer has formed an alliance with Thomson Consumer Electronics to develop a range of domestic entertainment products. The two companies plan to involve other consumer electronics and PC manufacturers, entertainment content creators and broadcasters in developing products that combine computer technology with the latest developments in the consumer electronics field.

The first product, expected within twelve months, will be a PC-TV that combines the features of a multimedia PC with a large-screen TV. Compaq and Thomson will be aiming such products at the upper end of the consumer electronics market. Internet access will be a feature.

ComStream Corporation of San Diego, California, a leader in satellitebased technology, has announced an agreement with Matsushita Electric (UK) Ltd. to develop and manufacture TV set-top products for use with digital TV services. ComStream is also to work with Matsushita's R&D centre in Frankfurt on developing enhanced digital TV products incorporating multimedia technology. Manufacture of set-top boxes at Matsushita's Cardiff plant is to start later this year. ConStream has supplied over 1.5m demodulator subsystems used in Thomson Consumer Electronics' digital satellite set-top boxes marketed under the RCA brand name.

Interactive TV

Two Way TV, which has been running interactive TV trials in the Central TV area, plans to develop its services beyond games to betting, interactive advertising, home shopping, banking and market research. Over fifty hours of interative programming a week is currently available to subscribers, ranging from Telly Addicts to Question Time, using terrestrial broadcast technology.

MPEG-4

The latest MPEG audio-vision compression system, no. 4, is designed for Internet use. It's described as "a universal mechanism for communicating audio and visual data". The specification is due to be completed by November 1998. The vision side will code information on the items that comprise the scene individually rather than working on a field by field basis, using a "virtual reality modelling language" (VRML). Instead of a fixed compression algorithm for encoding and decoding, an extendible set of tools that are combined as required for the particular application will be used. The VRML approach will enable

The Next Generation

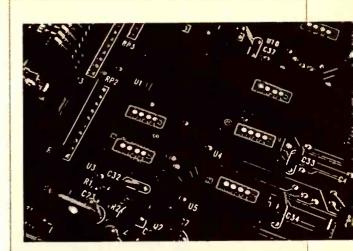
Texas Instruments has announced a major advance in IC technology. The company's TImeline technology uses 0.18 micron connections within the chip, enabling 125m transistors to be fabricated on an IC the size of a thumbnail. This can give such a chip the processing power of 20 The UK's largest cable operator Telewest has announced a new service called Cable Internet. It will be a high-speed cable modem service available to cable and non-cable TV subscribers, both domestic and business. The operation will be run by a subsidiary company that will be open to other cable operators to join. Several leading cable companies have already expressed support for the service.

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the perspective to alter: as objects are approached, newer versions can be downloaded. The MPEG-4 Syntactic Description Language (MSDL) enables the coded objects to be linked and built up. MSDL handles the set-up between terminals, and checks whether the decoder has the set of tools required to manipulate the encoded audiovisual data – if not, it downloads the missing techniques.

What you seem to get at the receiving end is a multiplex of audio-visual data that can be manipulated, rather than having fixed fields. It's a new technique that provides a truly interactive approach.

PCs! Complex consumer equipment, including videophones and voice-recognition systems, are possible applications. The reduced size makes the chips faster and quieter and reduces power consumption. Different types of device can be fabricated on a chip to increase design flexibility.



TEMPERATURE CHECK

The new MicroCelsi self-adhesive labels enable the temperature reached by electronic components to be permanently shown. The labels measure 5×12 mm and are particularly suitable for attaching to ICs. They have four spots which change permanently from white to black when the temperature rises to 60, 71, 82 and 93°C respectively. By sticking the labels on components in equipment being soak tested, you can from time to time check for any excess temperature hot spots that have occurred, enabling suspect components to be identified. The temperature level needs to be exceeded for only a fraction of a second for a spot to change from white to black.

More information and free samples are available from Dipl.-Ing. Ernest Spirig, PO Box 1140, Hohlweg 1, CH-8640 Rapperswil, Switzerland [fax (+41) 55 222 6969].

Special Edition Teletest

A special limited edition of the Teletest is available from Ozan, for the same price as the standard version. The special edition has been introduced to celebrate two years of Ozan's pattern generators, which are being used by thousands of satisfied customers. The Teletest-2 has six test patterns and S video outputs as well as composite video, RF video and a 1kHz audio tone. For a free information pack call Freecall Ozan on 0500 009070.

D-VHS Standard Finalised

JVC has finalised the technical specification for its Data VHS format. The system, announced in April 1995, offers both analogue and digital bit-stream recording. The latter is a process of recording compressed or encrypted digital signals on the tape directly, with readout in the same way. In other words the D-VHS deck does not contain a DAC or digital decompression or decoding circuitry: these would be handled by a set-top decoder or other external device.

D-VHS uses a new grade of S-VHS tape

and a special cassette with an ID hole. The cassette is based on conventional VHS technology and offers a standard capacity of 31.7-44.5Gbytes, giving a recording time of five to seven hours. Tape speed is 1.67cm/sec, the drum rotating at 1,800 RPM. Video head azimuth is $\pm 30^\circ$, track width 29 microns and track length 10.6mm.

The recording specification is as follows: main input data rate 14·1Mbits/sec, subdata input rate 0·146Mbits/sec, recording rate 19·14Mbits/sec. Each track represents one sector, the length of the sync block being 112 bytes. Reed-Solomon error correction coding is used, the modulation system being NRZ (non return to zero).

The format also uses an IEEE1394 digital interface. This is a high-speed serial interface with a maximum speed of 400Mbits/sec. It is designed for data communication amongst multimedia equipment such as electronic cameras, computers and digital AV equipment. The first D-VHS decks will be launched in the USA later this year, with a European launch in 1998.

Long-distance Television

DX-TV conditions and reception; satellite TV news and sightings; HDTV and long-distance reception in the Thirties. Roger Bunney reports

April produced the hoped-for increase in Sporadic E reception, which suggests that the coming season will be a good one. Certainly during the Sixties a mid-April opening always seemed to be followed by E-layer propagation from mid-May to early August, across Band I.

In those days the openings would be dramatic. As most TV stations transmitted test cards during the day time, identification of both familiar and rare signals was easy. Now that all-day TV is the norm, transmitter identification can be difficult. Dramatic reception is still possible – transatlantic signals from Canada, double-hop propagation from Nigeria and Ghana, exotic signals from Syria and Iran and so on.

Reception reports for April relate mainly to the weekends. Day-time checks showed that sustained lowlevel SpE signals were often present from the middle of the



month, but always it seemed RAI (Italy) ch. IB! Other reports I've received are as follows:

- 14/4/96 Unidentified ch. E4 signals from 1200 onwards.
- 21/4/96 Slovenia ch. E4; ARD (Germany) E2; TVE (Spain) E2,
- 3; RAI (Italy) IA, IB. 27/4/96 UT (Ukraine) R1, 2;
- Moldova R2; TVE E2, 3; RAI IA. 28/4/96 Slovenia E4; ARD E2. 30/4/96 ARD E2; Italy E2 (not
- RAI).

The 1996 edition of the *World Radio and TV Handbook* lists ch. E4 and E23 transmitters being operated in Jericho by the Palestinian Broadcasting Corporation. If the ch. E4 station is in operation and you receive it, let us know – the power isn't listed. Can anyone in the middle east provide further information? This could be the DX-TV challenge for 1996!

Satellite Sightings

The Israeli action in Southern Lebanon produced much news activity, with various SNG uplinks brought into operation. Eutelsat II F3 (16°E) was an extremely active bird, in both the Telecom band (12.5-12.75GHz) and, when capacity limitations made it necessary, the FSS band (10.95-11.7GHz). The UK 'Uplynx' facility was in operation on April 27th at Tyre, its UK144 truck providing a feed for CNNI at 1400 hours. Unfortunately the Eutelsat news feeds from 13°E now use compressed digital video.

The Jason VII project was in operation throughout April. This is

an educational exercise, with live broadcasts from the Caribbean sent to Europe via the PAS-3R satellite at 43°W (tune to 12.733GHz). For many enthusiasts it provided the first reception from this new and rather introvert satellite.

I've also seen very weak NTSC signals via Orion (37.5°W), at 11.657GHz (vertical). Even with threshold extension I was unable to identify the source. Perhaps it was a spot beam directed at Africa? Orion is often used for BBC regional OB hook-ups. Check at 1830-1900, when analogue programme inserts are often present at various frequencies within the Telecom band. BBC-Wales is a frequent user. Unusually, at the end of an insert the carrier is cut rather than displaying an identification, the general practice with other uplink operators.

An ART-Europe OB on the 28th featured a religious event. I'm told it was the Hajj, which marks the annual pilgrimage to Mecca. This was via Eutelsat II F3. At around the same period ART-5 appeared via this satellite. It's a general entertainment channel, with heavy emphasis on music. Some days later it disappeared.

MTA (Muslim TV Ahmadiyya), which used the 11.575GHz transponder aboard Eutelsat II F3, has moved to Intelsat at 34.5°W (11.009GHz vertical). The orbit is not inclined, which suggests that Intelsat has replaced the aged 603 bird at this position.

Ian Waller (Lincoln) reports that PAS-3R, though quiet in the Ku band, is active in C band (4GHz). He's logged a Chinese TV feed (CCTV-4) from Beijing to Africa at

Muslim

Television

at 34.5°W.

Photo from

John Locker.

Ahmadiyya via

Intelsat 603 (?)

4.18GHz. This is part of a Chinese World TV Service.

Checking eastwards, PAS-4 is very lively with the Arabic ART3/5 services at 11.649GHz and another ART programme at 11.585GHz, along with Paramount and VH1. This orbital slot ($68.5^{\circ}E$) represents a very low elevation angle in the UK. The signals are therefore susceptible to the weather, with rain fade.

Alan Smith in Thailand has been angered by loss of BBC World Service TV via AsiaSat 1 – it's been transferred to PAS-4, at 4·155GHz. He points out that no BBC signals can be resolved in SE Asia across the 90° arc from 53° to 143°E. CNNI, ESPN, ABN etc. all provide excellent signals. Most viewers in the region have a fixed dish directed at AsiaSat 1.

Terrestrial News

Ireland: The main transmitters for the new RTE network are to be as follows: Cairn Hill E50 (H), Kippure E59 (H), Mt. Leinster E23 (H), Three Rocks E55 (H), Clermont Carn E68 (V), Maghera E68 (H), Mullaghanish E31 (H), Truskmore E63 (H).

Digital TV: On April 9th the BBC successfully transmitted and received DVB-T (digital video broadcasting – terrestrial) signals using the recently finalised terrestrial DVB specifications. The MPEG-2 coded BBC-1 transmission was transmitted from Crystal Palace and received at the BBC-TV centre in West London, using 18·1Mbits/sec.

In the USA Westinghouse Electronic has tested a newlydesigned solid-state TV transmitter that, in comparison with conventional silicon solid-state hardware, will increase transmit power by up to three times and halve construction costs. The new transmitter uses silicon carbide devices. It was installed at the KLAS-TV studio, Las Vegas and transmitted pictures across the city to the NAB exhibition hall. This was the first public demonstration of the new technology.

UK: In its May bulletin the BDXC mention that the club's 1,602kHz RSL station at the Silverstone racing circuit operates with an 87.7MHz outlet in parallel. A TV service is transmitted on special racing days, using chs. E47/49. RSL is a restricted service transmission licence, usually lowpower (FM radio typically 25W fed to the aerial), issued for s specific period, i.e. special days or a continuous 28-day run. Did any DXer see any of this?

Norway: The NRK-2 service is to open on August 31st. It will use PAL for terrestrial transmission, with network distribution via Intelsat 702 (1°W). NRK-1 and -2 will then use encrypted DMAC for their downlinks. Eighty per cent of the population is expected to be able to receive NRK-2 from day one, 34 per cent via cable, 27 per cent off air and 18 per cent by DTH dish.

Regional programming in the early evening (1645-1700 GMT, 1630-1700 Wednesdays) has now started in seven different areas. The regions listed are Ostnytt, Ostlands-Times, Sorvestnytt, Midnytt, Vestlandsrevyen, Nordnytt and a rather odd-sounding 'NRK-4' (the Oslo region perhaps?).

Gibraltar: For several months a ch. E46 transmitter in the nearby Spanish town of La Linea has been radiating a PM5544 test pattern with the identifications 'CAMPO' at the top and 'GIBRALTAR' at the bottom. There are no programmes. It's thought that this is a political move related to the proposed GBC-2 service.

Africa: The first TV channel has opened in Malwi, operated by Central African Television. The Gambian government is financing an English-language TV service that's due to start in the late autumn – test transmissions are now on air for nearly 18 hours daily.

Moldavia: The ORT TV service from Moscow has been reduced to between 0300-0910GMT. RTR is now 1400-2100GMT and at other times the Ukrainian UT-1 channel is broadcast.

Portugal: Television Independiente (TVI) is to relaunch a terrestrial pay-TV service offering mainly films. It's run by the Portuguese Catholic Church.

Requests

Andrew Emmerson is interested in preserving old broadcasting equipment from the 405-line, valve era. In particular he wishes to restore a Marconi valve sync-pulse generator and an image orthicon camera. If you can help, ring Andy on 1604 844 130 or fax 01604 821



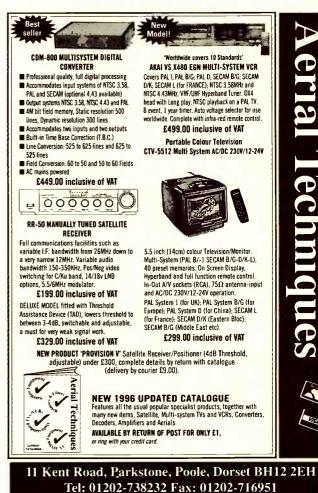
647 to discuss collection/delivery and financial details.

The latest newsletter from the Eddystone Users Group, of which I am a member, asks for information on an Eddystone TV receiver apparently made in the 405-line era. Can anyone confirm whether such a receiver was in fact produced and, if so, provide any technical details?

Thirties Style HDTV This year marks the sixtieth

anniversary of electronic TV

A rare shot of a PanAm PAS-2 feed to the UK via Intelsat K at 21.5°W, during the Taiwan elections. The PAS-2 position at 169°, over the Pacific, suggests that three links were required to bring the signal to Europe. Photo from John Locker.



transmissions in the UK. The first regular high-definition (405-line) service started on November 2nd 1936 from Alexandra Palace and ran until it was abruptly closed down in September 1939, recommencing in 1946. Military use was made of the transmitter during the war years.

I have in my possession a number of copies of Practical and Amateur Wireless – incorporating Practical Television dating from the 1936-38 period, also a copy of Television from 1928. The latter includes a 30line spinning disc TV receiver project! It's interesting that experimental 30-line mechanical TV transmissions continued in Russia up to the mid-Thirties: a "Birmingham youth" received a Moscow medium-wave broadcast of "a dancer performing", a distance of over 1,200 miles. The article went on to say that Russia was expected to have developed a form of electronic HD-TV by the end of 1937. It also mentions that the BBC's 30-line transmissions were received across Europe between

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Telephone: (01732) 743400 Fax: (01732) 743335 1932-35. Was this the start of DX-TV? The report dates from July 1937.

A few weeks earlier *Practical Television* was reporting on preparations for the May 1937 coronation of George VI. OB TV was then in its infancy, and much technical detail was included. Maximum camera cable distance was 300m, which had restricted outside broadcasts to the parkland around Alexandra Palace. For the coronation a new OB unit was brought into operation. It included a vehicle with a 1kW VHF transmitter to provide a link to Alexandra Palace.

The same issue of the magazine contained a report mentioning complaints about US TV receivers. The pictures were generally under ten inches wide and the tube phosphors tended towards a green hue. There were seldom less than thirty valves, though the latest 1937 designs were down to twenty four.

There was more on DX-TV in the January 13th 1938 issue of *Wireless World*, where daytime reception of Alexandra Palace TV sound (41.5MHz) was reported by India Radio in Delhi. This was early F2layer propagation, the result of high solar activity.

Sixty years on we have MPEG video compression, satellite TV offering dozens of channels via a 60cm dish and talk of Ka band broadcasting at 28GHz. We've come a long way from the 30-line mechanical televisor. I wonder what the next sixty years will bring?

Satellite TV News

The digital Astra 1F satellite is now in orbit at 19.2°E. Transponder capacity has already been extensively booked. SES Astra has filed for twelve further orbital slots, which would enable the company's distribution services to be extended across Europe and into Russia. Discovery Europe plans to downlink five digital channels from Astra 1F. BSkyB's plans for digital TV via 1F have been put on hold awaiting confirmation of the technical standards and second generation equipment design, also passage of the new Broadcasting Bill now before Parliament.

Galavision is to move from Astra 1C to PAS-1 at 45°W (11.515GHs horizontal).

Star TV has launched its Mandarin language TV service to SE Asia from AsiaSat 1 and 2, with three channels. Future Star TV transmissions will be digital instead of analogue, starting with Chinese Channel Taiwan.

The M Group in Thailand plans to launch two satellites, L Star-1 and L Star-2, in late 1997 and mid 1998 respectively, broadcasting 500 digital channels across SE Asia.

The Spanish broadcaster Antena 3 Television plans to introduce a twenty-channel pay-TV package by the end of the year.

PanAmSat plans to use C/Ku slots at 79 and 103°W and Ku-only slots at 58 and 79°W for worldwide expansion up to the year 2000.

Intelsat's Indian Ocean satellites are to be moved to new positions, with the traditional 3° spacing reduced to 2°. This could cause cochannel interference problems when smaller dishes are in use. The lineup will eventually be 704 at 66°E, 803 at 64°E (to be launched this Christmas), 602 at 62°E and 604 at 60°E.

Egyptian Radio and TV (ERTV) has ordered Nilesat, which is expected to be in operation by December 1997. Based on the Orion Atlantic design, it will be positioned at 7°W with twelve transponders offering up to sixty compressed channels in the DBS band (11·7-12·5GHz). Coverage will be Middle East/North Africa. Nile TV International, a weak signal in the UK via Eutelsat II F3 (16°E), will continue from its present slot.

Orbit International is to move from C band operation via Arabsat 1D at 20°E to Ku band operation via Intelsat 704 at 66°E. It will also be increasing its North African coverage by leasing Ku band transponders aboard Intelsat 601 at 27.5°W. Orbit claims to have 55,000 subscribers.

Arabsat 2A is due up this summer, with 22 C band and twelve Ku band transponders. 2B is to follow a year later. Coverage will extend across the Middle East and southern Europe. Ku band EIRPs are quoted at around 43-47dBW, which implies the use of 1-1.2m dishes.

The Israeli AMOS-1 satellite should be in orbit at 4°W by the time that this is read, with 54dBW spot beams focused on Israel and the surrounding countries and additional spot beams for eastern and central Europe. The latter beam is centred on France, with coverage extending to southern Ireland and the UK south of the Scottish boarder. At 54dBW EIRP, reception should be possible using 65-80cm dishes. Transmissions will use 10.95-11.2GHz and 11.45-11.7GHz, with linear polarisation.

MISCELLANEOUS

Answer to Test Case 403

- see page 625 -

The TDA3562A is a funny chip that's been fooling technicians for well over a decade. An auto grey-scale tracking circuit within the chip pulses the tube's R, G and B cathodes in sequence during the field blanking period to check each gun's 'black current'. Pin 18 of the chip then receives, in turn, feedback on each gun's black-current emission. The chip uses this feedback to set the clamping level for each gun individually.

In this particular set the TDA3562A chip was getting no reply from the red gun. Now you might, under these conditions, expect the chip to increase its R output in an attempt to get some red gun emission in the tube. But this would be to underestimate the TDA3562A! What it does instead, for reasons unknown to any of the workshop worthies, is to shut down its red channel.

The cause of the trouble turned out to be the tube's red gun heater, which was open-circuit. This wasn't easy to discern by looking at the tube neck, even in darkness. Nothing short of a new tube would get an R output at pin 13 of the chip.

If Ray had tested the tube's emission at the start, he would have seen why there was no red in the picture. But he would have been none the wiser about the strange habits of the TDA3562A chip! Right, now back to the Sony CD player and the Amstrad IRD ...

NEXT MONTH

A Look at the Panasonic Z5 Chassis

The Panasonic Z5 small-screen chassis was introduced in 1993 as a lower-cost replacement for the Z4. It was largely designed at Panasonic's Cardiff plant, and introduced a new feature for non-Japanese chassis – a 'hot' line output stage. This means that the yoke and the chopper and line output transformers all have to provide mains isolation, a significant point when servicing is undertaken. Other features include a linear, transformerless remote control standby circuit, contrast auto tracking and an interesting teletext option. Ray Meadows describes the design.

Servicing the Amstrad TVR2/3

These were probably the first combined TV/VCR units to appear in the UK and sold well. Chris Watton describes repair procedures and the faults you are likely to encounter.

Cleaning with Water

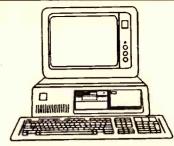
Contamination, corrosion and general messiness are common problems with electronic equipment. Cleaning procedures are changing, with water-based products now finding favour for use with PCBs and mechanical bits and pieces. The Electrolube Safewash 2000 range enables the technique to be used for general servicing. It pays to know what is involved and what can and can't be done. Pete Roberts reports.

Centre-mounted Madness

During the past couple of years all VCR manufactures seem to have adopted centre-mounted cassette mechanisms. This has made servicing much more difficult. The increasing use of plastic mechanical parts has added to the problems. Jeff Herbert on the disadvantages of the present approach to VCR design.

Monitor Fault Finding

More servicing know-how on computer monitors.



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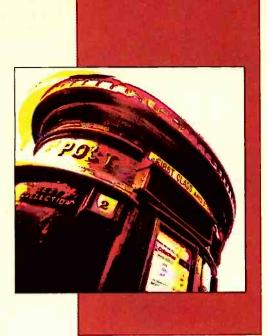
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VCR Audio Servicing

In his article on VCR audio servicing (April '96, page 404) Eugene Trundle omitted to mention that as recently as 1990 Akai introduced a Nicam twin audio linear track stereo VCR that incorporated Dolby noise reduction (Model VS485EK).

The picture quality produced by this VCR is very good, with a resolution of around 270 lines, and to my ears the sound quality, despite the 0.3mm track width, is perfectly acceptable with respect to frequency response, noise and distortion.

The audio channel separation is excellent and remains good throughout a three-hour tape. *Eric H.E. Barron, Retired electronics engineer, Dorset.*

Going it Alone

Having just read the excellent article Going it Alone by John Pitt-Francis in the June edition I feel that I may have some further advice to offer regarding customers and pricing. I hope that the following notes will be of help to those just about to jump in at the deep end.

First you have to build up a base of regular 'good' customers. Most of them will come from word of mouth recommendations from customers who have had a good deal from you! There is an army of what we call "wasters" in our neck of the wood: people who pick up electrical goods from boot sales and the like and descend on you with countless items that have already been written off several times by local repair shops. If you are a newcomer to the area and advertise, as you will have to do, they will seek you out in the

Letters

We welcome letters from our readers and try to publish as many as we can. You can send them typed, hand written, or on disc – addresed to the Letters Editor, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

hope of getting these items repaired - "for a few quid" as they put it. The travelling population will also come to you with items they get for a song from local auctions. After a while you will get to know their faces and write off the items before you waste time stripping them down. The best way to get rid of both of these types is to charge an 'Inspection Fee'. ranging from say £5, £10, or more depending on the type of unit brought in for repair. You will lose most of them when you mention this fee, as they don't like paying for estimates and will seldom come and collect something that you cannot repair. With these types you need to get your inspection fee up front - as the chance of getting it later is minimal! Despite your need for new customers, this type is of no use to you, as if you do manage to get one of their units working they will not want to pay a reasonable price for the work. Those companies that advertise "free estimates" - there are very few these days - simply load the cost of the estimate on to the customer's bill or the next customer's bill, as the running costs of a van and petrol have to be paid for by someone. You can explain this to your customers when they ask you for a free estimate: most of the genuine ones will understand.

Secondly you must have a minimum trade price, as we call it. (We do a lot of trade work: around 80 per cent of our throughput, and trade customers are among the best types you will get.) Apart from sending you work on a regular basis, they are less likely to haggle over prices, so you can give them a reasonable trade discount. Having a minimum trade price is essential if you are going to make a profit at the end of the year. It is also a help when dealing with retail customers at your door. Those who want jobs done for "a few quid" can be respectfully reminded that you are a professional, not some cowboy who works from his kitchen table, and that you do a good job for a fair price. Those who wince at your minimum price are likely to want

something for nothing and are of little use to you as a customer. Sounds hard and callous, doesn't it, but when you've been in this business for eighteen years you will be thinking exactly the same.

Pricing is difficult. The amount you can charge will depend on your competitors and the type of turnaround and service they give. Large outlets with high overheads are likely to have to charge a lot more than you. This gives you one advantage. If you work from home or run a small shop you are unlikely to be inundated with work these days. With time on your hands you can do a faster turnaround than your competitors, earn a reasonable living and charge less.

Our advertisement in the local rag states that most jobs can be done within 24 hours, and in many cases can be collected on the same day. This has won us many a customer.

Keep paperwork to a minimum (you don't need everything in quadruplicate, with copies for head office, despatch department, etc.) Keep it simple. All we use is a stick on 'post-it' label attached to the unit. This records the customer's name, address and telephone number, and the fault symptoms. It can be kept with the job until you come to write out the invoice.

Another advantage of the minimum price approach is that you make a reasonable profit when the fault is a simple one. This will make up for those 'horror jobs' we all get from time to time. If these were charged at the normal rate, the cost would exceed the original price of the equipment. We all have to grin and bare these jobs: it's part of your life as a repair man. If you can't take it, don't start in the first place! It may seem unfair to charge your customer a minimum price to replace a blown fuse or attend to a loose wire, but at the end of the day you are there to make a living. If you get into the habit of charging only "a few quid" for this type of job, and your minimum charge for the difficult ones, you will soon go under. Incidentally you won't find

many blown fuses or loose wires: the chances are that your customer will have already had a peek inside and attended to any fault of this nature. The way to look at it is that if your customer is not prepared to pay say £40 to repair a unit that cost around £300 new, he doesn't really want it done.

We now specialise in in-car audio equipment, and often have to remind the customer of how much the unit cost in the first place and its replacement value. Many are astounded to learn that the radiocassette units in cars a few years old cost £200 upwards to replace. £40 for a repair doesn't seem so bad then!

Thirdly, estimates. We try and explain to customers that if we have to strip a unit down, write out an estimate, contact them and wait for confirmation before getting on with the job, this all takes time and at the end of the day they will be paying more than if they just let us get on with it. Another important rule is to estimate only if a unit is likely to cost over a certain amount to repair. With our digital car radio-cassette units we have a rule that we contact the customer only if the repair is likely to cost over £40, otherwise we go ahead and repair it (TV and video repairs could be priced higher, at say £50 or more). This will enable you to avoid those awkward individuals who take their units to every repair shop in the area and waste countless engineers' time in the hope of getting a "bargain" repair. Your inspection fee will also deter these individuals. At the end of the day the best way to succeed is to be fair and be seen to be fair. The cowboy rip-off merchants who operate in the plumbing and roofing trades in some areas don't last long and have to keep moving on. If you get known as a rip-off merchant you will soon run out of customers to fleece, as word travels fast especially in a rural area.

And finally, warranty. You will have to decide what length of warranty you want to give, and can afford to give, on your repairs. We give 30 days on our in-car unit repairs, and price them that bit cheaper, which is what the majority of our trade and retail customers prefer. If you go for three months, as some TV and video repairers do, you need to charge a little more to cover the few that you are likely to get back during the warranty period. It's fine to make the odd allowance for your regular trade customers if one of their jobs has come back just out of warranty, but if you do this with your retail customers the word will soon get around and they will expect their units to be warranted for life once you have had them on your bench. With units that are just out of warranty you can compromise by charging for any new parts and fitting them free – and can still make a few bob by pricing the spares at retail over what you paid for them trade.

I hope that the above will be of help to any of you starting out in the land of the self-employed, and the best of luck. Radio Electronics Engineer, Cambridgeshire. Name and address supplied.

Head Cleaning Tapes

A s Edward Branch said (letters February), customers seem to think that head cleaning tapes can cure all VCR ills, which we know is not true. When customers are told this, and that these tapes can cause damage to a VCR, they invariably ask me the same question – "why are they sold if they cause damage?" My answer is always short and sweet. "Why do they sell cigarettes?" The look on their faces says it all.

Incidentally I am now employed at Ford's engine plant at Bridgend, where I stick bits on engines. This is rather a waste of twenty odd years' experience. But with the shape the trade is in, I consider myself very lucky.

Kevin Jones, Ex technician, West Glamorgan.

The TDA2170 IC

If its became aware of the problem of non-availability of this IC last year, when I used my last one and was unable to obtain further supplies. I tried the Help Wanted column of this magazine, and my thanks to all who took the trouble to contact me – most of whom had the same problem.

The answer came from Charles Hyde who suggested fitting a TDA8170, instead with some modifications. I have successfully carried out this modification to a 59cm ITT Model TX3546 (Digi 3 chassis). The procedure is as follows.

Remove the DIGI panel and HF unit to give more room, then take out the TDA2170. ITT had kindly numbered the holes on the top of the PC panel. Before inserting the TDA8170, bend pin 1 back in line with pin 2 and slightly open out the pins. Put pin 7 into hole 9, pin 6 into hole 8, pin 5 into hole 7, pin 4 into hole 6, pin 3 into hole 5, pin 2 into hole 4, pin 1 into hole 2. Then link hole 3 to hole 9. Replace C402 with a 100 μ F 105° capacitor and check or replace D402. Refit the DIGI panel and HF unit.

When I switched on I was rewarded with a normal picture, though it was displaced downwards giving a two inch gap at the top. Adjusting the vertical shift still left a quarter inch gap. I looked at the circuit diagram and decided to play around with the value of the 6.8V zener diode D411: fitting a 7.5V zener diode allowed me to shift the picture up with a little to spare. Height and linearity adjusted normally.

The set has now been running for about 100 hours with no problems and with the TDA8170 getting no warmer than the original. As for long time reliability, only time will tell. John R. Langley, Burton Lattimer, Northants.

Ultrasonic Cleaning

avid Woodnott (Television May '96) referred to possible use of a jewellers' type ultrasonic cleaner for camcorder PCBs with electrolyte leakage on them. A few points to note are that ultrasonics clean very well – so well that the component markings may come off the components and the PCB – while not all components are rated for ultrasonic cleaning. GEC Hirst Research Centre has published (Electronic Production March 1990) the results of a Government sponsored investigation into reintroducing ultrasonic cleaning of military electronics. It was found that old fears of damage are largely unfounded when current technology products are cleaned. The weakest components are quartz crystals. At a power density of 11W/litre of cleaning solution, cleanliness is obtained in less than two minutes, i.e. flux residues are removed, even beneath surface-mounted microprocessors, and no damage is caused. When the power is multiplied by three, the time for damage to occur is reduced by a factor of one thousand. So it's very important to know the power density of your cleaner - always fill it up fully.

The results were found using CFC (now banned) cleaners and aqueous solutions, so the method should be applicable to the service engineer as equipment becomes even smaller. *Ray Porter. M.Sc., C.Eng., MIEE, Stourbridge, W. Midlands.*

Help Wanted

The help wanted column is intended to assist readers who require a part arcuit 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: CX519-004P chip for the Sonv Model KV2216UB2. D. Field, 18 Brighton Road, London N16 8EG. 0171 249 7820. Wanted: Manual for the Tektronix 453 oscilloscope or a photocopy of the power supply circuit. David Hughes, 39 Whitehouse Lane, North Shields, Tyne and Wear NE29 8PB. 01912 911 492. For disposal: Ferrograph RTS2 recorder test, as new £150. Philips VR323 in excellent condition £150. Free for collection, a Panasonic NV333 with a mechanical fault. John Pearce, 29 Shalgrove Field, Fulwood, Preston PR2 3SX. 01772 863 595 Wanted: Manual or circuit diagram

for the Scopex 4D 10A oscilloscope. Photocopy would do or does anyone know where I can get one? Have several years' *Television* and *Wirless World* issues for disposal. S. Jacovides, 20 Cheverton Road, London N19 3AY. 0171 272 7139.

Wanted: Panels for the Hitachi Model CNP192, also a circuit diagram. Donald Bills, 69 Greenfields Road, Kingswinford DY6 8EG.

Wanted: Manual or circuit diagram (photocopy OK) for the JVC Model VR5521L stereo receiver. G. Jones, 2A Mountain Road, Brynamman, Dyfed SA18 1AA.

Wanted: Remote control unit for the Osaki Model P1404T with Fastext. Several universal units have been tried but none work correctly. Andy Nicholas, 3 Chalkdell Fields, St. Albans, Herts AL4 9LZ. 01727 845 577.

For disposal: A Sobell Model T176C dating from approximately 1955-7. Any offers? Mrs Martyn, 01915 848 518.

Wanted: Circuit diagram for the Minbea Electronics (UK) IBMcompatible switch-mode power supply (made in Malaysia). Also the two foil-side surface-mounted chips, which are unmarked. One is an 8-pin flat pack the other a 16-pin flat pack. And a circuit diagram for the Amiga 500 power supply. D.J. Bolt, Park Cottages, Berners Lane, Woolverstone, Ipswich, Suffolk IP9 1HR.

Wanted: High-voltage focus

control unit for the Sony KV2212UB. Spares for the Rediffusion Mk 3/4 chassis or information on a supplier. Line output transformer (KF2825G) for the IBM 8503002. *Television* Sept. 1984, May 1986, May and Sept. 1988, Jan 1990 and Jan 1991. C.J. Davies, 52 The Close, Johnston, Haverfordwest, Pembs SA62 3QQ. 01437 890 561.

Wanted: Service manual for the Sony Model KV6000BE or information on a tuning fault (won't stop and won't store). Geoff Dawson, Calder Valley TV, Old Tuch Lane, Sowerby Bridge, Halifax HX6 2EL. 01422 834 717. Wanted: Service information or advice on a Triumph VR9501 (accepts a cassette but won't lace up or run). J. Cronk, 2 Mostyn Avenue, Prestatyn LL19 9NF. 01745 888 355.

Wanted: DMA2285 chipset, version 31, for the Ferguson SRB1 BSB satellite receiver. D. Robinson, 1 Sycamore Farm Cottage, Lower Bassingthorpe, Grantham NG33 4ED. 01476 585 760. Wanted: PCD8571 memory chip or front control panel for the Luxor model 18056449 (SX9 chassis). Also a remote control handset for the Sony KV2092UB and a circuit diagram for the Amstrad CTV1401. H.S. Downing, 16 Mayfield Crescent, Lower Stondon, Henlow, Beds SG16 6LF. 01462 850 144. Wanted: Circuit diagram for the Hitachi Model CPT2226 or details of the 7-pin chip M601 which is missing. R.C. Peirson, 61 Seaton Close, Staithes, Saltburn, Cleveland TS13 5AU. 01947 841 077. Wanted: Circuit diagram and user manual for the Video Circuits V33 tube tester/reactivator, or one to buy. Also same for the Korting 82515 colour-bar generator. And Macdonald TV servicing books for 1982-3, 1983-4 and 1984-5. B.R. McLeod, 8 Cunningham Road, Horndean, Portsmouth, Hants PO8 9LT. 01705 597 941. Wanted: MN1512VTJ chip IC7503 for the Panasonic NV730 or better still timer board VEP07213C. L. Gerken, Hertsmedia Servicing, Goldings North Road, Hertford SG14 2PY. 01992 555 873.

Wanted: Remote control unit for the Goodmans C141/Osume 1484R and a 1N5304 diode. Peter Ward, Petgra, Forest Corner, Ringwood, Hants BH24 3JW. 0142 475 445. Wanted: Spares for Grundig TS1000 reel-to-reel tape recorder, especially two-track head carrier module, feet, NAB spool adaptors, accessories. Can supply part nos. Also service manual for the Mitsubishi Model HS710B. Have Salora SVE2000 video editor plus various sundries for exchange/disposal. Neil Black, 12 Clovullin, Ardgour, by Fort William, Invernessshire PH33 7AB. 01855 841 256 (evenings). Wanted: Circuit diagram (photocopy OK) for the Mitsubishi EUM128IM monitor and the Dell P1428E monitor. Tony Jackson, 31 Newcourt Road, Bray, Co. Wicklow, Ireland. 286 7142 Wanted: An A51EBV13X01 tube (21in.) for the Ferguson TX98 chassis and an A66EAK51X01 tube or a 28in. Hitachi set. Must be in good condition and at cheap price. Stuart Fletcher, 131 Walsh Avenue, Hengrove, Bristol BS14 9SQ. 01275 891 893. Wanted: Service manual for the Roneo 208 photocopier, user's guide for the Philips NMS6302 Viewdata terminal, text panel for the Sony XE4, a Sony RM641A remote control unit and a Philips VR6560. David Lacey, 7 Green Leach Avenue, St. Helens WA11 9LS. 01744 753 072. Wanted: Mains transformer for the Hinari VXL6 VCR. Please contact Pat on 0171 474 4750 (53 King Street, Plaistow, London E13 8DB). Wanted: Instruction manual for the Panasonic UF140 fax machine. Ken Howe, 13 Howardian Close, Lambton, Washington NE38 0PX. 01914 178 101. Wanted: Power on/off switch knob for the Alba Model CTV744, and a control door for the Hitachi CPT2240 colour receiver. Dave Mackrill, 13 Tower Road, St. Leonards-on-Sea, East Sussex

TN37 6JE. 01424 427 996. Wanted: RF converter module for the Sanyo VHR3300 VCR. A salvaged working one will do. Also, does anyone know of any book(s) that deal with DAT recorder servicing? Eddie Cox, 86 St. John's Road, Hedge End, Southampton SO30 4DF. 01489 782 885. Wanted: WYC panel (in particular the HT4507A chip IC202) for the GEC V4005/Hitachi VT63 VCR. Pressure anywhere on the panel causes loss of signals, but blanket resoldering has had no effect. Nicholas Arnold, 19 Bond Street, Bournville, Birmingham B30 2LB. 01214 581 187.

Wanted: FMC-1245DL LOPT for the Samsung SM-12SFA7 monochrome monitor. The monitor was probably OEM and is badged ARC?. Ken Sims, 37 Glaisdale, Thatcham, Berks RG19 3XJ. 01635 873 128.

Wanted: LOPT for the Huanyu Model 37C-3, and an electronic viewing unit for the JVC GRA30. J.B. Thornton, John's TV Video and Hi-Fi, 27 Browning Road, The Straits, Lower Gornal, Dudley, West Midlands DY3 3BE. 01902 681 020 or 885 226.

Wanted: One or two Philips 20in. G11 sets, any condition. Also, can anyone explain the operating symbols on the front of Philips 20in. CTX-E sets? They are not shown in the manual. M.J. Levy, 19 Totternhoe Close, Kenton, Harrow, Middx HA3 0HS. 0181 907 3620. Wanted: Circuit diagram and user manual (photocopies will do) for the Solartron/Solarscope Model CD711S·2, serial no. 41868 - an ex-MOD scope. C. Findlay, 56 Turlin Road, Mamworthy, Poole, Dorset BH16 5AF. 01202 679 246. Wanted: Control unit and remote control for a Finlux 5620bc. Alan Hillman, 414 Canterbury Road, Densole, Folkstone, Kent CT18 7BH. 01303 89 281.

Wanted: LM1800N or μ A758C stereo decoder chip for the 3938 tuner unit in the Ferguson Hi-Fi System 25. Edward Christie, 251 The Avenue, Deneside, Seaham, Co. Durham SR7 8BE. 01915 812 265.

Wanted: Circuit diagram/manual (photocopies OK) for the Advance OS2200 scope with OS2007Y and OS2005AX inputs. S.E. Fung, 4 Ford Lane, Crewe, Cheshire CW1 3EQ.

Wanted: Service manual or circuit diagram (loan or for copying) for the Hinari VXL8 VCR. George Carruthers, 68 Osborne Road, Wisbech, Cambs PE13 3JW. 0836 693 809.

Wanted: Remote control handset for the Samsung SI1260 VCR. Les Swain, 53 Park Road, Huntingdon PE18 9SL. 01480 811 058. Wanted: Nicam board or SN74LS08NS chip (IC4113) for the Hitachi Model C25-P819. D. Hall, 63 Wakefield Road, Aspley, Huddersfield, W. Yorkshire HD5 9AB. 01484 420 313. Wanted: Circuit (photocopy OK)

of an audio output stage using the STK086 module. Richard Dennis, 56 Holcombe Vale, Bathampton, Bath BA1 6UX. 01225 460 857. **Wanted:** AVO CT160 valve tester, panel meter or complete assembly. P. Shepherd, 25 Tomkins Close, Stanford Le Hope, Essex SS17 8QU. 01375 640 618.

Wanted: Instruction manual for the Tektronix 543B scope – especially the timebase and X amplifier circuits. Also an owner's handbook for the Salora 5902 satellite receiver. Photocopies would do. W.G. Larman, Derimr, Horton Road, Stanwell Moor, Staines, Middx TW19 6BD. 01753 682 933. Wanted: Reel assembly for the ITT 5035 music centre. R.L. Stroud, 16 Linden Road, Gloucester GL1 5HD. 01452 416 078.

Wanted: Circuit diagram for the Leak Stereo 20 valve amplifier; circuit diagram for the Saisho CT14RA; laser pickup assembly for the Crown Model CD110N. Neil Bilton, EBME Dept., Bronglais General Hospital, Aberystwyth, Dyfed SY23 1ER. 01970 635 926. Fax 01970 635 923.

Wanted: Where do Sinclair calculators go to die?! Information on the Sinclair Scientific calculator construction kit (photocopy would do) wanted, and a working calculator if possible. Also a service manual for the original ZX81 computer printer. D. Lee, 16 Devonshire Place, Claughton, Birkenhead, Merseyside L43 1TU. Wanted: Any information on the CED 4A CRT tester; a Philips MAB8441P-T090 chip; and a LOPT for the Tensai TCT1025P 10in. mains/battery colour portable. D. Gough, 39 Bideford Road, Llanrumney, Cardiff CF3 9EF. Wanted: Circuit diagram and any other service information on the Lasertech CD100 CD player. M.F. Blair, 65 Jackson Avenue, Rochester, Kent ME1 2SX. 01634 403 211.

Wanted: Sixties TVs. BRC 850/950 and any KB, GEC, Pye, Bush, Philps etc. sets. Those with flat dust screen preferred. Also complete chassis for the GEC C2236H and any Bush/Murphy CV2212 receivers. Philip Gay, 80A Milton Brow, Weston-super-Mare, Avon BS22 8DE. 01934 642 701. Wanted: Remote control unit for the Tatung FX70 TV set. Have over 200 copies of Television from '59 on for disposal. Stan Jesney, 56 Barnacle Lane, Bulkington, Nuneaton CV12 9RQ. 01203 315 788.

Wanted: Line scan and power supply panels for the Philips G11 chassis. J. Abram, 11 Derwent Gardens, Ilford, Essex IG4 5NA. 0181 550 8546.

Wanted: Circuit diagram and any other information on the Silver CA2158 TV set, which was purchased in Cyprus. A. Jewitt, 1 Oakleigh Way, Durranhill, Carlisle CA1 2TE. 0122 832 481.

Wanted: Philips UV616S/6456 tuner. G. James, 58 Cromwell Court, Rushden, Northants NN10 0DS. 0193 357 374.

Wanted: Power supply circuit for the Echostar 6500 satellite receiver/positioner. H.S. Jeetley, 75 Hamstead Hall Road, Handsworth Wood, Birmingham B20 1HU. 01215 238 992.

Wanted: Type M48JLJ32X79 CRT and circuit diagram for the Tystar 2015 monitor. Also a charger for the Canon RC251 ion still video camera. J. Howells, 4 Kingsway Road, Fallings Park, Wolverhampton WV10 0SD. 01902 728 242.

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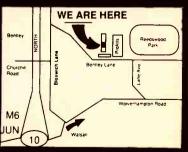
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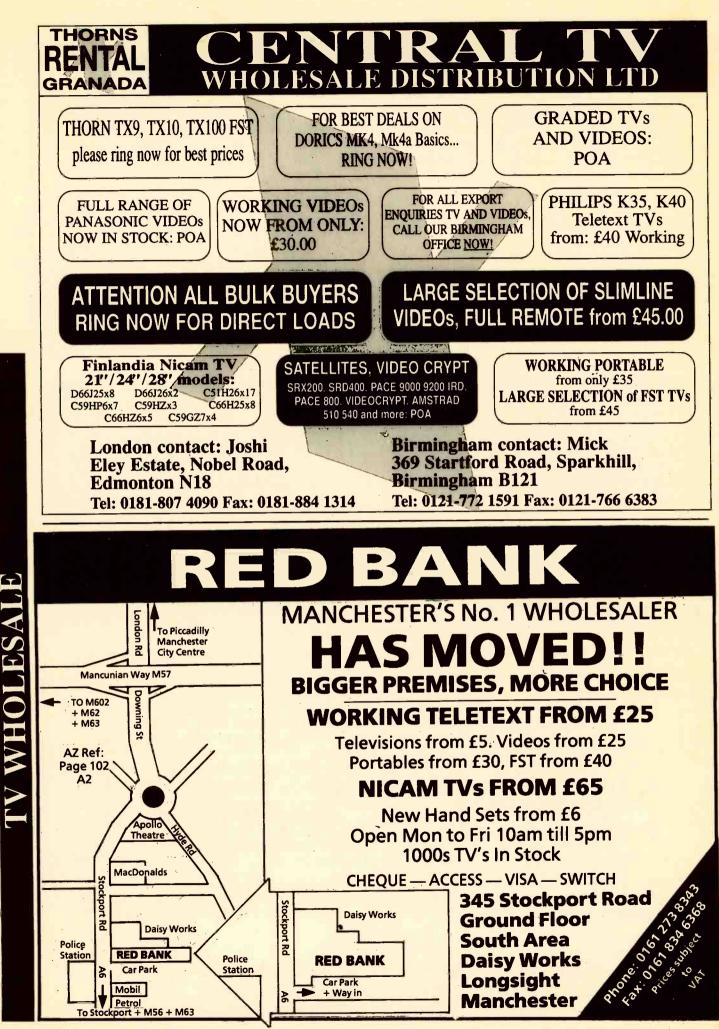
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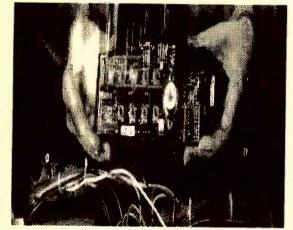
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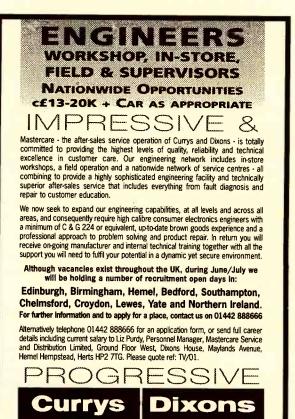
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Power Supply Main Panel Capstan Motor Hitachi Capstan Witachi Capstan VT530 Pre-Am Amstrad VS100 4MHz XTALS 6MHz XTALS 6MHz XTALS 6MHz XTALS 4.4 T/V XTAL 8.8MHz T/V X Amstrad – Per Fidelity – Dec Plastic – Front I Mitsubishi RMI Nokia RC202 H Sanyo A09801 I Siemens Hand S Tuner Env-5742 UF754B UHF 7	n Motor Hand Set p 00-VS110 S KTALS deo ker – T. Panels for M35 Har Hand Set Hand Set Hand Set 1994 Set 1994 Sogi UF Cuner V31R F	ACE G4-B RM933E 200 Power Su 30p Each atung or all 1992 M ad Set Video t Video L.C Model T/V IF-VHF ERGUSON	to ACE G40- pply Text P f TX8 odels .D. Video	anel No. T12 or Ferguson 9-TX98-TX1	£6.00 £5.00 £10.00 £10.00 £10.00 £10.00 £6.00 28B 280 28B 00 28B 28B 00 28B 28B 00 28B 280 280 280 280 280 280 280 280 280 280
Power Supply Main Panel Capstan Motor Hitachi Capstan Hitachi Capstan VT530 Pre-Am Amstrad VS100 4MHz XTALS 6MHz XTALS 6MHz XTALS 6MHz XTALS 6MHz T/V XTAL 8.8MHz T/V X Amstrad – Per Fidelity – Dec Plastic – Front I Mitsubishi RMI Nokia RC202 H Sanyo A09801 I Siemens Hand S Tuner Env-574 UF754B UHF 1 F 64 pin N	n Motor Hand Set P 00-VS110 S KTALS rdeo ker – T. Panels fo M35 Har Hand Set Hand Set Hand Set 1994 SoGI UF Funer V31R F Jain IC I	ACE G4-B RM933E 00 Power Su 30p Each atung or all 1992 M nd Set Video t Video L.C Model T/V HF-VHF ERGUSON HD6140815	to ACE G40- pply Text P fr TX8 odels .D. Video	anel No. T12 or Ferguson 9-TX98-TX1	£6.00 £5.00 £10.00 £10.00 £10.00 £10.00 £6.00 28B 280 28B 00 28B 28B 00 28B 28B 00 28B 280 280 280 280 280 280 280 280 280 280
Power Supply Main Panel Capstan Motor Hitachi Capstan Witachi Capstan VT530 Pre-Am Amstrad VS100 4MHz XTALS 6MHz XTALS 6MHz XTALS 6MHz XTALS 6MHz T/V XTAL 8.8MHz T/V XTAL 8.8MHz T/V XTAL 8.8MHz T/V XTAL 8.8MHz T/V XTAL Namstrad – Per Fidelity – Dec Plastic – Front I Mitsubishi RMI Nokia RC202 H Sanyo A09801 I Siemens Hand S Tuner Env-5745 UF754B UHF 7 Fidelity – Fite 64 pin N	n Motor Hand Set P 00-VS110 S CTALS rdeo ker – T. Panels for M35 Har Hand Set Hand Set Set 1994 S9GI UH Funer V31R F Main IC I RGUSO	ACE G4-B RM933E 200 Power Su 30p Each atung or all 1992 M ad Set Video t Video L.C Model T/V IF-VHF ERGUSON	to ACE G40- pply Text P fr TX8 odels .D. Video £1	anel No. T12 pr Ferguson 9-TX98-TX14 e	£6.00 £5.00 £10.00 £10.00 £10.00 £10.00 £6.00 28B 00 28B 00 28B 00 28B 00 £4.00 £5.00 £4.00 £5.00 £3.00 £3.00
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		ed main transformer 0-120v-0-120v Pri 0-9v-	0-9v Sec
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FST Y260482		10	KT3/K30 T/Text			£8.00 £8.00
TX9 LOPT		£4	Handset KT3/K30 Full R	emote		£8.00
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White Spot		£8	KT3/K30 Chassi No. RC5150-RC		C5071-	
Blue Spot Yellow Spot	f	10 £8	RC5177		Special Pric	e £8.00
Red Spot		£6	RC4001 KT3 and		ext	£8.00
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1	USON	~	TX9 & TX10 Bu	tton Pr	int	£1.00
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Y260482	1	12	Mains Stand-by	Switch		
DECO NICAM HAND SET		£4	with Coil			£1.00
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2435013 £10 2436771 each	47003481 £10 36761 each	- 1	TDA2170 TDA3561A	£5.00 £3.00	BYX55/600 (Bead)	10p
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2435062	36962		TDA3652	£3.50		30p
2436797 2433752	AT 2078/25 AT 2076/78		TDA3653AQ	£2.00		30p
2433952	AT 2077/81-£15		TDA3654 TDA3654Q	£1.00 £2.00		£1.00 15p
2434141 2434451	AT 2076/88		TDA3710	£3.50		
2434494 - £12	TFB 3035D		TDA3800 TDA3803A	£4.00 £4.00	80v/t	15p
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2435701	LOPTS		TDA4420	£2.00 £2.00		30p £1.00
2432351 2432211	£10 EACH	1	TDA4439 TDA4600	£3.00	200000	75p
2432984	Y260482,		TDA4601	£2.00		30p
2432491 2432871	2435121		TDA8190 TDA8703	£3.00 £3.00		£1.00 £1.00
2432851	FERGUSC		TDA8349	£3.00	2SD1398	£1.00
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Decks with heads TV & Video hand set		£16.00*				-
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B.Sky.B VHF to IF			Front Pan		all pin conr	nected
Block Converter		£1.00	£4		£2.00	
10 Panels Ferguson Mixed from TX9 to I	CC5 #	20.00	TX 9 Remote P	anals		
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VHF Tuner for ICC5		£5.00	TX 100 Remote IC M293B1-SA			£10
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POWER SUPPLY	d Charles	£5.00	and ICs			£10
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Ferguson Switch Mo			6B513A			
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regulated		£2.00			OF	
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IF Panel for		~~.00	No acci	ounts (Technical inf	ormatio
Philips CP90-CP110		£5.00	Unles: heavie	s speci er items	fied add £1.70 • Specific P/ TO ORDER TH inless VAT No	P P to s P charge
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£3			.00
HITA Handset	£5.00 each		50p
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CPT2158 (No Repla			.00
1R3506 A CPT1408T	All modules £8 each ITT IF Modules	Tuners Nat. Pan. Small. UHF/VHF £3	0.00
CPT2176	5827-01-51		
CPT2178	5827-02-51	U321 - U341 - U342 - U343 - U344 - U944 Tuners each £5	
CPT2176 CPT2478	5827-03-51 5828-04-10	U743 - U744 £3 Tuner, IF TERC8-022A TBJZ4-00ZA	
£10 INVERTER	5829-02-58 5829-05-52		7.00
12V IN 24V OUT	ITT – NOKIA	15 Mixed hand set LCD Video T/V All new £20	1.00
9 AMPS	RF-IF Modules 4828-04-10		5.00
TV	5827-01-51	U411 - U412 Tuners each £5	-
DIODES	5827-02-51 5827-03-51	LNB'S MARCONI	
MIXED	5829-01-05	Ex Rental Black Cap £2	2.00
100 for £3	5828-03-41	No Guarantee Bridge Rectifiers 10 for £1	~
PANASO Handsets for models:	NIC-TV	Sitege total	1.00
TC1632, TC1642, TC22	32, TX2034,		1.00
TX2044, TX2200, TX2 TX2200, TX2234, TX2	244, TX2300,	Sound 5.5 MHz MPM 1000T £1	1.00
TX2636, TX3300, RC20 TNQ1411/2		Sound 6.0 MHz MPM 1040 £1	1.00
HITACHI sets	HANDSETS	FERGUSON CHASSIS Post £5	5.00
STR454 £2.00 A	Amstrad Export £3.00		4.00
SS2000AF A	Amstrad 6800 £4.00	TX98 Chassis	£20 £35
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BU124 50p 1 BU126 80p -	Q081 GEC £3.00		5.00
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BU206 £1.00 1 BU207 £1.00 1	CC5 £5.00 K2000 £5.00	Plastic Front with Flap 8.900 £3	3.00
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BU508AF £1.00 BU508D 80p	Microwave Turntable Motor		5.00
BU705 £1.00 BU806A £1.00	1 urntable Motor £10	- · · · · · · · · · · · · · · · · · · ·	4.00
BU807 £1.00 BU808DFI £1.00	SANYO	Grundig Tripler with Focus Pot E Grundig Universal Tripler.	7.00
BU826 £1.00	TDO 124EB UHF VHF Tuner		7.00
BU824 50p	UHF VHF Tuner £3		7.00
BUT11 50p - BUT11AF £1.00	SUPER		7.00 3.00
BUT13 600V-28A £1.00 BUT18AF £1.00	HIGH CAPACITY		3.00
BUW84 60p BYW20-08-9 £1.00	BATTERY VA310 9.6V 1700 MA £4	BU 208A, BU 508A, BU 508D, BU 508AF, BU 508DF £1.00 e	
BYW95 10P - BUX39 25A-150V £1.00	VPT ADAPTOR	BU 801	60p 1.00
BUX84 50p BUY49 20p	VA354 FERGUSON		30p
BU 149 200 BUK444/800 £2.00 BUK445/600 £2.00	£5.00 (TEXT)	Min Sat Receiver with IC M491 BB1, has tuner modulator etc	5.00
BUK454/600 £2.00	06D4-025-001 Mains Input		2.00
TDA3048 £3.00	Mains Input Choke for	FERGUSON SRBI modulator 25pe	-
TDA3083 £2.00 TDA3190 £1.00	TX9 £4		5.00
TDA3505 £3.00 TDA3506 £3.00	THORN		2.00
TDA3561 £3.00 TDA3560 £4.00	M494B1 on Remote		2.00
	Panel £5		2.00
Text-Type Replace Handset for Pl	bilins KT3/K30.	TATUNG universal tuner 205, or eqv with aer	
K4 etc	£6.00		8.00
Thorn Handsets 9000-9600-TX9-TX10-		U/V REMOTE HANDSET 5 IN ONE TV1 - TV2 - VCR £15	
Text and Non-Text Philips RC5171 Handse	£10.00 ct £8.00	SAT - AUX	
Philips RC5171 Handse 1992 to 1993 Mod.	1	BURGLAR ALARM	
Orion Vidco handset w		Use Infra Red Detector Wide or Short Angle	
SATELLITE TUNER I with Base Band, Video		* Wall Mount, with Relay £8.00	
AMSTRAD Long Chas	ssis	MODULATOR KIT £5 5v to 12v for all cameras etc.	
Display Panel 1992/199		6251 FRAME O/P THICK FILM	
COMPONENTS		HITACHI GEC £9.00	
EBURYNESS, ESSEX S E • SUBJECT TO AVAIL	S3 8AF	THICK FILM HITACHI HM9205A £4.00	
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E P/P charges are PER ITEM ● For UK addresses 'THEN 17/2® VAT TO TOTAL ● This applies for the No. is given ● EXPORTS – P/P at cost ● tal Order Cheque with order. London Road. Southend ● Open 9.30-1. 2.15-5. 02 332992 ● Fax: 01702 338805 ● chool orders on official headings

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Mains input choke for TX9 £4 TX100 REMOTE PANEL No. 56413IC M293B/ and SAA5012 £10 etc.