THE LEADING UK CONSUMER ELECTRONICS TECHNOLOGY MAGAZINE

SERVICING-VIDEO-SATELLITE-DEVELOPMENTS

FEBRUARY 1997 £2.35

A REED BUSINESS PUBLICATION

Servicing Samsung VIK310/20/50 Series VCRs

Refurbishing Handsets The NiCad Cell TV Tuning Signal Source Promax Signal Generator Review

Special offer Function generator 25% reader discount



Fault Reports TVs, VCRs, Camcorders and Satellite

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The NiCad Cell



NiCad batteries offer superior performance provided certain rules are observed. Tom Bowers on their characteristics and how to get the best from theme

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of

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

MX2020 function generator with int/ext sweep; spans 0.02Hz to 2MHz and is available to **Television** readers for just £179 - fully inclusive of VAT and postage. See page 281 for ordering details.

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BC107 BC108	8p 8p	BD434 BD435	30p 31p	BU126 BU128	65p 125p	BUV48AF BUV48C	325p 250p	MJ4502 MJ10012	300p 300p	4N35 ·	50p	LINEAR AN203	/Cs 210p	AN6340 AN6341	600p 200p	8A335 BA338	55p 80p	BA7004 BA7007	200p 200p
BC109 BC109C		BD436 BD437	30p 28p	BU133 BU137	125p 150p	8UV50 8UV61	425p 1000p	MJ11015 MJ11016	250p 300p	RECTIFIER		AN210 AN211	165p 150p	AN6342 AN6344	325p 440p	BA340 BA343	75p 60p	BA7021 BA7022	180p 350p
BC140 BC142 BC143	20p 20p 20p	BD438 BD439 BD440	36p 40p 40p	BU160 BU184 BU204	100p 100p 65p	BUV70 BUV90 BUV93	200p 175p 375p	MJ11032 MJ11033 MJ15003	800p 800p 250p	DIODES BY127	8p	AN214Q AN217P	170p 95p	AN6345 AN6346 AN6350	400p 350p 610p	BA336 BA401 BA402	175p 60p .50p	BA7025L BA7107 BA7212S	100p 475p
BC147 BC149	20p 8p 8p	BD441 BD533	40p 50p	8U205 BU206	70p 100p	BUW11A BUW11AF	200p	MJ15004 MJ15015	300p 250p	BY133 BY164	8p 40p	AN228 AN252	280p 150p	AN6350 AN6352 AN6356	450p 300p	BA511 BA514	145p 160p	BA7212S BA7252S BA7604N	200p 150p 100p
BC159 BC160	8p 30p	BD534 BD535	38p 38p	BU207 BU208	150p 70p	BUW12 BUW12A	125p 150p	MJ15016 MJ15022	350p 250p	BY179 BY184 BY206	35p 32p 11p	AN259 AN262	250p 140p	AN6359 AN6360	500p 320p	BA516 BA518	150p 150p	BA7751LS BA7752	150p 250p
BC171 BC172	10p 10p	BD538 BD537	38p 40p	BU208A BU208AT	75p 200p	BUW12F BUW13A	250p 200p	MJ15023 MJ15024	400p	BY207 BY227	20p 19p	AN271 AN274	230p 250p 400p	AN6362 AN6363	400p 375p	BA521 BA524	100p 240p	BA7755 BA7767A	150p
BC177 BC178	14p 14p	BD538 BD643	40p 50p	BU208B BU208D	200p 130p	BUW32A BUW48	500p 550p	MJ15025 MJE340	700p 25p	8Y228 BY298	28p 15p	AN277B AN278 AN301	60p 330p	AN6367N AN6368	275p	BA526 BA527	180p 95p	BA8504 BA15218	350p 60p
BC179 BC182 BC182L	14p 7p	BD645 BD647 BD649	50p 50p	BU209 BU225 BU226	90p 120p	BUW49 BUW50 BUW81A	550p 400p	MJE350 MJE520	80p 30p	BY299 BY329-1200		AN302 AN303	650p 250p	AN6371 AN6387	350p 480p	BA532 BA534	100p 220p	CA3140E CNX62A	38p 80p
BC183 BC183L	7p 7p 7p	BD675 BD676	50p 40p 40p	BU312 BU325	120p 90p 55p	BUW84 BUW85	150p 75p 85p	MJE29557 MJE30557 MJE13004	65p	BY448 BYT11 BYT13-1000	20p 25p	AN304 AN315	360p 210p	AN6550 AN6551 AN6552	100p 50p 45p	BA536 8A546 BA612	150p 160p 120p	CNX82A CNX83A CX136	80p 80p 600p
BC184 BC184L	7p 7p	BD677 BD678	38p 40p	BU326A BU406	75p 60p	BUX10 BUX11	150p 200p	MJE13005 MJE13007	60p 100p	BYV96E BYW96E	30p 25p 36p	AN316 AN337	350p 600p	AN6554 AN6555	80p	BA614 BA618	70p 55p	CX139A CX141	750p 750p
BC212 BC212L	7p 7p	8D679 8D680	40p 40p	BU406D BU407	85p 55p	BUX12 BUX20	150p 350p	MJE13009 MJE15028	100p 200p	BYX10 BYX55/600	15p 25p	AN360 AN362 AN363	100p 140p 150p	AN6605 AN6612	35p 60p	BA631 BA656	280p 110p	CX145 CX150B	725p 325p
BC213 BC213L	7p 7p	BD681 BD682	45p 45p	BU407D BU408	75p 60p	BUX21 BUX22 BUX23	450p 450p	MJE15029 MJE15030	250p	IN4001 IN4002	3p 3p	AN366 AN610	150p	AN6650 AN6651	45p 45p	BA658 BA681A	350p 350p	CX175 CX187	326p 825p
BC214 BC214L	7p 7p 7p	BD705 BD707 BD709	50p 50p 50p	BU408D BU409 BU412	75p 85p 175p	BUX37 BUX39	900p 220p 450p	MJE15031 MJE18004 MJF18004	400p 125p 175p	IN 4003 IN 4004	3p 3p	AN3211K AN3215K	375p 350p	AN6652 AN6671K AN6676		BA682A BA683A	300p 300p	CX804A CX867	775p 575p
BC237 BC238 BC239	7p 7p	8D711 BD736	50p 50p	8U413 8U4148	175p 250p	BUX40 BUX41	210p 200p	MJF18204 OC28	350p 350p	IN4005 IN4006 IN4007	3p 3p	AN3231K AN3236K	300p 450p	AN6780S AN6870	600p 80p 450p	BA684 BA685 BA715	400p 400p 45p	CX868 CX877 CX7925B	525p 300p 550p
BC300 BC301	20p 20p	BD826 BD828	50p 50p	8U415A BU426A	170p 70p	BUX42 BUX47A	200p 220p	OC29 OC35	250p 350p	IN4148 IN5400	4p 2p 9p	AN3310K AN3312	325p 350p 300p	AN6875 AN6878	150p 65p	8A718 BA728	45p 55p	CX200154 CX201064	600p
BC302 BC303	20p 20p	BD839 BD897	55p 50p	8U433 BU500	120p 100p	BUX48A BUX55	150p 800p	OC35 52000A3	250p 175p	IN5401 IN5402	8p 8p	AN3313 AN3320K AN3331K	450p 450p	AN6879 AN6880	225p 75p	BA806 BA843	220p 130p	CX20109 CX20187	140p 700p
8C304 8C327 8C328	25p 7p	BD899 BD977 BDX33	50p 50p 60p	BU500D BU505 BU505D	225p 90p 90p	BUX80 BUX81	180p 160p	S2000AF S2055A S2055AF	175p 175p	IN5403 IN5404	8p 8p	AN3792 AN3794	300p 325p	AN6882 AN6884	300p 200p	BA1310 BA1320	160p 75p	CXA1001A CXA1019F	1500
BC337 BC338	7p 7p 7p	BDX37 BDX44	100p 100p	BU505DF BU506	90p 90p 100p	BUX84 BUX85 BUX86	50p 50p 30p	S2530A TIP29	200p 100p 15p	IN5405 IN5406 IN5407	11p 12p	AN3814K AN3821K	450p 600p	AN6888 AN6889 AN6913	150p 100p 60p	BA1330 BA1332 BA1350	120p 60p 130p	CXA10195 CXA10445 CXA10445	550p
BC441 BC446	28p 8p	BDX47 BDX54C	60p 75p	BU506D BU506DF	70p 120p	BUX87 BUX98A	50p 350p	TIP29A TIP29C	22p 25p	IN5407 IN5408 RGP10	12p 12p 25p	AN3822K AN3830K AN3990K	600p 800p	AN700 AN7010K	650p 250p	BA1355 BA1356	125p 100p	CXA1081 CXA10818	275p
BC477 BC516	18p 22p	BDX62C BDX63C	150p 175p	BU508A BU508AF	70p 95p	BUZ71 BUZ71AF	75p 100p	TIP29E TIP30	40p 25p	RGP15 RGP30	25p 16p	AN3991K AN5010	300p 400p 250p	AN7025K AN7060	90p 175p	BA1360 BA1404	160p 120p	CXA10815 CXA1082A	300p \$ 1000p
BC537 BC546 BC547	25p 8p 8p	BDX64C BDX65 BDX66C	175p 80p 175p	BU508API BU508D BU508DF	4 80p 90p 115p	BUZ72A BUZ72AF BUZ73A	100p 100p 150p	TIP30C TIP31A TIP31C	26p 22p 27p	SR2M	60p	AN5011 AN2020	225p 80p	AN7062 AN7072 AN7081K	300p 250p	BA1604 BA2266A BA3306	125p 250p	CXA1191	400p
BC548 BC549	Sp Sp	BDX67C BDX71	276p 70p	BU508DR BU508V	130p 110p	BUZ73AF BUZ76A	60p	TIP32 TIP32A	24p 21p	I.C. SOCKI		AN5025 AN5033	250p 400p	AN7105 AN7106K	200p 170p 135p	BA3308 BA3312	60p 70p 60p	FT5754M FT5764M HA1124	600p 250p 125p
BC550 BC556	8p 8p	BDX77 BDX87C	175p 175p	BU508VF	100p 75p	BUZ80 BUZ80AF	200p 200p	TIP32C TIP33	28p 50p	8 PIN 14 PIN	4p 5p	AN5034 AN5070 AN5071	400p 125p	AN7110 AN7111	75p	BA3402 BA3406A	90p	HA1125 HA1137W	120p 150p
BC557 BC558	8p 8p	BDX88C BDW24	150p 55p	BU536 BU546	100p 125p	BUZ83 BUZ90A	200p 180p	TIP33C TIP34	60p 50p	16 PIN 18 PIN 20 PIN	6p 9p 10p	AN5111 AN5132	100p 450p 250p	AN7112 AN7114	45p 120p	BA3416BI BA3422	80p 350p	HA1151 HA1197	175p 130p
BC559 BC560 BC637	8p 8p 20p	BDW93 BDW94 BDY29	50p 50p 225p	BU603 BU606D BU608D	125p 225p 120p	BUZ91A BY448 BYT11	400p 20p 25p	TIP34C TIP35C TIP36C	60p 65p 65p	22 PIN 24 PIN	12p 13p	AN5135N AN5138N	K 400p	AN7115 AN7116 AN7117	110p 90p	BA3505F BA3506A BA3516	140p 70p	HA1199 HA1201	130p 225p
BC639 BC640	20p 20p	BDY56 BDY58	225p 500p	BU626 BU705	120p 130p	IRF120 IRF130	225p 475p	TIP41A TIP41C	20p 22p	28 PIN 40 PIN	13p 15p	AN5150 AN5151	400p 200p	AN7120 AN7130	65p 100p 75p	BA3520 BA3521	120p 130p 225p	HA1202 HA1319 HA1338	125p 200p 300p
BCY33 BCY34	200p 200p	BDY90 BDY92	125p 100p	BU706DF BU706F	175p 150p	IRF140 IRF230	550p	TIP42A TIP42C	20p 22p	ZENER DIO	DDES	AN5210 AN5215 AN5222	675p 100p 200p	AN7131 AN7133N	90p 325p	BA3704 BA3705	200p 75p	HA1339A HA1367	350p 300p
BCY70 BCY71 BCY72	16p 16p	8F137 BF167	35p 30p	BU724A BU801 BU806	100p 70p	IRF240 IRF250	425p 375p	TIP47 TIP48	40p 40p	400 mWatt 2V7 to 39V	ts	AN5250 AN5256	160p	AN7134 AN7140	300p 170p	BA3812L BA3822LS		HA1377 HA1384	120p 600p
BD116 BD124P	16p 30p 50p	BF181 BF183 BF195	18p 20p 7p	8U807 8U807F	70p 60p 75p	IRF330 IRF340 IRF350	600p 325p 750p	TIP50 TIP51 TIP52	60p 80p 80p	1.3 Watts 2V7 to 39V	5p 9p	AN5260 AN5262	300p	AN7141 AN7142 AN7145	70p 80p 195p	8A3824L9 BA3920 BA4110	300p 75p	HA1388 HA1389 HA1392	320p 210p 120p
BD131 BD132	25p 25p	BF199 BF200	8p 16p	BU808DF BU810	300p 110p	IRF450 IRF510	650p 150p	TIP54 TIP102	85p 70p			AN5265 AN5315	80p 600p	AN7146 AN7147	210p 180p	BA4210 BA4220	85p 50p	HA1394 HA1396	170p
BD133 BD135	50p 20p	BF225 BF240	30p 16p	BU824 BU825	450p 120p	IRF520 IRF530	150p 300p	TIP105 TIP106	65p 65p	VOLTAGE		AN5352 AN5411 AN5421	600p 450p 150p	AN7148 AN7149	140p 160p	BA4234L BA4236L	70p 110p	HA1397 HA1398	200p 175p
BD136 BD137 BD138	20p 20p 20p	BF245 BF254 BF255	25p 15p 12p	BU826A BU902 BU903	160p 110p 110p	IRF540 IRF610 IRF611	300p 150p 150p	TIP107 TIP110 TIP111	65p 40p 40p	7805 7806	25p 25p	AN5429 AN5431	420p 275p	AN7154 AN7156	180p 240p	BA4402 BA4403 BA4405	45p 220p	HA1406 HA11123	120p 350p
BD139 BD140	20p 20p	BF256 BF257	18p	BU910 BU912	80p 100p	IRF620 IRF630	200p	TIP112 TIP112H	35p 50p	7808 7812 7815	25p 25p 25p	AN5435 AN5436N	125p 160p	AN7158 AN7160 AN7161N	310p 350p 375p	BA4412 BA5101	80p 50p 350p	HA11211 HA11215 HA11219	170p 350p 280p
BD144 BD157	90p 38p	BF259 BF262	18p 25p	BU920 BU922	100p 110p	IRF640 IRF642	400p 200p	TIP115 TIP116	30p 30p	7818 7824	25p 25p	AN5512 AN5515 AN5520	100p	AN7163 AN7156	175p 350p	BA5102 BA5115	140p 75p	HA11221 HA11225	180p 130p
BD166 BD175	30p 30p	BF270 BF273	18p 15p	BU930 BU932	130p 175p	IRF650 IRF710	200p 150p	TIP117 TIP120	30p 37p	7905 7906	25p 30p	AN5520 AN5521 AN5560	550p 100p 350p	AN7168 AN7169	200p 225p	BA5115L BA5204	75p 200p	HA11235 HA11244	100p 375p
BD177 BD179 BD181	30p 32p 45p	BF311 BF336 BF337	21p 20p	BU941 BU2508A BU2508AF	250p 130p 130p	IRF720 IRF730 IRF740	150p 175p 400p	TIP121 TIP122 TIP125	35p 30p	7908 7912	30p 30p	AN5601K AN5612	750p 200p	AN7170 AN7171K		BA5208AI BA5402	180p	HA11247 HA11251	375p 120p
BD182 BD184	60p 60p	BF338 BF362	20p 20p 30p	BU2508D	130p	IRF820 IRF830	150p 225p	TIP126 TIP127	30p 40p 35p	7915 7918 7924	30p 30p 30p	AN5613 AN5615	200p 300p	AN7172K AN7173K AN7177	325p 450p 375p	BA5406 BA5408 BA5413	180p 180p 225p	HA11412 HA11414 HA11423	600p 300p 110p
BD187 BD201	30p 33p	BF367 BF371	13p 17p	BU2520AF BU2520DF	225p 225p	IRF9140	200p 1000p	TIP130 TIP131	30p 30p	78L05 78L08	24p 24p	AN5620 AN5622	250p 275p	AN7178 AN7205	180p 35p	BA6104 BA6109	250p	HA11440 HA114858	250p N 400p
BD202 BD203 BD204	38p 42p	BF421 BF422 BF423	18p 21p	BU2525A BU2525AF		IRF9510 IRF9511	150p 150p	TIP132 TIP136	30p 40p	78L12 78L15	24p 24p	AN5625 AN5630 AN5633	400p 375p 350p	AN7213 AN7216	40p 175p	BA6110 BA6125	226p 75p	HA11702 HA11703	330p 400p
BD222 BD225	42p 31p 31p	BF455 BF458	25p 12p 19p	BU2527AF BUF405A BUH315	400p 200p 200p	IRF9520 IRF9530 IRF9531	150p 400p 200p	TIP137 TIP162 TIP141	65p 110p 65p	78L18 78L24	24p 24p	AN5635N AN5640	330p 500p	AN7218 AN7220 AN7222	60p 85p	BA6137 BA6138 BA6146	55p 130p	HA11706 HA11710 HA11713	280p 500p 250p
BD232 BD233	31p 30p	BF462 BF471	50p 28p	BUH315D BUH515	175p 200p	IRF9540 IRF9541	300p 200p	TIP142 TIP145	75p 50p	79L05 79L08 79L12	35p 35p 35p	AN5700 AN5701	90p 150p	AN7223 AN7224	75p 105p 75p	BA6149LS	150p 700p 60p	HA11715 HA11716	250p 480p
BD234 BD235	32p 28p	BF472 BF479	28p 30p	BUH515D BUH517	250p 276p	IRF9610 IRF9620	200p 225p	TIP146 TIP147	70p 80p	79L15 LM309K	35p	AN5710 AN5712 AN5720	100p 180p 70p	AN7225 AN7254	175p 150p	BA6208 BA6209	175p 85p	HA11718 HA11724	700p 550p
BD236 BD237 BD238	30p 21p 24p	BF494 BF495 BF595	16p 16p	BUH517D BUH715	175p 425p	IRF9622 IRF9630 IRF9640	200p 325p	TIP150 TIP151	90p 60p	LM317T LM323K	100p 350p	AN5722 AN5730	140p 160p	AN7256 AN7273	250p 75p	BA6218 BA6220	85p 55p	HA11741N HA11744	330p
BD239 BD240	30p 40p	8F596 8F615	16p 16p 30p	BUT11A BUT11AF BUT12	55p 55p 80p	IRFD9220 IRFBC30	375p 100p 200p	TIP2955 TIP3055 TIPL760	50p 50p 100p	78H08KC 79H12KC	800p 700p	AN5732 AN5750	120p 75p	AN7310 AN7311 AN7312	60p 90p 70p	BA6222 BA6227 BA6229	130p 50p 130p	HA11745 HA11749 HA11751	330p 350p 1500p
BD241A BD243A	40p 50p	BF617 BF780	30p 40p	BUT13 BUT18	310p 80p	IRFBC40 IRFP140	400p 250p	TIPL762A TIPL763A	200p 200p	79HGKC	800p	AN5753 AN5763	130p 250p	AN7315 AN7330	40p 110p	BA6235 BA6238A	50p 130p	HA11752 HA11839N	325p
BD244 BD245	50p	BF763 BF870	40p 22p	BUT18AF BUT30V	80p 1700p	IRFP150 IRFP240	300p 300p	TIPL791A 2N2369	80p 15p	LED: 3mm		AN5790 AN5791 AN5836	240p 225p 450p	AN7362 AN7363	200p 225p	BA6239A BA6247	130p 150p	HA11847 HA12002	700p 220p
BD246A BD265 BD267	50p 45p 45p	BF871 BF960 BF961	22p 38p 35p	BUT56A BUT76A BUT90	100p 80p 1300p	IRFP250 IRFP350 IRFP450	400p 325p 400p	2N2646 2N2904 2N2905	40p 20p 20p	RED	5p 8p	AN5862K AN5900	225p 130p	AN7410 AN7411	150p 50p	BA6248 BA6259 BA6259	140p 170p	HA12003 HA12005	150p 180p
BD269 8D278	45p 50p	BF964 BF0232	38p 75p	8UT92 8UV18	1200p 850p	IRFP450 IRFP460 IRFP9140	400p 775p 1450p	2N2905 2N2906 2N2907	20p 18p 18p	GREEN Smun	80	AN608P AN620	125p 250p	AN7414 AN7415 AN7470	275p 70p 100p	BA6290A BA6290A BA6294	300p 200p 250p	HA12010 HA12016 HA12017	300p 120p 100p
BD311 BD314	100p 100p	BFQ252A BFR90	60p 85p	BUV20 BUV21	650p 400p	IRFP9240 IRFPC50	500p 600p	2N3019 2N3053	28p 18p	RED	5p 8p	AN6130 AN6135 AN6209	130p 120p	AN8053 AN8275	200p 250p	BA6302A BA6304	150p 120p	HA12026 HA12038N	125p
BD315 BD317 BD221	150p 150p	BFR91 BR100	99p 14p	BUV23 BUV24	475p 350p	IRFRC20 IRFZ20	250p 65p	2N3054 2N3055	40p 38p	GREEN	80	AN6209 AN6250 AN6247	350p 50p 200p	AN8370 AN8377	1000p 400p	BA6305 BA6321	140p 250p	HA12044 HA12045	350p 280p
BD331 BD332 BD361	40p 40p 80p	BR103 BR303 BU105	37p 85p 80p	BUV25 BUV26 BUV27	110p 150p 125p	IRFZ42 IRFZ44 MJ2501	275p 275p 100p	2N3055H 2N3440 2N3441	50p 45p 175p	RECTANG	ULAR	AN6270 AN6300	400p 600p	AN8387 BA222 BA225	350p 65p	BA6328 BA6334 BA6410	250p 75p 220p	HA12047 HA12058 HA12088	450p 320p 375p
BD362 BD370	60p 30p	BU108 BU109	100p 80p	BUV28 BUV37	110p 175p	MJ2955 MJ3000	55p 100p	2N3442 2N3771	85p 85p	LEDe 5mm x 2.5		AN6306 AN6310	380p 200p	BA314 BA301	100p 40p 55p	BA6411 BA6418N	220p 250p 100p	HA12116 HA12116 HA12411	130p 175p
BD371 BD410 BD433	30p 50p	BU110 BU111	90p 100p	BUV46A BUV47	75p 120p	MJ3001 MJ4032	100p 175p	2N3772 2N3773	90p	RED YELLOW	5p 8p	AN6320 AN6326N AN6332	180p 250p 320p	BA311 BA313	80p 60p	BA6435S BA6993	425p	HA12412 HA12413	175p 70p 200p
80433	28p	BU124	60p	BUV48A	175p	MJ4035	175p	2N3819	29p	GREEN	8p		and	BA333	80p	BA7001	150p	HA12430	200p

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CALLANS IN			3 ¹⁰	1. 1. 1. 1.					li Jan Jr		03				1				10.00
Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
HA13001	110p	LA2211	350p	LA7054	350p	LC7881B	135p	MC1455	45p	SA82022		STK2250	650p	STK5468	300p	STR7001	600p	TA72678	
HA13002 HA13006	400p	LA2800 LA3120	350p 200p	LA7060 LA7096	160p 200p	LF347	325p 110p	MC1488 MC1489	36p 35p	SAB3012 SAB3013	675p 200p	STK3041 STK3042	370p 376p	STK5471 STK5472	330p 375p	STR9005 STR9012	400p 450p	TA7269 TA7270	260p 170p
HA13007 HA13108	2800	LA3150	200p 120p	LA7113 LA7116	276p 125p	LF353 LF355	48p 60p	MC1496 MC3302	55p 50p	SAB3017 SAB3021	320p 460p	STK3044 STK3062	500p	STK5473 STK5474	480p 500p	STR10006	4500	TA7271	220p
HA13117 HA13118	175p	LA3161 LA3210	40p 66p	LA7123	1300p	LF357	70p 300p	MC3401 MC3423P	450	\$AB3029	525p	STK3082	500p 550p	STK5478	350p	STR11006	450p	TA7272 TA7273	260p 300p
HA13119	1400	LA3226	60p	LA7210 LA7212	60p	LF398 LH2426S	600p	MC3488A		SAB3035 SAB3036	600p 725p	STK3102 STK3106	25000	STK5477 STK5478	450p 380p	STR13006 STR15006		TA7274 TA7279P	210p 325p
HA13127 HA13128	400p	LA3246 LA3300	75p 140p	LA7214 LA7220	150p 125p	LM301 LM311	26p 35p	MC34063. MN1220T	4P 300p 600p	SAB3037 SAB3042	700p 825p	STK3122 STK3152		STK5479 STK5481	300p 520p	STR16006 STR17006	500p	TA7280 TA7281	190p 200p
HA13130 HA13135	460p 500p	LA3301 LA3361	110p 100p	LA7222 LA7224	110p 150p	LM319 LM324	165p 30p	MN1226 MN1228	450p 600p	SAB3064 SAB3209	130p 225p	STK3156 STK4017	500p 400p	STK5482 STK5483	285p	STR20005	450p	TA7282	160p
HA13139 HA13150	600p	LA3365 LA3370	70p 70p	LA7225 LA7292	250p 275p	LM335Z	120p	MN1276	1300p	SAB3210	- 250p	STK4019	480p	STK5486	440p 450p	STR20012 STR20015	450p	TA7210 TA7283	200p 200p
HA13151	875p	LA3373	70p	LA7294	200p	LM348	35p 60p	MN1280 MN3004	70p 600p	SAB6456 SAB8048	125p 225p	STK4021 STK4024		STK5487 STK5488	525p 480p	STR30110 STR30115	2750	TA7284P TA7288	400p 220p
HA13403 HA13406	W 400n	LA3375 LA3376	300p 80p	LA7295 LA7297	160p 120p	LM358 LM380	45p 80p	MN3005 MN3011	2000p 4000p	SAB8051, SDA2003	450p	STK4025 STK4026	630p 480p	STK5490 STK5632	450p 450p	STR30120 STR30123		TA7291P TA7292P	200p 325p
HA13408 HA13412	600p	LA3380 LA3390	300p 250p	LA7305A LA7308	350p 70p	LM381 LM382	150p 130p	MN3101 MN3102	110p	SDA2004 SDA2005	325p 700p	STK4028 STK4032	560p	STK5720 STK5725	400p 450p	STR30125 STR30130	550p	TA7294P TA7299	450p 200p
HA13426 HA13432	500p 400p	LA3400 LA3401	250p 90p	LA7311 LA7320	200p 120p	LM386 LM387	60p 100p	MN3207 MN3208	375p 950p	SDA2007 SDA2008	300p 400p	STK4034 STK4036	X 925p 470p	STK5730 STK8316	450p 300p	STR40090 STR40115	350p	TA7302P	75p
HA13441 HA17524	450p	LA3410 LA3430	150p 135p	LA7323 LA7330	325p 360p	LM389N LM393	105p 45p	MN8030B MN6163A	350p 700p	SDA2112 SDA2120	450p 200p	STK4038	6800	STK63248	500p	STR41090	4000	TA7303 TA7307	70p 100p
KA2102 KA2130	100p 150p	LA3600 LA3605	60p 100p	LA7331 LA7332	250p 225p	LM431 LM710	50p 45p	MTA001N	600p	SDA2131	225p	STK4040 STK4042	II 800p	STK8327 STK6328A	1200p 800p	STR43111 STR44115	550p	TA7310 TA7312	100g
HA2131 KA2206	110p	LA3607	126p	LA7340	300p	LM723	40p	NE555 NE556	20p 40p	SDA2208 SDA4212	450p 775p	STK4044 STK4046	800p 950p	STK6431 STK6607	850p 400p	STR45111 STR50020	450p	TA7313 TA7314	70p 175p
KA2209	160p 125p	LA4030 LA4031	180p 140p	LA7376 LA7391	150p 550p	LM741DiL LM741M5	T 45p	NE558 NE565	80p 110p	SDA5241 \$DA5243-	725p 2 450p	STK4048 STK4050	1280p	STK6722 \$TK6732	725p 1000p	STR50092 STR50103	550p	TA7315 TA7317P	200p 120p
KA2210 KA2212	230p 66p	LA4032 LA4051	140p 160p	LA7520 LA7530	200p	LM747 LM1017	55p 200p	NE567 NE571	116p 290p	SDA5343 SDA5640	1450p 200p	STK4060 STK4065	650p	STK6922 STK6922	900p 500p	STR50113 STR50115	500p	TA7320P TA7322	200p 130p
KA2213 KA2214	130p 100p	LA4100 LA4101	85p 80p	LA7535	175p 160p	LM1035N LM1040N	350p	NE592 NE5532P	85p 140p	SDA5642 SGSF444	450p 500p	STK4101 STK4111	500p	STK6932 STK6962	525p 275p	STR51041 STR50213	500p	TA7323 TA7234	80p
KA2224 KA2244	50p 75p	LA4102 LA4110	100p 120p	LA7550 LA7555	275p	LM1203 LM1203A	225p	SAA1000 SAA1004	350p	SGFS465 SLA4031	500p 750p	STK4112 STK4121	500p 480p	STK6972 STK69818	490p 600p	STR53041	500p	TA7325	75p 90p
KA2261 KA2263	100p	LA4120 LA4138	270p 105p	LA7620 LA7680	150p 500p	LM1875T	3300	SAA1005	3250	SLA7020M	4500	STK4122	5600	STK6982	600p	STR54041 STR55041	350p 500p	TA7326 TA7328	200p 110p
KA2264 KA2284	100p 75p	LA4140 LA4142	60p	LA7681	675p 650p	LM1881N LM1886	375p 250p	SAA1006 SAA1008	300p 450p	STA301A STA341M	200p 180p	STK4131 STK4132		STK6982H STK7216	600p 420p	STR56041 STR58041	550p 325p	TA7330P TA7331P	80p 80p
KA2309	175p	LA4145	65p 65p	LA7710 LA7800	260p 90p	LM1889 LM1894N	300p 200p	SAA1010 SAA1024	400p 250p	STA401A STA403A	220p 270p	STK4133 STK4141	II 420p	STK7217 STK7225	400p 500p	STR59041 STR60001	350p 525p	TA7333 TA7335	100p 85p
KA2401 KA2412	150p 225p	LA4160 LA4162	100p 110p	LA7801 LA7802	100p 300p	LM1895N LM2901N	275p 35p	SAA1025 SAA1026	250p 400p	STA405A STA431A	280p 250p	STK4142 STK4147	530p	STK7226 STK7251	600p 500p	STR80145 STR81145	475p	TA7336 TA7337P	180p 175p
KA2912 KA2913A	126p 175p	LA4178 LA4180	150p	LA7806 LA7808	260p 250p	LM2902N LM2903N	40p 40p	SAA1027 SAA1029	400p 150p	STA432A STA434A	220p 270p	STK4151 STK4152	680p 660p	STK7253 STK7308	450p 350p	STR90120 STRD1208	425p	TA7339P	175p 250p
KA2914A KA22427	200p 100p	LA4182 LA4190	180p 300p	LA 7820 LA7823	100p 200p	LM3900 LM3909	40p	SAA1042 SAA1043F	325p	STA435A STA441C	270p 220p	STK4151 STK4162	650p 550p	STK7309 STK7310	400p 470p	STRD1406	600p	TA7341 TA7342P TA7343	70p
KIA62135 KIA62104	60p	LA4192 LA4200	140p 130p	LA7824 LA7830	130p 200p	LM3911N LM3914	200p 160p	SAA1044 SAA1056	400p 300p	STA451C STA456C	280p 240p	STK4154 STK4171	1175p	STK7348	400p	STRD1806	400p	TA7347P	120p 120p
KIA6281H KIA6283K	1 250p	LA4201 LA4260	120p 230p	LA7831 LA7832	175p 130p	LM3915 LM3916	160p 270p	SAA1057 SAA1058	375p 225p	STA471	210p	STK4172	1 680p	STK7356 STK7358	425p 440p	STRD1816 STRD1906	7000	TA7348P TA7349P	126p 176p
KIA6299H KIA72270	1 2100	LA4261 LA4265	300p 125p	LA7835 LA7837	150p 150p	LM8383 LM8560	320p	SAA1060	376p	STA901M STK0025	280p 420p	STK4181 STK4182		STK7402 STK7404	560p 400p	STRD3035 STRD4412	500p	TA7354P	65p 340p
KIA7313 L149V	45p 300p	LA4270	300p	LA7838	2000	LM13600	176p 150p	SAA1061 SAA1062	250p 250p	STK0029 STK0039	360p 600p	STK4191 STK4192	700p 700p	STK7406 STK7408	650p 675p	STRD4420 STRD4512	4006	TA7358 TA7359P	85p 90p
L165V	250p	LA4420	350p 140p	LA7850 LA7851	225p 200p	LM13700 LM18293	126p 500p	SAA1063 SAA1064	250p 275p	STK0040 STK0049	520p	STK4211 STK4211	V 800p	STK7410 STK7458	1500p 1250p	STRD5441 STRD5541	450p	TA7361 TA7362	125p 150p
L200 L272	200p 200p	LA4422 LM4425/		LA7910 LA7913	150p	M491881 M49481	600p 700p	SAA1070 SAA1073	550p 325p	STK0050 STK0059	440p 620p	STK4221 STK4231	1200p	STK7564 STK7561	600p 650p	STRD6008 STRD6009	5750	TA7364P TA7366P	176p 65p
L272M L290B	110p 225p	LA4430 LA4440	130p 200p	LA7930 LA7940	350p 200p	M5265P M50115P	200p 320p	\$AA1075 SAA1086	360p 175p	STK0060 STK0070	820p 1100p	STK4241 STK4241	1050p V 1250p	STK7562 STK7563	1000p 800p	STRD6018 STRD6602	450p	TA7368P TA7373F	36p 150p
L291B L292	300p 750p	LA4445 LA4446	200p 170p	LA7953 LA9200	300p 300p	M50117P M50119P	500p 525p	SAA1089 SAA1101	325p 700p	STK0080 STK011	580p 330p	STK4272 STK4273	500p 660p	STK7573 STK7576	400p 1500p	STRD6601 STRM6545	650p	TA7374 TA7376P	176p
L293B L293C	225p 325p	LA4460 LA4461	120p 120p	LB1205 LB1216	170p 150p	M50422P M50461	750p 350p	SAA1124 SAA1130	200p 550p	STK015 STK016	440p 760p	STK4301 STK4311	500p	STK7703 STK8050	1000p 750p	STRM654	900p	TA7378P TA7401	60p 250p
L293D L293E	225p 250p	LA4466 LA4470	225p 300p	LB1258 LB1268	100p 70p	M50784 M50786	300p 500p	SAA1250 SAA1251	250p 380p	STK025 STK050	650p 1600p	STK4332 STK4352	365p 500p	STK8250 STK8260	500p 1200p	STRS5741 STRS5941	800p 750p	TA7402P TA7403	200p
L294 L295	475p 450p	LA4475	225p 225p	LB1274 LB1290	85p 120p	M50790 M51014L	600p 120p	SAA1271 SAA1274	400p 280p	STK077 STK078	520p	STK4382	450p	STK8260	1860p	STRS6307	600p	TA7404	325p 150p
L297 L298	625p 400p	LA4480 LA4485	225p 300p	L81292 L81405	110p	M51143AL M51161	110p 300p	SAA1290 SAA1293	750p 550p	STK080	550p	STK4372 STK4392	490p 500p	STK73405 STK73410	3500	STRS6308 STRS6309	600p 600p	TA7405P	
L465A L482	525p 400p	LA4495	250p	LB1407 LB1409	130p 200p	M51161P M51162P	250p 250p	SAA1294 SAA1300	800p 200p	STK082 STK084	600p	STK4412 STK4432	450p 600p	STK7340 II STK73805	500p 375p	STRS6707 STRS6708	1000p 700p	TA7415P TA7417A	350p 225p
L497B	525p 400p	LA4498	275p 200p	LB1412	300p	M51164AL	. 80p	SAA1310	200p	STK085 STK086	900p 800p	STK4773 STK4793	820p 800p	STK73907 STK78617	700p 2400p	TA7054 TA7061	190p 115p	TA7521P TA7607	350p 200p
L702N	325p	LA4505	220p	LB1416	100p 85p	M51166P M51182L	300p 110p	SAA1350 SAA1351	276p 750p	STK0100 STK010011	900p 1200p	STK4803 STK4813	840p 800p	STR370 STR371	300p 400p	TA7062 TA7066	200p 120p	TA7608 TA7609	360p 170p
L2722	150p 175p	LA4510	200p 100p	LB1426 LB1450	125p 110p	M51191L M51231P	85p 200p	SAA1900S SAA3004	400n	STK420 STK430	400p 500p	STK4833 STK4843	700p 720p	STR380 STR381	350p 390p	TA7075P TA7089	300p 300p	TA7611 TA7612	210p 300p
L4960 L6203	325p 600p	LA4520 LA4550	170p 200p	LB1615 LB1620	270p 210p	M51308SF	9000	SAA3006P SAA3007P	225p 130p	STK433 STK435	400p 375p	STK4853 STK4863	730p 700p	STR383 STR384	410p 350p	TA7102P TA7119	500p 150p	TA7613AF TA7614	90p 170p
L6210 L6221AS	250p 300p	LA4555 LA4557	120p 150p	LB1622 LB1630	220p 80p	M51316P M51320	300p 200p	SAA3008P SAA3010P	200p 300p	STK436 STK437	430p 460p	STK4873 STK4893	850p 1000p	STR440 STR441	800p 1200p	TA7120 TA7124	55p 250p	TA7616 TA7621	300p 300p
L6506 LA1130	300p 240p	LA4558 LA4570	125p 130p	LB1639 LB1640	300p	M51356P M51358P	400p 150p	SAA3027P SAA3049P	375p 650p	STK439 STK441	500p	STK4913 STK5314	900p 475p	STR442 STR450A	1600p 700p	TA7130P TA7137	85p 60p	TA7622 TA7628	420p 110p
LA1135	120p 200p	LA4571 LA4581	175p 175p	LB1641 LB1642	75p 150p	M51365P M51366P	350p	SAA4700 SAA5000	4250 200p	STK443 STK457	700p 470p	STK5315 STK5322	500p	STR451 STR452	800p 600p	TA7140 TA7141	100p	TA7529	220p 200p
LA1150 LA1170	150p 90p	LA4597 LA4620	125p 400p	LB1645 LB1648	100p 200p	M51381P M51384AF	200p	SAA5010 SAA5012	220p 400p	STK459 STK460	560p 660p	STK5323 STK5324	600p 450p	STR453 STR454	500p 1300p	TA7150P	825p 250p	TA7630 TA7632	400p
LA1177	130p 76p	LA4630 LA4700	325p 350p	LB1649 LB3500	190p 125p	M51387P M51392P	600p 300p	SAA5020 SAA5030	350p 440p	STK461 STK463	600p 950p	STK5325	3700	STR455 STR456	550p	TA7172P	1500	TA7641	140p
LA1185 LA1186	150p 35p	LA4705 LA5005	400p 90p	LC4966	65p 500p	M51393AF M51395AF	3500	SAA5040A SAA5040B	280p	STK 465	720p	STK5326 STK5330	750p 850p	STR457	470p 600p	TA7193 TA7200	320p 200p	TA76448P TA76545P	85p
LA1201 LA1205	76p 75p	LA5112	200p	LC7060	600p	M51397AP	425p	SAA5041	550p	STK501 STK561	550p 460p	STK5331 STK5332	300p 160p	STR470 STR1096	400p 275p	TA7205 TA7207	150p 150p	TA7658 TA7659P	100p 400p
LA1207	120p	LA5511 LA5512 LA5522	50p	LC7120 LC7130	350p 300p	M51436P M51496P	350p 276p	SAA5042 SAA5050	426p 650p	STK563 STK583	415p 500p	STK5333 STK5335	1000p 350p	STR1195 STR1229	350p 325p	TA7208 TA7210	125p 200p	TA7660P TA7666P	325p 100p
LA1222	140p 80p	LA5523	45p 150p	LC7131 LC7132	260p 400p	M51533 M51544	300p 150p	SAA5051 SAA5052	400p 500p	STK760 STK770	600p 400p	STK5336 STK5337	350p 500p	STR2005 STR2012	400p 400p	TA7214 TA7217	220p 145p	TA7668 TA7672	100p
LA1230 LA1235	130p 130p	LA5524	80p 150p	LC7137 LC7181	450p 350p	M51848 M54523P	150p 200p	SAA5052 SAA5054 SAA5230	500p 850p	STK772 STK7728	650p 480p	STK5338 STK5339	295p 400p	STR2013 STR2015	300p 550p	TA7220 TA7222	220p 90p	TA7676AP TA7679	450p 475p
LA1240 LA1245	80p 110p	LA5530 LA5531	65p 65p	LC7185 LC7191	360p 300p	M54563P M58484	200p	SAA5231 SAA5240P. SAA5243P	300p	STK780 STK795	\$75p 450p	STK5339 STK5340 STK5342	350p	STR2024 STR2105	550p 575p 600p	TA7223 TA7225	210p 300p	TA7680AP	2000
LA1260 LA1261	76p 75p	LA5537 LA5655	45p 175p	LC7207 LC7215	275p 160p	M51516 M51518	260p 200p	SAA5244A	P 950p	STK1039 STK1040	480p 640p	STK5343 STK5353	380p 400p	STR2124 STR3105	676p 525p	TA7226 TA7227	290p 170p	TA7687AP	
LA1265 LA1266	125p 130p	LA5658 LA5665	225p 250p	LC7217 LC7218	350p 260p	M51995P M51977P	250p 300p	SAA5246A SAA5246P	P 950a I	STK1049 STK1050	700p 650p	STK5361 STK5362	375p 400p	STR3113 STR3115	225p	TA7230 TA7232	100p 95p	TA7698	400p
LA1267 LA1354	150p 225p	LA5667	200p 300p	LC7230 LC7257	700b l	M52307P M54646AP	9000	SAA5250P	750p 375p	STK1060 STK1070	790p 850p	STK5372 STK5373	260p 375p	STR3123 STR3125	400p 480p	TA7233 TA7237	120p	TA7699 TA7705	600p 300p 160p
LA1363 LA1364	90p 200p	LA6339 LA6355	35p 50p	LC7351 LC7364	550p 200p 200p	MB3708 MB3712	140p i	SAA5351 SAA7000 SAA7020	560p	STK1080 STK2025	940p 620p	STK5391 STK5392	375p 500p	STR3130 STR3135	500p 250p	TA7238	400p	TA7709P TA7719P	200p
LA1365 LA1368	120p	LA6510 LA6515	150p	LC7432 LC7522	425p 350p	MB3713 MB3714	130p	SAA7210P SAA7220P	13000	STK2028	500p	STK5421	450p	STR3212	2750	TA7240	160p 165p	TA7727P TA7750	125p 200p
LA1369 LA1385	200p	LA6520 LA6531	175p 250p	LC7535 LC7537AN	300p	M83715 M83722	250p	SAA7274P SAA7280P	8000	STK2029 STK2030	875p	STK5422 STK5431	375p 550p	STR3214 STR3215	275p 275p	TA7242 TA7243	190p 320p	TA7757 TA7769	200p 130p
LA1503 LA1805	120p	LA7007	400p	LC7537N	450p	MB3730	350p	SAA9050	1450p 450p	STK2038 STK2048	700p 950p	STK5434 STK5436	500p	STR3315 STR4090A	275p 650p	TA7245 TA72458PC		TA7772P TA7784	160p 250p
LA1610	130p	LA7016	46p	LC7560 LC7565	750p 300p	MB3731 MB3732	2400	SAA9057 SAB0600	475p 600p	STK2058/V STK2101	1600p 1050p	STK5441 STK5443	400p 575p	STR4142 STR4211	3700	TA7248P TA7250B	575p 325p	TA7792P TA7796P	250p 75p
LA1851 LA2000	150p	LA7018	100p 130p	LC7582E LC7800	300p 175p	MB3735 MB3756	400p 160p	SAB0601 SAB0602	525p 625p	STK2110 STK2125	550p	STK5446 STK5451	350p 390p	STR4512 STR5015	400p 500p	TA7251BP TA7256P	325p 225p	TA8101N TA8105N	230p
LA2001 LA2101	2700	LA7033	2800	LC7815H LC7818	176p 280p	MB3759 MB3771	110p	SAB100981 SAB1016	600p	STK2129 STK2139	750p	STK5461 STK5462	500p	STR5100 STR5214	560p	TA7259P TA7262P	225p 400p	TA8110AP TA8119P	110p 70p
LA2110 LA2200	190p	LA7048	130p	LC7820 LC7821N	325p 250p	MB3773 MB8719	110p 360p	SAB1046P SAB2015P	350p 625p	STK2155 STK2230	900p 470p	STK5464 STK5466	300p	STR5315 STR5412	576p	TA7263P TA7265AP	325p 300p	TA8122AN TA8127N	250p 100p
LA2205	150p	LA7053	130p	LC7822N	160p	MC1391	120p	SAB2016P	150p	STK2240	740p	STK5467	400p	STR6020		TA7267	220p	TAB13ZAN	200p

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Part TA8164P	Price	TDA1180	120p		Price		226p		Price	-	Price	Part	Price	Part	Price	Part	Price	Part	Price
TA8184P TA8189P TA8200A TA8201A	350p 130p	TDA1185 TDA1190 TDA1200	A 190p 80p 8 80p	TDA2780 TDA2791 TDA2795	600p 275p 200p	TDA4670 TDA4680 TDA4685	475p	TDA8395 TDA8405 TDA8415	450p 550p 650p	UPC1009 UPC1018	950p 170p 200p	2SA771 2SA773 2SA777 2SA778	90p 50p 35p 100p	2SA1179 2SA1182	25p 20p 20p 120p	2SB561 2SB562 2SB564 2SB566	30p 20p 15p 90p	2SC738 2SC739 2SC751 2SC762	150p 150p 110p 150p
TA8205 TA8207K TA8210	2600	TDA1235 TDA1236	300p	TDA2824 TDA2840	85p	TDA4700 TDA4714 TDA4718 TDA4718	C 350p	TDA8417 TDA8421	625p 650p 500p	UPC1023 UPC1024 UPC1025	60p 2 75p 230p	2SA781 2SA786 2SA794	150p 25p 50p	2SA1185 2SA1186 2SA1198	200p 500p 40p	2SB596 2SB598 2SB600	50p 30p 500p	2SC783 2SC790 2SC792	85p 50p 380p
TA8211A TA8214K TA8215	H 200p 260p 300p	TDA1270 TDA1327 TDA1405	150p 200p 50p	TDA3048 TDA3082 TDA3083	130p 200p 200p	TDA4725 TDA4800 TDA4810	750p 350p 250p	TDA8432 TDA8433 TDA8440	500p 550p 600p 300p	UPC1028 UPC1031F UPC1032	95p 90p 150p 60p	2SA798 2SA812 2SA814 2SA814	30p 15p 60p 70p	2SA1202 2SA1204	40p 25p 225p 80p	258601 258605 258631 258632	60p 25p 40p 45p	2SC805 2SC828 2SC829 2SC839	225p 20p 15p
TA8216H TA8217P TA8220A TA8221A	120p H 500p	TDA1412 TDA1506	35p 275p	TDA3301 TDA3310	120p	TDA4814 TDA4850 TDA4851 TDA4851	A 300p 475p 400p	TDA8442 TDA8443 TDA6444	200p 350p 200p	UPC10350 UPC10430 UPC1158H	110p 125p 70p	2SA817 2SA825 2SA836	20p 20p 20p	2SA1207 2SA1208 2SA1209	25p 70p 100p	2SB633 2SB641 2SB647	43p 80p 12p 20p	2SC857 2SC857 2SC870 2SC897	20p 900p 100p 175p
TA8225H TA8225L TA8227	475p 475p 250p	TDA1510 TDA1512 TDA1514	170p 180p A 450p	TDA3420 TDA3501 TDA3502	150p 200p 340p 450p	TDA4860 TDA4866 TDA4881	200p 325p 200p	TDA8451 TDA8452 TDA8453 TDA8461	400p 200p 350p 950p	UPC1167 UPC1170	110p 125p 150p 200p	2SA837 2SA839 2SA841 2SA844	200p 110p 20p 20p	2SA1210 2SA1215 2SA1215 2SA1216 2SA1217	120p 600p 550p 100p	2SB648 2SB649 2SB673 2SB675	45p 35p 100p	2SC900B 2SC930 2SC936	30p 15p 300p
TA8229K TA8400P TA8410K TA8410P	200p 200p 200p 200p	TDA1516 TDA1517		TDA3505 TDA3506	300p 275p 260p 450p	TDA4935 TDA4940 TDA4942 TDA4944	300p 325p 325p	TDA8490 TDA8540 TDA8702	350p 250p 275p	UPC1176C UPC1178H UPC1180C	120p 250p 200p	2SA847 2SA854 2SA861	25p 30p 45p	2SA1220 2SA1221 2SA1222	75p 70p 50p	259688 258703 258705	85p 90p 90p 200p	2SC941 2SC944 2SC945 2SC950	15p 140p 10p 40p
TA8432 TA8605N TA8606N	200p 350p 350p	TDA 1519/ TDA 1520 TDA 1521	A 200p 275p 250p	TDA3510 TDA3520 TDA3530	350p 650p 350p	TDA4950 TDA5030 TDA5140	A 150p	TDA6703 TDA6708 TDA8708 TDA8730 TDA8732	500p 900p 225p 400p	UPC1186 UPC1187	80p 150p	2SA872 2SA872A 2SA879 2SA884	26p 50p 30p 100p	2SA1226 2SA1227 2SA1232 2SA1232	25p 250p 180p 25p	2SB707 2SB716 2SB718 2SB727	200p 20p 60p 100p	2SC959 2SC980 2SC982 2SC983	225p 40p 20p
TA8607P TA8611A TA8615N TA8628N	480p	TDA1524	110p 200p 225p 2000p	TDA3541 TDA3560	200p 175p 260p 300p	TDA5330 TDA5331 TDA5332 TDA5500	T 200p T 150p	TDA8735 TDA8740 TDA8741 TDA88081	175p 625p 550p	UPC 191 UPC 1197 UPC 1198H UPC 1210	300p 140p 200p	2SA885 2SA885 2SA886 2SA887	35p 45p 20p	2SA1238 2SA1239 2SA1240	30p 30p 45p	2SB733 2SB734 2SB737	75p 35p 20p	2SC1000 2SC1001 2SC1008	120p 20p 950p 20p
TA8631 TA8632N TA8644N TA8646	500p	TDA1540 TDA1541 TDA1542	420p 760p 250p	TDA3561/	300p 260p	TDA5600 TDA5660 TDA5700	450p 260p 200p	TDA88097 TDA9045 TDA9080	350p 400p 550p	UPC1215V UPC1222 UPC1225H	150p 125p 130p 220p	2SA893 2SA895 2SA899 2SA899	15p 25p 40p 45p	2SA1242 2SA1244 2SA1245 2SA1245 2SA1245	80p 120p 55p 80p	2SB739 2SB744 2SB750 2SB753	22p 55p 60p 100p	2SC1010 2SC1012 2SC1013 2SC1014	225p 75p 170p 140p
TA8653N TA8659A TA8690N	1500p N 900p 700p	TDA1543 TDA15520 TDA15534 TDA15550	AQ 375p	TDA3563 TDA3564 TDA3565 TDA3566	350p 325p 275p 280p	TDA5701 TDA5708 TDA5709 TDA5800	200p 400p 450p 600p	TDA91020 TDA9403 TDA9500 TDA9503	260p 180p 750p 160p	UPC1228H	200p	2SA904 2SA907 2SA909 2SA912	20p 650p 500p 70p	2SA1248 2SA1249 2SA1252 2SA1253	35p 100p 20p	2SB754 2SB764 2SB765	80p 30p 70p	2SC1030 2SC1046 2SC1047	150p 250p 20p
TA8691N TA8701AI TA8718N TA8720	450p N 275p 550p 525p	TDA15570 TDA15580 TDA15600 TDA1571	350p	TDA3567 TDA3569 TDA3570	350p 300p 375p	TDA5820 TDA5832 TDA5850	370p 200p 175p	TDA9513 TDA9800 TDA9821	300p 300p 250p	UPC1238 UPC1241H UPC1242H	120p 150p 160p	2SA913 2SA914 2SA915	100p 90p 30p	2SA1253 2SA1256 2SA1257 2SA1257	30p 30p 30p 70p	2SB772 2SB774 2SB775 2SB775	26p 50p 100p 110p	2SC1050 2SC1051 2SC1061 2SC1069	280p 250p 85p 175p
TA8739P TA8872N TAA550	450p 450p 250	TDA1572 TDA1574 TDA1576	300p 176p 125p 170p	TDA3580 TDA3586 TDA3590 TDA3591	400p 750p 300p 360p	TDA5930 TDA6100 TDA6101 TDA6111	0 1200	TEA0652 TEA0653T TEA0655 TEA0665	150p 80p 300p 300p	UPC1245V UPC1270H UPC1274V UPC1277	130p 250p 250p 240p	2SA916 2SA921 2SA928A 2SA933	30p 40p 25p 30p	2SA1261 2SA1262 2SA1263	150p 110p 280p	258788 258791 258794	35p 130p 40p	2SC1070 2SC1079 2SC1080	65p 300p 225p
TBA120S TBA396 TBA520 TBA530	40p 70p 120p 100p	TDA15784 TDA1579 TDA1589 TDA1591	210p 200p 275p 275p	TDA3592/ TDA36010 TDA3602 TDA3611	350p 375p 225p	TDA6200 TDA6600 TDA6610	750p 2 700p 2 1100p	TEA1002 TEA1007 TEA1009	650p 120p 100p	UPC1278 UPC1288V UPC1297C	240p 230p 325p	2SA934 2SA935 2SA937	30p 40p 20p	2SA1264 2SA1265 2SA1283 2SA1283	200p 50p	2SB795 2SB810 2SB816 2SB817	45p 15p 160p 175p	2SC1096 2SC1098 2SC1106 2SC1114	40p 120p 180p 415p
TBA540 TBA560 TBA800	90p 90p 40p	TDA1595 TDA1598 TDA1600	200p 250p 275p	TDA3640 TDA3645 TDA3651	450p 350p 400p 200p	TDA6612 TDA7000 TDA7010 TDA7020	170p 120p 175p	TEA1015P TEA1017 TEA1019 TEA1024	110p 280p 130p 150p	UPC1298 UPC1313H UPC1316C UPC1318	320p A 100p 70p 300p	2SA939 2SA940 2SA942 2SA949	140p 50p 60p 70p	2SA1286 2SA1289 2SA1290 2SA1293	60p 60p 150p 110p	258819 258822 258824 258825	60p 40p 60p	2SC1115 2SC1116 2SC1124	280p 290p 270p
TBA810A TBA820 TBA820M TBA920	5 40p 55p 35p 100p	TDA1602A TDA1670A TDA1675 TDA1675	400p 230p 250p 300p	TDA3652 TDA3652-T TDA3653 TDA3654	500p X10800p 150p 90p	TDA7021 TDA7050 TDA7052 TDA7053	7 200p 200p 120p	TEA1035 TEA1039 TEA1045	200p 180p 300p	UPC1330H, UPC1335V UPC1350	4 80p 320p 115p	2SA950 2SA951 2SA952	18p 60p 30p	2SA1294 2SA1295 2SA1301	450p 500p 260p	258826 258827 258828	135p 75p 200p 200p	2SC1161 2SC1162 2SC1164 2SC1165	110p 30p 800p 750p
TBA950 TBA990 TC5020	100p 60p 200p	TDA1771 TDA1870A TDA1872A	250p 200p 275p	TDA36540 TDA3710 TDA3720	120p 300p 175p	TDA7056 TDA70570 TDA7072	175p	TEA1060 TEA1061 TEA1062 TEA1064	225p 175p 260p 250p	UPC1352C UPC1360C UPC1362C UPC1362 UPC1363	450p 200p 250p 190p	2SA953 2SA954 2SA957 2SA958	60p 30p 185p 60p	2SA1302 2SA1303 2SA1304 2SA1306	400p 110p	2SB829 2SB835 2SB857 2SB861	200p 75p 80p 110p	2SC1166 2SC1170 2SC1172 2SC1173	100p 180p 150p
TC5081AF TC5082P TC5090A TC9126BP	80p 170p 230p 410p	TDA1904 TDA1905 TDA1908A TDA1908A	80p 80p 90p 225p	TDA3724 TDA3725 TDA3730 TDA3740	500p 500p 400p 480p	TDA7077 TDA7211 TDA7220 TDA7222	176p 150p 100p 200p	TEA1067 TEA1068 TEA1080P TEA1087	150p 350p 170p	UPC1363C UPC1364C UPC1365	300p 350p 250p	2SA963 2SA965 2SA966	120p 30p 25p	2SA1307 2SA1309 2SA1315	100p 50p	2S8863 2S8865 2S8882	220p 25p 180p	2SC1195 2SC1212 2SC1213	330 210p 35p 10p
TC9130P TC9134 TC9135P TC9137P	150p 750p 125p	TDA 1940 TDA 1941 TDA 1950	180p 300p 175p	TDA3750 TDA3755 TDA3760	400p 425p 350p	TDA7230/ TDA7231/ TDA7233	A 225p A 80p 150p	TEA108/ TEA1101 TEA1330 TEA1511	40p 426p 65p 150p	UPC1385C UPC1370C UPC1373 UPC1377C	130p 300p 85p 200p	25A968 25A970 25A979 25A984	55p 25p 35p 25p	2SA1317 2SA1318 2SA1319 2SA1320	20p 25p	2SB885 2SB891 2SB892 2SB895	45p 35p 25p 60p	2SC1214 2SC1215 2SC1216 2SC1222	15p 25p 200p 15p
TC9138AP TC9142 TC9143	500p 150p 320p 300p	TDA2002 TDA2003 TDA2004 TDA2005	50p 65p 150p 160p	TDA3765V TDA3771 TDA3780 TDA3791	225p 480p 400p 300p	TDA7240 TDA7241 TDA7245 TDA7250	175p 250p 300p 500p	TEA2000 TEA2014A TEA2018A TEA2019	500p 80p 200p 200p	UPC1378 UPC1379C UPC1382	180p 170p 110p	2SA985 2SA988 2SA991	60p 25p 30p	2SA1321 2SA1327 2SA1329	80p 130p 200p	258908 258926 258941	70p 30p 60p	2SC1226 2SC1237 2SC1247A	75p 250p 35p
TC9145 TC9148 TC9149 TC9150	150p 200p 226p 426p	TDA2006 TDA2007 TDA2008	70p 120p 100p	TDA3800 TDA3803A TDA3810	350p 500p 200p	TDA7255 TDA7256 TDA7262	500p 600p 425p	TEA2025B TEA2028 TEA2028B	75p 325p 376p	UPC1384 UPC1387C UPC1394 UPC1397	425p 250p 120p 360p	2SA992 2SA993 2SA995 2SA999	30p 50p 60p 30p	2SA1346 2SA1348 2SA1352 2SA1353	45p 100p	258950 258951 258953 258975	180p 190p 90p 100p	2SC1252 2SC1278 2SC1279 2SC1308K	850p 110p 30p 350p
TC9151P TC9152 TC9153	425p 425p 300p	TDA2009 TDA2010 TDA2020 TDA2020	160p 150p 120p 80p	TDA3825 TDA3827 TDA3840 TDA3842	225p 200p 300p 400p	TDA7272 TDA7273 TDA7274 TDA7275	170p 80p 60p 75p	TEA2029A TEA2029C TEA2031A TEA2037	650p 350p 125p 200p	UPC1403CA UPC1406HA UPC1420CA UPC1421CA	70p	2SA1005 2SA1006 2SA1008 2SA1008	25p 90p 125p	2SA1356 2SA1357 2SA1358 2SA1358 2SA1359	100p 65p 130p	2S8985 2S8986 2S81009	30p 40p 110p	2SC1312 2SC1318 2SC1325	40p 10p 400p
TC9154AP TC9156 TC9158P TC9162	225p 300p 450p 275p	TDA2030H TDA2040 TDA2048 TDA2051V	100p 140p 600p	TDA3843 TDA3845 TDA3856	200p 325p 400p	TDA7282 TDA7284 TDA7302	50p 100p 450p	TEA2114 TEA2117 TEA2130	200p 450p 350p	UPC1423CA UPC1470 UPC1474HA	550p 200p	2SA1010 2SA1011 2SA1012	200p 225p 80p 85p	2SA1369 2SA1360 2SA1362 2SA1370	45p 25p 50p	2SB1010 2SB1012 2SB1015 2SB1015 2SB1016	25p 56p 60p 130p	2\$C1327 2\$C1328 2\$C1342 2\$C1343	20p 15p 15p 200p
TC9163 TC9164 TC9167P	375p 400p 100p	TDA2052V TDA2054M TDA2107	525p 110p 250p	TDA3857 TDA3950 TDA4001 TDA4050	350p 225p 325p 150p	TDA7310 TDA7313 TDA7318 TDA73304	800p 650p 550p 700p	TEA2164 TEA2260 TEA2261 TEA2262	175p 225p 225p 275p	UPC1484CA UPC1488H UPC1498H UPC1505C	300p 150p 200p 400p	2SA1013 2SA1015 2SA1016 2SA1018	100p 10p 30p 100p	2SA1371 2SA1376 2SA1380 2SA1381	100p 30p 75p	2SB1017 2SB1018 2SB1020	40p 130p 120p	2SC1345 2SC1346 2SC1358	15p 100p 270p
TC9172P TC9174P TC9176P TC9176P TC9177P	300p 325p 500p 225p	TDA2148 TDA2151 TDA2170 TDA2220	350p 375p 260p 200p	TDA4052 TDA4060 TDA4092 TDA4100	500p 500p 350p 225p	TDA7350 TDA7359 TDA7360 TDA7361	650p 300p 700p 175p	TEA3717DF TEA3718S TEA5030	160p 175p 135p	UPC1513HA UPC1514CA UPC1515CA	70p 200p 250p	2SA1020 2SA1021 2SA1023	30p 35p 60p	2SA1382 2SA1385 2SA1386	120p 180p 400p	2SB1039 2SB1066 2SB1068 2SB1068 2SB1077	40p 160p	2SC1359 2SC1360 2SC1364 2SC1368	15p 70p 25p 75p
TCA9940 TCEP100 TD62308A	100p 100p P 200p	TDA2270 TDA2320 TDA2501	250p 80p 400p	TDA4173A TDA4180 TDA4190	F 326p 145p 180p	TDA7370V TDA7374V TDA7770	600p	TEA5040 TEA5101A TEA5110 TEA5114A	650p 176p 176p 200p	UPC1520CA UPC1521HA UPC1536C 2SA329	250p 120p 550p 75p	2SA1026 2SA1029 2SA1036 2SA1037	90p 60p 60p 50p	2SA1387 ZSA1396 2SA1399 2SA1400	120p 25p	2SB1098 2SB1099 2SB1109 2SB1109 2SB1123	80p 75p 40p 50p	2SC1382 2SC1383 2SC1384 2SC1384	40p 25p 20p 20p
TD62382 TD62506 TD62705 TD6304AP	200p 200p 250p 300p	TDA2502 TDA2503 TDA2504 TDA2505	175p 200p 200p 300p	TDA4200 TDA4210 TDA4260 TDA4280	360p 250p 250p 320p	TDA8114 TDA8115 TDA8116 TDA8120B	226p 200p 350p 550p	TEA5115 TEA5116 TEA5170 TEA5500	220p 220p 200p 325p	2SA467 2SA473 2SA483 2SA484	40p 29p 90p 80p	2SA1038 2SA1048 2SA1051 2SA1052	40p 25p 300p	2SA1423 2SA1428 2SA1441	30p 35p 110p	2SB1133 2SB1134 2SB1135	50p 65p 60p	2SC1394 2SC1398 2SC1399	15p 55p 100p
TD6306P TD6350P TD6359P TDA1001	350p 200p 300p 200p	TDA2506 TDA2507 TDA2507T TDA2507T TDA2510	500p 450p 450p	TDA4282 TDA4283T TDA4290	360p 450p 200p	TDA8124 TDA8134 TDA8135	250p 225p 225p	TEA5501 TEA5550 TEA5560	225p 150p 130p	2SA489 2SA490 2SA493	50p 45p 25p	2SA1060 2SA1061 2SA1069	120p 300p	2SA1442 2SA1443 2SA1450 2SA1459	130p	2SB1140 2SB1143 2SB1151 2SB1151 2SB1162	40p 75p	2SC1400 2SC1403 2SC1407 2SC1413	50p 500p 50p 150p
TDA1002 TDA1003 TDA1005A	200p 150p 175p	TDA2510 TDA2514A TDA2515 TDA2530	450p 500p 450p 450p	TDA4400 TDA4420 TDA4421 TDA4426	175p 120p 300p 170p	TDA8136 TDA8137 TDA9138 TDA9138A	225p 200p 200p 200p	TEA5570 TEA5580 TEA5581 TEA5591	86p 165p 200p 200p	2SA495 2SA496 2SA505 2SA509	40p 30p 120p 35p	2SA1073 2SA1076 2SA1077 2SA1080	375p 230p	2SA1462 2SA1469 2SA1475 2SA1488	25p 100p 95p	2SB1163 2SB1168 2SB1182	370p 50p 40p	2SC1419 2SC1426 2SC1429	50p 700p 50p
TDA1010A TDA1011 TDA1012 TDA1013A	80p 75p 120p 110p	TDA2532 TDA2540 TDA2541 TDA2542	120p 85p 120p 110p	TDA4427 TDA4431 TDA4433 TDA4437	200p 150p 150p 300p	TDA81388 TDA8139 TDA8140 TDA8143	200p 200p 200p 160p	TEA5620 TEA5630 TEA5640E	300p 225p 750p	2SA537 2SA539 2SA544	170p 20p 650p	2SA1081 2SA1082 2SA1083	80p 80p 20p	2SA1489 2SA1490 2SA1491	300p 225p 300p	2SB1185 2SB1202 2SB1203 2SB1203 2SB1204	45p 45p	2SC1431 2SC1444 2SC1445 2SC1445 2SC1446	400p 275p 350p 55p
TDA1015 TDA1016 TDA1020	85p	TDA2543 TDA2544 TDA2545 TDA2546A	210p 200p 120p	TDA4439 TDA4440 TDA4442	220p 180p 240p	TDA8145 TDA8146 TDA8160	120p 200p 125p	TEA5701 TEA6000 TEA6100 TEA6200	650p 400p 350p 225p	2SA550 2SA562 2SA564 2SA571	160p 30p 15p 650p	2SA1084 2SA1085 2SA1091 2SA1093	75p 100p	2SA1492 2SA1493 2SA1494 2SA1516	500p	2581205 2581223 2581243 2581274	40p 60p 40p	2SC1447 2SC1449 2SC1450 2SC1454	70p 120p 200p 250p
TDA1022 TDA1023 TDA1024 TDA1025	130p 150p	TDA2548A TDA2548 TDA2549 TDA2555	200p 200p 300p 175p	TDA4443 TDA4445 TDA4450 TDA4452	250p 220p 225p 250p	TDA8170 TDA8172 TDA8173 TDA8174	170p 250p 280p 300p	TEA6300 TEA6310T TEA6414A TEA6415B	600p 425p 425p	2SA603 2SA606 2SA608	100p 200p 15p	2SA1094 2SA1095 2SA1096	190p 300p 80p	2SA1519 2SA1523 2SA1535	20p 2 45p 2 175p 2	2SB1282 2SB1318 2SB1375	300p 40p 45p	2SC1470 2SC1472 2SC1473	120p 40p 15p
TDA1028 TDA1029 TDA1035	175p 200p 160p	TDA2556 TDA2557 TDA2558	230p 225p 500p	TDA4453 TDA4480 TDA4481	275p 280p 350p	TDA8175 TDA8178 TDA8179S	300p 400p 750p	TEA6420 TEA8172 TL431	525p 360p 125p 45p	2SA614 2SA628 2SA634 2SA636		2SA 1102 2SA 1103 2SA 1104 2SA 1104 2SA 1105	130p 140p	2SA1538 2SA1540 2SA1598 2SA1599	50p 2 220p 2	2581382 2581468 25C182 25C372	100p 75p	2SC1474 2SC1501 2SC1505 2SC1507	45p 70p 55p 48p
TDA1038 TDA1041E TDA1041P TDA1044	180p	TDA2574V TDA2575A TDA2577A TDA2577A	350p 100p 200p 200p	TDA4482 TDA4500 TDA4501 TDA4502	350p 300p 400p 550p	TDA8185 TDA8190 TDA8191 TDA8192	300p 200p 425p 275p	TL061 TL064 TL071	100p 40p 80p 38p	2SA639 2SA640 2SA642 2SA643	60p 50p	2SA1106 2SA1111 2SA1112	160p 90p 150p	2SA1600 2SA1601 2SA1625	250p 2 200p 2 40p 2	2SC380 2SC388A 2SC394	10p 60p 60p	2SC1509 2SC1514 2SC1515	35p 35p 60p
TDA1047 TDA1048 TDA1053 TDA1054	200p 200p 300p	TDA2579A TDA2582 TDA2590 TDA2591	250p 130p 170p	TDA4503 TDA4505A TDA4505E	300p 300p 300p	TDA8196 TDA8205 TDA8213	150p 1250p 275p	TL074 TL083 TL084	80p 55p 70p	2SA673 2SA677 2SA678	15p 35p 26p	2SA1115 2SA1120 2SA1123 2SA1124	40p 40p 60p	2SA1626 2SA1640 2SA1652 2SA1667	100p 2 70p 2 175p 2	SC403 SC454 SC458 SC458	15p	2SC1520 2SC1541 2SC1545 2SC1567	45p 110p 120p 40p
TDA1057 TDA1059B TDA1060	60p 40p	TDA25910 TDA2593 TDA2594	110p 150p 110p 300p	TDA4505K TDA4505M TDA4510 TDA4532	270p 200p	TDA8214B TDA8215H TDA8217 TDA8303	225p 300p 225p 350p	TMP47C-434N TPU2732 TPU2735 UC3524	1200p 900p	2SA683 2SA684 2SA699 2SA705	25p 25p 100p	2SA1127 2SA1133 2SA1135 2SA1135	50p 120p 130p	2SA1668 2SA1671 2SA1673 2SA1680	180p 2 310p 2 425p 2	SC451 SC495 SC496 SC497	15p 45p 25p	2SC1568 2SC1569 2SC1570	35p 55p 40p
TDA1062 TDA1068 TDA1072 TDA1074	140p 75p 150p	TDA2595 TDA2600 TDA2611A TDA2615	200p 250p 100p 250p	TDA4555 TDA4555 TDA4557 TDA4560	400p 370p 450p	TDA8304 TDA8305 TDA8340 TDA8341	600p 500p 200p	UC3842N UC3843 UC3844	125p 125p 100p	2SA706 2SA708 2SA711	140p 50p 280p	25A1142 25A1143 2SA1145	100p 15p 40p	2SA1706 2SB175 2SB324	25p 2 45p 2 40p 2	SC515 SC535 SC536	100p 30p 20p	SC1571 SC1573 SC1576 SC1580	50p 25p 550p 600p
TDA1077 TDA1082 TDA1083	250p 275p 95p	TDA2630 TDA2640 TDA2653A	300p 220p 225p	TDA4565 TDA4566 TDA4568	200p 325p 225p	TDA8349A TDA7350Q TDA8351		UPC20C UPC554 UPC555 UPC556H	80p	2SA715 2SA719 2SA720 2SA725	50p 20p 80p	2SA1146 2SA1151 2SA1152 2SA1153	30p	2SB337 2SB474 2SB492 2SB511	150p 2 250p 2 80p 2	SC605 SC619 SC641 SC644	100p 100p 80p	SC1583 SC1586 SC1617 SC1619	25p 540p 340p 170p
TDA1085 TDA1087 TDA1092 TDA1097	60p	TDA2654 TDA2668 TDA2670 TDA2690	150p	TDA4570 TDA4580 TDA4600 TDA4600	650p	TDA8360N TDA8361N TDA8362AN TDA8362AN	3 800p 3 900p 1200p	UPC571 UPC574 UPC575C2 UPC577	220p 60p 90p	25A726 25A733 25A740	20p 15p 90p	2SA1154 2SA1156 2SA1162	22p 90p 30p	2SB525 2SB527 2SB531	65p 2 130p 2 400p 2	SC647 SC681 SC683	300p 2 250p 3 35p 3	SC1623 SC1624 SC1626	50p 60p 55p
TDA1151 TDA1154 TDA1170 TDA1170N	40p 50p 85p	TDA2710-1 TDA2721 TDA2730 TDA2740	400p 200p 200p	TDA4601 TDA4605 TDA4610	120p 220p 370p	TDA8366N2 TDA8372A TDA8380	1500p 450p 200p	UPC592 UPC595 UPC596	95p 190p 190p	2SA742 2SA747A 2SA748 2SA764	425p 60p	2SA1163 2SA1169 2SA1170 2SA1173 2SA1173	500p 500p 60p	258536 258537 258544 258546	80p 2 90p 2 22p 2	SC708 SC710 SC711 SC730	100p 15p 15p 350p	SC1627 SC1628 SC1634 SC1667	16p 75p 30p 450p
TDA1175	839 175p	TDA2750	300p 350p	TDA4650 TDA4660	425p 370p	TDA8385 TDA8390A	275p 650p	UPC1001 UPC1004C		2SA769 2SA770	80p	2SA1174 2SA1175	25p	2SB549 2SB560	50p 2	SC732 SC735	40p	SC1669 SC1674	100p 15p

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Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
2SC1675 2SC1678 2SC1683	90p 80p 100p	2SC2258 2SC2259 2SC2261	30p 60p 700p	2SC2710 2SC2712 2SC2714	50p 20p	2SC3244 2SC3246 2SC3259	45p 50p	2SC3781 2SC3782	160p 75p	2SD287 2SD291	250p 250p	2SD879 2SD890	60p 40p	2SD1311 2SD1313	65p 1000p	2SD1756 2SD1758	275p 75p	25K240 25K241	140p 30p
25C1683 25C1684 2SC1685	30p 30p	2SC2267 2SC2267 2SC2270	90p 60p	2SC2716 2SC2716 2SC2719	20p 50p 25p	25C3260 25C3261	350p 220p 230p	2SC3783 2SC3787 2SC3788	300p 100p 60p	2SD313 2SD315 2SD325	25p 75p 30p	2SD882 2SD889 2SD892A	25p 36p 75p	2SD1326 2SD1327 2SD1328	200p 150p 60p	2SD1760 2SD1761 2SD1762	80p 60p 50p	25K248 25K300 25K301	30p 25p 40p
2SC1729 2SC1730	900p 10p	2SC2271 2SC2274	25p 16p	2SC2721 2SC2724	120p 15p	2SC3262 2SC3263	280p 280p	2\$C3789 2\$C3790	75p 120p	25D330 25D348	65p 300p	2SD894 2SD895	35p 100p	2SD1330 2SD1347	50p 70p	2SD1763/ 2SD1764	4 60p 70p	25K303 25K304	40p 25p
2SC1735 2SC1740 2SC1741	70p 10p 35p	2SC2275 2SC2278 2SC2283	60р 70р 700р	2SC2738 2SC2749 2SC2750	200p 350p 300p	2SC3264 2SC3269 2SC3270	390p 50p 50p	2SC3795 2SC3798 2SC3807	140p 220p 120p	2SD350 2SD357 2SD358	320p 40p 40p	2SD896 2SD898B 2SD900	200p 225p 400p	2SD1348 2SD1350 2SD1376	65p 150p 60p	2SD1785 2SD1769 2SD1773	70p 110p 160p	2SK312 2SK315	750p 70p
2SC1755 2SC1756	90p 35p	2SC2290 2SC2291	1800p 40p	2SC2751 2SC2752	270p 75p	25C3271 25C3277	75p 280p	2SC3808 2SC3811	70p 80p	2SD359 2SD361	50p 100p	2SD905 2SD916	450p 130p	2SD1378 2SD1379	60p 100p	2SD1776 2SD1783	70p 100p	2SK320 2SK323 2SK332	120p 130p 175p
2SC1758 2SC1760 2SC1775	30p 70p 10p	2SC2298 2SC2307 2SC2308	35p 300p 10p	2SC2767 2SC2769 2SC2773	300p 400p 700p	2SC3279 2SC3280 2SC3281	30p 200p 200p	2SC3831 2SC3832 2SC3833	250p 135p 250p	2SD362 2SD371 2SD380	100p 240p 650p	2SD917 2SD921 2SD923	300p 320p 360p	2SD1380 2SD1382 2SD1384	100p 60p 50p	2SD1785 2SD1789 2SD1796	150p 210p 180p	25K359 25K363	40p 50p
2SC1781 2SC1789	20p 100p	2SC2312 2SC2314	300p 70p	2SC2774 2SC2785	500p 40p	2SC3284 2SC3293	600p 85p	2SC3851 2SC3852	100p 80p	2SD381 2SD382	50p 75p	2SD946 2SD947	120p 100p	2SD1390 2SD1391	350p 250p	2SD1802 2SD1806	75p 75p	2SK364 2SK367 2SK369	40p 40p 30p
2SC1809 2SC1810 2SC1815	40p 250p 10p	2SC2316 2SC2320 2SC2324	150p 10p 120p	2SC2786 2SC2787 2SC2791	20p 10p 500p	2SC3298 2SC3299 2SC3300	50p 120p 400p	2SC3853 2SC3855 2SC3857	220p 220p 500p	2SD386 2SD388 2SD389	70p 150p 60p	2SD950 2SD951 2SD957A	300p 200p 520p	2SD1392 2SD1395 2SD1396	85p 80p 120p	2SD1812 2SD1815 2SD1825	60p 100p 60p	25K373 25K374	40p 45p
2SC1819 2SC1826	70p 60p	2SC2328/ 2SC2310	25p	2SC2792 2SC2793	220p 700p	2SC3303 2SC3306	100p 130p	2SC3858 2SC3866	\$50p 275p	2SD400 2SD401	14p 50p	2SD958 2SD965	60p 35p	2SD1397 2SD1398	100p 120p	2SD1827 2SD1843	120p 100p	2SK386 2SK389	600p 115p
2SC1827 2SC1829 2SC1833	60p 500p 27p	2SC2315 2SC2329 2SC2230	175p 480p 300p	2SC2808 2SC2810 2SC2812	40p 350p 40p	2SC3307 2SC3309 2SC3310	600p 150p 125p	2SC3868 2SC3870 2SC3883	100p 200p 210p	2SD402 2SD414 2SD415	120p 45p 55p	2SD970 2SD972 2SD973	170p 40p 60p	2SD1399 2SD1400 2SD1402	300p 280p 120p	2SD1845 2SD1847 2SD1849	350p 350p 280p	2SK400 2SK405 (2SK414	700p 450p 550p
2SC1834 2SC1841	50p 12p	2SC2331 2SC2333	50p 200p	2\$C2814 2\$C2824	40p 75p	2SC3318 2SC3317	280p 350p	25C3884/ 25C3885	200p 250p	2SD424 2SD426	350p 150p	2SD973A 2SD982	70p 90p	2SD1403 2SD1405	225p 80p	2SD1850 2SD1853	325p 40p	2SK415 2SK423	500p 75p
2SC1844 2SC1845 2SC1845	50p 15p 35p	2SC2334 2SC2335 2SC2336/	80p 55p 125p	2SC2825 2SC2826 2SC2827	900p 200p 130p	2SC3326 2SC3327 2SC3328	60p 60p 50p	2SC3885/ 2SC3886/ 2SC3890		2SD427 2SD438 2SD467	350p 36p 15p	2SD985 2SD986 2SD998	120p 120p 70p	2SD1408 2SD1407 2SD1408	60p 60p 125p	2SD1856 2SD1857 2SD1858	40p 75p 40p	2SK427 2SK430 2SK511	50p 200p 450p
2SC1847 2SC1855	45p 85p	2SC2344 2SC2347	150p 36p	2SC2832 2SC2834	300p 280p	25C3330 25C3331	20p 25p	2SC3892/ 2SC3893	225p	2SD468 2SD471	15p 20p	2SD1010 2SD1012	40p 40p	2SD1409 2SD1411	170p 86p	2SD1863 2SD1864	35p 85p	25K513 25K526	326p 160p
2SC1856 2SC1865 2SC1870	25p 700p 700p	2SC2353 2SC2360 2SC2361	120p 120p 150p	2SC2837 2SC2839 2SC2853	250p 40p 70p	25C3333 25C3345 25C3346	120p 100p 130p	2SC3895 2SC3896 2SC3897	400p 400p 400p	2SD476 2SD525 2SD526	100p 50p 70p	2SD1020 2SD1021 2SD1022	40p 120p 250p	2SD1412 2SD1413 2SD1415	75p 60p 190p	2SD1877 2SD1878 2SD1879	175p 160p 275p	2SK531 2SK534	350p 700p
2SC1871 2SC1875	425p 220p	25C2362 25C2365	50p 280p	2SC2873 2SC2877	80p 120p	2SC3352 2SC3353	200p 280p	2SC3907 2SC3927	250p 250p	2SD545 2SD549	18p 120p	2SD1024 2SD1027	850p 850p	2SD1417 2SD1425	125p 260p	2SD1880 2SD1881	360p 350p	25K537 25K538 25K539	900p 350p 1100p
2SC1881 2SC1890 2SC1895	70p 15p 500p	2SC2369 2SC2371 2SC2373	100p 25p 210p	2SC2878 2SC2879 2SC2882	20p 3200p 60p	2SC3355 2SC3356 2SC3358	50p 120p 50p	25C3940 25C3943 25C3944	40p 75p 80p	2SD551 2SD554 2SD555	300p 225p 500p	2SD1030 2SD1031 2SD1036	75p 70p 600p	2SD1426 2SD1427 2SD1428	135p 160p 180p	2SD1884 2SD1886 2SD1887	300p 450p 300p	2SK544 2SK552	30p 250p
2SC1904 2SC1906	126p 15p	2SC2383 2SC2389	50p 45p	2SC2883 2SC2898	60p 200p	2SC3376 2SC3377	300p 50p	2SC3950 2SC3953	120p 60p	2SD556 2SD558	225p 200p	2SD1036 2SD1045 2SD1047	200p 180p	2SD1430 2SD1431	280p	2SD1894 2SD1895	300p 225p	2SK553 2SK555 2SK558	225p 320p
25C1907 25C1909 25C1913	20p 250p 90p	2SC2407 2SC2408 2SC2412K	110p 120p 50p	2SC2899 2SC2909 2SC2910	50p 60p 25p	2SC3378 2SC3379 2SC3381	120p 1200p 130p	2SC3955 2SC3964 2SC3972	70p 100p 250p	2SD560 2SD571 2SD575	50p 20p 530p	2SD1051 2SD1055 2SD1060	130p 60p 130p	2SD1432 2SD1433 2SD1438	400p	2SD1910 2SD1911 2SD1913	280p 300p	25K557 25K559	500p 400p 600p
2SC1914 2SC1921	30p 15p	25C2440 25C2458	200p 10p	2SC2911 2SC2912	80p 120p	2SC3383 2SC3393	80p 80p	25C3973 2SC3975	210p 210p	2SD592 2SD596	25p 25p	2SD1062 2SD1063	150p 200p	2SD1439 2SD1441	100p 165p 220p	2SD1929 2SD1930	50p 50p 50p	25K560 25K566	580p 475p
2SC1922 2SC1923 2SC1929	175p 10p 180p	2SC2459 2SC2486 2SC2486	50p 55p 275p	2SC2921 2SC2922 2SC2923	850p 480p 75p	2SC3397 2SC3399 2SC3400	20p 50p 36p	2SC3987 2SC3996 2SC3997	220p 800p 1400p	2SD600 2SD601 2SD602	30p 40p 60p	2SD1064 2SD1065 2SD1069	250p 160p 150p	2SD1442 2SD1445 2SD1446	80p 200p 300p	2SD1933 2SD1939 2SD1941	75p 76p 500p	25K606 25K612 25K684	70p 80p 950p
2SC1940 2SC1941	110p 27p	25C2492 25C2470	50p 65p	2SC2928 2SC2929	550p 280p	2SC3401 2SC3402	50p 40p	2SC3998 2SC4006	1000p	2SD612 2SD613	50p 70p	2SD1003 2SD1073 2SD1088	350p 150p	2SD1450 2SD1451	60p 200p	2SD1941 2SD1944 2SD1958	50p 80p	25K685 25K699	1150p 100p
2SC1942 2SC1944 2SC1945	350p 350p 350p	2SC2481 2SC2482 2SC2483	120p 20p 120p	2SC2934 2SC2937 2SC2939	75p 250p 400p	2SC3405 2SC3409 2SC3416	130p 400p 30p	25C4020 25C4023 25C4029	280p 325p 350p	2SD617 2SD633 2SD636	300p 70p	2\$D1094 2\$D1110 2\$D1111	375p 225p 20p	2SD1452 2SD1453	275p 140p	2SD1959 2SD1978	210p 50p	25K719 25K724 25K725	300p 500p 550p
2SC1948 2SC1947	1500p 450p	2SC2484 2SC2485	185p 400p	2SC2944 2SC2958	300p 50p	2SC3417 2SC3419	90p 120p	25C4043 25C4046	45p 40p	25D637 25D638	10p 15p 15p	2SD1113 2SD1128	225p 200p	2SD1455 2SD1457 2SD1458	250p 165p 50p	2SD1984 2SD1991 2SD1994	450p 50p 300p	2SK726 2SK727	425p 475p
2SC1953 2SC1957 2SC1959	45p 70p 10p	2SC2491 2SC2498 2SC2500	200p 50p 25p	2SC2962 2SC2979 2SC2987	800p 160p 250p	2SC3420 2SC3421 2SC3422	80p 45p 75p	2SC4056 2SC4059 2SC4064	350p 550p 140p	2SD639 2SD640 2SD655	20p 350p 18p	2SD1133 2SD1135 2SD1138	65p 75p 40p	2SD1459 2SD1468 2SD1487	80p 40p 225p	2SD1996 2SD2006 2SD2010	48p 76p 250p	2SK739 2SK758 2SK769	400p 300p 500p
2SC1962 2SC1967	175p 1300p	2SC2502 2SC2503	140p 600p	2SC2988 2SC2995	150p 60p	2SC3423 2SC3425	60p 65p	2SC4106 2SC4107	200p 175p	2SD661 2SD666	60p 25p	2SD1140 2SD1142	40p 350p	2SD1494 2SD1496	200p 300p	2SD2010 2SD2011 2SD2012	60p 50p	2SK786 2SK787	200p 800p
2SC1969 2SC1970 2SC1971	160p 100p 400p	2\$C2512 2\$C2517 2\$C2519	20p 120p 60p	2SC2999 2SC3001 2SC3019	50p 1400p 320p	2SC3446 2SC3447 2SC3456	150p 130p 200p	2SC4124 2SC4125 2SC4137	250p 400p 40p	2SD667 2SD669 2SD673	20p 35p 350p	2SD1145 2SD1148 2SD1153	25p 175p 30p	2SD1497 2SD1497-0 2SD1505	230p 2 350p 90p	2SD2018 2SD2033 2SD2061	65p 80p 100p	2SK791 2SK792	225p 300p
25C1972 2SC1973	600p 150p	2SC2527 2SC2534	300p 150p	2SC3020 2SC3022	1450p 1550p	2SC3457 2SC3459	125p 180p	2SC4138 2SC4157	200p 400p	2SD676 2SD717	250p 180p	2SD1159 2SD1160	65p 150p	2SD1506 2SD1508	50p 60p	2SD2066 2SD2125	250p 180p	25K793 25K794 25K796	300p 315p 600p
2SC1975 2SC1980 2SC1983	120p 30p 75p	2SC2535 2SC2538 2SC2540	300p 100p 1900p	2SC3025 2SC3026 2SC3030	500p 550p 300p	2SC3460 2SC3461 2SC3466	130p 275p 225p	2SC4159 2SC4161 2SC4169	100p 125p 60p	2SD718 2SD722 2SD725	85p 240p 200p	2SD11634 2SD1164 2SD1168		2SD1509 2SD1511 2SD1519	100p 100p 250p	2SD2136 2SD2144 2SD2151	85p 35p 175p	2SK809 2SK812	850p 150p
2SC1984 2SC1985	150p 100p	2SC2542 2SC2545	300p 55p	2SC3037 2SC3038	125p 125p	2SC3468 2SC3481	70p 300p	2SC4199 2SC4204	700p 60p	2SD726 2SD731	275p 250p	2SD1169 2SD1173	280p 350p	2SD1521 2SD1525	70p 600p	2SD2255 2SD2331	175p 250p	2SK817 2SK851 2SK872	325p 550p 650p
2SC1986 2SC2001 2SC2002	100p 15p 15p	2SC2546 2SC2547 2SC2550	25p 65p 50p	2SC3039 2SC3040 2SC3042	80p 260p 300p	2SC3482 2SC3486 2SC3502	275p 275p 100p	2SC4231 2SC4235 2SC4236	250p 550p 550p	2SD732 2SD734 2SD741	250p 15p 120p	2SD1185 2SD1186 2SD1189	280p 400p 55p	2SD1526 2SD1541 2SD1545	100p 350p 275p	2SD2333 2SD2340 2SJ48	200p 225p 425p	2SK875 2SK903	475p 500p
2SC 2003 2SC 2004	20p 20p	2SC2551 2SC2552	70p 60p	2SC3052 2SC3057	30p 150p	2SC3503 2SC3504	50p 120p	25C4237 25C4242	650p 120p	2SD743 2SD757	130p 120p	2SD1191 2SD1192	120p 90p	2SD1546 2SD1548	350p 400p	2SJ56 2SJ74	700p 60p	2SK904 2SK951 2SK952	500p 275p 275p
2SC2022 2SC2023 2SC2025	110p 180p 30p	2SC2553 2SC2555 2SC2562	200p 120p 90p	2SC3068 2SC3070 2SC3071	60p 35p 25p	2SC3505 2SC3506 2SC3507	240p 250p 650p	2SC4278 2SC4288A 2SC4300	175p 650p 200p	2SD760 2SD762 2SD763	70p 100p 140p	2SD1196 2SD1197 2SD1198	150p 150p 60p	2SD1554 2SD1555 2SD1556	170p 170p 300p	2SJ76 2SJ77 2SJ79	220p 350p 225p	25K955 25K955	750p 600p
2SC2027 2SC2036	200p 50p	2SC2563 2SC2568	200p 120p	2SC3073 2SC3074	100p 200p	2SC3509 2SC3514	750p 170p	2SC4301 2SC4304	550p 225p	2SD768 2SD772	180p 200p	2SD1207 2SD1210	40p 280p	2SD1565 2SD1571	75p 170p	25J103 25J109	75p 200p	2SK962 2SK1023	700p 550p
2SC2037 2SC2053 2SC2055	50p 120p 150p	2SC2570 2SC2571 2SC2577	30p 350p 110p	2SC3075 2SC3077 2SC3086	150p 120p 150p	2SC3518 2SC3519 2SC3526	120p 250p 45p	2SC4313 2SC4381 2SC4382	1000p 225p 300p	2SD773 2SD774 2SD777	20p 30p 400p	2SD1211 2SD1213 2SD1218	120p 220p 75p	2SD1572 2SD1575 2SD1576	100p 200p 200p	2SJ113 2SJ114 2SJ116	1060p 1160p 1200p	25K1036 25K1057 25K1058	450p 600p 800p
2SC2058 2SC2060	20p 40p	2SC2578 2SC2579	170p 110p	2SC3089 2SC3101	130p 750p	2SC3528 2SC3531	750p 225p	2SC4386 2SC4387	275p 425p	2SD784 2SD786	650p 100p	2SD1223 2SD1225	75p 70p	2SD1577 2SD1579	250p 120p	25J117 25J119	550p 700p	2SK1081 2SK1082	700p 450p
2SC2061 2SC2068 2SC2071	75p 60p 140p	2SC2580 2SC2581 2SC2588	175p 225p 600p	25C3112 25C3114 25C3116	36p 40p 75p	25C3549 25C3552 25C3568	200p 270p 200p	2SC4408 2SC4429 2SC4431	50p 276p 90p	2SD787 2SD788 2SD769	20p 30p 20p	2SD1227 2SD1229 2SD1237	40p 250p 300p	2SD1589 2SD1590 2SD1591	50p 100p 310p	2SJ162 2SJ175 2SJ182	680p 200p 150p	2SK1102 2SK1117 2SK1118	375p 250p 225p
2SC2073 2SC2075	40p 60p	2SC2590 2SC2591	40p 50p	2SC3117 2SC3122	120p 50p	25C3577 25C3584	275p 200p	2SC4487 2SC4488	175p 250p	2SD792 2SD794	400p 33p	2SD1238 2SD1244	300p 25p	2SD1593 2SD1595	125p 100p	2SJ200 2SJ307	625p 175p	2SK1120 2SK1190	550p 350p
2SC2078 2SC2085 2SC2086	100p	2SC2592 2SC2603 2SC2610	200p 10p 50p	2SC3148 2SC3149 2SC3150	145p 180p 100p	2SC3591 2SC3595 2SC3597	200p 220p 75p	2SC4517 2SC4517A 2SC4531	250p 300p 450p	2SD795A 2SD798 2SD799	140p 175p 150p	2SD1246 2SD1247 2SD1251	20p 40p 180p	2SD1608 2SD1609 2SD1632	210p 45p 400p	2SK19 2SK33 2SK40	45p 40p 50p	25K1191 25K1217	800p 700p
2SC2092 2SC2094	100p 1200p	2SC2611 2SC2621	30p 70p	2SC3151 2SC3152	175p 130p	2SC3599 2SC3600	140p 175p	2SC4532 2SC4542	1400p 650p	2SD809 2SD811	45p 450p	2SD1254 2SD1263	55p 90p	2\$D1637 2SD1647	50p 40p	2SK55 2SK68	100p 100p	25K1221 25K1275 25K1296	200p 276p 350p
2SC2097 2SC2099 2SC2118	2500p	2SC2625 2SC2626 2SC2630	190p 600p 1800p	2SC3153 2SC3156 2SC3157	175p 350p 200p	2SC3606 2SC3607 2SC3608	100p 150p 65p	2SC4742 2SC4744 2SC4745	276p 350p 875p	2SD819 2SD820 2SD821	300p 260p 550p	2SD1264 2SD1265 2SD1266	75p	2SD1649 2SD1650 2SD1651	260p 150p 150p	25K73 25K97 25K106	75p 200p 40p	2SK1299 2SK1317	450p 900p
2SC2120 2SC2122A	10p 300p	25C2631 25C2632	20p 35p	2SC3158 2SC3159	260p 200p	2SC3616 2SC3636	45p 280p	2SC4747 2SC4762	375p 350p	2SD822 2SD826	290p 30p	2SD1267 2SD1271	55p 55p	2SD1656 2SD1663	250p 350p	2SK107 2SK109	40p 150p	25K1338 25K1341 25K1342	250p 500p 500p
2SC2131 2SC2141 2SC2153	60p	2SC2634 2SC2636 2SC2637	10p 40p 120p	2SC3164 2SC3169 2SC3170	270p 150p 300p	2SC3642 2SC3657 2SC3659	226p 400p 600p	2SC4769 2SC4770 2SC4820	300p 250p 225p	2SD829 2SD836 2SD836A	50p	2SD1271A 2SD1272 2SD1273	225p 200p 50p	2SD1666 2SD1667 2SD1668	60p 120p 120p	2SK117 2SK118 2SK125	50p 50p	2SK1350 2SK1356	200p 226p
25C2166 25C2168	80p 120p	2SC2640 2SC2653	1800p 100p	2SC3173 2SC3175	180p 150p	2SC3668 2SC3675	120p 100p	2SC4825 2SC4924	70p 300p	2SD837 2SD838	55p 500p	2SD1274 2SD1275	80p 50p	2SD1669 2SD1677	85p 300p	25K133 25K147	650p 160p	2SK1357 2SK1358	350p 400p
2SC2188 2SC2200 2SC2209	250p	2SC2654 2SC2655 2SC2656	180p 75p 860p	2SC3178 2SC3179 2SC3180	126p 70p 175p	2SC3678 2SC3679 2SC3680	280p 140p 380p	2SC4927 2SC5002 2SC5003	500p 450p 350p	2SD841 2SD844 2SD850	110p 200p 170p	2SD1276 2SD1277 2SD1279	190p	2SD1680 2SD1683 2SD1684	225p 45p 70p	2SK152 2SK161 2SK163	40p 30p 40p	25K1377 25K1400 25K1404	150p 250p 290p
2SC2216 2SC2221	50p 650p	2SC2660 2SC2665	100p 200p	2SC3181 2SC3182	200p 120p	2SC3685 2SC3687	450p 300p	2SC5044 2SC5129	250p 500p	2SD856 2SD858	48p 250p	2SD1288 2SD1289	175p 250p	2SD1706 2SD1707	325p 400p	2SK168 2SK170	40p 50p	2SK1461 2SK1462	220p 425p
2SC2228A 2SC2229 2SC2230	16p	2SC2668 2SC2671 2SC2681	10p 100p 170p	2SC3198 2SC3199 2SC3202	30p 40p 25p	2SC3688 2SC3692 2SC3715	550p 150p 480p	2SC5149 2SD158 2SD158	400p 350p 140p	2SD863 2SD864 2SD866	200p	2SD1291 2SD1292 2SD1293	60p	2SD1708 2SD1710 2SD1718	375p 200p 275p	25K184 25K192 25K193	36p 45p 40p	2SK1487 2SK1507 2SK1529	250p 475p 700p
2SC2233 2SC2235	100p 60p	2SC2682 2SC2688	70p 27p	2SC3209 2SC3210	120p 550p	2SC3717 2SC3729	120p 450p	2SD199 2SD200	195p 180p	2SD866A 2SD867	140p 350p	2SD1297 2SD1302	300p 20p	2SD1729 2SD1730	230p 275p	2SK195 2SK197	150p 140p	2SK1537 2SK1544	400p 900p
2SC2236 2SC2237 2SC2238	540p	25C2690 25C2694 25C2705	60p 3500p 50p	2SC3211 2SC3212 2SC3225	220p 260p 50p	25C3746 25C3747 25C3748	100p 120p 100p	2SD201 2SD213 2SD234	260p 250p 90p	2SD868 2SD869 2SD870	150p	2SD1306 2SD1308 2SD1309	45p 80p	2SD1732 2SD1739	325p 225p	25K212 25K214 25K216	35p 170p	2\$K1767 25K2038 25K2039	275p 295p
25C2240		2SC2706		2SC3242		2SC3740 2SC3752		2SD234 2SD257		2SD870 2SD871		2SD1309 2SD1310		2SD1740 2SD1748		25K216 25K223		2SK2039 2SK2134	750p 300p

REPLACEMENT VIDE O HEADS

		REPLAC	E
Mödel	Price	Model Pric	e
AKAI VS105, 112, 115, 116, 120,	125, 126,	VHSAN3 800 VHSAY3 1200 VHSBH1, VHSCH1 2100	op
V\$105, 112, 115, 116, 120, 201/202, 205, 220, 240, 24 248, 250, 301, 303, 304, VS VSP82	4, 245, 247, P8, 1000p	VH56P1 88	
VP7100, VS9300, VS9500 VP7200, VS9700, VS9800	650p 1200p	VHSD52 1800 VHSEH2, VHSDH2 1600 VHSEY1, VHSEY2 1400	Dia I
V\$1 V\$2 V\$3	1250p 1200p 1350p	VHSFS1, VHSFS2 130	Op
VS10 VSP1	1350p	VHSFB3 130 VHSTJ1, VHSTJ2, VHSTJ3, VHSWJ VHSYJ2 70	0p 3.
VS33,35, 37, 38, 38EOG M 86, 765, 766, 767, 768, 865 VSF30, 33, 4, 400, 410, 420 441, 450, 455, 480, 490, 49	KII, 53, 55, , 867, , 430, 440	VHSYJ2 700 VHSVH4, VHSWH1, VH\$XH1, VHSYH2 1600	Sec. 1. 1.
YSG51, 54, 55, VXS450.		VHSWJI VHSXJ3 704	22
VXS470 VS512, VS515, VS516 VS462, 465, 467, 467EOG2 15EK, 15EOH, 300, 301, 31 VSF320, 330, 340, 350, VS1 33, 34, 35	2250p 2250p VSF12,	GRUNDIG VS410, 415, 435, 450, 456, 480, 500, 505, 510, 520, 521, 530, 546 1800 BARCELONA, MVS5400, 440, 500, 500, SE5100, 6100, 6110, 9100 TVR4500, 4510, 5510, VS400, 440, 441, 500, 505, 510, 518, 600, 510, VS5180, VS6190, 700, 900, 901, 902, 9091, G/200, 201, 2027, SE2100, 5110 MADRID, SE5140, VS540,	Op
15EK, 15EOH, 300, 301, 31 VSF320, 330, 340, 350, VS	0, 330, 2300p	600, SE5100, 6100, 6110, 9100 TVR4500, 4510, 5510, VS400, 440,	
VS11, VS12 VS6, VS8, VS9	1200p 2400p	441, 500, 505, 510, 518, 600, 610, VS5180, VS6190, 700, 900, 901, 902, 9091, GV200, 201, 2092	
VSX9 VSA1100, 1110, 650, VSF5 550, 660, 580, 590, 600, 650 VSG60, 64, 65, VSG70, 73,	2250p 00, 510,		
VSG60, 64, 65, VSG70, 73, VSX560, 580	74, 75, 3600p	VS5480 \$00 MVS550, 820, VS550, 620, 630, 840, 790, 930, 940 2400 VS120 2300	
VSG60, 64, 65, VSG70, 73, VSX560, 580 VS155, VS165 VS20, 22, 23, 24, 25, 26, 27 426, 427, 445, VSF10, 11, 1 VSF200, 210, 220, 221, 222 280, 261, 262, 2865, 270, 27 VSF209, 610, 550, VSG20, 206, VSG21, 211, 212, 215, VSG217E0G, 23, 24, 25, 4 415, 417, VSP 100, 100EM, VSP88, 884K, 8111, VSP3, 100EDG, 100EM, 110, VSX VSR9	2300p , 422, 425, 80, 190	VS120 2300 VS680, GV280 4600 VS160, VS740 4400	Dp Dp
VSF200, 210, 220, 221, 222 260, 261, 262, 265, 270, 27	, 230, 240, 5, 280,	VS170 460 MVS660, SE6160, VERONA, VS660,	DD 1
VSF290, 510, 550, VSG20, 206, VSG21, 211, 212, 215, VSG217EQG, 23, 24, 25, 4	204, 205, 05, 411.	VS6690 350	_
415, 417, VSP 100, 100EM, VSP88, 88KC, 8111, VSP9,	110, VSR100,	MVS710, 720, 910, SE7120, 9120, VS710, 716, 720, 800, 810, 910, 920, VS922, 9291, GV210, 211, 220, 2292, MV2105, 2115, SE2120 17,0	
VS 109, VS603, VS606, VS	807 25000 I	MINARI	
	2600p 3450p	VXL2, 3, 4, 20, 25, 35 1000 VXL5, V20H 1054 VXL6 1200	Op Op
VS/5 VS965, VC967 VSF400, 410, 420, 430, 440, 450, 455, 480, 490, 497, VS 470 VSC20, 204, 204, 205, 205	X450, 2850p	VXL7 1300 VXL8.9, 10, 11, 19, 90, VCR34H, VTV	Dep
VSG20, 204, 204, 205, 206, 212, 215, 217, 225, 23, 24, 1 VSP100, 110, 88, VSR100,	20, 21, 211, 25, 110	100, 200 1100 HITACHI	
		VT11, 14, 15, 16, 30, 33, 34, 330, 340 503, 640, 5030, VTP10, 30 1000	op
VSG415, VSG415EA, VSG4 VS75, VSA77 VSF1000, VSF1010, VSF10 ALEA	3500p 30 5800p	VT7, VT17, VT18, VT19 2000 VT35, VT350, VT38, VT39 2300 VT100, 110, 111, 112, 112, 115, 119	0p 0p
VDR3000, VCR4000, VCR50 VCR6000	16500	120, 125, 128, 220, 225, 400, 405, VT410, 413, 414, 415, 416, 418, 510.	
VTV10 VCR7000, 7800, 8000, 8800	1000p	HITACHI VT11, 14, 15, 16, 30, 33, 34, 330, 340 503, 640, 5030, VTP10, 30 1000 VT7, VT17, VT18, VT19 VT10, 110, 111, 112, 1115, 115, 118, 120, 125, 128, 220, 225, 400, 405, VT140, 413, 414, 415, 415, 418, 510, 515, 517, 518, 520, 527, 528, VTM625, 628, 225, 210, 211, 215, 727 727, 728, 200, 821, 825, 920,	8,
AMSTRAD VCR4500, VCR5200, VCR90 TVR1	900, 900p	921 1400 VT3000 55	oc
VCR7000 VCR1000 2000 6000 6100	1000p	VT4000, VT4200, VT5000, VT5500, VT5600 1100 VT77, 680, 6500, 6700, 6800, 7000,	op
8600, 8602, 8700, 9005, DD DD8904, TVR4 TVR2, TVR3, VCR4600, VC	1100p R4600 MKII,	V15600 1100 V157, 880, 6500, 6700, 6800, 7000, 8000, 8030, 8040, 8100, 8300, 8500 V18700, 9000, 9300, 9500, 9700, 9900 100 50 510 510 510 500	
VCR400 VCR8800, VCR8804, VCR93 VCR8603, VCR8604, VCR93	11000	588 320	o, Do
VCR9140, VCR9142	1350p 2550p 3650p	VT65 2400 VT130, 135, 138, 145, 250, 255, 258, 420, 425, 426, 428, 430, 431, 435 VT438, 535, 536, VTL30, 301, VTM63	3m
VCR9340 VCR9244 UF020, 22, VCR3000, 3002,	3450p	VT438, 535, 536, VTL30, 301, VTM63 635, 636 1900	10, Dp
9500 FISHER	1750p	635, 636 1900 VT52, VT60, VT61E, VT62E, VT63, VT64, VT640 1100 VT168, VT150, VT260, VT450, VT454 (4 HEAD) 2204	qQ
FVHP420, 510, 520, 530, 61 622, 710, 711, 715, 716, 720 FVHP721, 722, 730, 830, 90 908, 910, 911, 915, 916, 911	5, 618, 620,), 15, 906, 907,	(4 HEAD) 2206 VT530 2056 VT522, VTM212, 620, 622, 720, 722,	op op
908. 910, 911, 915, 916, 914 FVHP5000, 5001, 5005, 505 5075	8, iC, 1100p	822, 922, 925 1654 VT560E 2600	bol
VBS3500, 7100, 7500, 7600, VBR330	9900,	VT570, VT575, VT580, VT585, VT588 VTF70 3100 VT540, 545, 546, 548, VTD660, 665,	>p
VB\$7000, VB\$7100, VB\$90 FVHP500, 711, 715, 721, 72 5100, FVHD720	2,730,830,	VTM580, 545, 546, 548, VT0600, 665, VTM589, 640, 645, 648, VTM730, 731, 735, 736, 740, 745, 74 746, 753, 754, 830, 831, 835, 838, 84 VTM841, 845, 930, 931, 935, 2600 VTF770, 774, 775, 860, 861,	8,
FVHP725, FVHP830, FVHP9 FVHP990	2500p	VTM841, 845, 930, 931, 935 2600 VTF770, 774, 775, 860, 861,),)p
FVHP975 FVHD407, FVHD140, FVHP FVHP20	11500	865 410 VT85, VT86, VT88 2600 VTF780, VTF785 4800 VTF780, VTF785 550 VTF280, VTF785 550	28
FVHD230, FVHP1100, 1200 1410, 2000, 200, 210, 300,	, 130, 1340,	VTF180, VTF185, VTF280 8500 VTF350, VTF351 5150 VTM220, VTM220E, VTM220UK 5150	00
EVH0250, 270, 370, EVHP1	1800p 500, 2700p	VTS390E 6150	90
FVHP132, 1400, 1440, 320, 440, 445 FVHP470S, FVHP475HV FVHP1250, FVHP430S	3550p 4800p	J.V.C. & FERGUSON HR2200, 3300, 3320, 3330, 3350, 336 3660, 3750, 3860, 4100	ю.
	1950p	3660, 3750, 3860, 4100 3292, 6900, 8901, 6902, 8903, 8906, 8922, 8928, 3V01, 3V06, 3V22 604 HR3660, 7600, 7610, 7650, 7700, HRD110, 111, 120, 121, 220, 225,	0p
GOLDSTAR 8000 3HSSDB, GHV121, R 2031, 2051 GVH51, GVH122, VCP4000	1900p	HRD110, 111, 120, 121, 220, 225, HRS100, 8904, 8923, 8924, 8925, 892	9,
VCP4200	1100p	HRS100, 8904, 8923, 8924, 8925, 893 8935, 8941, 8943, 8944, 3V16, 3V233V24, 3V31, 3V35, 3V36, 3V38, 3V39, 3V49 621	50
GHV1232, 1233, 1241, 124, 1244, 1245, 1246, 1266, 12: GHV1295, 1296, 1891, 8210 1221, 1240, 1241, 1247, 12: VCP400, VCP4130, 4300, 4: 4306, 4310, 4311, 4315, 43 VCP4320, 4321, 4325, 4326 C211, GMV1392P, 1332P, 1	90, 1291), 8215, 49, 2145	BR1600, HRD140, 141, 142, 143, 150 152, 156, 157, 158, 160, 5101	
VCP400, VCP4130, 4300, 4 4306, 4310, 4311, 4315, 43	301, 4305, 16,	3V46, 3V47, 3V52, 3V54, 3V55, 3V56, 3V57 1160	Dip
C211, GHV1392P, 1393P, 1 1290, 1291PQ, 12931Q, 12	1100p 900P, 95P,	HRD154, 170, 171, 210, 211, 217, 31(320, 321, 350, 521, 522, 526, 526, HRD577, 540, 550, 560, 590, 770);
VCP4320, 4321, 4325, 4326, C211, GHV1392P, 1339P, 1 1290, 1291PO, 12931Q, 12 GSE1295PO, GSE1296, 12 1910, 20005, 2000, GSEC2 GSEC12, 2004, 20, 22, P416 QUISY22, QUISY24, RC20 GSEC3001, RC20, RC20, RC2001, RC20, RC20, RC201, RC20, RC201, RC201, RC20, RC201,	97, 1891, 20, 2301	3016, 30233024, 3031, 3035, 3036, 3038, 3039, 3046 52, 156, 157, 158, 160, 5101 HR510, 8947, 8948, 3042, 3044, 304 3045, 3047, 3052, 3054, 3055, 3056, 3047 HR0154, 170, 171, 210, 211, 217, 311 320, 321, 350, 521, 522, 525, 556 HR0527, 540, 550, 550, 590, 770, HR0X20, HR0X22, 8350, 8951, 3064, 3065, FV10, FV11, FV20, FV21, FV26	
GSEQ12, 204, 20, 22, P416 QUISY22, QUISY24, RC206	P, P500P P, RG11P,	FV26 1300 HRD565, HRD566, 3V48 2200 HRD725, HRD755, 3V43, 3V53 285 8930, 8931, 8933, 8940, 3V29,	bp
RG20, RG2001, RQ20, RQ204HP, RQ241, VCP100 GSEG10	P, 1600p	3V30 704	00
GHV4400, 4400, GSE-Q404 QUISY40,	ip,	3V00, 8902, 8903, 8909, 8912, 8922 1004	
RC405P GSEQ121, RQ2011, RQ203 RQ2051	2350p 1, 1950p	FV31, FV41R 1500 FV37, FV43H, HRD860 3100	Dp
G.E.C. 4000H, 4001H, 4002H	12000	BR7000E, BR7000S, BR7030, BR7030/40H, BR7040 2600 HR7200, 7300, 7350, 2650,	
V4001H, V4004, V4100 V4005H	1200p 1500p	886200 700 HRD455 2000 HRD520 1400	90 90 90
GRANADA CSI, DS2 VHSAH1	1600p 1100p	HRD300, 400, 580, 600, 620, 840, 650, 2004	m
VHSAH3	2400p	HR4100 1000 HRD750, HRD830, HRD860 3300	P .

Model	Price	1
HRD250, HRD257 3V32, 8942, HR7655 HRD180, 190, 230, 610, 3V9 FV208, 26, 30, 32, 33, VC14 HRD370, HRD430, HRD470 FV13H HRD520, HRD430, HRD420	2300p 2200p	ľ
HRD180, 190, 230, 810, 3V FV20B, 26, 30, 32, 33, VC14 HRD370, HRD430, HRD470	9, FV12L, 11L 2050p , 3V58,	
FV13H HRD530, HRD700, HRD840 HRD910, EV14T, EV57H	2300p HRD870, 3100p	
GRC1, GRC2, 3 V41 BR9060, HRD330, 337, 440,	2800p 441, 637,	
HRD370, HRD430, HRD470 FV13H HRD530, HRD700, HRD840 HRD910, FV141, FV57H GRC1, GRC2, 3 V41 BR9060, HRD330, 337, 440, 841, 860, 670, 720, 730, 744 HRFC100, SR3300MS, FV4 HRFC100, SR3300MS, FV4	0,820 4L 2100p	l
FV46 HRS5000, HRS5500, 5800, FV395.BRS600, SRS368E FV22L	5000p 9000,	
	2600p	1
VR782LV, VR202LV FV67HV, FV68TX, FV77 R2000 SERIES FV61LV, FV62LV, FV67HV FV62LV, FV62HV, FV67HV	1960p 3800p	
FV61LV, FV62LV, FV67HV FV42L VP160L, VR172L	4500p 4000p £101.00p 1950p	
VP160L, VR172L HRJ200, HRJ205 HRJ600EG, HRJ600EK, HR. HRJ605UK, HRJ610EK	1950p 3300p J605EG.	l
HRJ605UK, HRJ610EK HRJ300, HRJ305, HRJ315, HRJ306, HRJ305, HRJ315,	7100p 3750p	
HRJ605UK, HRJ610EK HRJ300, HRJ305, HRJ315, HRJ316EG, HRJ318E HRJ615, HRJ715, HRJ615 HRJ400, HRJ405, HRJ407N OEK HRJ415, HRJ407N	9200p 15, HRJ41	
OEK, HRJ415, HRJ416 MATSUI	5850p	
MATSUI VX500E, B0IA, 810A, 820, 1 7738 VCRL3, VX730, VX750 VX735, VX755, VX990	1200p 1450p	
	1500p 1750p 1100p 2650p	l
VX600 VX900 MITSUBISHI		
HS303, HS304, HS320, HS7 HS306, HS318, HS710 HS307	700 1400p 1400p 2300p	
MITEUBISHI HS303, HS304, HS320, HS7 HS306, HS318, HS710 HS307 HS319 HS330 HS400 HS349, HSE27, 31, 32, HS6 31, 32, HSM33, 34, 35, 37G HS411 HS620, HS627,	700 1400p 1400p 2300p 1900p 2300p 2300p	
HS400 HS349, HSE27, 31, 32, HSE 31, 32, HSM33, 34, 35, 37G	2800p 27, 2150p	
HS411 HSE30, HSB30	1900p 2000p 1900p	
HS338 HSE10, HSE11, HSE20, HSI HSE41, HSB10, HSB20	E21,	
HSE10, HSE11, HSE20, HSI HSE41, HSE41, HSE10, HSB20 HS200, HS301, HS302, HS3 HS273, HS5500 HS200 HS200 HS200 HS200, HS347, HSE12, HSE12, HSE22, HSI 23, 25, 30, MX1 HS411EZ, HS411GZ HSB11, HS821 HSB21, HSE30, S2G, HSM3 55, 87, 58, 60 HSE51 HS410	2100p	
HS200 HS337, HS347	650p 1400p	
HSB12, HSE12, HSE22, HSE 23, 25, 30, MX1 HS411EZ, HS411GZ	2100p 2600p	į
HSB11, HSB21 HSB52, HSE50, 52G, HSM3	2000p 6, 50, 54,	
HSE51 HS410	3000p 3250p	1
HS412, HS421GZ HS5300, HS5424, HS5600 HSM20, HSM55 HSM40	4000p 3050p 2250p	
HSM40 HSM59, HSM68E	2850p 6050p	1
HSM40 HSM59, HSM68E NV300, 322, 332, 333, 340, 2010, 3000, 7000, 7200, 750 7850, 8170, 8200, 8400, 860 8620 NV777, NV330 NV8050, NV8051	390, 2000, 0, NV7800, 0, 8610,	
8620 NV777, NV330 NV8050 NV8051	625p 1150p 2800p	
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NATIONAL PANASONIC AG 1000, 1050, NV250, 260, 450, 455, 470, 480, 650 AG8010, AG8015 AG6840	1600p 2500p 2400p	
NV620	775-	
NVD80, NVH65 AG5150, AG5250, NVF65, N NVH77	VH75, 3200m	
NVr51	42000	
NVG30, 31, 40, 130, NVJ37 NVSD30, 10EE, 11, 2, 30, 39	40, 42, 1450p	
NVG19 NVJ30, NVHJ33, NVL10, 20 NVJ30, NVHJ33, NVL10, 20 NVSD30, 10EE 11, 2, 30, 32 NVJ35, NVG45 NVM1, NVM3, NVM5 AG2100, AG2200 NV430, NV431, NV433, NV NVSD22, NVSD25, NVSD3 NV730, NV730F, NV770 4 HEAD	1700p 4200p 700m	
NV430, NV431, NV433, NV NVSD22, NVSD25, NVSD3	SD2, 1000p	
NV730, NV730F, NV770 4 HEAD NV386	1850p	
NV386 NV21 HQ, NV 180, NVD48 NV7881 NV810, NV8301	2000p 2500p 2400p 2750p	
NV870 NV890 NV970		
AG6024, NVG33, 46, NVL2: NVJ47, 49, 700PX, NVSD20EE,	5, 25, 28,	
49, 700PX, NVSD20EE, 400, 44, 45 NVG10, 11, 12, 14, 15, 120, 280,	1450p NV250,	
280, 450, 465 NVG18 NVG20, 21, 22, 25, 28, 200, NVD48	1500p 1800p	
NVG20, 21, 22, 25, 28, 200, NVD48 NVG50, NVG300	1700p	
NVG50, NVG300 NVG45 NVH70 NV688	1450p 3600p 2400p 1050p	
kil/goo	1050p 2600p 2600p	
AG6800, AH6810, AG6820 AG6100, AG8200, AG6300 NVG7, NVG9, NV230 NV780	1050p	
NV780 NVG 15, NVG400 NVM7, NVMC20 NVF70	2800p	
NVSD45, NVJ4/	5200p 2000p 2250p	
NVF75, NVF77 NVF55	4750p 4000p	
NVFS200, NVFS88, NVSF9 NW8000 NVHD90, NVHD 100, NV HI NVHF 100	0, 4600p D 101,	
NVHF 100	3100p 1400p	
AG7330, AG7350, AG7355, AG7450	5000p	
	nis at	Í

	0	H	EA	DS	
	Mo	de	ľ	P	rice
	NVFS	1	1313		5000p 4850p
	N.E.C N901 9015,	1, 9012 9016,	2, 9013E, 9 901A, 902 9054, 9055 906, 9077, 000, 1600, C, 915A, 91	014E, 90 A, 9033,	14G, N9034,
	9040, 9065, N909	9053, 9066, 8, DX1	9054, 9059 906, 9077, 000, 1600,	9056, 9 PX1200	063, 1150p
	N911 9120 PVC6	A, 9140	C. 915A, 91 0. 744, 754	6A, 917, 1	2400p
	PV230 774 N380	00, 240 N381	0, 760, 79	4, 770, 31. N832	1650p
	N834 82611 DX40	N835	0, 744, 754 00, 760, 79 , N830, N8 , N836 FOR MODI 610, NS70	EL DX300	700p 0), 3000p
	N905	2, N95	30, DX200	0	3150p 3400p 1700p
	PVC2 764 DS60	. 00	400, 740, 7	44, 760,	1400p 3500p 3500p
	VH90	VH555 0.	, VH600, V		1844,
	VH10	00 (AL	L MODELS	5)	1100p 700p 1600p
	D1200	D, D201 50. VR	00 500X, D45 00X, D500 6520, 64Vi	00, VPCD 0 R60.	1600p
	VR67	114H	EAD		18009
	VR64- VR66- DV78	41, VR 42 1, VR5	6540, VR6 12, 522, 52 6761, VR6	541, VR66 29, 6358	540, 1300p 7,
	VR69:	20			2750p
	6490.		118VR412		
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	17400 4500p 2150p
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VFH815 VC800, VCH851, VCH852 VCH882	
VCH382 VCH80, VCH81, VFH815 VCA33, VCA36, VCA43, \ VCA48,	2700p 2800p /CA44,
VCA48, VCA49 VCA55, VCA63 <u>VC570</u>	1500p 2200p 2800p
	2800p
DSR-19R FOR SL-T 9ME DSR-21 R FOR SLC 8-C9 DSR-35R FORC20, C30 (3100p 2600p 40. SLE1U8
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SLV201, SLV202 SLK95, SLT50ME	2000p 2900p
SL36ES, SL37E SL3000, SL3000, SL3000, SL3000, SL77ME SLV201, SLV202 SLV255, SLT50ME SLV275, SLV373VB, SLV477 SLV427, SLV437, SLV477 SL412, SLV427, SLV475, SL41700UB SL41777, SLV415, SLV325 SLV350UB CDDF340E, CCDF50E, C CDDV35E, CCD595E SLV450, SLV302, SLV325 SLV451, SLV302, SLV325 SLV351, SLV325, SLV351, SLV3	10, 2200p
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SLV801, SLV802 SLV310, SLV315, SLV325	4800p 3550p
SLV335 SLV210, SLV212, SLV270 SLV295, SLV200	1500p , SLV273,
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CIV/YEE	2750-
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SLVE7, SLVE8, SLVE9 SLVE90 SLV615, SLV825, SLVE60 SLVE800	5150p 00, SLVE700,
TOSHIBA V63	15000
V9580 V8500, V8650, V8700	34000
	1450p
VA2 VA3 VA41VA5 VA6	V80, V81, V87
V88 DV90, 96, 97, NM3, V108 199, 200, 202, 205, 207, 2 93, 94 V5470, V5480	1200p
199, 200, 202, 205, 207, 2 93, 94 V5470, V5480	1450p 1300p
V600 V880MS V700G	2600p
V500G, V509G V9680	3700p 2500p 2900p
V300G, V301, V305, V306 V309G V61, V63	2550p
V110, V120, V130, V140,	V210, V211,
V711, V880	1500p 3850p 1200p 1260p
V312, V322, V412	2800p
V609, V610V6108, V610U	JK, V611, 3200p 9200p 5200p
V312, V403T, V413G V703W, V813G V95G	\$200p \$200p
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All those Channels

he prospect of two hundred channels and more via satellite TV presents a number of problems. All being well, Mr Murdoch's two hundred digital TV channels should be available to us by next Christmas, if not before. The row over whether and how to make BSkyB's conditional access technology available on "fair, reasonable and nondiscriminatory terms" has been resolved, after a fashion. It has been left to the telecoms regulator Don Cruikshank, director-general of Oftel, to "interpret" the regulations that have now become law. Strange that, introducing a law with the proviso that it requires interpretation! But then law making and fast-moving technology do not fit easily with one another. Mr Cruikshank has at any rate a clear strategy. He has issued a consultative document, and has set January 24th as a deadline for responses. The broadcasters will have to come to some sort of arrangement with one another, otherwise there could be no new digital TV services.

The interesting thing is how multi= channel TV will turn out. Will people make use of the two hundred plus channels on offer, or simply stick to the ones they are used to? Obviously some will wish to experiment, while others won't – and certainly won't wish to pay the extra cost involved. It's a great bonus that we have been freed from the restrictions of "balanced programming", which were more relevant when spectrum space was limited. Those who want to watch old movies or sport all the time can do so, without being bothered by programming they don't want. Those who simply switch on and let TV do its stuff will continue as before. One can't help but feel that this will be the majority of viewers. If so, the new channels will find it difficult to raise the funds required to finance their operations. Meanwhile the existing channels will of course have fewer viewers, which implies less advertising revenue - and a bit of a conundrum for the BBC, which fits uneasily into this new multi-channel world.

The government has just announced a five-year deal which will increase the licence fee, and thus the BBC's income. in line with retail prices. To start with, anyway. From April, the colour TV licence will cost £91.50 and the monochrome TV licence £30.50. Next year's licence will be set at inflation plus three per cent. The following year there will be an increase of half a per cent in excess of retail prices, in the fourth year the figure will be inflation minus one per cent and in the final year inflation minus two and a half per cent. This is measly to say the least. The BBC's director-general John Birt has already commented that "we will have to go back to government and say we don't think this is realistic in later years". Without an adequate income, the BBC will be unable to compete with those advertisement financed and pay TV channels to secure rights to the sports programming and good movies that viewers expect. Deprived of these, the BBC channels could become very much of minority interest.

One question is whether those who intend to get their sport, old movies, music programming, etc. elsewhere will be happy to go on paying for the BBC's position to be maintained? That depends to some extent on how well the BBC succeeds in maintaining viewer interest. Above and beyond this there is the old, still valid, argument about maintaining public broadcasting channels that are independent of particular interests, whether commercial or political. The BBC's position, and that of public broadcasting everywhere, is going to become more difficult. If you accept the case for public broadcasting, one that to us seems to be watertight, then adequate financing is essential. The present government seems to be in two minds about this. We shall have to see how the next government, of whatever colour, reacts to the problem. Quite apart from its role in providing an unbiased source of news and an open forum for views, public broadcasting can be a means of maintaining standards. But only if it is adequately funded. This will be a continuing problem, however many channels of various sorts become available.

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REED BUSINESS INFORMATION



Digital Set-top Boxes

BSkyB is understood to be about to place an order for a million set-top decoder boxes for the start of its multi-channel digital TV service, which is on schedule for an autumn launch. The order is worth over £200m and will be spread amongst, up to six electronics groups, including Amstrad, Nokia, Pace, Panasonic and Sony. BSkyB hopes that the boxes will sell for about £200-£300 initially. This is likely to involve a subsidy of some sort, which BSkyB hopes to share with firms that will run interactive services.

The initial boxes will not incorporate facilities for interactive services such as home shopping and banking however. These will be catered for by a more sophisticated decoder design fo follow later. The first decoders will enable the digital transmissions to be received, with provision for payTV sport and film viewing. Hyundai Electronics America, one of the first manufacturers to deliver cable and satellite digital IRDs to the consumer market, has set up a joint venture with Scottish manufacturer Solectron to supply the European market. The company is the first manufacturer in Europe to incorporate OpenTV technology - in the set-top boxes it is manufacturing for distribution to NetHold digital TV networks worldwide. The boxes will enable cable and satellite TV viewers to use interactive TV services. Hyundai points out that current hardware is future-proofed with OpenTV, as the software can be downloaded to set-top boxes via the satellite or cable system. It can thus be upgraded without the need to purchase new hardware. First shipments have been to Italy and the Benelux and Nordic countries.

Users of OpenTV employ remote control and menu-based selection of the services and programmes required. The Hyundai digital settop boxes incorporate powerful 32bit Motorola processors and use a real-time operating system. They have a large selection of input/output connectors, including low- and high-speed data ports.

Pace has manufactured its 500,000th digital IRD. The company has formed a joint venture in Italy to supply subscribers to the Telepiu service, has received a contract to deliver £25m worth of receivers to Canal Plus in France, and is supplying digital cable receivers to Stream of Italy.

PerfectTV, the first Japanese multi-channel digital TV service that started in October, signed up more than 100,000 subscribers during its first two months in operation.



VIDEOcopy Printer

Colorgraph has introduced the VIDEOcopy, a compact device that can be connected to a TV set, VCR or camcorder and a desktop colour printer to produce quality colour prints of pictures displayed on the screen. It can also show pictures on the screen, and has an optional output to a computer. The VIDEOcopy enables video pictures to be captured and printed without the need of a computer. It comes as a stand alone unit at £199 plus VAT, or with a colour printer from around £350 plus VAT. It will work with PAL, NTSC or Secam signals and is simple to use - at the push of a button a single frame is taken and fed to the printer. For further details contact Colorgraph (UK) Ltd. on 01734 819 435.

Business News

Sony has decided on South Wales as the site for production of its widescreen CRTs and TV sets for the European market. An investment of £50m over two-three years is involved, with the creation of some 1,000 jobs. A production unit for 28 and 32in. widescreen tubes is being installed at the company's Bridgend plant, while sets will be assembled at its nearby Pencoed technology centre. The Welsh plants at present produce 2.4m CRTs a year and 1.6m TV sets. Monitors and decoders are also produced. About 85 per cent of the production is exported.

Philips Electronics is restructuring its TV operations in western Europe. Bruges is to become the global colour TV development and manufacturing centre. Dreux will be the final assembly centre for western Europe. Development and manufacture of TV sets at Monza is to stop in mid-1997. The restructuring is thought to involve a loss of around 1,400 jobs.

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A price war in China is boosting the sale of colour TV sets and reducing the share of the market held by foreign brands. It has also resulted in a rationalisation of the Chinese industry, which has the capacity to produce nearly three times the number of sets currently being sold. The price cutting began last March, when market leader Sichuan Chang Hong Electric reduced prices by 8-18 per cent. Other major domestic producers followed suit. Since its price cuts were introduced, Chang Hong's share of the market has risen from 16 to 26 per cent (at end October). It has overtaken Matsushita Electric Industry as the top selling manufacturer. Total CTV set production by Chang Hong during 1996 is put at 4.5m, out of a total national output of 58m sets.

New Technology from Canon

Some interesting technology, including a new type of flat-screen display.is being developed by Canon. The display is known as the Surfaccconduction Electron Emitter Device (SED). It consists of an array of electrodes on a quartz or soda-lime glass substrate. Advantages are the low drive voltage – less than 10V – and a wider viewing angle than with an LCD screen. Canon is aiming to launch a 40in. TV set using the display by the year 2000. It will be 10cm deep and weigh about 18kg.

Canon is also developing a high-density memory that could store the equivalent of the contents of 200 CD-ROMS on a 2cm square chip. It's expected to be at least five years before such chips become available.

The Thomson Sale

In the December issue we reported the French government's decision on the privatisation of the Thomson electronics and defence group. But of course you can never tell with the French. Although the decision was described as provisional, it looked pretty cut and dried at the time. Since then however the government has changed its mind, causing a furious reaction from Daewoo which was to have taken over Thomson's consumer electronics interests (Thomson Multimedia).

After an independent commission rejected the terms of the offer for Thomson made by its preferred bider Lagardère, the government decided to suspend the privatisation and could well now sell the profitable Thomson CSF defence division and the loss-making Thomson Multimedia separately, something it had previously ruled out.

The stumbling block seems to have been Lagardère's proposal to sell Thomson Multimedia to Daewoo: the commission pointed out that neither the government nor Lagardère could hold Daewoo legally to promises made to increase jobs and investment in Thomson Multimedia. Privatisation of Thomson remains the government's intention, but we will have to wait to see how it's to be done. **System Trials**

Cable modems can provide interactive services and fast Internet access. Telewest Communications, the UK's second largest cable operator, plans to launch a cable modem trial at Basildon later this year. The trial will involve a hundred homes and small businesses, and will use Motorola's CyberSUFR cable modem. This can operate at data speeds up to 10Mbits/sec, with an upstream data rate of 768kbits/sec. Telewest has access to some 4.3m homes in the UK.

The Philips CD-i system forms part of a major European home shopping trial, Homestead 2000, that's due to start in March. The project will cost around £3m and is part-funded by the European Commission. Some 5,000 people in the UK will take part, along with others in France, Italy and possibly Spain. They will use a CD-i deck or home PC to browse through multimedia CDs, then order goods, on line. The project will end in November.

It's Official!

Channel 5 has announced that the revised date for the start of its service is March 30th, and that it is "on target to meet this scheduled date".





B-Tech has added two new TV wall mounts to its range of Hi-Style accessories. Models BT518 and BT521 are both designed for TV sets with screen sizes up to 21in. (53cm) - safe loading is 77lb (35kg). The BT521 has a single straight arm while the BT518 (see photo) has an articulated twin-arm for maximum versatility. The arms swivel through 180° while the TV support platform has provision for a 7° tilt up or down. The wall mounts are available in black or white. For further information apply to B-Tech International Ltd., Vulcan House, Vulcan Way, New Addington, Croydon CR0 9UG (phone 01689 848 535, fax 01689 841 087).

JJ Components' Move

JJ Components is expanding and moving to new premises, with a trade counter, on January 16th. The new address is R/O 243-247 Edgware Road, The Hyde, Collingdale. London NW9 6LU. Telephone no. is 0181 205 9055, fax 0181 205 2053.

Bull Electrical Catalogue

Bull Electrical has introduced a new full-colour mini catalogue that features some of the company's more popular lines. The wide range includes optical, electronics and other products. For a copy apply to Bull Electrical, 250 Portland Road, Hove, Sussex BN3 5QT (phone 01273 203 500, fax 01273 323 077).

CPC of Preston has doubled the number of items available in its test equipment range. There are now over 300 product lines. New items being stocked include oscilloscopes from Kenwood, GoldStar, Fluke and Pico and both analogue and digital multimeters from Tenma.

The company has recently added the Commodore Multimedia Keyboard Plus to its range of computer accessories. It has a built-in 3W per channel amplifier with speakers and a microphone, and connects with the PC via one integral cable with four end connectors.

For further information apply to CPC PLC, Component House, Faraday Drive, Fulwood, Preston PR2 9PP (phone 01772 654 455, fax 01772 654 466).



Reports from David C. Woodnott **Simon Bodgett Brian Storm and Eugene Trundle**

Sanyo VMD90R

When the eject button was pressed the cassette housing would open then close automatically. It's not an unusual fault with models that use this deck. The trouble occurs when the mechanism, which is of very light construction and liable to bend under stress conditions, has been forced/dropped etc. The cassette latch and down switch are particularly vulnerable, but can normally be reset (bent!) to overcome the problem. A warning to the customer about the consequences of repeat damage, i.e. the cost of a new cassette housing, is not out of place and is generally heeded. D.C.W.

Sharp VLV690H The VTR functions were OK but there were no E-E pictures. Checks showed that the 15V camera supply was low at 10V. The guilty components were R116 (2.2kQ) which had gone high in value $(3k\Omega)$, C138 (10µF) and C137 (1µF). Normal service was resumed when they had been replaced. D.C.W.

Panasonic NVG3B

The customer phoned to ask how much we would charge to replace the CCD imager. We asked why he thought this was necessary? Apparently he had been told that this was the only thing that could cause the symptom - vertical lines in the background of the picture. While agreeing that the imager could be the cause, we suggested that an inspection would probably be worthwhile before such an

Camcorner

expensive item was replaced. The cause turned out to be a dry-joint at the CCD connector. Result - one happy customer! D.C.W.

Sanyo VMRZ1P

The customer complained about "lines across the playback picture". In fact because of an ATF fault there was incorrect tracking and LP/SP switching. The cause of the trouble was failure of IC361 on the main PCB.

This was a common problem with an early batch of these camcorders. Hoperfully most of the faulty chips have now been replaced. D.C.W.

JVC GRS707

"No camera power" was the complaint. On test we found that after a while the blank screen changed to a very discoloured picture, with red in the centre and a green line across the top. Then, as the camcorder warmed up. a good picture appeared. As freezer failed to reveal the culprit(s), patience was required. It paid off after several days. C37 and C38 on the imager PCB were both leaky - C37 was well out of specification. S.B.

JVC GRSZ1

The fault report said that this camcorder wouldn't record sound. When I checked it I found that there was no power. Previous repair attempts had resulted in the failure of several circuit protectors. The cause of the trouble was the audio/ control head cable. We had to replace the head assembly. S.B.

JVC GRS707

This camcorder wouldn't record colour. We found that C445 was open-circuit. It's mounted on the edge of the PCB and can be damaged as a result of an impact you sometimes find that it's missing altogether. S.B.

JVC GRAX10

The fault report said that this unit recorded in monochrome for the first two minutes, then in colour. What it didn't say was that previous repair attempts had left IC601 and its surrounding components in pretty poor condition. After a cleanup operation we found that the cause of the original fault was R605 and that the VCO (320fh) resistor R666 needed setting up. S.B.

JVC GRS70/GRS77

Poor S-VHS playback, VHS OK, occurs when the THE326A nonlinear de-emphasis module IC2 fails. Record as well as playback is affected, leaving the customer with defective recordings. The chip usually becomes intermittent in operation, and can reduce or limit its output without failing completely. S.B.

JVC GFS1000

This camcorder produced very poor playback pictures. It had been to another service organisation, which had replaced many components but not the defective one. The culprit turned out to be C47, in the comb filter return path. S.B.

Panasonic NVM40

This full-sized machine behaved as if it had faulty video heads: when a known good tape was played back there was just a screenful of noise. Initial checks showed that there was no playback 5V supply at the head amplifier circuitry. As the correct switching sense was present at the systems control chip IC6004, we followed the switching lines through to the various buffer transistors. The switching terminated prematurely at the 2SB970X transistor Q3022. B.S.

Sony CCDTR55

The E-E luminance signal would disappear a few minutes after this camcorder was switched on, leaving just the chroma and syncs. We found that there was no luminance output from the encoder chip IC301, though it was receiving a luminance feed, blanking and sync pulses and the correct control voltages from the EVR chip. IC301 itself, type CXA1072R, was faulty. E.T.

PINCH ROLLERS/VCR BELT KITS

Model Price Model Pri AKAI VS10, VS93000, VS9500, VS9700, VS9800, 1059 PVHD140, 40, 56, FVHP1, 10, 25, 30. PVHD140, 40, 56, FVHP1, 10, 25, 30. V97100, VF77 1659 PNCH ROLLER ASSEMBLY	
VS10, VS9300, VS9500, VS9700, VS9800, VP7100, VP77 105p FVHD140, 40, 55, FVHP1, 10, 25, 30, 4	40, 4000,
VS12, VS15 VS4, VS5, VS5, VS5, VS5, VS5, VS5, VS5, VS5	1350p
VS105, 112, 115, 116, 120, 125, 126, 155, 165, 206, 220, 240, 244, 245, 1243, 1244, 1245, 1244, 1245, 1246, 165p	, 1242,
V\$247, 248, 250, 512, V5515, 516, V\$X9 165p 1295, 1295, 1392, 1393,	
VS201, 301, 303, 304, 603, 606, 607, VSP8, VSP82, VP56, VP52 VS128, VS155, VS165, VS220, VS240, VS250, VS128, VS155, VS165, VS220, VS240, VS250,	. 1
VS512 165p 1291, GHVP1295, 1296, VCP4000, 41 VS22, 23, 25, 35, 37, 38, 53, 66, 75, 422, 425, 4200, 4300, 4301, 4305, VCP4306, 43	10, 4311,
426, 427, 492, 465, 467, V\$485, 765, 766, 787, 768, 865, 867, 965, 987, V\$A77, V\$A850, 1291, 1296, 1296, 1297, 18 V\$A77, V\$A650, 1910, 2006, 2000	350, 91, 185p
VSF10. 11, 12, 15, 180. 190, 200, 210, 220, WTACHI 221, 222, 230, 240. 30, 33 VT7, 11, 14, 18, 17, 18, 19, 33, 34, 35	
VSF330, 4, 500, 550, VSP88, VSR100, VSX400, 450, 470 165p VT5000, 5030, 5500, 6800, 700	0. 8000.
VSF260, 261, 262, 265, 270, 274, 276, 280. 290, 340, 350, 410, 420, 43C VSF441, 440, 480, 455, 640, 490, 497, 510. VSF441, 440, 480, 455, 640, 490, 497, 510.	165p
560, 580, 590, 599, 600, VSG20, 21, 23, 24, 25, 30, 33, 34, 35, 51, 54, VSG20, 21, 23, 24, 25, 70, 73, 74, 75, 168, 970, 175, 220, 225, 21, 21, 21, 21, 21, 21, 21, 21, 21, 21	1.1.1.1
VSP110, VSX560, VSX580 165p VT250, 255, 258, 260, 400, 405, 410,	13, 414.
55, VSA77 775p VT426, 428, 430, 431, 435, 438, 450, PINCH ROLLER ASSEMBLY 515, 517, 518, 520, 525, 517, 518, 520, 525, 517, 518, 520, 525, 517, 518, 517, 518, 520, 525, 517, 518, 518, 518, 518, 518, 518, 518, 518	498, 510,
V\$422, 425, 426, 427, 462, 465, 467, 485, 498. 765, 766, 767, 768, 865, 555, 576, 580, 585, 588	
867, 966, 867, VSA860, VSF10, 11, 12, 14, 15, 180, 190, 200, 210, 220, 221, 222, 230, 240, 30, 300, 301, 310, 320, 33, VTLS0, 180, 190, 200, VTLS0, V	
330, 4, 500, 510, 600, VSR110, VSX100, 400, 450, 470 800p VTM636, 640, 645, 646, 720, 722, 725	
VSS99 165p 727, 728, 730, 731, 736, VTM736, 740, 745, 746, 748, 753, 754	
ALBA 821, 822, 625, 830, 831, VCR3000X, VCR4000 185p VTM835, 838, 840, 841, 845, 920, 92' VCR5000, VCR6000 185p 926, 530, 531, 935,	
VCR161, VCR222 180p VTS80, 65, 890, 895VM200, 2300, 23 VCR7000, VCR7800, VCR8000, 3280, 500, VMS7200	80, 3200, 165p 165p
VCR8800 165p VT3000 VTV10 165p VT410, 420, 428, 430, 450, 498, 518, 348, 518, 518, 518, 518, 518, 518, 518, 51	520, 522,
VCR1000, 2000, 4500, 4600, 4700, 5200, 8000, VTM598, 622, 722, 740, 748, 753 PINCH ROLLER ASSEMBLY	650p
VCR8602, 8603, 9604, 8700, 8704, 8714, 8800 VTF150, 155, 190, 185, 250, 255, 260, 8804, 9000, 9005, 280, 285, 350, 351, 355, 260, 280, 285, 350, 351, 355, 260, 280, 285, 250, 255, 260, 280, 285, 250, 280, 285, 250, 255, 260, 280, 285, 250, 256, 250, 255, 250, 255, 250, 255, 250, 255, 250, 255, 250, 255, 250, 250	
VCR7000 165p VIN300, 3504, VIN300, 365, VIN140, 141, 145, 145, 145, 145, 145, 145, 145	165p
DD8900, DD8904, VCR6000, 5100, 6200, 8800, 8602, 8603, 8804, V20H, VXL5, VXL5, VXL5, VXL7, 8, 9, 10, 1	. 19, 90.
VCR8700, 6800, 900-9, 9140, 9244. H13V, VTV100, 200 9340 700p VXL2 VXL3 PINCH ROLLER ASSEMBLY PART NO: VXL4, VXL20, VXL35	165p 165p 165p
PINCH ROLLER ASSEMBLY PART NO: VXL4, VXL20, VXL35 163148 VV100, VXL10, VXL11, VLX9, VX160, VXL10, VXL11, VLX9, VX190	700p
VCR9500 300p PINCH ROLLER ASSEMBLY PART NO: V20H, VXL5, VXL6 MOD KIT	276p
2554966 DD9900, 9904, TX3650, UF20, 22, 24. HR2200, 3300, 3330, 3360, 3860, 410 VCR3000, 3002, 9500 165p 7700	0, 185p
VS1004 VS1104 165p HR2650, 7200, 7300, 7350, 7600, 761 FERGUSON 7655	0.7650, 165p
3V00, 3V01, 3V16, 3V22, 3V23 , 3V24, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922, 8523, 8524, 8925, 8929 HRD160, 220, 225, 250, 257, 445, 455	
3V29, 3V30, 3V31, 3V32, 3V52, 8930, 8931, 568, 725, 755, HRP50, BP5000, BR70 8933, 6940, 6941, 6942 165p BRS611, 811	165p
3V35, 3V36, 3V39, 3V39, 3V42, 3V43, 3V44, HRD520, 540, 550, 560, 580, 600, 510 3V45, 3V48, 3V49, 3V53, 3V54, 3V55, 3V56, 537, 640, 641, 650, 680, 3V57, 3V58, 3V59, 3V66, FV10, FV11, FV12, HRD570, 720, 730, 740, 770, 820, 830	, 620,
FV14, 8943, 8944, 8945, 8947, 8948 165p 560, 870, 580, 910, 960, 3V52 185p HRD980, HRDX20, 22, 25, HRJ200, 2	
8950, 8951, FV106, 11R, 13H, 14T, 208, 21R, 22L, 26D, 31R, 32L, FV33H, 39S, 41R, 42L, 50B, 51R, 52L, VC141L 166p 500, 605, 510, 615, 715, 815	. 507,
508.51R.52L, VC141L 186p 500, 805, 610, 615, 715, 815 FV37H, FV44L, FV46T, FV43H, HRUS7, HRSA700, 5800, 5900, 6800, FV57H 186p S78,200, 330, 388	5900, 165p
3V35, 3V36, 3V38, 3V39, 3V49, 8943. 8944 1100p 320, 321, 330, 337, 350,	, 300,
PINCH ROLLER ASSEMBLY HRD370, 400, 430, 440, 441, 470, 500 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8945, 5947, 8948 1380p HRS5000, 5500, 8000, 9000, BR7030, HRS7030, 400, 430, 441, 470, 500	
PINCH ROLLER ASSEMBLY 9060. FV37, FV57, FV58 350p BRS600, 605, 747, 777, 920, 925	165p
PINCH ROLLER ASSEMBLY HRS10 FV31R 166p 8P5000, HRD110, 111, 120, 220, 226, FV41L, FV42L 928p 455	165p
PINCH ROLLER ASSEMBLY PINCH ROLLER ASSEMBLY 3V58, 3V59, 3V64, 3V65, FV10, 11, 12, 13, 14, HRD140, 141, 142, 143, 150, 152, 157	
20, 21, 22, 28, 30, 32, 33 FV39, VC141L 8759 PNCH ROLLER ASSEMBLY PINCH ROLLER ASSEMBLY	1350p
First in Rotten Rosemet First in Rotten Rosemet FV33H, FV44L, FV45K, FV46T 700p HRD1520, 510, 520, 521, 522, 525, 53 First in Rotten Rosemet 600, 610, 620, 637, 641,	7, 560,
FV61, FV62, FV67, FV68, FV70, FV71, FV72, HRD650, 720, 830, 840, 910, HRJ205 FV74, FV77 775p HRS5800	350p
PINCH ROLLER ASSEMBLY PINCH ROLLER ASSEMBLY FISHER BR7030, BR5800, HR0160, 170, 171, FVHP420, 520, 530 165p,	180,
FVHP615, 618, 620, 622, 710, 711, 715, 716, 720, 721, 722, 725, 730, HRD230, 271, 300, 310, 320, 321, 334 350, 400, 430, 440, 441,	
FVHP810, 830, 840 165p HR0470, 800, 530, 700, 750, 950, HR FVHP905, 906, 907, 906, 910, 911, 915, 915. 5500, 9000	876p
5050, 5075, 5100 165p HRD540, HRD550, HRD580, HRD660 VBR330, VBS3500, 7000, 7100, 7500, 7600, HRD660, HRD960	700p
9000, 9900 165p PINCH ROLLER ASSEMBLY PVHD230, 250, 270, 370, 2000D, FVHP3, 210, HRJ600, HRJ605, HRJ615,	875p
250, 300, 310, 1100, FVHP1200, 1250, 130, 132, 1340, 1340, 1400, 1410, 1440, 1600, 200, VX6000, 730, 736, 750, 755, 765, 800 VX6000, 730, 736, 750, 755, 765, 800	
FVHP320410, 420, 430, 440, 445, 470, 475, FVSP290S, 496, 2905 1850 VX1000, VX2000, VX2500, VX3000,	1650
FVH0140, FVH040, FVH055, FVHP1, FVHP10, VX8000A MITSUB4SHI	180p
GRANDATA LTD H512, 5300, 5424, 5600, HSB11, 12, 27, 31, 32, 41, 61, 52, 82, HSE12, 15, 17, 21, 22, 27, 31, 32, 41,	
Tel: 0181-900 2329 82, HSM1000, 110, 120, 15 0, 16, 170, 190, 210, 23, 25, 250, 27, 1	
Fax: 0181-903 6126 35, 55, 55, 55, 56, 59, 68, H5MS2, 9, 14, 15, 17, 19, 26, 560, HV	
F125, 150, 303, 85, SV8900, 8930	850p

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Mo	del	Price
		SSEMBLY PART NO:
HSE11 52, 530	, 12, 16, 17,	21, 22, 27, 31, 32, 41, 51, 00, H5811, 12, 15, 21, 27, 62, H5M1000, 110, 120, 18, 190, 210, 25, 25, 250, 36, 37, 370, 38, H5M380, 55, 555, 57, 57, 58, 59, 60, 68, 1, 18, 19, 2, H5S11, 12, 14, 5600, HV7152, HV7150, 3930 1 H5324, H5330, 3201, H5324, L5330, 18560, 18560, 199715, 1997 18570, 1997 1997 1997 1997 1997 1997 1997 1997
31, 32, 150, H	41, 51, 52, SM16, 170,	62, HSM1000, 110, 120, 18, 190, 210, 23, 25, 250,
27, 30, 40, 45,	33, 34, 35, 450, 50, 54	36, 37, 370, 38, HS M380, 55, 555, 57, 58, 59, 60, 68,
15. 17,	19, 21, 25, SV9900	1, 18, 19, 2, HSS11, 12, 14, 5600, HVF125, HVF150, 930
HS200	H\$300, HS	5301, H\$302, H\$303, 5320, H\$330, H\$360
H\$700 H\$306	HS307, HS	165p 5318, HS319, HS337,
HS338 HS411	, HS347, HS	5318. HS319, HS337, 5349, HS400, HS410, 5421, HS480, HS710, HS8 15 10, 20,
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NV100	NAL PAN	330PX 332 333 340 366
600, 68 AG601 7450	88, 777, 788 10, 6015, 61	, 3321, 00, 6200, 6400, 6900, 165p
NV230	, 250, 260, 1	290, 370, 380, 430, 431, 433, , 480
NV630 890, 25	, 650, 730, 000, 2010, 3	770, 780, 810, 830, 850, 870, 000, 00, 6050, 8150, 8170, 8200,
NV700 8300, 8	10, 72 00, 78 9400, 8500 ,	00, 6050, 8150, 8170, 8200, 8600
NV861 15, 18,	0, 8620, NV 30, 130, 40	8600 (G11, 14, 16, NVG7, 10, 12, 10, 100, 1500, 2100, 2200, 6500,
6010, 4	/500, /510,	
NVH70 NVG9, AG684	NVG120	165p 165p 50, 7350, 7350,
7355. 1 28, NV	7650, NVH6 G300, NVF	168p 50, 7330, 7350. 5, 75. NVJ30,NVL20, 23, 25. 85, NVF70, NVFS1 NVFS 25, 33, 40, 50,
Let A Sul	000	10-00
NVD48 NVJ70	8, NVD80, N IOPX	VG21 NVG45 165p 165p
NV\$D	40	101, NCHD90, NV\$D30, 1125p
AG515	ROLLER A	SSEMBLY 00, 6024. NVD38. 48, 80, . 77.
NVFS1	1, 100, 200,	88. 90, NVG 19, 20, 21, 22. 0, 45, 48.
NVG5	1. NVH65 7	5. 77. NV J30. 33. 35 37. 40.
NVL20 PINCH	47, 23, 25, 28 ROLLER A	NVW 1 350p SSEMBLY
N.E.C N830.	831, 832, 8	33, 895 165p
PVC23	00. 2400. 7	40, 744, 748, 760, 764,
DX100 9013, 9	0, 1600, 18 9014, 9016,	00, 2000, 3000, N9012, 9033 4, 9055, 9056, 9066, 9096, 9520, 1200 165p
N9034 9110, 1	9053, 905 9120, 9510,	4, 9055, 9056, 9066, 9096, 9520,
DS600 N\$700	00, 04400	1200 165p 0. N9077 165p
ORION VH1, V	N	165p
VC160	, 160, VH3,	33, 200, 201, 205, 212, 250,
VH404 1000.3	, 565, 700, 2948, 3030,	704, 712, 770, 780, 844, 900. 3312
VHF2A COMB	VP2948	i, 312, 704, 712, 770, 780, 844, 900, 3312 165p 100, HV03, LVH50, NEVH, L 1004 30, 102, 200, 258
360, 30 VH530	62, 400, 416 1, 632, 535,	512, 536, 600, 630, 635, 640, 668,
VHRM	820 850	999 993 900 930 940 943
VH106	10, 1070, VH	1050, 133, 500, 530, 540, 542, 1050, 1120, 1204, 1440, 2004, 042400, 2500, 2600, 2700
VH298	1, 2970, 30	042400, 2500, 2600, 2700, 50, 08, 4010, 4012, 4015, 4015,
4020,	4300, 5020,	
2949,	2959, 2957,	25, 245, VR821, 925, 1032, 2966, 2979, 2980, VTV300,
PHILE	0, 25, 30 PS	165p
VR646 VR202	0 VR8920	VR2022, VR2023,
VR202 VR671	1	165p 165p
VR654 DV856 6785.		165p 12, 703, 6485, 6585, 6589, 165p
VR445	VR6442, V	R6542, VR6643, VR6843,
DV464 2340,	, 662, VR22 2350, 2414,	20, 2300, 2324, 2330, 2334, VR2480, 2486, 2486, 2489, 6462, 6463, 6464, 6560,
2490, VR666	2498, 2840, 0, 6860, 68	6462, 6463, 6464, 6560, 61, 6862, 6863 186p
N-170 VR202	0, VR2870 5, VR6580,	61, 6862, 6863 185p 185p VR6581 165p C349, 6448, 6449, 6548.
6648		249, 6448, 6449, 6548. 165p ER ASSEMBLY PS403-
40205 DV186		1, 2115. 212, 213. 223. 286.
291, 2	92, 311, 312	2 313,
471, 5 VR201	62, 582, 571 , 202, VR20 6185, 6285.	2, 3229, 323, 53580, 486. 1, 761, 13, 302, 303, 305, 6180,
VR629	1, 6293, 53	62, 6367, 6390, 6391, 6393,
VR657	6458, 6470, 0, 6581VR6	670, 6676, 6710, 5760.
VP607	6762, 6870, 5, 8681, 633 1,72588, 82	CR7 69584 71584 71585
20RW	7, 21DVI, 21	SB31, 20DV1, 20DV2, IDV2, 2SB01, 2SB02, IDV2, 31DV1, 31DV2,
31DV3 35805	35802, 358 35811 358	503. 312 35813 300 p
VR231 7229.	, 232, 332, 4 723	422. 4229. 512, 5229, 722, 185p
VR501	10	PR38 165p
	100, 1110, 1 2300, 2370,	150, 1200, 1300, 1500, 2500,
Contraction of	COLOR DE LA	

В	E		K	115
	oc			Price
VHP	2700, 5000,	3330, 5150, 1 0, 9100	MVR220 5300, 5350,	165p 5400, 5500, 6000,
VTC	9300, 5800	VTCM	10, 20, 11,	21, 30, 31, 40, 50, 165p
VHR	D600	700		3500, 3700, 3800, 165p 165p
VHP 154	120, 1	130, 14 8, 171,	, 141, 143, 194, 22	14, 150, 151, 153,
0VH 297, 4150	R23, 2 310, 1	235, 24 330, 33 0, 430,	0, 244, 250, 15, 350, 390 4300, 4350	251, 274, 27, VHR4100, 4105, 4400, 474, 4770,
5080 5700), VHF	6100, 0, 7100	5200, 5300, 7200, 725	5350, 5600, 0,VHR7260, 7300,
774, 8250	780, 1	0VHR7 0, 8900	810, 9000, 1 VHRD440	185p 14, 150, 151, 153, 251, 274, 27, VHR4100, 4105, 4000, 4104, 4770, 5350, 5600, 0, VHR7260, 7300, 0, 7540, 7700, 8070, 8100, 8200, 0, 4410, 4600, 0, VHR5700166p 185p
4600 VCR	100	0, 4710 135, 15	, 4890, 670 0. 190, 415	0, VHR\$700165p 165p 0, 4160, 4350.
5200 VHR	0, 524 D441	0, 5350 0, 4610	7200, 725	0, 4180, 4350, 0, 7250, 7700, 0, 5450,
DIN	IS700 CH RC 13100,	LLER .	ASSEMBLY 3300, 3310,	3400, 3700.
PIN	CH RU	DSOD,	7000 ASSEMBLY	1360p
SH/ VC2 800,	00 36	1, 383.	384, 385, 3	386, 388, 390, 393, 7750, 7800, 8300,
838 VC8	200, 6 9100 600 9	300, 7; , 9300, (500, 9)	9400, 7700, 7 9400, 700, 9800	7750, 7800, 8300, 185e
VC3 486	00, 38	7, 402. 496, 50	471, 473, 4	165p 165p 177, 481, 482, 483, 5, 8481, VC5F3, 165p
573, VC5 VC1	, 581, W206 08, 20	582, 58 , VCA1 8, 405	(3. 584, 585 (031 . 408, 550, (5, 8481, VC5F3. 165p 500, 651, 671, 674,
681, VCS	, 682, 99, 70	684, 68 10, 772,	5, 693, , 750, 779, 1	780, 781, 7810,
VC7 VC7	782N 85, 78 72, VI	16, 787, C6F3, V	22, 783, 793, 800, 1 (C6V3, VC4	7810, 7822. 100, 102, 104,
131, 502,	140, VCA	170, 20	2, 203, 211 11, VCD60	7810, 7822 , 100 , 102, 104, 1, 234, 303, 501, 1, 602, 851, 652, CT72,
VCE	361			166p
211. VCA	10, 3	DG, 60, 254, 33 3, 40, 4	103, 105, 1 1, 35, 36, 2, 454, 46,	165p 106, 111, 113, 131, 47, 48, 50, 505, 55, 68, 1031, 11613, 9805, 806, 810, VCS 1060, VCT310, 13, VC790 165p 131, 105, 106, 211,
51, VC/	52, 53 160, 6	, 54, 55 05, 615	. 57, 58, 50 . 62, 63, 67	15. . 68. 1031, 11613.
815 VCE	UCH 410. (320, VC 80, 81, 510, VC	:8597, VCC 865, 910, V CT 1314, 53	CS 1000, VCT310, 13, VC790 165p
VC7 244	80, 75, 254,	10. VCA	10. 103. 10	131. 105. 106. 211,
815. VCi-	VCH 1665, 1	90, 81, 87, 910	50, 60, 605 83, 85, , VCS 1000	, 615, VCD806. , VCT212, 310,
1 AC1	2313		CT1314, ASSEMBLY	arab
SA	SHO	200		3200, 3300, 3500, VRS5000 165p
VR3	0, 365 1400 MSUI), VRS4400,	VRS5000 185p 180p
SV7	16.71	7. V85	10, 520, 61	0, 616, 517, 619, 621, 626, 900,
V91 910	0, V16 VX5	10, 520	0, 611, 616, 616, 671, 670	. 621. 525. 900.
SV2 750	(301, 3770,	303, 30 971, 82	5, 307, 319 20, VB822	, 322, VB710, 713, 5, V1710, 730, 750,
770 VX7 971	790, 20, 73 972	8220, 6 30, 750 8220 6	225, 970, \ , 770, 790, 2380, 981,	165p 322, V8710, 713, 5, V1710, 730, 750, (X710, 712, 825, 8225, 970, 882, SE9000, 7221, 7230,
		120, 7 /K8220	121, 7220,	
DVA	880	2R, PX	R30, SV80,	165p 185p \$X3230, 3231,
328 370	0, 326	1, V\$3 380, V	90, VX30, 3 XK300, 301	, 308, 307, 320, 3561, , 308, 307, 320, , 337, 350, 351,
356 PX9	90 95	1 992	S11230 1	165p 240 SVX4000
503 SX1	231,	600, S	X1230, 261, 1566, 1 261, VX154	V11560, VPK43, 30, 1561,
50	NY	-	_	165p
SLC SLC	5, 6, 1 6ME, 3, 20	7. SL30 SLT7N 24. 30	00, 8000. 9 IE , 33, 44, 51	080. 8200, SLJ 10. 168p HF100, SLF1, 11.
20, SLF	25, 30 200, 5	35, 60	, 100, S. SLF90E,	168p HF100. SLF1, 11, SLFH150, 850, IOME, 165p
SLR SLT BM	50ME C 100.	BMC2	OME, SET3	IOME, 165p 165p
802			00, BMC50 1, 302, 401,	, 402, 80 1, 165 p , 353, 373, 410,
415 SLV	, 474,	656. 7 777	15,	165p
SIV	255 275. 2 416.	282, 31 474, 62	5. 325. 353. 25. 656. SL	165p . 363. 373, 410, V715, 725, 727,
				V715, 725, 727, , 50, 55 166p , 262, SLVXI, 166p
20. SLV 363	215, 2 EE, 37	16EE, 3, 393,	275. 282. 3	15, 325, 353.
SLV 579	416E	E, 474, IF, 595 B6HF	494EE, 555 HF, SLV604	15, 325, 353, UC, 559, 575UC. W, 615, 625, 656, .725, 727, 757, .VE7, 8.
PIN	CH RO	OLLER .	XBOAS, SL	VX55DH, 1250p Y PART NO:
X37	27770	11		. 285. 300, 310. 350p
PIN	CH R0	750 97	ASSEMBL	00 3200 3300
331 PIN	0, 340 CH RC	0, 37700 DLLER	ASSEMBL	RD500, 7001350p Y

Model Prid	0
SL100, 200, SLC20, 30, 33, 34, 40, 44, 8 9, SLF1, 20, 25, 30, 36, 45, SLF60, 65, 7 SLHF100, 160, 950, SLK85, 95, SLO170	0, 88, 3, 90,
SLHF100, 150, 950, SLK85, 95, SLO170 SL\$550, SLT0, 30, 50 PINCH ROLLER ASSEMBLY	0, 300p
VCR BELT KITS	
VP7100, VS9300, VS9500, VS9700, VS9 120p	1.23
VS1, V\$2, V\$3, V\$5, V\$12, V\$16, VP88 V\$10 V\$X9, V\$105, 112, 115, 116, 120, 125,	650
VSX9, VS105, 112, 115, 116, 120, 125, 155, 165, 205, 220, VS24, 240, 244, 245 248, 250, 512, 515, 518	
V\$22, V\$23, V\$25, V\$35, V\$37, V\$38, V\$55, V\$66	VS53, 80p 120p
VS4, VS6, VS8, VS9 VSA77 VSS99	140p 105p
ALBA VCR40000 VCR5000, VCR6000	130p
VCR161, VCR222 VCR3000X, VCR4000, VCR4000X	105p 100p 75p
VCR7000, VCR7800, VCR8000, VCR8800 VTV10 AMSTRAD	105p
TVR123, VCR4600, VCR4700, VCR5200	110p
VCR7000 VCR1000, 2000, 5000, 6100, 6200, 8600 8603, 8604,	80p , 8602.
VCR8700, 8704, 8714, 8800, 8804, 9000 9244, 9340	
DD8900, DD8904, TVR4 TX3650, UF20, 22 24, VCR3000, 3002, - 9500	75p
VS1004 BLAUPUNKT	105p
RTV100 RTV200, RTV222, RTV224 RTV202, RTX200	200p 90p 150p
RTV322, RTV248 RTV306, 307, 309, 310, 311, 312, 328, 4 434, 444, 707	100p 14, 135p
RTV211, RTV214 RTV324, RTV325650	140p
RTV315, RTV316, RTV316, RTV320, RTV317 RTV301, RTV333, RTV338, RTV404,	50p
RTV424 FERGUSON	85p
3292, 3V00, 3V01, 3V16, 3V22, 8900, 85 8902, 8903, 8904, 8906, 8909, 8912, 8922	120p
3V23, 8923, 8924, 8929 3V29, 3V30, 8930, 8931, 8933,	65p
8940 3V31, 3V32, 8941, 8942 3V35, 3V36, 3V38, 3V39, 3V49, 8943,	75p 75p
8944 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3	75p 1V54.
3V55, 3V57, 8945, 8947, 8948 3V58, 3V43, 3V44, 3V59, 3V64, 3V65, 8	55p 950.
8951, FV10, FV11, FV12, FV13, FV14, F FV21, FV22, FV26, FV32, FV39, VC141L FV31R	. 65p 110p
FV61L, FV62, FV67, FV68, FV70, FV71, FV74, FV77 FV43H, FV44L, FV46T, FV57H	FV72, 50p 100p
FV37H 3V52	80p 55p
FV418, FV42L FIDELITY HQS200, VCR1000, 2000, 600, 6000,	100p
6100 VCB100	180p 160p 100p
VTR1000, VTR1001 TX3650, VCR3000, VCR3002, VCR9600	75p
FISHER VBS7000 VBS9000	245p 120p
VBS9000 FVHP520, FVHP530, FVHP420 FVHP615, 618, 620, 622, 710, 711, 715,	60p
721, 722, 725, 730. FVHP830, 840 FVHP905, 906, 907, 908, 910, 911, 915,	750
918 VBR330, VB\$7500, VB\$7600,	75p
VBS9900 VBS3500 FVHD140, FVHD40, FVHD56, FVHP1, F	100p 75p VHP10,
FVHP20 FVHD230, 250, 270, 370, FVHP1100, 12 1250, 130, 132,	110p 200,
FVHP1340, 1400, 1410, 1440, 1500, 20 210, 250, 3, 300,	
310, 320, 2000, 410, 420, 430, 440, 445 475, FVSD2905 FVHP5000, 5005, 5050, 5075, 5100, 975	85p 5, 980,
990 G.E.C. 4005	<u>95p</u>
4005 V4004 <u>V4007</u>	160p 100p 80p
GOLDSTAR GHV1221, 1232, 1233, 1240, 1241, 124 1243, 1244, 1245,	2.
GHV1246, 1247, 1248, 1250, 1266, 51, 8200, 8210, 8215,	8000.
VCP4100, VCP4130 GHV1290, 1291, 1295, 1296, VCP4000, 4300, 4301,	80 p 4200,
4300, 4301, VCP4305, 4306, 4310, 4311, 4315, 4324 4325, 4326	0, 4321. 120p
GRANADA VHSH1, VHSAH3 VHSVH4, VHSWH1, VHSXH1	100p 60p
VHSYH2 VHSBH1, VHSCH 1 VHSBP1	50p 150p 135p
VHSAN3 VHSDS2	110p 125p
VHSAY3 VHSBY3 VHSEY1, VHSEY2	125p 100p 70p
VHSCC1	100p

TELEVISION FEBRUARY 1997

VCR BELT KITS/VIDEO LAMPS & SWITCHES

I VCR	BELT KITS	VIDEO LAIV	IPS &	SWITC	HES	
Model Price	Model Price	Model Price		Price	Model	Price
GRANADA VHSDP1, VHSFV2	323, 535, VR20DV1, 20DV2, 20RW7, 21DV1, 21DV2, 21D, V3, 25B01, 25B02, 11, 12, 302,	Models & Description	Order Price		ON/OFF MAIN	
VHSTJ1, VHSTJ2 160p VHSTJ3 65p VHSWJ1, VHSWJ2 120p	303, 305, 31DVI, 31DV2, 31D, V3, 3SB11, 3SB12, 3SB13, 72SB8, VR30DV2, 35B02,		Code	GRUNDIG	SWITCHES	
VHSXJ3 85p VHSYJ2 \$0p	VR86582. 91682, 92583, VR6160, 6182, 6183	UNIVERSAL VIDEO LAMP 9V 80mV (310mm WIRES)	VL01 25p	PART NO:	29703, 29102	
VHSFJ2 140p VHSFS1, VHSFS2 180p VHSFG1, VHSFG2, VHSFG3,	6285, 6290VR6291, VR6293, 6362, 6367, VR6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, VR6676, 6710, 6760, 6761,		1// 00	USED ON:	C7500,C7500TT,	
VHSFG4, VHSF63 180p GRUNDIG		PANASONIC VIDEO LAMPS	VL02 30p		C8712,C8714,C88 M68-190/99,M70	
MVS400, 440, VS400, 410, 415, 435, 440, 441 450, 458, 480 550	VR44589, VR4458920, VR4458922, VR6443, 6843, 6843, VR6943 100p	SHARF VIDEO LAWIPS	VL02 30p		ST66-1602,T55-3	
V\$180, 200, 220, 226, 262, 265, 287, 2X40800, 0850, 0880, 1500, 2000, 2080, 2200, 2280,	VR3260, 6349, 6448, 5449, 5548, 6648, 4958620, 6448695, 49586 110p VKR6850, VKR6855 70p	VIDEOLAMPS	I)VL04 135p	PRICE:	140p	
MVS200RC 90p VS150 160p	VR501 110p	AIWA AKAI AIRA AMSTRAI	D,VL05 100p	USED ON:	MATSUI-2190, S	AISHO-
V\$310, 311, 315, 320, 326, 340, 345, 380, 385, 445 859 V\$150 75p	SE4104, VR231, 2310, 2319, 231, 232, 2329,	BLAUPUNKT FERGUSON		PRICE.	PST21 30TX	
LC290N, LC295SN, SVS 180, VS 170 70p VS 160, BARCELONA, FLORENZ, GV4000,	247, 2479, 251, 252, 256, 257, 258, 33, 19, 332, 3329, 333, 337, 339, 3419, 342, 343,	FIDELITY FISHER, FUJITSU,		PRICE: PHILIPS	140p	
4000, 4001, GV4002, 400, 401, 4010, 402, 403, 404, 405, 406, 407, 4092, 410, GV411, 412, 414, 415,	3469, 347, 3479, 35, 1, 352, 357, 358, 422, 4229, 432, 437, 442, 4229, 432, 437, 442, 44, 5, 4469, 447, 4479, 451, 452, 457, 458, 459,	FUNAI, G.E.C., GOLDSTAR, GRANADA, GRUNDIG, HINAR		USED ON:	K30, K35, K40, K	T3, KT4
416, 417, 4192, 4200, 420, 430, 434, 435, GV437, 440, 450, 4592, 480, 464, 470, 500, 501, 5050, 5095,	512, 522, 5229, 6379, 642, 647, 722, 7229, 723, 7379, 747, 8389, 948, 9489 70p	HITACHLITT IVC (HRD		PRICE:	£0.95	
GV5105, 611, 530, 5395, 540, 580, 5695, MV4005, 4105, SE4100, 4104, 4120, 5102,	SAISHO VR2000, VHL3 900	SERIES), MATSUI, MITSUBISI	Hla	PART NO:	(POWER SWITCH	
6104, 5106, TVR37001 70p HINARI	VR3800, 3200, 3300, 3500, 3600, 3650, VRS4400, 5000 78p	NEC, ORION, NATIONAL,			SWITCH)	I T NEWOTE
VXL2 80p VXL7, VXL8, VXL9, VXL10, VXL11, VXL19, VXL90, VCR34, VTV 100,	VR3400 100p SAMSUNG	PHILIPS, SAISHO, SALORA, SAMSUNG, SANYO, SHARP,		USED ON:	KV1612, MK1, KV KV1614, KV2052,	
200 180p VXL4, VXL35, VTV300 70p	SV716. 717. V1616. V-621, V1626. VX616. VX617, VX619, X626. VX627, VX629. VX714 85p	SIEMEN, SONY, TELEFUNKEN	٩, *		KV2062, KV2068,	
VXL5, VXL6 160p VXL3, VXL20 90p	VB520, 510, 610, 616, 617, 619, 620, 626, 627 629, V1510, 520, V1611, 616, 621, 626.	THOMSON, TOSHIBA			KV2216, KV2252,	
HITACHI VT11, 14, 16, 17, 19, 33, 330, 34, 35, 350, 38, 39, 88, 165, 5030 85p	VX510, 511, 520, VT320, 5600 100p VB900, VB910, V1900, V1910 110p	, and a, and an appendix (1110102),			KV2704 KV2705, KV2752PE3, KX2	
VT5000, VT5500, VT18 120p VT7000, VT8000, VT8030, VT8040, VT8300,	319, 322, VB750, 770, 8220, 8225, V1770, 790	HITACHI (VT3000), ITT (VR391	-,	PRICE:	KX20PS2, KX27P	S1
VT8500, 8700 50p VT680, VT6500, VT9300, VT9300, VT9500, VT9700, 9900 75p	8220, 8225, VK8220, VPX31, VX750, VX770, 790, 8220, 8225, SE9000, 9001 90p	VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI		PART NO:	1.50p (POWER SWITCH	+ REMOTE
VT52, VT57, VT61, VT62, VT63, 64, 65, 85, 86, 640 90p	SVX301, 303, 305. SX7301, V3710, 971, V1710, 730, 750, 970, VX710, 712, 720, 730, 970, 971, 972	(HS200), TELEFUNKEN (VR510	D,		SWITCH	
VT3000 120p VT100, 110, 111, 113, 115, 118, 120, 125, 128, 130, 135, 138,	VX9880 110p SX7121 95p	519, 610), THOMSON (VK300,		USED ON: PRICE:	KV2022, KV2024 200p	
VT145, 150, 168, i70, 175, 220, 225, 250, 255, 258, 260, VTL30 90p	SANYO VTC5000 5150 5000 6500 VTCM10 11 20	305, 306, 3301), FERGUSON		PART NO:	(POWER SWITCH	
VM500 VM600 90p J.V.C.	21. 30. 31, 50 75p VTC5300, VTC5350, VTC5400,	(3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912,		USED ON:	KV1400, KV1440, KV2060	KV2040,
HR3300, HR3330, HR3360, HR3660, HR4100 130p HR7200, HR7300 70p	VPR5800 80p VTC5500 70p	8922, 8925)		PRICE:	125p	
HR7350, HR7600, HR7610, HR7650, HR7665 75p	VTC9100, VTC9300 140p VTC1100, 1300, 1500, VHR1100, 1110, 1150, 1200, 1300,	BLAUPUNKT, ORION (VH1, 2A),VL02 30p	PART NO:	(POWER SWITCH REMOTE SWITCH	
HR7700 75p HRD110, 111, 120, 121, 220, 225. BP5000 90p	VHR1500, 2370, MVR220 90p VHR2100, VHR2300, VHR2500,	NATIONAL (NV200,2010, 3000		USED ON:	KV2020	"
HR0140, 141, 143, 150, 152, 157, 158, 160, 190, 250, 257, 310, HR0455, 565, 566, 725,	VHR2700 100p VHR3100, 3110, 3150, 3300, 3310, 3400,	7000, 8150, 8200, 8400, 8600,		PRICE £2.00 PART NO:	2 PIN (FUNCTION	SMITCH
755. HRP50 55p HRD170, 171, 180, 210, 21 1, 217, 230, 300, 320, 321, 330, 337, HRD350, 370, 400, 430,	3500, 3700, 3800, VHRD506, 700, TLS1000, TLS1001 80p	8610, 8620), SHARP (VC2300,		USED ON:	KV1612, MKK, V1	
440, 44 1, 500, 530, 700, 750,950, HR\$5000, 5500, 8000, 9000, BR9060,	VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, VHR154, 220, 23, 235, 240, 244, 250, 251, 274, 297, 310, 330, VHR335,	6000, 6200, 6300, 7300, 7700, 8300)			KV2052, KV2056,	and the second se
BR\$600, 605, 920, 925 50p HRD227, 520, 521, 522, 527, 600, 610, 620, 637, 641, 650, 830,	390, 4100, 4105, 4150, 4200, 430, 4300, 4350, 474, VHR4770, 5080, 5100, 5200, 5300, 5350.				KV2215, KV2216, KV2256, KV2704,	
HR0840, HR0X20, 22, HRJ200, 205, 300, 305, SR330, HRS10 80p	5700, 6850, 7100, VHR7200 7250, 7260, 7300, 7400, 7500, 7520, 7530, 7530, VHR7540,	AKAI IVS10), GRANADA V (VHSXJ3), TT (VR3993, 3994),	/L06 40p		KV2706, KV275PE	
HRD840, 550, 560, 580, 590, 640, 660, 670, 720, 730, 740, 770, HRD820, 860, 870, 880, 910, 960, 980, HRDX20, 25, HRJ2 10,	7700, 774, 7800, 7810, 8000, 8100, 8200, 8250, 8500, VHR8800, 8801, VHRD4400, 4410,	JVC (HR2650 7600 7610 765	0,	REPLA	CEMENT IDLER T	35p
HRJ215, 315, 316, 318, 400, 405, 407, 410, 411, 415, 416, 507, HRJ6 10, 615, 715, 97,	4500, 4600, VHRD4610, 4710, 4890, 570076p VMD66, VMD68P 80p VTR1000 70p	7655), TELEFUNKEN (VR530,		AKAI M132773		IT01
HRS4700, 5800, SR3200, SRS368E 60p HRJ600 40p LOGIK	VTC6010 75p SHARP	535, 539, 550, 630, 650},		GOLDSTAR	MZ366960J2 VXP0521	1102
VR955 180p MATSUI	VC200, 381, 384, 385, 386, 388, 390, 393, 838, 9100, 9300, 9500, VC9700 100p	THOMSON (V309, 316, 357, VK309, 411,TX8000),		HITACHI	6861471	IT17 IT03
VX600, 730, 735, 750, 755, 765, 850, 6000, VS888 75p	VC7300, VC7700, VC7760, VC7800. VC8000 110p	FERGUSON (3V31, 8941, 8942)	1		6861482 6886971	IT04
VX1000, VX2000, VX2500, VX3000, VX5000 100p VX800 70p	VC8300 115p VC300, 387, 471, 473, 481, 482, 483, 486, 458,	AUTHENTIC (N850), DECCA V	/L07 40p	JVC/	PU 48967B	1T05 IT06
MITSUBISHI HS200 2000	496, 8481 80p VC402, 500, 671, 573, 581, 582, 583, 584, 585, VCSF3, VC8581 80p	(VR8300), GRANADA (VHSTJ3,		FERGUSON	PU 51380	IT07
HS300, 301, 302, 307, 310, 337, 338, 347, 349, 411, 412, 421, 480, HSB10, 20, 30, HSE10, 20,	VC108, 405, 408, 550, 600, 651, 674, 681, 682, 682, 684, 685, 693	WJ1, WJ3), ITT (VR3913, 3914,		A Leve	PU 51402A PU 55373	IT08 IT09
HS303, HS304, HS306, HS307, HS330, HS400, HS700 110p	VC700, 750, 783, VC6F3, VC6V3 70p VC206, 671, 772, 779, 780, 781, 782, 785, 786,	3963) JVC (HT7200, 7300, 7350).	NATIONAL	PU 55374	IT10
HS318, HS319, HS410 110p HSM1000, 18, HSM23, 25, 33, 34, 35, 37, 54,	787, 793, 800, VC7810, 7822, VCA100, 102, 103, 104, 131, 140, 170, 202, 03, VCA234,	7700) TELEFUNKEN (VR450, 520, 529, 540, 549, 620, 640, 92	0	PANASONIC	VXP 0329 VXP 0343	IT11 IT12
55, 67, 68, 59, 68 56p N.E.C. N830, N831, N832, N833 100p	501, 502, 602, 5011, VCB311, 361, VCD801, 802, VCH651, 852, 882, VCM73, VCT72 75p VCA10, 103, 105, 106, 113, 11613, 211, 234,	1920), THOMSON (V4100,	,		VXP 0344	IT13
N895 80p PVC2300, PVC2400 180p	244, 254, 30, 33, 35, VCA36, 37, 40, 43, 454, 48, 50, 505, 51, 52, 53, 54, 55, 56, 57, 58,	VK308, 309, 312, 410),			VXP 0401 VXP 0433	IT14 IT15
DX1000. 1600, 1800, 2000, 3000, N9012. 9013. 9014, 9016. N9033, 9034, 9053, 9054, 9055, 9058, 9066, 9096, 9110, 9120.	VCA60, 605, 615, 67, 68, 1031, VCB320, VCB597, VCD805, VCD806, 810, 815, VCH80,	FERGUSON (3V23, 29, 30, 8923	3,		VXP 0463	П16
N9510, 9520, 9530, 9610 85p NATIONAL PANASONIC	81, 85, 865, 910, VC51000, VCT212, 310, 410, 610, VCT1314, VCTS312,	8924, 8929, 8930, 8931, 8940)			VXP 0521 VXP 0581	IT17 IT18
NV300, NV330PX, NV332, NV333 NV340, NV366 100p	313, VC790ET 80p VCC10 70p	GRANADA (VHSAY3), SHARP V		SANYO	1430662T15620	П19
NV777, NV788 100p NV2000, NV2010, NV3000 100p NV7000, NV7200, NV7800 95p	SONY SLC6, SLI10, SLT6ME 140p SLC5, SLC7, SLI7, SLI9, SLT7ME 140p	(VC200, 381, 384, 385, 386, 388 390, 393, 9300, 9500, 9700)		SHARP	NIDL005GEZZ NIDL0006GEZZ	IT20 IT21
NV8600, NV9610, NV862 145p NV230, 250, 280, 430, 431, 433, 450, 460, 465	SLC9, SL8000, SL8080, SL150 165p SL8000E, SL8080E, SL8200, SL8600 175p				NPLY0107GEZZ	IT22
470, 650, 730, NV770, 810, 870, 890, 970, AG 1000, 1050 110p NV370, NV380, NV480, NV630, NV780.	SLV255. 125. 213, 225, 262, SLVX1. 20. 3 95p	PANASON		PRICE 20p EACH		
NV830, NV850 70p NV600, NV608, AGC010, AG0015 100p	TOSHIBA V55, V37 86p	MODE SWITC			A PACK OF 5 FOR EA	CH MODEL
NVG7, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, 400, NVH70 50p NVFV1, NVM10, 3000, 3300, 40, 7, 9000,	V33, V31, V32, V51, V52, V53, V9600, V9680 85p V61 V63 V65 V65 V67 180-	NV2000, 2010, 7000, 7200, 7800 NV230, 260, 430, 810, 870, 230		13p EACH FOR	A PACK OF 10 FOR E	ACH MODEL
9900, NVMS1, 4 70p NVM 1, NVM3, NVM5 70p	V61, V63, V65, V66, V67 150p DV80B, DV80D, V71, 73, 74, 75, 77, 61, 83, 85, 86 80p	(VSS0110)	£2.25	Series and		THE REAL PROPERTY.
PHILIPS VR6450, VR6920 170p	V108, 109, 110, 120, 130, 140, i99, 209, 210, 211, 220, 221, 411, V421, 609, 610, 611, 659,	NV830 (VSS0091)	£2.10	Restored and the second	RANDATA LTI	
VR6442, VR6542 70p VR2025, VR2580 100p	660, 711, 880 120p V91 G, V95G 115p	NV300, 333, 340, 366, 688, 777,		No. of the second second	l: 0181-900 23	
DV186, 190, 286, 291, 292, 468, 471, 562, 571, 761, VR201, 202, 203, 211, 2115, 212, 213, 223, 311, 312, 313, 3210, 3219, 322, 32, 29,	V212, 213, 22-2, 3i2, 322, 403, 412, 413, 610, 703, 813 50p	(VSS0060 NVG21, 25, NVH65, NVD80 (VS	£3.75	- Fax	k: 0181-903 61	26
	VCP81E 110p	02., 20, 101100, 10000 (V3				

VIDEO SERVICE KITS

VIDEO	SER	IVICE KITS		V
AMSTRAD				VT11/VT3 Contents
Contents BELT SET. PINCH ROLLER. F Order Code: SK41	REEL IDU	ER, VIDED LAMP	£5.50	BELT SET TYRE SU TYRE PI
FERGUSON & JVC 3V42/43				IDLER. CI TENSION Order Co
HRD455/HR0725 Contents BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TEN BAND Order Code: SK37	ISION £16.00	Economy Kit Contents BELT SET, PINCH ROLLER SUPPLY CLUTCH, TAKE UP CLUTCH ORDER CDDE: SK38	£9.00	VT52/61/0 Contants BELT SET FF/REW / TENSION
3V58/59/64/65	110.00	UNDER CODE. ORDE	1.3.99	Order Co VT400/40
HRD 170/180/210/230/300/32/ HRS5000 <i>Contents</i> BELT SET, PINCH ROLLER, 1 Drder Code: SK44			£7.00	510/520/2 Contents TIMING I TENSION
3V29/3V30			27.00	Order Co VT100/11
HR7200/7300/7350 Contents				175/220/2 Contents
BELT SET, PINCH ROLLER, " Order Code: SK05	TENSION	BAND, IDLER TYRES	Ē5.00	BELT SET TENSION Order Co
3V35/36, 38/39/49 HRD110/111/120/225				PANAS
Contents BELT SET, PINCH ROLLER, " Order Code: SK04	TENSION	BAND, JOLER TYRES	£5.00	NV2000/1 Contents BELT SET
3V31/3V42 HR7600/7610/7650/7655				Order Co
Contents BELT SET, T/U REEL TABLE TYRE. PINCH ROLLER. REEL IDLER. T/U CLUTCH. T/U ID	LER.	Economy Kit Contents BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, TYRE, T/U IDLER, TYRE TRI CUTTON		NV300/N Contents BELT SET Order Co
TENSION BAND. VIDEO LA Order Cede: SK33		T/U CLUTCH Order Code: SK34	£5.00	NV2000/1
3V35/36/38/39/49 HRD110/111/120/121/225 Contents		Economy Kit Contents		Contents BELT SE IDLER. P
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE		BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE		BAND. V Order Co
TYRE PINCH ROLLER. T/U CLUTCH. T/U IOLER. REEL IDLER. TENSION BAND		TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER TYRE. RI IDLER TYRE	ΞĘĻ.	NV7000/1 Contents BELT SE
Order Code: \$K35 3V29/3V30	£10.00	ORDER CODE: SK36	£5.50	IDLER UI TENSION Order Co
HRD7200/7300/7350 Contents		Economy Kit Contents		NV300/N
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLER. T/U CLUTCH. T/U ID		BELT SET. T/U REEL IDLER TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLE TYRE. T/U IDLER TYRE.		Contents BELT SE IDLER UI TENSION
TENSION BAND. VIDEO LA Order Code: SK31	MP	T/U CLUTCH ORDER CODE: SK32	25.00	Order Co
3V44/45/48/53/54/55/57 HRP50/HRD140/150/158/160 HRD250/257/565/566/755				NVG7/NV NVG18/N AG1810 (Contents
Contents BELT SET. PINCH ROLLER. CLUTCH MECHANISM. TER	NSION	Economy Kit Contents BELT SET. PINCH ROLLER		LOADING BELT. Pil TENSION Order Co
BAND Order Code: SK39	£15.00	ORDER CODE: SK40	£9.50	NV332
FISHER FVHP905/906/907/908/910/9	11/916/91			BELT SE PLAY ID
Contents BELT SET. PINCH ROLLER. IDLER. GEAR IDLER UNIT. TENSION BAND		Economy Kit Contents BELT SET. PINCH ROLLER. IDLER TYRE		TENSION Order Co
Order Code: SK57		ORDER CODE: SK58	£5.00	AG1200F
FVHP615/618/620/622/710/7 730/830/840 Contents	11/715/71	6/720/721/722/725/ Economy Kit Contents		BELT SE IDLER. T
BELT SET, PINCH ROLLER. IDLER, GEAR IDLER UNIT, TENSION BAND		BELT SET. PINCH ROLLER. IDLER TYRE		Order Co NV600/N
Order Code: SK58	£11.00	ORDER CODE: SK69	£300	Contents BELT SE PLAY ID TENSIO
VT11/VT33 Contents BELT SET. PINCH ROLLER.	TENSION	BAND. IDLER TYRES		Order Co
Order Code: SK08			£5.00	NV730/N Contents SLOT IN
		L TRIPLER 5.00 each		PINCH F TENSIO
		MODE KIT		NV370/N Contents
	-	R PAGES		BELT SE IDLER. T Order Co
말 아이들 것 같아요. 그렇게		IORE	100	NV777/N
10			2.5	Content BELT SE

GRANDATA BARGAINS

VIDEO SEF	RVIC	E KITS (Cont.)
VT11/VT33 Contents BELT SET. T/UP REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. FF/RE		Economy Kit Contents BELT SET. PINCH ROLLER. FF/REW IOLER TYRE. T/UP R TABLE TYRE. SUPPLY REEL	EEL
IDLER. CLUTCH PLATE. TENSION BAND Order Code: SK45	£13.00	TABLE TYRE -	63.75
VT52/61/62/63/64/65/85/86/64 Contents BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLAJ		Economy Kit Contents BELT SET, PINCH ROLLER FF/REW IOLER	
TENSION BANO Order Code: SK49	£14.00	ORDER CODE: SK50	£3.00
VT400/405/410/13/14/15/18/4/ 510/520/25/26/530/35/36/540/ Contents TIMING BELT. PINCH ROLLE TENSION BAND	545/46/4	3/570/75/576/580/85/88	
Order Code: SK52 VT100/110/111/113/115/118/F		28/130/135/138/145/150/	£9.75
175/220/225/250/255/258/250/ Contents BELT SET, PINCH ROLLER, F TENSION BAND Order Code: SK51		RM. CLUTCH PLATE.	£14.00
PANASONIC			
NV2000/NV2010 Contents BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYR Order Code: SK03		NV7000/NV7200/NV7800 Contents BELT SET. PINCH RDLLER. TENSION BAND. IOLER TYR ORDER CODE: SK02	ES (5.00
NV300/NV330/NV333/NV340, Contents	/NV356		
BELT SET, PINCH ROLLER, T Order Code: SK01	ENSION	BAND. IDLER TYRE	£5.00
NV2000/NV2010 Contents BELT SET. PINCH ROLLER. F IDLER. PLAY IOLER. TENSIO BAND. VIDEO LAMP	N	Economy Kit Contents BELT SET. PINCH ROLLER. IDLER TYRE. PULLEY TYRE	
Order Code: SK13 NV7000/NV7200/NV7800	£6.00	ORDER CODE: SKI¢	63.50
Contents BELT SET. PINCH ROLLER, IDLER UNIT. PLAY IDLER. TENSION BAND		Economy Kit Contents BELT SET, PINCH ROLLER IDLER TYRE. CLUTCH TYRE	63.25
Order Code: SK11 NV300/NV330/NV333/NV340		ORDER CODE: SK12	6.25
Contents BELT SET, PINCH ROLLER, IDLER UNIT. PLAY IDLER. TENSION BAND		Economy Kit Contents BELT SET, PINCH ROLLER IDLER TYRE. PLAY IOLER	
Order Code: SK15 NVG7/NVG9/NVG10/NVG11/	£7.00	ORDER CODE: SK16	£3.25
NVG18/NVG30/NVG120/NVG AG1810 (P/K) Contents			
LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLEF TENSION BAND		LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLEF TYRE	L £3.00
Order Code: SK27 NV332	£6.00	ORDER CODE: SK28	11.00
Contents BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW T	/RE	Economy Kit Contents BELT SET, PINCH ROLLER PLAY IOLER TYRE. FF/REW IDLER TYRE	
Order Code: SK29 NVZ30/250/260/280/430/450/		ORDER CODE: SK30	£5.10
AG1200PK/AG1500PK Contents		Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER. TENSION BAND Order Code: SK23		BELT SET, PINCH ROLLER IDLER TYRE ORDER CODE: SIZ4	£3.25
NV600/NV688 Contents		Economy Kit Contents	
BELT SET, PINCH RDLLER, PLAY IDLER, FF/REW IDLER,		BELT SET, PINCH ROLLER PLAY IDLER TYRE. FF/REW	
TENSION BAND Order Code: SK25	£12.00	IDLER TYRE Order Code: Sk26	£6.00
NV730/NV770 Contexts SLOT IN BELT, LOADING BE PINCH ROLLER, IDLER UNIT TENSION BAND		Economy Kit Contents SLDT IN BELT, LOADING BE PINCH ROLLER, IDLER TYRE	
Order Code: SK19	<u>£5.00</u>	ORDER CODE: SK2D	£3.00
NV370/NV380/480/630/780/8 Contents BELT SET, PINCH ROLLER, IDLER, TENSION BAND		Economy Kit Contents BELT SET, PINCH ROLLER IDLER TYRE	
Order Code: SK21 NV777/NV788	13.00	ORDER CODE: SK22	£2.75
Contents BELT SET, PINCH ROLLER, IOLER UNIT. TENSION BAN		Economy Kit Contents BELT SET, PINCH ROLLER IDLER TYRE	
Order Code: SK17	10.96	ORDER CODE: SK18	£4.00

1.00		
VIDEO SERVIC	E KITS /Con	+1
SHARP		/
VC381		
Contents BELT SET. PINCH ROLLER.	Economy Kit Contents BELT SET. PINCH ROLLER	
REEL IDLER, TENSION BAND. VIDEO LAMP	REEL IDLER TYRE	
	ORDER CODE: SK48	£3.25
VC500/VC571/VC581/VC582/VC583/VC		
Contents BELT SET, PINCH ROLLER	Economy Kit Contents BELT SET. PINCH ROLLER	
REEL IDLER. TENSION BAND Order Code: SK60 £9.50	REEL IDLER ORDER CODE: SK61	£5.00
VC781/VC7810/VC7822/VC785/VC786/	VC793/VC800/	
VCA100/VCA102/VCA104/VCA202 Contents	Economy Kit Contents	
BELT SET. PINCH ROLLER.	BELT SET. PINCH ROLLER REEL DRIVE UNIT TYRE	
REEL DRIVE UNIT. TENSION BAND		
	ORDER CODE: SK65	£3.75
VC681/VC682/VC684/VC685/VC693/VC Contents	Economy Kit Contents	
BELT SET. PINCH ROLLER. REEL DRIVE UNIT. TENSION	BELT SET. PINCH ROLLER REEL DRIVE UNIT TYRE	
BAND	ORDER COOE: SK63	£5.00
		-
FOR MORE DETA		- 1
PLEASE		13.4
FLEASL	MAG 03:	
BACKUP E	ATTERIE	s
REPLACEMENT PHILIPS NI		-
Replaces Ferguson Part No: 00E6-067-001, used on TX10, L	2V	90p
Replaces Philips Part Nos:		
138-10138, 138-10313. 1.2V - 9 Replaces Philips Part Nos:	uman	75p
138-1229, 2.4V - 90mAh REPLACEMENT FERGUSON I		£1.35 TERIES
Replaces Ferguson Part Nos:00 Used on: 3V35, 3V56, 3V58, 3V	0E6-066-001, 2.4V	150p
	EMENT	
	ORMERS	
Description	Price	Order
HITACHI 2433752	1500p	Code LOT01
ORION 3714002 FIDELITY ZX300	1500p 1500p	LOT02 LOT03
FE TX100 90 DEG	1500p 1500p	LOT04 LOT05
SABA 490007182 FE TX90 WHITE	1650p	LOT06
ITT 0307/37 EQ BLAUPUNKT 210	1600p 1600p	LOT07 LOT08
GRUNDIG 2922010 ITT CVC800/1/3	1600p 1500p	LOT09 LOT10
17TD218/37 EQ NORMENDE 5255	1600p 1600p	LOT11 LOT12
SABA 81000 200 SALORA T236 EQ	1600p 1650p	LOT13 LOT14
SABA 811-50-24 SABA 770223500	1600p 1600p	LOT15 LOT16
TELEFUNKEN AT1	1450p	LOT17
TELEFUNKEN EQ SALORA FM0218B	1400p 1600p	LOT18 LOT19
NORMENDE 5255	1600p 1500p	LOT20 LOT21
ITT COMPACT 80 FE TX100 GREEN	1500p 1400p	LOT22 LOT23
HINARI CT4/5 5113 SELECO 6320410	1500p 1600p	LOT24 LOT25
BLAUPUNKT 8667		
	1600p	LOT26
ITT COMPACT B1 ITT CT3326 MUL	1600p 1450p 1500p	LOT26 LOT27 LOT28
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ	1600p 1450p 1500p 1600p 1600p	LOT26 LOT27 LOT28 LOT29 LOT30
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920	1600p 1450p 1500p 1600p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31 LOT32
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP	1600p 1450p 1500p 1600p 1500p 1600p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FË TX100 110 D HANTAREX 28021	1600p 1450p 1500p 1600p 1600p 1600p 1200p 1200p 1500p 1600p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31 LOT32 LOT33 LOT34 LOT35
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FE TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432981 CP	1600p 1450p 1500p 1600p 1600p 1600p 1600p 1500p 1600p 1600p 1600p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31 LOT32 LOT33 LOT34 LOT35 LOT36 LOT37
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FE TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432951 CP FERGUSON 00D3-508-002 Fits Chassis TX59 41cm + 51cr	1600p 1450p 1500p 1600p 1600p 1600p 1600p 1500p 1600p 1600p 1800p 1600p 1600p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31 LOT32 LOT33 LOT34 LOT35 LOT36
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FÉ TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432981 CP FERGUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cr Used On: 51X2, 5134, 51J7, 41	1600p 1450p 1600p 1600p 1600p 1600p 1500p 1500p 1500p 1500p 1500p 1500p 1600p 1600p 1600p 1800p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31 LOT32 LOT33 LOT34 LOT35 LOT36 LOT37 LOT38
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FË TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432981 CP FERGUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cr Used On: 51X2, 513, 51J7, 41 41H2, 41H2, 51X3 PANASONIC TLF14567F Used On: TC2043, TC2243, TX	1600p 1450p 1500p 1600p 1600p 1600p 1500p 1500p 1500p 1500p 1500p 1600p 1600p 1800p 1800p 1850p 1850p 300	LOT26 LOT27 LOT29 LOT30 LOT30 LOT31 LOT32 LOT32 LOT34 LOT36 LOT36 LOT37 LOT38
ITT CT3326 MUL ITT D566/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FE TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432981 CP FERCUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cr Used On: 51K2, 51J8, 51J7, 41 41H2, 41H2, 51K3 PANASONIC TLF14563F Used On: TC2043, TC2243, TX PANASONIC TLF14563F Used On: TC2243, TX2244	1600p 1450p 1500p 1600p 1600p 1600p 1600p 1600p 1600p 1600p 1600p 1600p 1800p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31 LOT32 LOT33 LOT36 LOT36 LOT37 LOT38 LOT39 LOT40
ITT CT3326 MUL ITT D06677 EQ ITT 3546 EQ LUXOR 5810110 SABA 833809200 HITACHI 2434141 CP FE TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432981 CP FERCUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cr Used On: 51K2, 51J8, 51J7, 41 41H3, 41H2, 51K3 PANASONIC TLF14588F Used On: TC2210, TC2160, Used On: TC2210, TC2160, Used On: TC2210, TC2160,	1600p 1450p 1500p 1600p 1600p 1600p 1500p 1500p 1500p 1500p 1500p 1600p 1600p 1800p 1800p 1850p 1850p 300	LOT26 LOT27 LOT29 LOT30 LOT30 LOT31 LOT32 LOT32 LOT34 LOT36 LOT36 LOT37 LOT38
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FE TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432981 CP FERGUSON 00D3-508-002 FIS Chassis TX99 41cm + 51cr Usad On: 51X2, 5138, 51J7, 41 41H3, 41H2, 51K3 PANASONIC TLF14567F Usad On: TC2043, TC2243, TX PANASONIC TLF14588F Used On: TX2231, TX2244 PANASONIC TLF14584	1600p 1450p 1500p 1600p 1600p 1600p 1600p 1600p 1600p 1600p 1600p 1600p 1800p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31 LOT32 LOT33 LOT36 LOT36 LOT37 LOT38 LOT39 LOT40
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FË TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432981 CP FERCUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cr Used On: 51K2, 51J8, 51J7, 41 41H2, 41H2, 51K3 PANASONIC TLF14563F Used On: TC2204, TC2160, TX231, TX2244 PANASONIC TLF14584 Used On: TC2210, TC2160, TX1752, TX2112 TX2112, TX2162, TXC22 PANASONIC TLF14586F	1600p 1450p 1500p 1600p 1600p 1600p 1600p 1600p 1600p 1600p 1600p 1600p 1800p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31 LOT32 LOT33 LOT36 LOT36 LOT37 LOT38 LOT39 LOT40
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FE TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432981 CP FERGUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cr Usad On: 51K2, 51J8, 51J7, 41 41H3, 41H2, 51K3 PANASONIC TLF14567F Usad On: TC2043, TC2243, TX PANASONIC TLF14567F Usad On: TC2031, TC2243, TX PANASONIC TLF14568F Usad On: TC2231, TX2244 PANASONIC TLF14584 Usad On: TC2210, TC2160, TX1752, TX2112 TX2112, TX2162, TXC22 PANASONIC TLF14586F TC2051, TC2051, TC2061, TC2253, TC2263, TX5500	1600p 1450p 1600p 1600p 1600p 1600p 1600p 1500p 1600p	LOT26 LOT27 LOT28 LOT29 LOT30 LOT31 LOT32 LOT33 LOT34 LOT36 LOT36 LOT36 LOT39 LOT40 LOT41
ITT CT3326 MUL ITT D066/37 EQ ITT 3546 EQ LUXOR 5810110 SABA 849380920 HITACHI 2434141 CP FË TX100 110 D HANTAREX 28021 SHARP C3700 EQ HITACHI 2432981 CP FERCUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cr Used On: 51K2, 51J8, 51J7, 41 41H2, 41H2, 51K3 PANASONIC TLF14563F Used On: TC2204, TC2160, TX231, TX2244 PANASONIC TLF14584 Used On: TC2210, TC2160, TX1752, TX2112 TX2112, TX2162, TXC22 PANASONIC TLF14586F	1600p 1450p 1600p 1600p 1600p 1600p 1600p 1500p 1600p 1500p 1600p 1500p 1600p	LOT26 LOT27 LOT28 LOT29 LOT31 LOT31 LOT32 LOT33 LOT34 LOT35 LOT36 LOT37 LOT39 LOT40 LOT41

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 recommended parts is supplied for the most popular models, which when fitted should overcome this should overcome this.

MAKE & MODEL	ORDER CODE	PRICE
PACE PRD800, PRD900	SATP SU1	650p
PACE SS9000, 9200, 9010, 9210, 9220	SATPSU2	6500
AMSTRAD SRD510, SRD520	SATPSU3	650p
AMSTRAD SR0500	SATPSU4	650p
AMSTRAD SRX340, SRX345, SRX350	SATSPU5	650p
PACE D100/150	SATPSUS	650p
CHURCHILL OZMAC	SATPSU7	850p
PACE MSS100	SATPSU8	730p
PACE MS S200/300 APPOLL	SATP SU9	650p
PACE MSS500/1000	SATPSU10	1230p
FERGUSON SRD4	SATPSU11	\$35p
ECHOSTAR SR5500	SATPSU12	1735p
ECHOSTAR 8500/7700/8700	SATPSU13	3125p
AMSTRAD SRD600	SATPSU14	31250
MIMITEC (Surensen)	SATPSU15	775p
AMSTRAD SRD700/SR950/SRX100/301 SRX501/1002/2001/SRD2000 SAT250	SATPSU16	. 730p

PACE 9000 SWITCH MODE TRANSFORMER ORDER CODE: PACE9000 PRICE 800p

SATELLITE TUNERS PACE PRD800/MSS200 2Ghz Order Code: TUNER 01 Price: 1650p + VAT PACE PRD900/MSS1000 2Ghz

Order Code: TUNER 02 Price: 1650p + VAT



Audio Control Head

AMSTRAD ORIGINAL NO: 150751 Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4800MKH, 4700. FUNAI VS2, VCR4800, 4800, 5200, 5600, 6600, VIP3000, 5000 Also fits: FIDELITY, FUNAI, HINARI, PROLINE, SCHNEIDER, TOWADA, UNIVERSUM ORDER CODE: AHOT PRICE: 1350p

AMSTRAD ORIGINAL NO: 153134

Used on: AMSTRAD DD8900, 8904, VCR2000, 6000, 5100, 8600, 8802, 8803, VCR8804, 8700, 8704, 8714, 8800, 9005, 8244 Also fits: ANTECH, BONDSTEC, CASIO, CROWN, FIDELITY, GOLDHAND, GRANADA, HINARI, MARQUANT, OMEGE, PROFEX, SCHNEIDER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA, UNIVERSUM ORDER CODE: AHQ2 PRICE: 1450p

Replacement Audio Control Video Sound

Head for Nation	al Panasonic	
PART NUMBER	MODELS	PRICE
VIBR 0091	NVG7 etc	6750
VBR0050	NV300, NV340 etc	6750
V8R0061	NV777 etc.	875p
VBROTOSA	NV250, NV450 etc	625p
VBR0125		6250
	and the second sec	

8 way Preprogrammed Universal Remote Control A single remote control to operate Televisions, Videos and Satellite Receivers. Plus Auxiliary Options1

- Replaces up to 8 remotes with one Simple 4 digit setup routine
 Controls 1000s of models Teletext functions with Fastext
- Clear (large key) layout Code Search Facility

· Stylish and easy to operate · Replace broken or lost remotes

- Original remote not required Order Code: 8 WAY PRICE: 1250p + VAT

Cassette DC Motors

MOTOR TYPE	PRICE
6V MOTOR	1700
SV MOTOR	170p
12V CW MOTOR	170p
12V CCW MOTOR	1709
13.2 CCW MOTOR	, 2900

GRANADA	V\$56, V\$75	CH18	3200
	VHSDP1	CH05	1100
	VHSYJ2	CHOI	2800
GOLDSTAR	GHV1290P, 1291P, 1295P, 9400.	Grigi	2000
outrainer.	73401, GSE1295P, GSE1891P,		
	200010, 200510, VCP4200, 4300,		
	4301, 4305, VCP4306, 4311, 4315,		
	4316, 4320, 4321, 4325	CH25	2000
	GHV51, 1221, 1232, 1240, 1241,		-
	1242, 1244, 1246, 1248, GHV9000,		
	8200	CH26	29005
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, HRD 140, 141, 150, 157, 158, 160, 250,		
	HRD257, 455, 565, 566, 725, 755	CH02	2800p
	8948, 8950, FV108, 12L, 13H, 14T,		
	208, 21R, 22L, 28, 395, HRD230,		
	430, 530	CH03	2800p
	3V58, 3V59, 3V64, 3V65, FV11R,		-
	8950, 8951, HRD170, HRD180,		
	HRD370	CHO4	2800p
	FY31R	CH19	4300
		0.114	1000
	HRD515, 520, 527, 540, 550, 580, 600, 610, 620, 660, 670, HRD830,		
	840, 850, 860, 4050, 6600, FV37H	CH20	2200
	NRD540, 580, 830, 860, 910, 960,		
	HRDS70, HRDX20,		
	FERGUSON FV57H	CH27 .	2400
LT.T.	VR3805, VR3905	CHOI	2800
	VR3916, 3926, 3946, 3948, 3976,		
	3986, 3995, 3997, 6948	CHO2	
	VR3916, 3926, 3946, 3948, 3976,	and the second second	
4	3986, 3995, 3997, 6948	CH02	2800;
NATIONAL PANASONIC	NV730	CH06	43000
N.EC.	N830EG, N831EG, N831EG, N832,		
	N833EG	CHOI	2800p
	N895	CH02	28000
PHILIPS	CASSETTE UFT ASSEMBLY (691)		
rniura	DV186, 190, 286, 471, 562, 781,	(1300)	
	VR6180, 5182, 8185, 6285, VR6290,		
	6291, 6293, 6362, 6367, 6393, 6467,		
	6468, 6470, VR6561, 6670, 6780,		
	6761, 6870, 6970	CH05	1100p
	VR6443	CH22	29000
	VR6448	CH23	25000
	49586	CH24	25000
SHARP	VCA100, VCH851, VCH852	CH22	2900p
	VCA103, 103GV, 106, 106GVM,		
	254GVM	CH23	2500p
	VCS211, 244, 5055, 805, VCB230,		
	VCD806G, 810G, VCT212, 310,		
	410G, 610	CH24	2500p
TELEFUNKEN	VR2970	CH02	28000
THOMSON	V320, 321, 323, 326, 4200, 4300	CHOI	2800p
	V342, 343, 352, 353, 360, 364, 368,		
	4210, 4230, 4260, 4400, V5500,		
	6000, 8540	CH02	2800p
TOSHIBA	V55, V57	CH01	28000
	V65, V86	CH02	2900p
	103, 100	GINGE	25000
Service Aids			
DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER	75ML	SPDI	160p
SWITCH CLEANER	176ML	SP02	170p
SILICONE GREASE	200ML	SP03	2100
FREEZE IT	. 170MIL	SPO4	3100
FREEZEIT	400ML	SPIE	600p
FOAM CLEANE	400ML	SP05	1800
	150ML		
ANTI-STATIC AEROKLEANE	135ML	SP06 SP07	190p
	150ML	and the owner where the owner w	
AERD DUSTER	400ML	SP08	310p
AERO DUSTER		SP17	550p
	200ML	SP09	2500
PLASTIC SEAL	250ML	SP10	1600
GLASS CLEANER			.2300
GLASS CLEANER COLDKLENE	250ML	SP13	
GLASS CLEANEH COLDKLENE EXCEL POLISH 80	250ML 250ML	SP18	150p
GLASS CLEANER COLDKLENE EXCEL PDLISH 80 ADHESIVE 120	250MiL 250MiL 400MiL		
GLASS CLEANEH COLDKLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130	250ML 250ML 400ML 200ML	SP18 SP19 SP20	150p 190p 240p
GLASS CLEANEN COLDKLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130 REFURE 140	250MiL 250MiL 400MiL 200MiL 400MiL	SP18 SP19 SP20 SP21	150p 190p 240p 240p
GLASS CLEANER COLDKLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130 REFURB 140 TUBE SILICON GREASE	250ML 250ML 400AL 200ATL 400ML 50 GRAMMES	SP18 SP19 SP20	150p 190p 240p 240p 210p
GLASS CLEANEH COLDKLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130 REFURB 140 TUBE SILICON GREASE TUBE SILICON SEALANT W	250ML 250ML 400ML 200ML 400ML 50 GRAMMES 750 GRAMMES 75ML	SP18 SP19 SP20 SP21	150p 190p 240p 240p
GLASS CLEANER COLDKLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130 REFURB 140 TUBE SILICON GREASE	250ML 250ML 400ML 200ML 400ML 50 GRAMMES 750 GRAMMES 75ML	SP18 SP19 SP20 SP21 SP11	150p 190p 240p 240p 210p
GLASS CLEANEH COLDRLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130 REFURB 140 TUBE SILICON SREASE TUBE SILICON SREASE TUBE SILICON SEALANT O TUBE SILICON SEALANT O TUBE SILICON SEALANT O	250ML 250ML 400ML 200ML 50 GRAMMES 50 GRAMMES HITE 75ML LEAR 75ML	SP18 SP19 SP20 SP21 SP11 SP22	150p 190p 240p 240p 210p 280p
GLASS CLEANEH COLDKLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130 REFURB 140 TUBE SILICON GREASE TUBE SILICON SEALANT C TUBE SILICON SEALANT C TUBE HEAT SINK COMPOU DRIVE CLEANER	250ML 250ML 400ML 200ML 50 GRAMMES 50 GRAMMES HITE 75ML LEAR 75ML	SP18 SP19 SP20 SP21 SP11 SP22 SP23	150p 190p 240p 240p 210p 280p 280p
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GLASS CLEANEH COLDKLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130 REFURB 140 TUBE SILICON GREASE TUBE SILICON SEALANT O TUBE SILICON SEALANT O TUBE SILICON SEALANT O TUBE SILICON SEALANT O TUBE HEAT SINK COMPOL DRIVE CLEANER SCREEN CLEANER COMPUTER CARE KIT	250ML 250ML 400ML 200ML 50 GRAMMES 50 GRAMMES 7HITE 75ML LEAR 75ML LEAR 75ML 200ML 200ML 200ML 200ML	SP18 SP19 SP20 SP21 SP21 SP22 SP23 SP12 SP24 SP25 SP26	150p 190p 240p 240p 210p 280p 280p 150p 150p 150p 2100p
GLASS CLEANEH COLDKLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130 REFURB 140 TUBE SILICON SREASE TUBE SILICON SEALANT O TUBE SILICON SEALANT O TUBE SILICON SEALANT O TUBE HEAT SINK COMPOL DRIVE CLEANER SCREEN CLEANER COMPUTER CARE KIT All the above the	250ML 250ML 400ML 200ML 50 GRAMMES HITE 75ML LEAR 75ML LEAR 75ML 200ML 200ML 200ML 200ML 200ML 200ML 200ML	SP18 SP19 SP20 SP21 SP11 SP22 SP23 SP24 SP25 SP26 Servia	150p 190p 240p 240p 210p 280p 280p 280p 150p 150p 150p 2100p
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GLASS CLEANEH COLDKLENE EXCEL POLISH 80 ADHESIVE 120 LABEL REMOVER 130 REFURB 140 TUBE SILICON SEALANT IC TUBE SILICON SEALANT IC TUBE HEAT SINK COMPOL DRIVE CLEANER SCREEN CLEANER COMPUTER CARE KIT All the above the flyou purchase moto	250ML 250ML 400ML 200ML 50 GRAMMES 7HTE 75ML LEAR 75ML LEAR 75ML 200ML 200ML 200ML 200ML 200ML e than one Servisol Product will be charged as follows:	SP18 SP19 SP20 SP21 SP21 SP22 SP23 SP12 SP24 SP25 SP26 SP26 Servise postag	150p 190p 240p 240p 210p 280p 280p 280p 150p 150p 150p 2100p
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Replacement Video Cassette Housings

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AKAI

VS35, VS53, VS55,

PRICE

3200p

CH18

Fits most Sony, Akal & J.V.C. Portable Hi-Fi and Midi Systems

2200p

PART NO: KSS210B

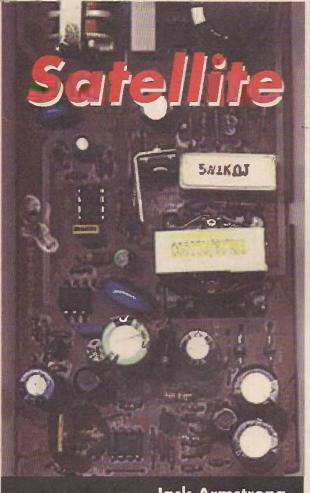
CFD 100, 105L, 120, 300, 440, 454, 455, 50, 500, 55, 58, 80 CFD68, 750, **755**, 760, 765, 770, 776, 440S, W100, 100S

Cassette Tape Heads	-	
HEAD TYPE MONO HEAD	-	PRICE 90p
STERE D HEAD		110p 150p
AUTO REVERSE HEAD		200p
Soldering Accessories DESCRIPTION	CODE	PRICE
ANTEX SOLDERING IRONS	7- Carlo	
25 WATT 240 VAC (XS25W 240V) 15 WATT 240 VAC (XS15W 240V)	S101 S102	900p 900p
25 WATT SPARE ELEMENT 15 WATT SPARE ELEMENT	S103 S104	450p 450p
SOLDERING STAND & SPONGES		
SOLDERING STAND (MADE BY ANTEX) SPARE SPONGE	S 108 S 109	350p 55p
SOLDER 18 SWG 500 GRAMMES	S110	500p
20 SWG 500 GRAMMES	S111	650p
22 SWG 500 GRAMMES DESOLDERING AIDS	S112	700p
SOLDER MOP STANDARD GAUGE 1.2MM X 1.5M SOLDER MOP 1.2MM X 10M	\$107 \$113	80p 400p
DESOLDERING PUMP	S105	3200
SPARE NOZZLE	S106	60p
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UNIVERSAL HEAD EXTRACTO Hand tool design		
extracting hard		/8
heads without d	amage t	
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REMOTE CONTROLS

KEI	VIUIE		JNTRULS			1 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -		3 10	and the	
Description	Order Code	Price	Description	Order Code	VCR ALIGNMENT KIT					
GRUNDIG	0000	-	PHILIPS (continued)			CONTAINS:				ET OF 8
TP160E	RC 107	900p	RC38	RC 301	750p	and the second se	AUDIO & CONTRO			EN KEYS
TP200, TP300	RC 380	750p	KT3 TEXT	RC 5301	750p	TOOL	AUDIO & CONTINC	C NEXO I O		mm02.0
	RC 401	675p	RC5352	RC 5352	750p		STMENT TOOL FO	R TAPE GU	IDE POSTS	1.27mm
TP400		750p	RC5375	RC 5375	750p	- RCA TYPE	BACK TENSION TO	JOL		1.60mm
TP590-600	RC 600			RC 5534	850p	. TENSION	ADJUSTMENT TO	L FOR VAR		2.00mm
TP390, TP610	RC 610	750p	RC5 STANDARD			- VCR ADJU	STMENT TOOL			3.00mm
TP621	RC 621	800p	RC5901	RC 5901	850p	3 Re	versible Screwdriv	ers .	Circlip Pliers	
TP630, TP650	RC 650	750p	RC5903	RC 5903	700p		Spring Hook		Micro Screwdrive	er 👘
TP660	RC 660	750p	C404				VCR	lead Extract	tor	
TP661	RC 661	750p	SABA	Dette	000-	Orde	r Code: TC	OL10	Price: 29	q00
			T6772	RC149	900p			-		
HITACHI	00 14014	700-	TC319-320 ~	RC 328	800p		F	USES		
CLE800-CLE830	RC 140M	700p	TC356	RC 356	800p		TIME	-	QUICK B	TOW
A617402/655602	RC 192	800p	TC358	RC358	800p		(20m		(20m)	
A512120/230	RC 900	750p	TC360	RC 360	750p				and the second se	
A514790	RC 901	750p	TC365	RC 365	750p	Value	Order Code	Price	Order Code	
A5088470	RC 902	800p	10000			160mA	FUSE 01	75p	FUSE 17	60p
A518612	RC 903	750p	SALORA		100	250mA	FUSE 02	75p	FUSE 18	60p
	RC 904	750p	SERIES L	RC 190	750p	315mA	FUSE 03	75p	FUSE 19	60p
SCL002	RC 905	800p	86173	RC 882	750p	400mA	FUSE 04	75p	FUSE 20	60p
C2096		201				500mA	FUSE 05	75p	FUSE 21	60p
A511940	RC 906	750p	SANYO			630mA	FUSE 06	75p	FUSE 22	60p
655602H	RC 907	800p	RC218, RC222, RC228, RC238	8C 140M	700p			and the second s		
ПТ			JXGE	RC 878	800p	800mA	FUSE 07	60p	FUSE 23	60p
IFB13, 14, 15	8C 143	800p	JXDE	RC 884	750p	1A	FUSE 08	60p	FUSE 24	60p
	RC 148	750p		RC 890	750p	1.25A	FUSE 09	60p	FUSE 25	60p
FS4	RC 305		VHR2300			1.6A	FUSE 10	60p	FUSE 26	60p
RG305		675p	RC628	RC 865	900p	ZA	FUSE 11	50p	FUSE 27	60p
RG306	RC 306	750p	SHARP			2.5A	FUSE 12	500	FUSE 28	60p
FS9/1-10/1	RC 307	750p		8C 140M	850p	3.15A	FUSE 13	55p	FUSE 29	50p
VS5 RUK	RC 308	750p	G0121CESA, 123CESA, 204, 251	NC 1401VI	doce	and the second se			FUSE 30	
VS4-1	RC 310	750p	SIEMENS			4A	FUSE 14	55p		50p
MULTICONTROL (17C20)	RC 311	750p		8C 130	850p	5A	FUSE 15	60p	FUSE 31	50p
			FC616			6.3A	FUSE 16	60p	FUSE 32	50p
KORTING	00 100	750-	FC631	RC 132	750p			S		
18279, 18396, 18460, 18521 SE	RC 108	750p	FC742	RC 164	750p		F	USES	Sector Contraction	
40540 VTS	RC 108	750p	SONY			CURREN	TRATING	ORC	DER CODE	PRICE
LOEWE				RC 140	700p			IC PLU	G TOP	
DC11	8C 146	800p	RM604, RM605, RM606			3A			USE 33	100p
		.,	32 CHANNEL	RC 140M	700p	5A			USE 34	100p
MATSUI	-	750	RM613	RC 141	750p	13A			USE 35	100p
010270601	RC 889	750p	RM632, RM636	RC 160	675p	IJA	20mm CEI			
VX770	RC 892	750p				3.15A	Lonni CE		USE 41	100p
METZ			TATUNG		-	3.15A 4A			USE 42	1000
JAVA COLOR (6890)	RC 166	800p	FXA	RC 877	750p	4A ISA			USE 42 USE 43	100p
COLOR (7156)	RC 183	800p	RC70	RC 883	750p					
	RC 184		FX70 FASTTEXT	RC 894	750p	6.3A			USE 38	100p
JAVA (7180)	NL 184	800 p				8A			USE 39	100p
MITSUBISHI			TELEFUNKEN			10A.	200 3 0		USE 40	1000
939P/03607, 939P/03609	RC 140M	850p	FB632	RC 632 ST			32mm CER			
NOKIA			FB 639	RC 639 ST	750p	8A			USE 44	210p
Contraction of the second se	hörra	750-				10A			USE 45	210p
SATELLITE	RC 550	7 50 p	THORN/FERGUSON			15A		- F	USE 46	210
NORDMENDE			3V35-42	RC 342	650p	20A		F	USE 47	210
TC2336	RC 351N	750p	3V31-32	RC 344	750p		38mm CER	AMIC SI	LOW BLOW	
CMC1, TC3519	RC 356	800p	3V57-58	RC 628	750p	10A		F	USE 48	875
Contraction of the local division of the loc			TX10 TEXT	RC 732	575p	-		-		
OCEANIC		-	TX10 STEREO TEXT	RC 738	575p		ABOVE PRICE	S ARE FO	B PACKS OF 1	FUSE
390C9500	RC 339	-750p		RC 740	675p	ALL THE	ADOTETHIOL	o Parce To		
ORION			TX9-90-100	RC 783	750p	-		-		
RC53	RC 892	750p	3V55, FV11						FOTO	
	110 032	, Joh	TX100 FASTTEXT	RC 785	650p		C. PR			K
PANASONIC			TX100 STEREO FASTTEXT	RC 789	650p					
EUR51200	RC 200	800p	PROFESSIONAL	RC 790	650p					
TC2200	RC 201	850p	TROUMER			ICOF	10 ICPF3			N129
VSQ0357/NV730	RC 202	750p	TOSHIBA			ICPF	IU ICPF3		NITO ICP	1430
TNQ1621	RC 203	750p	CT937	RC 950	750p					
	110 200	. oop	CT9117	RC 951	750p	ICPE	15 ICPF5	O ICP	N15 ICP	N50
PHILCO		-	201R4B	RC 952	750p	Illiorr	10 10/10	- Ior		
CARVEL, CONCORDE,	RC 108	750p		-						
TELESTAR			We stock Remote	Controlof	OF	ICPF	20 ICPF7	5 ICF	N20 ICP	N75
TC10	RC 152	900p	AAG STOCK REMOLE	JUNITOIS I	Ur					
CONCERNMENT OF A DESCRIPTION OF A DESCRI	110 102	oroh	over 5000 differen	t modele						
PHILIPS			over sooo amerei	it mouels	•	ICPF:	25 ICPN	5 ICF	PN25	
RC5002,5154	RC 134	750p								
KT3 NON TEXT	RC 135	750p	Ring for further o	letails on					12.1	
69117032	RC 178	800p					Price: C	inly 30	up each	
69117194	RC 180	750p	0181-900 23	329.						
RC5991-UNIV	RC 300	580p	UTOT USU L	Contraction of the local division of the loc	-	-	-			
UC2231-01414	nc 300	Soob	and the second s					-		-

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Jack Armstrong

NEC 3022

Have you noticed that it's always the very last component you replace that cures the fault? So it turned out with my wife's sister's daughter's receiver. What made the situation even worse was that the cause of the fault should have been blindingly obvious to someone who has replaced the tiny $2 \cdot 2\mu$ F electrolytic capacitor in thousands of Hitachi tuners used in Pace receivers.

The symptom had been a screenful of horizontal lines that gradually resolved themselves into a very poor quality picture as the unit warmed up. It was only after I'd replaced every electrolytic on the main board that I thought about the tuner. I replaced the 10μ F and $3\cdot3\mu$ F electrolytics there, but the cause was the 100μ F one of course. Next time I'll replace the last one first!

The Horrortron Decoder

The Oritron D2MAC Eurocrypt decoder has been sold under several other names, such as Dixi, Aegir and Lenco. It has, on the right-hand side, a heatsink that becomes

WORKSHOP

incredibly hot. The unit is not easy to work on, which is why I always think of it as the Horrortron.

The one that arrived by post from the Midlands was no exception. It was sent to me because it refused to respond to remote control commands. All Oritrons suffer from this to some extent: you usually have to stand at least two metres away to get reliable handset operation. But this one wouldn't respond at all. It remained on, but stubbornly refused to produce anything apart from a blank raster.

A phone call to my friend at Satfix produced the suggestion that the DMA2286 chip might be faulty. It's soldered directly to the board of course, and is square with at least 64 J-shaped legs. These curl beneath the chip, and there is almost no possibility of removing it with a soldering iron – though one enterprising dealer told me that he uses a pin to lift each leg in turn!

Deciding that I had nothing to lose, I placed a sheet of aluminium foil over the board, pressed it down firmly, cut a square hole in it to expose the suspect chip and applied heat from my trusty paint-stripper. A quick flick with my penknife and, in three seconds, the chip was off the board. I was also left hoping around the workshop, sucking my burnt fingers!

Fortunately the board had survived the treatment and the copper tracks were intact. I positioned the new – and expensive – chip and soldered each leg in turn, using 0.4mm solder and my finest Weller tip. Amazingly, the decoder worked! But I definitely don't recommend that you try this yourself. I've practiced on dozens of scrap boards, and my success rate is still depressingly low. There is also the safety aspect to consider.

Signal Meters

It occurs to me that I've never mentioned satellite signal-strength meters in this column. Since they cost more than the average receiver, you can charge a goodly sum for their repair. So here's what 1 know!

The Altai SM01 turns up under various brand names including Manhattan. There are several faults that can occur, the most common being:

(1) The meter reads backwards when it is switched on. Simply replace the $1k\Omega$ trimmer potentiometer SFR1 and adjust it for a zero meter reading. The trimmer fitted as standard seems to be underrated - it melts!

(2) No LNB power output. Check the 4.7μ H inductor L5 which tends to go open-circuit.

The low-cost Satfinder meters seem to suffer from some sort of burn-out if they are left switched on until the batteries are almost discharged. I've never bothered to look inside to find the source of the smoke, since Satfinder UK offers such a quick, low-cost repair service. For further information phone the company on 01491 573 390.

The now obsolete Maspro LC2E meter has always been the favourite of experienced installers. Its main problem is that you find copper wire strands in the nut at the rear of the threaded input connector. The result is an intermittent short-circuit that makes the front-panel LED go out. Simply unscrew the connector behind the panel and blow out the offending strands. I've found that Ali and Ishar at Satellite Services (0181 961 4662) provide a good repair service should you have any other problems.

For Promax meter repairs, phone 01727 832 266.

Plastic Tabs

The clips used to secure Pace front panels consists of plastic tabs that can become brittle when exposed to heat over the years. I've seen all sorts of bodged repairs done when they snap off, ranging from watchmaker's screws to hold a bridging piece to a strip cut from a leather belt Superglued in place!

For some time now I've replaced broken plastic tabs by using a soldering iron to melt a paper clip into the remaining plastic. Tape the base and front panel together securely, then gently screw the paper clip into place. Press the tip of a hot soldering iron down on the paper clip, where the clip rests on the remaining section of the plastic tab. The end result is shown in the accompanying picture.

I've never had one break after carrying out this repair.

More e-mail Blues

People still write me the most curt messages! Here's a typical one – the complete message, as it arrived, apart from the sender's name:

"PRD900. Problem is as follows. Sound okay but after 10 minutes Picture flashes on and off intermmitently (*sic*) leaving black raster. Thanks in anticipation."

"What's wrong with that?" I hear you ask. What's wrong is this. Imagine that you are writing to your bank manager for an interest-free loan. Do you think you would get one with such a letter? There's no "Dear Sir", no introduction, no mention of technical ability, soldering skills or equipment available. How do I know what is wanted? The receiver's serial number isn't mentioned, nor the age of the equipment, the history of the fault, the method of connection to the TV/VCR or the tests already carried out. Worst of all, there's no reference to Television magazine. So there's no way he's getting free advice from me! (The cause of the fault is probably transistor Q105, but don't tell him!) In fact I was unable to reply because no return address was provided!

So when you send me an e-mail, tell me who you are, your abilities, where you found my address and provide a complete description of the equipment, the symptoms and the fault history. It's also fun to learn about your interests and hobbies, and have a general chifchat! Maybe it's because I am a Yorkshireman, but I simply don't like replying to messages that look like telegrams.

Finally, do type your return

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:

jackarm@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.

address. I reply to all messages. If you don't get a reply, it's always because you provided an incorrect address or none at all.



A paper clip used to repair one of the plastic tabs that secure Pace front panels.

Test Case 410

Impatiently waiting for its heater to warm up, and with de-icer fluid dripping from the windscreen, Doc Colin swung the big van out into the main road. His nose glowed red as he drove to his first field call. It was to Mr Hay, who had recently bought from us a new Canon UC9Hi camcorder – after due study of *Camcorder User* magazine. Colin's task was to check it out on site, the complaint being no colour. The camera had already been returned to the workshop because of this, but had been tested and found to be OK.

Mr Hay was awaiting the call, and had the gear all hooked up ready. He'd bought the camcorder for its high definition, superior to his previous low-band Sanyo model. To take full advantage of this he had purchased a special lead by mail order. It had a scart connector at one end and two phono plugs plus an S plug at the other. But all that came through was an excellent monochrome picture plus sound – and that's all his VCR, a Panasonic HiFi VHS Model NVF65, would record from the camcorder.

Further proof of the camcorder's failure to produce colour was provided when Mr Hay disconnected the scart plug from his VCR and connected it to his TV set, a posh new largescreen model with two scart sockets. Again the sound was fine but the picture was in black-and-white, whatever the camcorder's mode of operation – record, playback or E-E. The camcorder itself provided no clues – it had a monochrome viewfinder. Colin soon had the situation sussed out. What was the cause and cure? Not a difficult one ...

Colin then went on his way, with the heater now working at full blast, to see Miss Jones, who also had some new merchandise from our shop – an Hitachi Model C2546TN TV set. It worked well enough until she switched it to the VCR channel to watch her keep-fit tapes and the programmes she had time-shifted during the day while she was out at work. The off-tape picture and sound came up beautifully, but the image was marred by a nasty little caption, full of nonsensical and garbled letters, numbers and symbols, that wiggled and juddered sideways at the bottom, centre of the screen. It would go away after a few seconds, but would occasionally reappear at odd times.

The caption put in an appearance only when the TV set was switched to its AV channel. Selection of any broadcast channel brought up a perfectly good, steady caption at the bottom centre of the picture to say which channel had been selected – BBC-1, Ch. 4 etc. And the lady's neighbour had gone to so much trouble to get the TV set tuned in for her to the VCR's output on channel 36!

After a visit to the accessories box in the van Colin once again triumphed – and Miss Jones found her equipment even simpler to operate than before. What magic had Doc worked this time?

These two very different problems had some interesting parallels. The solutions were almost identical, and none of the equipment was actually faulty. Neither call would have been necessary had everyone (the shop staff, workshop people and the customers) been fully clued up or communicated well. Don't turn to page 291 until you have given some thought to this! In real life you cannot get off the hook by turning over a few pages, can you?! Promax Pattern Generators

P113

TELETEXT

GV-698

REPERTORIO DE CAMACTERES GRAFICOS

Are you thinking of investing in a new pattern generator? Eugene Trundle tries out some suitable equipment from the Promax range

est gear generally has a longer life than that of consumer electronics equipment. As a result, a lot of what is at present in use in workshops is relatively old. It is not until you look at today's test instruments that you realise the extent to which things have progressed in this field: frequency-synthesis carrier generation for example; microcomputer and bus control; provision of Nicam and teletext signals; and complete 'test cards' that come out of relatively inexpensive boxes. All with an accuracy undreampt of (outside the broadcast industry) a few years ago.

Test Report:

Promax is a well-established Spanish manufacturer of test equipment. From its huge range, I've selected for review two TV pattern generators that reflect current techniques.

The GV698

The Promax GV698 is a very sophisticated bench generator of every TV signal currently required for alignment and servicing. It provides 32 different patterns that range from a complete, full-feature general-purpose test card (reminiscent of the broadcast-type Philips PM5544) to colour bars, W/R/G/B screens, chroma demodulator patterns, a multiburst (definition gratings) and crosshatch and dot displays.

These patterns are available as $1V/75\Omega$ baseband video (CVBS) at a front-mounted BNC socket and a rear-panel scart port, as S video at a Y/C socket at the back, and in RGB form at BNC and scart sockets. They can be modulated on to an RF carrier, along with an audio signal.

The RF department is glorious indeed. A doublesideband carrier is provided at a front-panel BNC socket at a level of $80dB\mu V$ (about 10mV), with 0-50dB attenuation available in 10dB steps. The carrier 'clock' consists of a high-stability, close-tolerance crystal that operates with a frequency-synthesis system to provide carrier frequencies in the range 37-865MHz, selectable by frequency (in 50kHz steps, which in effect amounts to continuous coverage) or by channels to CCIR specification, including all the broadcast and cable channels throughout the VHF and UHF bands. Channels and frequencies are shown on a front-panel alphanumeric readout display. The instrument includes an audio test facility, with tones available at the scart socket and modulated on to the RF carrier in accordance with systems B/G/H (5·5MHz), D/K/K'/L (6·5MHz), I (6MHz) and M (4·5MHz). The scan rates, colour encoding and modulation are changed as appropriate between PAL, Secam and NTSC, so that any terrestrial broadcast in the world can be matched. Also available on the version (/11) I had for test are stereo/dual sound in the German Zweiton form and Nicam, both with individually-switchable R and L channel tones at 1kHz and 3kHz. When the system is changed from I (UK) to B/G (W. Europe) the Nicam carrier automatically shifts from 6-552MHz to 5-850MHz to suit.

The review version also had a teletext facility. The text appears in Spanish and English, with eight pages that include an index, a clock-cracker, a full character/function screen and a graphic 'picture'. The real-time clock display alternates between zero and one on each page. Five lines per field are used for teletext data.

Operation

Since the instrument is microcomputer controlled, operation is very simple. A single rotary knob selects channels, frequencies, patterns and standards, enabling each function and range to be stepped through sequentially. You don't have to do this each time the instrument is used, because 32 complete settings can be stored in an EEPROM and called up at will. Each setting consists of a channel and system, for example ch. 21, PAL-I, on to which any required pattern can be modulated. An illuminated 16-character LC display provides a readout of all parameters.

There are eleven push keys on the front panel to control or modify the video and audio modulation. The first group of four keys governs the video image, by switching off the burst, the chroma or the interlace, and by superimposing a circle on any of the patterns. The circle comes from an EPROM which is scanned at 20MHz, giving a very smooth outline with no sign of jagged steps. Interlace switch-off makes convergence adjustment easier, by removing interlace flicker at close viewing distances. The second group of four keys controls the audio signal – on/off, dual, L off, R off. Finally come three keys for teletext function control.

Further Features

Three of the test patterns contain black-and-white captions. In standard form these are the manufacturer's name and trade mark and the instrument's type number (GV-698 is displayed). The captions can be customised, for example your trading name can be displayed, by replacing an EPROM with an appropriately programmed one – the manufacturer offers this service via its distributors.

In addition to the rear-panel sockets already mentioned there are a 5-pin DIN audio input port with an internal/external modulation switch, BNC sync and scope trigger outputs, and a sync-with-G switch for use with RGB monitors.

It's quite a box! I have not included a full specification, since it runs to five A4 sheets. We simply don't have room. Supply voltage can be 110, 125, 220, 230, 240V at 20W. Weight is 3kg, dimensions $288 \times 102 \times 247$ mm (w x h x d). For further details apply to the distributors, see the end of this review.

On Test

After learning how to drive the machine l used it for all bench and field work for a couple of weeks, then spent some hours playing with it and checking its functions.

The wide range of test patterns it provides satisfied my every need – and many more that I don't have at present! My favourite one is the composite test card. Having it continually on tap, with a test tone, was reminiscent of the good old days of BBC-2 in the Seventies.

The chroma demodulator test patterns (axis and anti-PAL) worked well. Though few modern TV sets or monitors have adjustments in the decoder department, they are useful for checks and fault diagnosis.

Two of the patterns are intended specifically for VCR work. The black block that hops along a white slot at a rate of one space per field enables things like freeze frame, stepped image, position of heads etc. to be checked.

The black-and-white patterns include some excellent ones for checking video bandwidth, LF response and ringing/echoes. They are useful for checking cable systems as well as receivers and monitors.

The RF generator section is excellent. I put all four local TV channels into the memory, along with channels 36 (VCR), 37 (Channel 5) and 38 (satellite TV). Further slots can be used to store other local channel groups, for pretuning and testing TV sets and VCRs, and for simulating any world standard (for checks on multi-standard gear and outward-bound sound- and system-conversion jobs).

The ability to tune down to the TV IF of 39.5MHz is another useful feature – it facilitates tuner checks by direct carrier injection into the IF amplifier.

RF gain checks are also easy. Switch 30dB of attenuation in for about 300μ V of RF and look for *slight* noise in the pattern. At 50dB attenuation the snowy picture should still be locked and discernible. The full output (about 10mV) should instigate tuner AGC action.

The teletext and Nicam facilities were put to good use, especially the latter since the BBC hasn't got around to Nicam in this neck of the woods! It was easy to test and align Nicam decoders by attenuating the RF signal, and one soon learns how decoders should behave as the noise level increases.

I checked the parameters, levels and tolerances of the signals produced by the generator, but gave up after a



while. All were bang on specification and up to broadcast standard, the result of using precision ICs and crystals. In the days of discrete component circuitry, banks of presets and lots of LC components, a reviewer could have a field day carrying out such checks. The likelihood now is that the generator will be more accurate than the gear with which you try to test it.

The GV698 has many applications beyond TV receiver testing and adjustment. It can be used to analyse the performance of cable and distribution systems; to check RGB monitors that use broadcast-type scanning standards; to test VCRs. including high-band types; to make video test tapes that provide high-quality video and audio content; to check, align and preset equipment that uses any terrestrial analogue TV standard in the world; and as a high-quality precision modulator for externally derived signals.

Inside

The instrument is surprisingly tightly packed inside. A large fibreglass motherboard supports eight plug-in daughter boards. This amounts to about 1.5 sq. ft of double-sided PCB that carries upwards of fifty ICs. The power supply is based on a toroidal mains transformer and four heatsinked three-leg regulator chips. The whole thing looks set to last for many years, with robust, strongly-mounted connectors and controls and a build quality appropriate to industrial as opposed to domestic equipment. If it were to last as long as my old and trusty – but very dated – Philips PM5509 pattern generator it would do very well.

Summary

You get a reasonably comprehensive instruction book but no service manual. Service, spares and repair back-up are available from the UK distributors Alban Electronic The test card produced by Model GV698.



The Promax GV298 pattern generator – a 'little brother' to the GV698. during and beyond the one year guarantee period. I would not buy test equipment without an assurance of this kind from a reputable and established company. There should be no problems here.

The GV698 is an excellent instrument, and I was sorry to see it go. It comes in several versions with several options at prices appropriate to the features incorporated. All have the wonderful RF modulator and 32 test patterns. The /11 version I tried out has all the available bells and whistles.

Two minor criticisms occurred to me. It would have been nice to have had a tilt-stand/handle of the sort often provided with oscilloscopes. And if possible I would have liked a simpler and cheaper method of customising the logos, either similar to that used in camcorder and satellite receiver caption generators or by setting them up on a PC and downloading them. If the instrument was mine and, knowing that it would sometimes stray into the field, my first action would be to buy it a foam-lined aluminium carry box.

The various versions of the GV698 cost from £969 to \pounds 1,428 excluding VAT. That's a lot of money, but it's good value – similarly specified instruments from other makers cost a good deal more. Your reputation and standard of work will both benefit from it.

The GV298

Little brother GV298 has a more modest specification and is certainly easier on the investment budget. Priced at £433 plus VAT, it's smaller and lighter and provides eight essential patterns – colour bars, W/R/G/B rasters, crosshatch with circle, dot matrix and chequerboard. It has switches to control interlacing, PAL commutation, subcarrier on/off and audio on/off. Up-down keys select the patterns, channels and frequencies. The RF modulator is similar to that in the GV698, with synthesis coverage of 37-865MHz and pushbutton channel selection. All are shown in a 16-character LC display. This instrument caters for only one standard, PAL-I in the UK.

The GV298 provides an RF output with 0-60dB attenuation in 20dB steps, composite video from a frontmounted BNC socket and a rear-mounted scart socket, RGB video from the scart socket, and a scope trigger output. External signals cannot be modulated on to the carrier.

This generator worked well for me on test, with everything spot-on as before: precise frequency and channel settings, a smooth circle and close-tolerance patterns. The build quality and internal workings are similar to those of the GV698. In fact it's a high-quality, precise instrument.

Its greatest virtue is the wonderful synthesis RF modulator, and much of the cost pays for that. If you want just the patterns rather than the channels and frequency coverage, you would be better off with something like the Promax mini-generators VG90 or GC981B at about half the price.

Availability

Promax instruments are marketed in the UK by Alban Electronic Ltd., 6 Caxton Centre, Porters Wood, St Albans, Herts AL3 6XT – phone no. 01727 832 266, fax 01727 810 546. Details of the huge range of Promax test and measuring equipment are available free on request.

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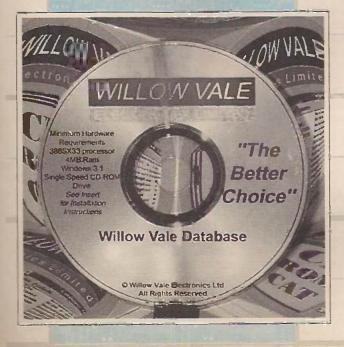
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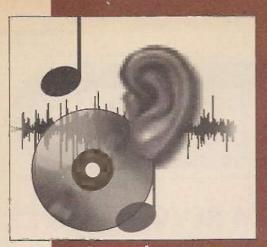




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Reports from Nick Beer Roger Burchett Hugh Allison Robert Marshall Graham Thomson John Edwards and Steven Leatherbarrow

Beogram CD5500

This player, part of the Beosystem 5500, wouldn't play discs. As soon as play was selected the radial arm moved to the outside edge of the disc. Checks around the radial error/ tracking error amplifier showed that the supply voltages were incorrect. Pins 2 and 4, which should have been at 9.5V and -9.5V respectively, were actually at -0.65V and -5.6V. As so often, a fault in one half of the split supply was upsetting both halves. The 9.5V regulator transistor TR10 had never had its base connection soldered. Remarkably, the player had worked for several years without giving any trouble, going wrong only when its N.B. owner moved house.

Pioneer PD-Z91

This player was dead. When we removed the main PCB we quickly saw the cause of the trouble: voltage regulator IC12 was badly dryjointed. N.B.

Pioneer XR-P250M

This system turned out to be faulty when we installed it. Discs were not read and were immediately ejected – there's no drawer as this is an edge loading model. We found that there was no laser output or focus bob. As is so often the case, the cause of the problem was a break in the flexiprint link (PNP1343) to the optical unit. There are connectors at both ends, making it easy to replace. It's folded under the traverse deck at 45°: many attempts had obviously been made during production to get the angle correct! **N.B.**

Sony CDP101

This early model had been well and truly butchered. I had to replace both

CD Player casebook

servo chips and repair quife a lot of print. I then found that the focus gain control had been turned right up. The cause of the trouble was a faulty inverter in IC105. Because of this the laser wasn't being turned on. **R.B.**

Saisho CDX200

Failure of the open/close button is a fault I've had with a number of these players. They often come to us with a disc trapped inside. More often than not the drawer mechanism will function correctly when you short out the switch momentarily (a quarter-inch screwdriver is ideal for this). The cause of the problem is nearly always that the small PCB which carries the single switch is mislocated.

Note that in these machines the open/close button is hinged at the top, i.e. it isn't a true button, being attached to the front panel. What seems to happen is that the front panel gets knocked, pushing the little PCB out of its two locating lugs so that the push button at the front can no longer reach it. Push the PCB back home, then use a dab of glue to hold it in position. H.A.

Matsui CDS1000

The sound was fine at first, but after playing one disc there would be a strong hum as the next disc was loading, with a background hum that became worse as the disc was played. The sound output chip is an NJM4060D, which is supposed to operate with $\pm 10V$ supplies. They read $\pm 15V$ however. The transformer was not the wrong one, but a replacement cured the problem – even though the supplies were still not within specification. The Matsui CDM30 uses the same PCB, which is a Philips design. **R.M.**

Sanyo DC-D12U

The display lit up, the CD section produced an error indication and there was no audio output. The N20 ICP4I was open-circuit – it's near socket CN705. I then found that safety resistor R4903 was open-circuit, while the audio output chip had a hole in it and had burnt the PCB. Repairing the burnt area of the PCB and replacing the failed components put matters right. **G.T.**

Cheap CD Players

This is something of a problem area. Access is often limited, and servicing is at times virtually impossible. The only spares available seem to be complete mechanisms, inclusive of the laser unit, and replacement PCBs. This is not good when the unit is out of warranty, as the cost makes repair uneconomic.

The good news is that the laser unit is normally a KSS210, which is readily obtainable, while in many cases all that's required is to clean the laser unit and the sled and apply a spot of light grease to the latter.

The PCBs seem to come from China. It is worth keeping old ones if you are given a unit that has been written off. G.T.

Goodmans SS5200

This is a component system with a tuner and a cassette player connected via a ribbon cable to a CD player and amplifier. The customer complained that nothing happened when he tried to activate the tuner preset scan function using the remote control unit. A check showed that the remote control unit was in order, the cause of the fault being traced to the ribbon cable socket on the tuner/cassette player – it was dry-jointed. G.T.

Alba CD1010

This machine wouldn't play discs. All three plugs to the CD mechanism had dry-jointed sockets. In addition there was intermittently no display and no operation. The plugs to the front PCB were not pushed fully home. G.T.

Bush MS352

The mains transformer was opencircuit, the cause being shorted protection capacitors across the bridge rectifier diodes. This is quite a common fault. G.T.

Daewoo AMI310

The CD player section of this tuner/ tape/CD system did strange things intermittently: the drawer would sometimes refuse to open or close while on other occasions the machine would refuse to play a disc. The cause was a dry-jointed socket – CN704. **G.T.**

Proline/Alba SYS150CD

The CD lid catch on this Proline midi system had failed. We were able to cross-reference and obtain a replacement from Alba – the part no. is 700016846000. **G.T.**

Sharp WQ-CD220L

The main fuse F651 in this portable radio/tape/CD player unit had blown. After replacing it everything worked until the tape deck was put into play. The fuse then went again. On investigation I found that the leaf switch in the supply to the motor was bent and shorting to chassis. A new switch cured the problem. All right, not a CD fault – but the sort of thing you have to watch out for with such units. G.T.

Aiwa CXN340X

This midi system holds three discs, using a turntable. The drawer would go in and out, but the mechanical timing was incorrect because of grease that had become like tar – the large amount of nicotine inside the unit was probably not unconnected with this. A clean, regrease and realignment cured this initial problem.

I next found that the spindle motor didn't rotate, then that the sled motor didn't move. The cause was an opencircuit N10 ICP -- it's behind connector CN30 on the CD PCB. While I had the equipment apart I cleaned and lubricated the sled.

The disc would now spin and the sled moved, but the player skipped. I'd given the optical unit a clean while I had the machine apart to replace the ICP. So I checked the eye pattern, whose amplitude was low at 700mV. Not surprising in view of all the nicotine. A new optical unit cured this final problem. G.T.

Hitachi DA7000

We fitted a new loading belt to get the drawer to open and close when told, then found that the inserted disc wouldn't spin. Cleaning the lens restored normal operation. J.E.

Alba CX740

When a disc was inserted this top loader did nothing apart from flash two zeros in the display. After switching it off 1 examined the objective lens carefully with a magnifying glass. Its

Panasonic RX-DT401

Apart from the CD section everything in this radio/tape/CD player worked correctly. But after inserting a disc and closing the lid the LC display remained unimpressed and did nothing. A few seconds later it would say "no disc". I noticed that the lens was bobbing up and down frantically in an attempt to focus, but the disc wasn't spinning. In fact the spindle motor's turntable had been pushed down the spindle shaft and was jammed against the cabinet moulding.

I released the turntable by prizing it gently upwards. It was then able to spin freely. After a few experiments to get the turntable height correct the player was back to normal. J.E.

milky white colour meant that there was no chance of it focusing on the disc. A phone call to the customer revealed that after cleaning the tape heads with methylated spirit he had decided to clean the "laser thingy" as well. The estimate for a new optical unit was refused. Oh well! J.E.

Pioneer PD103

Severe sound distortion was the complaint with this CD player. We've had the fault before with this and some Philips models. The symptom is often caused by a faulty AD converter. Sure enough IC401 (type PD2026B) was defective – a blast of freezer proved the point. S.L.



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NiCad batteries offer superior performance provided certain rules are observed. Tom Bowers on their characteristics and how to get the best from them

he nickel-cadmium cell is well-established as a source of power for portable electronic equipment. But care is required with its charging and use if it is to fulfill the promise of a thousand charge-discharge cycles. Many potential users are discouraged from using NiCad cells because of reports of their short life and high cost. These two factors go hand-in-hand: although the NiCad cell costs very little to recharge, the cost of the cell itself is high.

Construction

Cel

Fig. 1 shows the construction of a NiCad cell. The electrolyte is sandwiched between a sintered positive electrode strip of nickel hydroxide and a pressed powdered cadmium negative electrode strip. This sandwich is rolled up and placed in a cylindrical container, with tabs inserted to enable external connections to be made.

The rolled-up sandwich construction provides a very large surface area for the chemical reaction. The container is generally the negative terminal and the end stud, which is vented to allow the safe release of gas if overcharging occurs, the positive one. An aqueous solution of potassium hydroxide is used for the electrolyte.

Characteristics

NiCad cells are very rugged and have ideal characteristics for many forms of electronic equipment. They can nevertheless be abused, and certain rules have to be observed if the maximum number of charge-discharge cycles is to be obtained. The discharge characteristic is very nearly flat – see Fig. 2.

A freshly charged cell has a terminal voltage of about 1.3V. This falls quickly to a very stable 1.2V until the end of the charge is reached. At this point the voltage falls very rapidly.

Ideally, a cell should not be discharged below 0.9V. It is easy to detect this point in electronic equipment, but with a torch or hand tool it's not quite so simple. When the bulb goes dim however, or the motor rapidly loses speed, it's time to recharge. Where a number of cells are used in series to form a battery, there can be a problem should one of them have a slightly lower output voltage than the others. When the battery is almost totally discharged, the low-voltage cell will be discharged first and, as there is still some output from the others, the current will charge the low cell in reverse! If a battery consistently produces a lower voltage after being recharged than when new, a low cell in the chain is the probable cause. If you have access to the cells individually, remedial action can be applied to the defective one using a small bench power supply.

The disadvantage of the NiCad cell is its terminal voltage. NiCad cells are manufactured in the same physical sizes as zinc-carbon and alkaline cells, but these both have a terminal voltage of 1.5V. Using four NiCad cells in say a radio will not produce the best results because the set will be supplied at only 4.8V instead of 6V. A six-cell radio will normally operate with a 9V supply from alkaline or zinc-carbon cells: it will receive only 7.2V from NiCad cells. Thus equipment designed for use with zinc-carbon or alkaline cells will not be 100 per cent happy with NiCad cells. Although it will work for a long time before the cells are discharged, performance will not be at optimum. Bear in mind the lower terminal voltage before converting to NiCad cells at considerable cost.

Charging

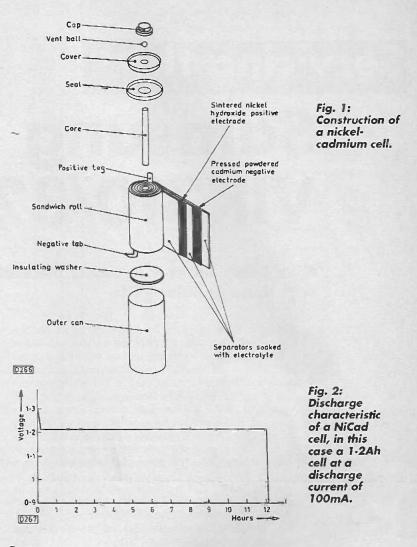
The main damage is done when a NiCad cell is charged. There are fast chargers that will refresh a camcorder battery in under an hour. Others will charge standard-size cells in five hours. These fast chargers are fine, but the rules for long life with a NiCad cell are that it must be discharged to 0.9V or less before it is recharged, and that the correct charging time must be observed. To 'top up' a partially discharged battery is asking for trouble. So discharge it first, either with a special discharger designed for the purpose or a bulb on clip-leads. Then charge it from the flat state, adhering to the recommended charging time if the charger is a fast one.

Fast camcorder battery chargers have a sensing circuit that detects the sudden temperature rise as a cell reaches full charge, but they are not foolproof. Using one to top up a cell's charge will result in over charging. The cell may reach its fully-charged state quickly, but the time will be too short to allow the internal temperature and the temperature of the cell's case to equalise and the sensing system to operate effectively.

A safe rate at which to charge a NiCad cell is at or below a current equal to one tenth of the cell's amperehour capacity for ten or more hours. Thus a 1.2Ah cell can be trickle charged at 120mA for ten hours or at 100mA for twelve hours and so on. Divide the Ah capacity by the charging current to obtain the total charging time. At the end of the charging period the current is sufficiently low to enable the gases produced by over charging to recombine, so nothing is lost from the cell via the safety vent and the electrolyte remains at 100 per cent volume.

Small radio batteries such as the PP3 require a slightly longer time to charge: 16 hours at 11mA is the recommended rate.

Failure to charge a NiCad cell fully lowers its apparent capacity: these cells have a 'memory' effect, and take to a short charge-discharge time as 'normal', thus exhibiting an apparent loss of capacity. The capacity can usually be restored by putting the cell or battery through several full-term charge-discharge cycles. Unfortunately this treatment does not work with over charged cells!



Storage

When a NiCad cell is not in use it should ideally be stored in a discharged state. Storage at high temperatures should be avoided – so don't keep them in the airing cupboard. A dry spot on a shelf in the garage is preferable

Performance and Safety

A NiCad cell will deliver its full capacity at low temperatures. At high temperatures the internal leakage increases and the apparent capacity is less.

As the internal resistance is very low, a cell will deliver a very high current for a short period – something like 1A per square inch of electrode area! This can result in fire in an external circuit and will also damage the cell. With some types of battery an internal fuse is incorporated to protect the cells and the circuitry in the event of a short-circuit.

With care NiCad cells and batteries will last for the 1,000 charge-discharge cycles claimed for them, and will at the same time provide a very low-cost source of electric power.

Disposal

Finally a word about the disposal of defective NiCad cells. Cadmium is a toxic substance, so dud cells should be well wrapped in platic bags and handed to the dustman.

Cells should not be burnt: they are likely to burst and could injure someone.

Servicing the Samsung VIK310/320/350

Mike Leach on how to tackle the various faults you could encounter with these popular VCRs

These VCRs are good from both the user's and the technician's point of view, though there are a few common fault conditions that we will look at in this article. They are reasonably easy to operate, and can be quickly dismantled for servicing as and when required. The VIK310/320/350 have been around for two to three years now, and a definite fault pattern seems to have emerged. Those who are familiar with them will be fully aware of the faults and remedies described in this article. It should however be of benefit to the technician who sees one for the first time. The range is as follows:

Model VIK310: This is a simple two-head machine with standard play only.

Model VIK320: This is a two-head machine with standard and long-play modes.

Model VIK350: This is a four-head machine with standard and long-play modes.

The most common failure occurs in the power supply. It can often lead to faults developing in other areas of the machine. I'll start off with the 'regulator' section of the power supply (the chopper circuit), as faults here must be cleared before any other checks can be made.

The Power Supply

VIDEO

The power supply can be divided into two sections. First the chopper circuit (see Fig. 1), which is housed inside the large metal can towards the right-hand side of the machine. This produces permanent outputs for the power switching/distribution section on the main mother board. We'll concentrate on the chopper circuit, since nearly all the power supply faults occur here.

The most common symptom is a completely dead machine. The customer will often say that the machine had been disconnected and moved, but wouldn't come back on when connected to the mains supply some time later. This is very common and brings us straight to the crux of most of the problems from which these machines suffer. The reason that they may fail to come on again after a rest is capacitor C110, a 100μ F, 25V, 105° C electrolytic. You may find it difficult to find: it's protected by a plastic shroud, which is brown in colour. Look between the STR11006 chopper chip IC101 and the chopper transformer T101. C109 is protected by a similar plastic

shroud, but this capacitor should not require replacement.

My rule these days is to replace C110 before I even plug the machine in on the bench. Even when the VCR has come in for only a minor fault such as a head clean, I always replace C110 first, C110 dries up because of excessive heat. It can destroy IC101 and the $2 \cdot 7\Omega$, 2W surge limiter resistor R101, thus producing the dead machine condition. The first time I came across this situation 1 replaced only R101 and the chip. I did that only once!

Dead Machine

Thus when faced with a dead machine the first thing to do is to replace C110. You'll find that in nine cases out of ten the surge limiter R101 will also have failed, which means that the STR11006 chip will require replacement as well. This chip doesn't always fail, but as there's no way of checking it the best course is to replace it to be sure.

When these three items have been replaced there are several other things to check in the power supply before trying the machine. Check F102 (2A) in the 6.5V supply. It may have blown. Another item that causes problems is the 22V zener diode ZD101, which is buried amongst other components. It protects the 16.5V supply. Well, sometimes it provides protection and sometimes it doesn't. I've known it to go short-circuit or open-circuit, so it must be checked and replaced as necessary. Then take a look at R113 (1.5k Ω , 0.25W), which may be a little charred. If so, replace it.

To summarise: always replace C110; replace IC101 if the machine is dead; check and replace as necessary R101, ZD101, R113 and F102.

This covers most of the common power supply ailments. I've known very bad cases where a complete new power supply has had to be ordered, but this is a rare occurrence and the above checks will in most cases provide a complete cure. If there are no other burn ups in the power supply, you can assume that the unit is now OK and that it's safe to power the rest of the machine.

In my experience the power supply will run on its own and doesn't have to be plugged into the main PCB. It's best to plug it in however, as the voltages on the supply lines can be rather high off load. It is obviously not a good idea to run the power supply in this way if you are not sure whether everything is OK. So the rule is to plug it in.

All things being equal, the machine should now work. But the chances are that it won't. Let's look at some of the other faults you may encounter.

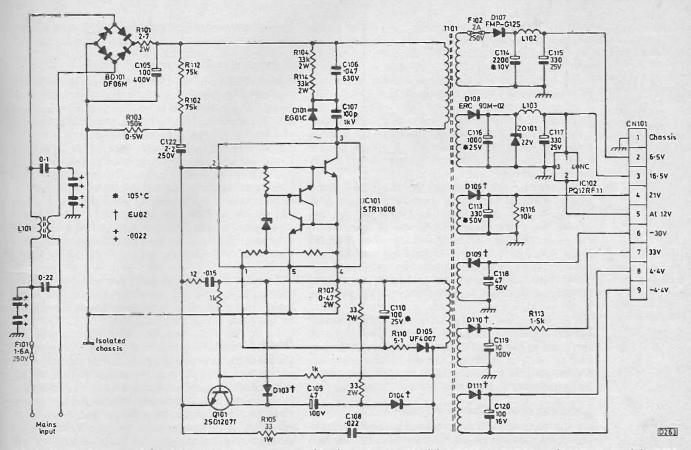


Fig. 1: Circuit diagram of the chopper power supply used in the Samsung Models VIK310, VIK320 and VIK350. Model VIK375 uses an almost identical circuit, the difference being that a single $68k\Omega$, 5W resistor is used in the R104/R114 position.

Clock/display Problems

After a major power supply repair you will often find that the clock is either dimly lit or there's no display at all. The fault is easy to rectify, but it's a good idea to know a bit about the source of the digitron display's power supply and also to able to identify which type of main panel is fitted to the machine.

A good working power supply provides -30V at pin 6 of plug CN151 on the main panel. This voltage is fed to the two 100 Ω chip resistors R638 and R664, which are mounted on the underside of the main panel. They are connected in parallel, presenting an effective resistance of 50 Ω . After the resistors, a chunky 27V zener diode stabilises the supply. It's then applied to the digitron (DT701) and the microcontroller chip. The zener diode and the two resistors are the main cause of display problems. The diode may be in one of two places, depending on which type of main panel was fitted during manufacture of the machine.

If you've got a problem the chances are that the zener diode is D606, which is mounted just to the left of the power supply plug/socket CN151. You may find that the board is a little charred in this area. If you can't find a D606 in this area the diode will be ZD702 instead. It's mounted on the front panel, just to the right of the digitron.

In either case a quick check should be made on the value of the two resistors. If the zener diode has gone shortcircuit or leaky, one or both of the resistors will probably have failed. If only one of them has gone open-circuit the effective resistance will have risen to 100Ω . So the clock display will be dim.

It's easy to check the resistors. Remove the power supply can and find CN151 on the main panel. Switch your bench meter to the 200Ω range and connect one

probe to pin 6 of CN151, the other probe to jumper wire W691. This jumper wire is immediately to the right of the larger of the two ribbon cables that connect the main and the front panel. It's a good idea to disconnect this ribbon cable whilst carrying out the resistance check. The reading obtained should be 50Ω . If you get a higher or an opencircuit reading, you will have to remove the main panel and replace the resistors.

Access to the PCB is simple. Remove the complete deck assembly (see mechanical section later) and the front timer board, also the power supply if you haven't already done so. Then remove the two screws at the back end of the machine, above the scart socket. The main PCB will now come out of the cabinet freely. Turn it over and look for CN151's soldered connections. R638 and R664 are just above it.

Always replace them both, even if only one of them is faulty. You must use chip components in these positions. It may be tempting to use a couple of 0.25W resistors if the original type is not to hand. They will work of course, but if the 27V zener diode were to go short-circuit at a later date the 0.25W resistors would fire up big time and produce much smoke and burning. Two chip resistors will just give off a minor 'phut' and go open-circuit. I would regard them as safety components, so the original type must be used.

This brings us to the heat generated by the 27V zener diode. When the diode is D606 on the main PCB you are likely to find that the board is somewhat charred or even burnt through. If the board is in a bad way, it could well be that damage to the very fine print that runs in this area has occurred. This means replacing the whole board. Samsung can supply one, minus the tuner etc., for a reasonable price.

If the board around D606 is just slightly darkened and

the print hasn't been damaged you can prevent further damage by replacing the diode, not necessarily in its original position. As a better alternative you can mount a new 27V zener diode in the ZD702 position on the front panel. Fortunately where the diode is D606 on the main PCB there is also a vacant position marked ZD702 on the front panel, just to the right of the digitron display. A new diode can be mounted here – on the component side of course – without fear of any further heat damage occurring. There are no extra leads to run, just fit the new diode in this position. Make sure that you solder it well as it will still get rather warm

Be careful when removing the old D606 diode. Waggling it about while trying to remove it can cause print damage – be very careful when working in this area, and always use a new diode. I've known of cases where excessive heat from a soldering iron has damaged the old diode, with the result that R638 and R664 were knocked out when the machine was switched on again.

Where the diode was mounted on the front panel during manufacture, just check it for dry-joints. It's likely that the solder will have dried up a little.

If the display is still dim after carrying out these checks and any necessary replacements, you'll have to replace the digitron. I've had to replace several of them over the past year or so. The symptoms are the usual ones: some segments brighter than others rather than the whole display being uniformly dim.

Loading Motor Drive

Another problem you may get after a major power supply failure is a blown loading motor drive chip (IC602, type KA8301). The damage can vary from a disintegrated chip that has blown itself in half and burnt its feed resistors (R630 and R631) to a chip that has simply packed up. The chip is mounted between the two ribbon cables on the main panel, to the left of the power supply.

Problems with this chip are becoming quite common. After a power supply repair a machine will often power up then either refuse to load a tape or, if the tape is already in the machine, it will remain in the fully-loaded position and refuse to eject the cassette. Don't despair. When you remove the bottom cover you will find that the loading motor drive chip and its two feed resistors are accessible from beneath. This is one of the few things you can get at without having to remove the deck assembly. The 7.5 Ω feed resistors R630 and R631 are of the safety type, rated at 1W. I always replace them both as they are connected in parallel. Once again the original type must be used.

Less Common Problems

If the machine keeps trying to front load of its own accord, without a tape being inserted, strip it down and check for dry-joints at the lighthouse (LD601) and the two end sensors. Also check the two plugs and sockets that connect the deck assembly to the main panel. They are usually OK, but bear in mind that one of these plugs is connected directly to the mode-select switch – you obviously don't want any intermittent connections here.

The cause of intermittent patterning, poor E-E and record pictures etc. is usually the tuner. The IF and mixer/booster assemblies are reliable.

A few weeks ago I repaired a machine that had died after a power cut. Apart from power supply failure, the capstan motor drive chip, which is mounted on the capstan motor, had blown itself apart and the servo and main microcontroller chips had failed. This was interesting. After replacing the 27V zener diode the machine continued to destroy the previously mentioned resistors R638/R664 in the -27V supply. It did so because of the shorted microcontroller chip. Definitely one to watch out for in future.

Summary – Electronics

Apart from the 'one off' failures we all get, that's about it with regard to electrical problems with these machines. If you are now in the fortunate position of being able to box up the machine and return it to the customer, there are just two small things that are worth attention.

First, when you replace the power supply in the machine for the last time check the condition of the small insulating pad between the power supply and the main board. The space between the power supply and the main panel is only a couple of millimetres: the white and green looking pad provides insulation between the two. It can deteriorate over a period of time because of heat, and obviously needs to be checked. I've found that the double-sided sticky Pritt Pads make an ideal replacement should the original pad be too far gone.

Secondly, make sure that the ribbon cables between the front panel and the main board are dressed clear of the loading motor drive chip. We have noted that this chip can be distressed, so don't ask for trouble!

Deck Basics

The deck used in these machines is very similar to that used in the earlier SI3260 and subsequent models. But it's more reliable. Two motors are used for tape transport. The loading motor drives the cassette housing and tape guides, while the capstan motor also provides wind/rewind drive. As with most modern machines, a pinch roller cam drives the pinch roller assembly up and down and a review arm guides the tape up to the capstan motor spindle. A sliding rack driven by the main cam provides tape guide operation.

Removing a Tape

Removing a tape from a dead machine looks difficult at first because in the loaded position one of the main deckretaining screws is obscured by the cassette housing. OK, you can remove the cassette housing by taking off the front panel to gain access to the two screws that hold it at the front, then remove the screws that hold it at the top. But if you do this you will still have difficulty if the tape is in the fully-loaded position, because the pinch roller will prevent the tape from coming out easily.

The best way to remove a tape is to take off the bottom metal cover to gain access to the previously mentioned loading motor drive chip. Then unsolder the chip and apply a few volts from the bench power supply to the loading motor via the print. Apply about 5-7V, positive to pin 10 and negative to pin 2. *with the chip removed*. This will unload the tape. Do it slowly, stopping every second or so. You will have to turn the capstan motor spindle from the top of the machine to wind in the loop of tape caused by this unloading.

You probably won't have to do this very often because, as we all know, the customer usually finds a far better way of removing a tape!

Cassette Housing and Eject Gear

The cassette housing is driven by the white or black eject gear that protrudes slightly above the metal chassis at the right-hand side of the deck. If a white one is fitted, you will probably find that the teeth which drive the cassette housing have wom away. Obviously the eject gear must be replaced. It's a good idea to replace the right-hand plate of the cassette housing at the same time, as the problem might otherwise recur.

To replace the eject gear, proceed as follows. Remove

VIDEO

Fig. 2: The loading

the six screws that hold the cassette housing in place. Remove the housing, then undo from underneath the three screws that hold the main deck. There are three more larger screws that have to come out from the top of the deck, after which it should be free. Don't forget to unplug the connecting leads from above. One of them is the flexy print to the lower drum. It can easily be damaged. You can now lift out the deck and turn it over to replace the eject gear. The loading motor and cam should be on the lefthand side as you look at the deck. Remove the three screws that hold them in position. From now on we will refer to this as the loading block.

Fig. 2 shows the loading block and eject gear in the eject position, correctly timed. If the mechanism has gone out of sync because of a worn eject gear, you will usually find that turning the loading motor a few times will resync the mechanism to the correct position. If the loading motor is stiff, it's likely that the nylon worm wheel will need to be replaced along with the eject gear. This worm wheel's teeth can be distressed if the loading assembly seizes. I've never known the main cam to suffer. The mode select switch, which is beneath the main cam, is also usually reliable.

The arrow on the relay pinch gear can be difficult to see. Make sure, by looking from the top of the deck, that the review arm is in the unloaded position (in line with the tape guides). It should now be easier to see the arrow for retiming. With the new eject gear in position, its arrow aligned with the main cam as shown in Fig. 2, double check the alignment of the relay pinch gear then screw the loading block firmly back into position. Also ensure that the sliding rack which loads the tape guides is pushed firmly to the right before tightening the loading block.

All that now remains is to reseat the cassette housing in line with the eject gear from above. Fig. 3 shows the timing of the eject gear and the cassette housing in the eject mode. Notice that the first tooth of the cassette housing rack goes into the first slot of the eject gear. As with most machines, if the timing is only one tooth out there will be problems.

The deck can now be replaced in the cabinet, with the cassette housing in place. The deck retaining screws are all accessible without a tape in.

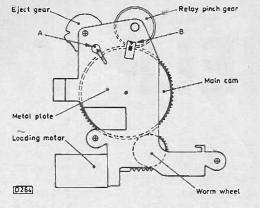
Tape Damage

No take-up is a common symptom with these machines. The usual cause is a faulty clutch unit, which has to be replaced. I've known several cases however where the cause was the small idler, which can be seen immediately below the cassette housing. It swings to and fro, and often becomes stiff on its pivot. I have had to replace it, but sometimes a small drop of light oil on the pivot is all that's required to get it swinging again.

In fact with the cassette housing removed you can see a whole series of small gears that drive the two reel urntables in the various modes. Each one can be removed and cleaned, which is a good idea when carrying out a service. If some of these gears seize up the result can be a severe tape loop on eject, though take-up in the play mode may be OK.

Tape wrinkling can also be a problem. As with any machine, a good test for tape wrinkling is to put it into fast-forward search then review search then back into play. The obvious cause is the pinch roller. When replacing this item, be sure to use the complete unit available from Samsung. I've tried using a plain pattern roller and have still had problems because the shaft on which the roller sits was slightly out of true (bent!). This will wrinkle the tape.

The review arm is critical. If in doubt, replace it. At least you know that a new one will be right. I say this because



there's no review arm height adjustment, and if the old one is only slightly bent there will be tape wrinkling problems.

If the pinch roller and review arm are OK but the machine still wrinkles tape, it's possible that the audio/control head requires fine adjustment. This is also

critical. If the head is only marginally out of alignment it will cause tape wrinkling, but check the other items first.

Loading

0

White plastic holding

Eject gear

Summary - Mechanical

So much for the general run of mechanical problems I've had with these machines. There is one other problem. I've spoken to Samsung about it on a couple of occasions and have also discussed it with other engineers, but no one has come up with the answer. On possibly seven or eight occasions now a machine has come into the workshop with a tape wrapped perfectly around the *back* of the drum, with no apparent tape damage. After removing the tape the machines have worked perfectly, showing no signs of any mechanical fault.

Now it's worth noting that as these machines load the tape to the drum they produce a little kick just at the time when the guides reach the fully-loaded position. This kick leaves, briefly, a very small loop of tape around the head and then tightens up again. It's very small and isn't really a problem. But suppose that a contaminated tape is inserted and the contaminated part reaches the head at the time when the kick occurs: it might be just enough to throw the tape over the drum to cause the problem. This is only a theory however, as I've never seen it happen. Has anyone else seen it? It's probably just one of those inexplicable quirks we encounter every day in this trade.

Useful part numbers **Power supply** Main panel C110 A1104-0364 D606 or ZD702 A4106-0065 B4010-0015 IC602 62119-401-300 IC101 A1014-0011 R630/R631 B1004-0229 R101 61079-917-101 R638/R664 ZD101 62169-423-096 A4153-0018 Front panel DT701 (digitron) Mechanical parts

Cassette housing complete	62052-0004-00
Cassette housing RH plate	62203-0025-01
Eject gear	61473-0051-01
Review arm	61544-0032-00
Pinch roller complete	61523-0021-01
Clutch unit	61453-0001-01

block assembly, shown in the correct position for the eject mode. **Broken lines indicate** the cam and worm wheel hidden beneath the metal chassis plate. A and B: the timing arrows on the eject gear, relay pinch gear and main cam, also the hole in the latter, should line up as shown for correct mechanical synchronisation.

Fig. 3: Correct timing of the eject gear and the loading rack attached to the cassette housing. The first tooth of the rack goes into the first slot of the gear.

HELP WANTED

The help wanted column is intended to assist readers who require a part, circuit etc. that's not generally available. **Requests are** published at the discretion of the editor. Send them to the editorial department do not write to or phone the advertisement department about this feature.

Wanted: Deflection yoke for the Matsui Model 1440A (narrow-neck 90° tube type 3702B22). Willing to try anything with a field coil DC resistance of 15Ω. L. Watkinson. Regent House, Week St. Mary, Devon EX22 6UJ. 01288 341 254. For disposal: Three Sony SLC6, four Philips N1700, five Philips VR2020 and five Philips VR6462 VCRs, with full service manuals for the Philips models. They all need attention but as I need the space and haven't the time to repair them I will accept £50 for the lot – if they are taken away as one lot. They are all complete and haven't been cannibalised, but many have worn video heads. MoorView Television, 13 The Arcade, Okehampton, Devon EX20 1QZ. 01837 54 044 (day). 01837 840 184 (evenings). Wanted: Sony RMT-V270 remote control unit for VCR Model SLV210. Robert McGrath, 41 Belvedere Place, Dublin 1. Ireland. Wanted: Scan coils for the Philips Model 14CT3605/05 (KT3 chassis). Tube is type A37-554X. Ron Bloy, 63 James Street, Stenhousemuir, Stirlingshire FK5 3HR. 01324 552 241.

Wanted: PWB-DEFL-SUB panel type CP210A132-10 for the Dell Ultra scan SVGA 17FS-EN monitor, Model VC7EN (Mitsubishi), or a circuit diagram for this panel. Chris Laudan, 235 Holt Road, Horsford, Norwich NR10 3EB. 01603 897 638. Wanted: Tripler for the Grundig 900GB GSC900 camera. or possibly a camera for spare parts. R.M. Brannigan, Old Omnibus, 59 St. Oswald's Street, Old Swan, Liverpool 13, 01512 520 514. Wanted: Service manual for the Philips CD104 and a handbook for the Philips VR6870, to buy or borrow. Have for disposal about 150 used TV valves, free if collected. S.J. Sheppard, 12 Bedford Road, Harrow, Middx HA1 4LZ. 0181 863 5150. Wanted: Parts list for the Perdio CTV Model 3002 - same as OSD 521/S. Paul Lee, 6 Woolton Close, Moston, Manchester M40 0HQ. Wanted: The following items for the Sanyo VTC5000 VCR. (1) The PCBs associated with the front panel, which contains the fluorescent

display and power switch. (2) The associated syscon panel, containing IC3301. (3) A reel drive motor, preferably new. (4) A pinch roller/idler asscmbly. F.C. Bailey, 2 Elmridge, Leigh, Lancashire WN7 1HN. 01942 675 299.

Wanted: Cassette mechanism for the Sharp TV/radio/cassette recorder Model 10P-18H, or a complete model – working or not. F. Hendry, 183 Boreland Drive, Knightswood, Glasgow G13 3TP.

Wanted: Scan transformer for the Philips PM3211 oscilloscope. A service manual (photocopy OK) for the Pioneer PDM550 CD player. A service manual (photocopy OK) for the Aiwa AA8500H stereo amplifier, or information on where this can be obtained. J. Rivas, 11 Palaipaphou Street, Kato Paphos, Cyprus. 06-249 446.

Wanted: An EVF for the Philips VKR6820 camcorder (or the JVC, Ferguson etc. equivalent) including lead and plug. A battery pack for the Philips VKR6810 (or equivalent) camcorder. A Panasonic Z1 chassis main PCB - preferably working. A Ferguson ICC5 chassis Nicam sound PCB. An Advent/Barco 750E 6ft projection TV screen. I have many PCBs from scrap sets free apart from postage costs. Malcolm Lambert. 20b Palmer Lodge, Old Kent Road, Paddock Wood, Tonbridge. Kent TN12 6JD. 01892 837 566. Wanted: A front control panel and a handset for the Mitsubishi Model HS-M55 VCR and a handset for the Mimtec Premier 2IRD satellite tuner. E.J. Edwards, 43 Hoose Court, Market Street, Hoylake, Wirral L47 5AB. 0151 632 0614.

Wanted: New or good second-hand LOPT, type MSU1RGV07. for the Samsung CSA7571 17in. monitor. Dave Chaplin. 470 Derby Road, Chesterfield, Derbyshire S40 2EX. 01246 273 048.

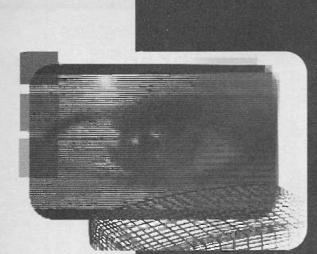
Wanted: UCL82 valve and circuit diagram (photocopy OK) for the AP100 amplifier produced by CSR Ltd. of Poole, Dorset. P. McKeever, 4 Castleview Park, Derry, N. Ireland BT48 8DL. 01504 353 613. Wanted: Would Nick, who called me in connection with my request for a TCM1705A and a TCM1512P chip and information on them, please give me a call – I've lost your telephone no. Peter Ward, 01425 475 445.

Wanted: Sony CCD element type ICX027BKA-6 or details of a source of supply or alternatively a complete drive PCB type 63005-701-461 with CCD for the Samsung VC-E805P camera. D. Pack, 10 Manus Place, Glenfield 2167, NSW, Australia. Wanted: Circuit diagram and operating/tuning instructions for the Thomson TF2502 colour portable and a circuit diagram for the Microvitec 653 Cub colour monitor. Photocopies will do. S.C. Stacey, 54 Swinston Hill Road, Dinnington, Sheffield S31 7SA. 01909 566 457. Wanted: TDA2270 field deflection chip for an Hitachi/Solaro TV set and a remote control unit for the Hitachi VT9700E VCR. Ted Yates, 79A Ash Road, Sutton, Surrey SM3 9LA. 0181 644 0710. Wanted: Mains transformer for the Solartron CD1400 scope, new or second-hand. M. Henry, 42 Chapel Road. Dungiven, Co. Derry, N. Ireland BT47 4RT. 01504 741 558. Wanted: Manual, circuit, control panel data or a working panel for the Electrolux 4076 microwave. Also a manual or parts list with ICs etc. for the Saft automatic 12V fast charger Mk. 2. Michael J. Levy, 19 Totternhoc Close, Harrow, Middx HA3 0HS. 0181 907 3620. Wanted: Programmable remote control unit for the Goodmans TX3650 VCR. S. Partin, Ilversden Cottage, Withy Road, West Hunspill, Somerset TA9 3NN. 01278 794 101. Wanted: Any technical information,

circuit diagrams or service shects for the Bell and Howell Hi-Bcam 550 video projector, manufactured by Videpro, Dublin. J. Foster, 117 Cotes Road, Barrow-upon-Soar, Loughborough, Leics LE12 8JP. 01509 413 145.

Wanted: LOPT for the Bush Model TV161. A Bush Model TV148 complete, also a colour set fitted with the BRC 2000 chassis and any dual-standard Bush-Murphy colour sets. S. Pendlebury, 218 Belmont Road, Sharples, Bolton, Lancs BL1 7AZ. 01204 305 781.





Reports from Philip Blundell, AMIEEIE Graham Richards Giles Pilbrow Michael Maurice Michael Dranfield John Edwards Terry Lamoon Eugene Trundle Glyn Dickinson and Bob McClenning

Ferguson 59P7A (ICC5 Chassis)

This set was dead. Another shortcircuit S2000 line output transistor (TL31)? Sure enough a reading of 40Ω was obtained between its collector and emitter, but when it was removed it was found to be OK. The reading was caused by a faulty EW coil, LG11, which was short-circuit between its primary and secondary windings. Resistor RL44, which consists of 56Ω and 120Ω in series. was open-circuit, and with the TDA4950 EW drive chip IG01 short-circuit from pin 5 to chassis this completed the path across TL31. With a new LG11, TDA4950 and RL44, also CL48 (10.5nF) and CL44 (300nF) for good measure. we tried the set. No other damage had been done. P.B.

Philips CTX-E Chassis

This set had been arcing from its first anode connector and was now dead. A check on the 125V HT supply showed that it was low at 70V. The voltage at the collector of transistor T7330 in the trip circuit was correct at 6.8V, so this eliminated possible problems in the excess current protection system. We removed for testing transistors T7322 and T7323 in the chopper pre-driver circuit. T7322 (BC548) was open-circuit. A new EHT lead

TV Fault Finding

and cap were required of course. **P.B.**

Grundig P37-2226 (CUC2201 Chassis)

This set was tripping. The front display was off, and there was no sound or vision – just a thumping noise from the speaker. The tripping noise stopped when the tripler's input lead was disconnected from the combi transformer, but the tripler was OK. Resistance checks showed that the transformer was open-circuit between secondary windings N and L. A new transformer restored normal operation. **P.B.**

Fidelity AVS1600

There was no sound and the set was stuck on ch. 8. Sound was restored by replacing a faulty TDA1908A chip and fuse. But the set was still stuck on ch. 8 with the balance control and remote control unit having no effect. Checks around the M104B1 chip IC1 showed that its 5V supply at pin 14 was missing. The cause was the 5.1V zener diode 5D1 which was short-circuit. Then we just had to reassemble it all! G.R.

Sanyo CBP2145 (E2 Chassis)

The two faults mentioned on the report card, patterning and lack of height, showed up only after about an hour. When freezer was sprayed near the 12V and 5V regulators IC361 and IC365 the faults cleared. Both regulators have 100μ F, 25V decoupling electrolytics – C364 and C398. Replacing them cleared the two faults. G.R.

Salora L Chassis

This set was actually a Tashiko Model 51E941. The fault was no sound. We soon discovered that there was no audio output from the TDA4505 chip, where voltage checks showed that pin 14 was at 0.2V instead of 1.5V. The 22nF decoupling capacitor CB119 was faulty, a replacement restoring perfect sound. **G.R.**

Cascade TV510

If one of these sets destroys either the line output transistor or the field output chip intermittently, disconnect the HT supply to the line output stage and connect a 60W bulb as a dummy load. The HT should read 112V. If it's high or goes high when the power supply warms up, replace the 47µF, 63V electrolytic C909.

Note that small variations in the HT voltage may cause volume variations or tuning drift. Again C909 is probably the cause. **G.R.**

Tatung 190/195 Chassis

This set was actually a Matsui 1424. Its line frequency was wrong, and adjustment of the control would produce only a very unstable lock. The cause of the trouble was R109 ($30k\Omega$) in the line oscillator circuit. It had increased in value to about $31k\Omega$. G.P.

Sanyo CBP2180

This set couldn't be tuned because its tuning voltage was missing. R714 ($10k\Omega$) on the front control PCB had gone open-circuit. G.P.

GoldStar CIT2175 (PC07X2 Chassis)

It would take several minutes for this set to come on from cold. We found that C811 (47μ F, 25V) in the power supply had dried up. It's the reservoir capacitor for the supply to pin 9 of the TDA4601 chopper control chip IC801. As a precaution we also replaced C812 (100μ F, 16V), C808 (1μ F, 50V) and C813 (100μ F, 16V). G.P.

Toshiba 145R7BZ

This set wouldn't go into the standby mode. Checks in the on/off

control section of the power supply brought us to R833 (120k Ω) which had gone open-circuit. **G.P.**

Matsui 6091

The field hold would lock at only one end of the control's range and would be lost completely once the set had warmed up. R412 ($220k\Omega$) had increased in value. G.P.

Sony AE2 Chassis

On very intermittent occasions this set would cut out and go to standby. The cause was rather roundabout. There was a dry-joint at R854, depriving the field chip of its supply from time to time. As a result, the protection circuit would come into operation. G.P.

Matsui 14R1 (Grundig G1000 Chassis)

There was no sound output from one of these receivers. On investigation we found that the 4.7Ω safety resistor R550 had gone open-circuit. **G.P.**

Mitsubishi Euro 4 Chassis

One of these sets had no tuning memory. The tuning memory chip IC702 requires a -30V supply, which was missing, at pin 2. This supply is derived from the standby transformer T951, one of whose secondary windings was opencircuit. When we removed T951 we found that some of the pins were covered with a hardened brown glue. This had corroded the fine secondary-winding leadout wires. G.P.

Ferguson TX86 Chassis

The cause of failure of the power supply to start up was traced to the TEA2018A chopper control chip IC4, which was faulty. It's always worth checking the soldering of R61 in the power supply in these sets, as a dry-joint here can destroy the line output transistor. G.P.

Panasonic Alpha 3 Chassis

One of these sets had no tuning memory because the chip select signal to the memory chip from pin 53 of the microcontroller chip was missing. We found that L1209 had gone open-circuit. Its part no. is ELEXT100KA. G.P.

Philips G110 Chassis

Two weeks after rebuilding the power supply in one of these sets we were called back because the set had again gone dead. When we switched it on there was silence for a few seconds then a purring noise came from the power supply. The cause of the trouble this time was the line output transformer, a replacement restoring normal operation. M.M.

Hitachi C2574TN

The owner had been told by the shop at which he had bought this set that he could connect the external speakers to it and to the external amplifier at the same time. But when a loud piece of music came on the set tripped out and went dead. We soon found that the main audio output chip IC4451 (type TDA7263M) was short-circuit, so a replacement was fitted. The set then started but couldn't be tuned in.

Checks showed that the correct voltages were reaching the tuner and the IF strip, but there was still only noise. I then checked the supply to IC4451 and found that it was missing. It comes via Q956, which is used for on/off switching and was open-circuit. A new BD438 restored the supply and brought the set into full operation. A look at the circuit diagram showed that the switched 25V supply also feeds a voltage regulator. M.M.

Texet CTV10

I'd never come across one of these budget 10in. portables before. The problem was that it wouldn't come out of standby. Power switching is controlled by a 2SA1012 transistor, which was open-circuit. A replacement cured the fault. M.M.

Philips K30 Chassis

A common problem with these sets is intermittent tripping because the little bush at the end of the EHT cable is dry-jointed. As a result, when you remove the cable the bush stays in the transformer. The way I deal with this problem is first to ensure that the EHT is fully discharged, then put a long screwdriver with a little bit of Araldite at its end down into the LOPT. Allow the Araldite to set then, when you remove the screwdriver, the bush will come with it. You can separate the bush from the screwdriver, remove the adhesive (by heating) and resolder it to the EHT lead. This is far cheaper than fitting a new transformer and EHT cable. M.M.

Texet CT141

There were two faults with this set. First, it went into standby after a few minutes. This was cured by replacing the capacitor in the chopper transistor's base circuit and resoldering the dry-joints in the power supply. The second fault was field bounce or, to be more precise, the field scan was trying to collapse. Scope checks were inconclusive and, after replacing several components in the field output stage, we eventually replaced the height control. This cured the problem. M.M.

Grundig CUC2800 Chassis

The usual cause of no sound with these sets is failure of the TDA6200 sound processing chip. On this occasion however the U2829B sound demodulator chip was responsible.

The construction of this chassis does not make servicing easy. There is some access to the print side of the IF board however. A scope check in the coupling circuit between the two chips will show which one is the culprit. M.M.

Matsui 1480A

This set displayed a dark picture. If the first anode preset was turned up there was a good bright picture, but the brightness control didn't work. As we didn't have the right manual we wasted a lot of time before we discovered that C483 (4.7μ F, 50V) in the beam limiter circuit was the cause of the trouble. It had dried up, which is not surprising as it is mounted right next to the field output chip's heatsink.

In the model whose manual we were using the beam limiter acts on the contrast. In this model it acts on the brightness. M.Dr.

Philips GR1-AX Chassis

If the set won't stop searching even when a good strong signal is found, replace C2031 (22nF) even if it reads OK when checked. **M.Dr.**

Matsui 1482

If the set is dead with the standby light on, check R605 (680k Ω) in the power supply. You will usually find that it's open-circuit. M.Dr.

Bush 2059NTX

Reduced, fluctuating height, with the Nicam sound dropping in and out, led us to carry out voltage checks in the power supply. We found that the 18V supply was low at only 11V. R919 (1 Ω) had risen in value to 13 Ω . M.Dr.

Nokia 6365

The sound was OK but the picture took up to twenty minutes to appear.

Timebase and EHT operation were normal. I initially suspected that something was amiss in the tube's heater supply, but it was OK. The first anode (G2) control had no effect however. The tube's first anode and focus supplies come from a module which is mounted on the chassis, near the line output transformer. I connected a scope, set to DC, to the module's first anode supply output and found that the display varied erratically and wildly between 100V and 250V. With time it gradually settled down and a picture appeared. A replacement module restored normal operation. It's quite cheap, and can be obtained from Willow Vale - the part no. is 57109W). J.E.

GEC C1402

There was HT at the collector of the line output transistor, but the line output stage was dead. When the dry-joint at the transistor's emitter had been resoldered the set came to life. J.E.

Nikkai NT1416

The only sign of life was a loud whine from the power supply. We found that C444 (370pF, 2kV) in the line output stage was shortcircuit. When this capacitor was removed a split could be seen around its outer edge. J.E.

Goodmans 5150RC

According to the job card this set was dead. A faint whine could be heard from the power supply however, while a regular 'ticking' noise at about one second intervals came from the line output transformer area. With the bench lamp switched off, a blue spark could be seen jumping the short distance between the transformer's base and one leg of the 33µH coil L652 in the HT feed. A closer look showed that the coil's legs were both dry-jointed. After a quick solder up the set worked normally. J.E.

ITT CVC801 Chassis

The owner of this ageing portable complained that it took over thirty seconds to come to life when switched on. It had obviously been well cared for, being in immaculate condition both inside and out. I didn't have the circuit to hand, but my attention was drawn to a sad looking electrolytic capacitor, C757, whose sleeving had shrunk untidily around its body and was discoloured. With the aid of a magnifying glass I found that its value should have been 10µF (350V). The capacitance meter produced a reading of only 0.5µF however. When a replacement had been fitted the set started up normally every time. J.E.

Lloytron T142C

This portable suffered from intermittent line hold drift. Slight movement of the cabinet would result in line collapse. We found that the pins of the line driver transformer T201 were dry-jointed. Resoldering them cured the problem. J.E.

Sony KVX2532

No sound from one of this set's speakers was the result of dry-joints at all five pins of the TDA2050 audio output chip IC261. J.E.

Hitachi CPT1474 (NP84CQ4 Chassis)

The cause of vertical rolling was traced to C906 (0.2μ F) in the field oscillator circuit. It measured OK when checked with a capacitance meter, but a replacement cured the fault. J.E.

Sony KVE2532

This rather bulky Nicam set came to me with a well over-modulated picture and field cramp. I was scratching my head over what could be the cause when the customer mentioned that the set "went funny during a thunder storm". This could have been a real nasty, or maybe an 'electronic screwdriver' reset was all that was required. When the test mode was entered all the settings were seen to be at their extremes. Resetting them produced a lovely square picture and a sigh of relief. T.L.

Ferguson TX80 Chassis

This set was stuck in standby. In the on condition the voltage at the junction of RP37 and DP45 should be 3V. It was very low. Cold checks revealed that RP36 ($75k\Omega$, 2W) was open-circuit. T.L.

Hitachi CPT2598 (G8Q Chassis)

The customer said that there was no picture, but on investigation we found that field collapse was the cause of the problem. A check at the field output chip IC601 showed that its LT supply was missing. Further checks showed that R715 (1 Ω fusible) had gone open-circuit. Its replacement burnt out immediately however. You'd expect to have found a short-circuit here, but there wasn't one. Nevertheless a new IC601 and R715 restored normal operation. **T.L.**

Matsui 1436XA

This portable had no picture. The line output stage was getting its HT supply, but the line driver stage wasn't. The line driver transformer T751 was open-circuit. **T.L.**

Grundig GT2003

This set had a bright raster with flyback lines. A quick check at the CRT base panel showed that the HT supply to the RGB output stages was missing. R918 (10Ω safety type) was open-circuit. T.L.

Matsui 2180TT

Field jitter was the problem with this set. We found that there was a dry-joint at the scan plug P570. Resoldering its connections cleared the fault. **T.L.**

Hitachi CPT2250

This set is fitted with the Salora J chassis. Its picture would gradually brighten, until there was a very bright raster with no picture content. The sound was not affected. The tube's cathode and first anode voltages remained stable, but the voltage at its control grid drifted upwards. This was caused by dry-joints at the metal screening shield on the PCB, directly above the tube's neck – it's used as an earth return. E.T.

Ferguson ICC9 Chassis

This set would come on for a second, with the rustle of EHT, then dic. Time for psychic fault finding! There were no shorts, so I decided to disconnect the TDA8172 field output chip IF01. The result was field collapse with no tripping. A replacement TDA8172 chip restored the picture. G.D.

Orion 14ARX

These sets, which use a simple resistive dropper to power the standby circuit. tend to come to us stuck in the standby mode. To prove where the fault lies, disconnect Q117. If the set docsn't come on, the cause is probably the STR50103 chip or the series-connected $330k\Omega$ resistors. If the set now works except for standby - the cause of the fault is usually in the standby 5V feed. If this falls below 4V, the LED still lights but the set doesn't respond. C530 (3.3µF, 250V) is the usual cause of this problem. It's mounted by the mains switch, in a hot corner. A high-temperature

component is a good idea here. This chassis is used in Matsui, Bush etc. sets. G.D.

Philips GR1-AX Chassis

This set, with remote control, was dead with very low outputs from the power supply. It was stuck in standby, though the microcontroller chip sent the on/off signal to transistor T7631. Replacing R3610 and R3613 restored the set to life, but the fault recurred. The cause of the trouble was eventually traced to the 10V zener diode D6610. It's in the chopper FET's gate circuit, G.D.

Matsui 2092

After fitting a new degaussing thermistor and fuse we were greated with – nothing! Although the power supply was working, there was no line drive. D411, a 9·1V zener diode in the start-up supply, had gone short-circuit. G.D.

Ferguson TX85 Chassis

Sets fitted with this chassis have a habit of going bang. Replacing the obviously damaged components will often get the set going again, but with an unhappy power supply that goes bang soon after.

For a reliable repair, replace TR6 (TIPL791A), IC4 (TEA2018A), R102 (1.2Ω, 3W) and FS1. This fuse must be a 1.25A anti-surge, not a slow-blow, type - you may find that an 800mA fuse is fitted. Solder the chopper transformer and mains switch tags - replace the latter if in doubt. Then check the following : R101 (1.2k Ω , 5W) – this is vital!; D8. D10 and D23 (all type 1N4002); D3-6 (all type BY133); R95 (100 Ω) and R97 (10 Ω). Power the set via a variac, with the degaussing coils disconnected. It should now work. If the picture is blotchy, replace the degaussing thermistor. G.D.

Matsui 209T

All sorts of odd intermittent faults can be caused by R630 which, despite its designation, is in fact a 1.25A fuse. The holder is usually to blame. I find it best to replace both the fuse and its holder. **G.D.**

Amstrad CTV1410

These sets have proved to be quite reliable. This one had very intermittent field collapse, especially when cold. Out with the polar bear! Replacing IC402 didn't help, but freezing C404 (0.022μ F) produced the fault symptom and a replacement cured it.

Another of these sets produced a picture that had all the hallmarks of a low-emission tube. In fact R650 and R651 (both $4.7k\Omega$) in the onscreen display circuit had gone high in value. **G.D.**

NordMende F10 Chassis

The set that came in, with the complaint of poor field centring, was a 14in. Model T3434. It has a 10-pin diodc-split line output transformer. The thing to check is the 21V supply, at CL28. Even if the supply is only marginally low, CL28 (1,000 μ F) and RL52 (15 Ω) should be tested. Either can cause very strange effects on the field scanning. B.McC.

Hitachi NP84CQ4 Chassis

The problem with this 14in. colour portable (Model CPT1474) was HT instability – the voltage was also low. Replacing C910 and C919 (both 10μ F) cured the trouble. B.McC.

HI-LOOK – JJ'S TRADE COUNTER OPENING ON 16TH JANUARY 1997 LETS GO AND GRAB THE BARGAIN AND A FREE GLASS OF WINE



TV Tuning Aid

Ian Rees describes a simple unit to enable the video and satellite channels of TV receivers to be set up accurately

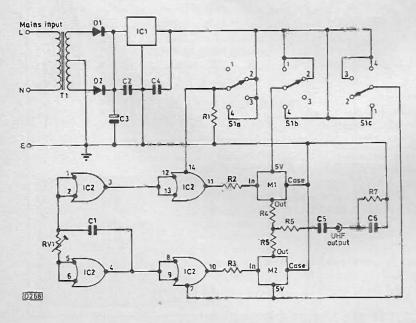
A signal source for setting up the video and satellite channels of TV sets is a useful item for both workshop and field use. The advent of Channel 5 in some areas has brought into focus the need for the outputs from VCRs and satellite receivers to be set accurately.

The unit described in this article provides two UHF outputs that can be tuned across the range from channel 30 to channel 40. A four-position switch enables blank or modulated rasters to be produced, either separately for manual tuning or simultaneously for sets with selfprogramming. The blank raster is also useful for carrying out grey-scale adjustment.

Circuit Details

Fig. 1 shows the circuit. The UHF carriers are produced by a pair of Astec UM1233 modulators, M1 and M2, whose outputs can be modulated by the CD4001 quad two-input nor gate chip IC2. This is arranged as an astable multivibrator with buffered complementary outputs. The multivibrator's frequency is set by RV1 to provide a suitable bar pattern.

The outputs from the two modulators arc combined by the three 47Ω resistors R4-6 and are terminated at the RF output socket by the isolation components C5-6 and R7.



The three-pole, four-way selector switch S1 can be set to give:

(1) Outputs 1 and 2 without modulation.

(2) Output 1 only, modulated.

(3) Output 2 only, modulated.

(4) Outputs 1 and 2, modulated.

A stabilised mains power supply is incorporated, with ICl to provide regulation. This is required to maintain the stability of the oscillator's output.

Construction

It would be best to enclose the unit in a metal box. As radiation from the Astec modules was found to be negligible however a plastic case was used for the prototype. The layout shown in Fig. 2 is not critical provided the following points are observed.

By mounting the modulators as shown there's no need to use phono plugs for their outputs: the two resistors R4 and R5 can be soldered directly to the inside of their phono sockets, leaving just the ends of these resistors showing to link together with R6. A right-angled PCB= mounting phono socket terminates the UHF output, enabling a coaxial flylead to be connected.

The small, compact Astec modulators were obtained from a couple of defunct Spectrum computers. Other computers and video games of that era use these modulators. I understand that both Sendz and Bull Electrical, who advertise regularly in *Television*, may be able to supply them or an equivalent. Modulators removed from VCRs or satellite receivers could also be used. If their physical size is different, the layout would have to be altered from that shown, but an advantage would be that their in-built test signals could be used.

I mounted all the components on a piece of standard Veroboard measuring 80×100 mm. The strips beneath the modulators etc. were soldered together to form an RF screen.

With care, you can use a drill to open up the holes a few millimeters to enable the selector switch to be tagmounted through the panel. The tags can then be connected via links or. to avoid lots of flying leads, soldered directly to the print. A single hole in the lid of the case is required for the switch shaft.

RV1 is mounted on the underside of the board.

Fig. 1: Circuit diagram of the TV tuning aid. A small mains transformer supplies rectifiers D1 and D2, whose output is fed to the 5V regulator IC1. This doesn't require a heatsink. To prevent instability the two small 0.1μ F capacitors (C2 and C4) associated with the regulator should be mounted as close to its input and output as possible.

R1 is included to ensure that IC2 doesn't oscillate in the no modulation position.

C5 and C6 should be high-quality isolation capacitors to prevent any danger of shock with older TV sets that have live or half mains potential chassis.

Setting Up

If you don't have a UHF frequency counter the simplest way of setting up the unit is with a TV set whose channel frequencies can be switch selected. Allow a few minutes for the modulators to stabilise after switching on, then proceed as follows – the example assumes that the standard channel 36 for video and channel 38 for satellite TV are to be used.

(1) Connect the unit to the mains supply and link its output to the TV set's UHF input socket. Set RV1 to mid-position.

(2) Switch the TV set to ch. 36.

(3) Set switch S1 to position 2. Carefully tune the core in modulator 1 until a strong, steady pattern is seen.

(4) Switch the TV set to ch. 38.

(5) Set S1 to position 3 and repeat the tuning, this time with modulator 2.

(6) Seal both modulator tuning cores with wax.

(7) Adjust RV1 until a suitable number of bars are obtained on both channels.

Use

The unit can be used by plugging its output into a TV set's UHF input socket directly. For a better indication of how the set will perform, use a passive Y splitter to

NEW FROM HAMEG

Two scopes and a spectrum analyser have been added to the Hameg Instruments range.

Model HM305 is a dual-trace, analogue/digital scope that replaces the HM205. It has a 30MHz analogue bandwidth and a 40MS/sec digital sampling rate. Sensitivity is 1mV/div, timebase ranges are 0.2s to 10ns/div, and there's an integral component tester. Digital functions include 40MS/sec sampling in both channels, two 2K × 8-bit memories. 50s to 0.5µs/div timebase operation and pre-trigger, singleshot and roll modes. An HO79-5 interface can be used to feed waveforms to a matrix printer or, via RS232 or IEEE lines, to a PC. Waveforms can also be fed back from the PC to the HM305's memories and displayed on its screen. The HM305 is available at £724 plus VAT, the price including two probes, a mains lead, a manual and a two-year warranty.

Model HM304 is a microprocessor-controlled analogue scope with an auto-set system that has six set-up memories to save and recall complete front-panel configurations. This can be achieved by frontpanel operation, or remotely using the standard RS232 interface. Basic specification includes 35MHz analogue bandwidth, 1mV/div sensitivity and 0.5s to 10ns/div timebase ranges. A delay timebase, variable hold-off and a built-in component tester are provided. The HM304 is available at £552 plus VAT, the price including two probes,

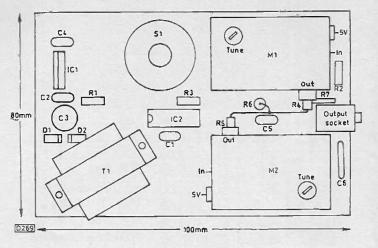


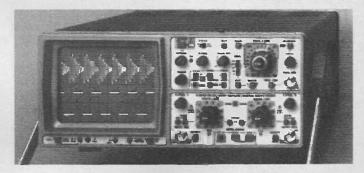
Fig. 2: Layout on a piece of 80 x 100mm Veroboard.

mix the output from the unit with the signal from the aerial. Picture/sound performance can be directly examined on each channel used.

Some TV sets won't lock to the unit in the automatic scan mode and will have to be tuned manually.

				and the second second
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	C1	0.01µF, 100V Mylar	R1-R3	2.2kΩ
	C2.4	0.1µF, 30V ceramic	R4-6	47Ω
1	C3	470µF, 16V electrolytic	R7	2.2MΩ
	C5	180pF, 600V ceramic	RV1	1ΜΩ
	C6	470pF, 600V ceramic		
	Contraction of the second	resistors 0.25W, 5% carbo on preset rated at 0.25W	on. RV1 is	a linear
	Т1	Mains transformer with secondary winding	6-0-6V, 15	50mA
	D1-2	BY127		
	IC1	7805 5V, 1A regulator		
	IC2	CD4001 quad two-input	nor gate	
	NA1-2	Actor LIM1222 modulate	TC	

M1-2 Astec UM1233 modulators



The Hameg HM305 analogue/digital scope.

a mains lead, manual and a two-year warranty.

Model HM5010 is a stand-alone spectrum analyser with a 5in. CRT and a frequency range of 150kHz-105GHz. An on-screen frequency marker cursor utilises the numeric digital display, which also indicates the centre frequency, with 100kHz resolution. Input range is -100 to +13dBm. This lightweight portable analyser is ideal for EMC precompliance testing. The price is £1,198 plus VAT.

These instruments are available from Hamcg Instruments, 70-78 Collingdon Street, Luton, Beds LUI 1RX (01582 413 174, fax 01582 456 416). A catalogue is available from the company.

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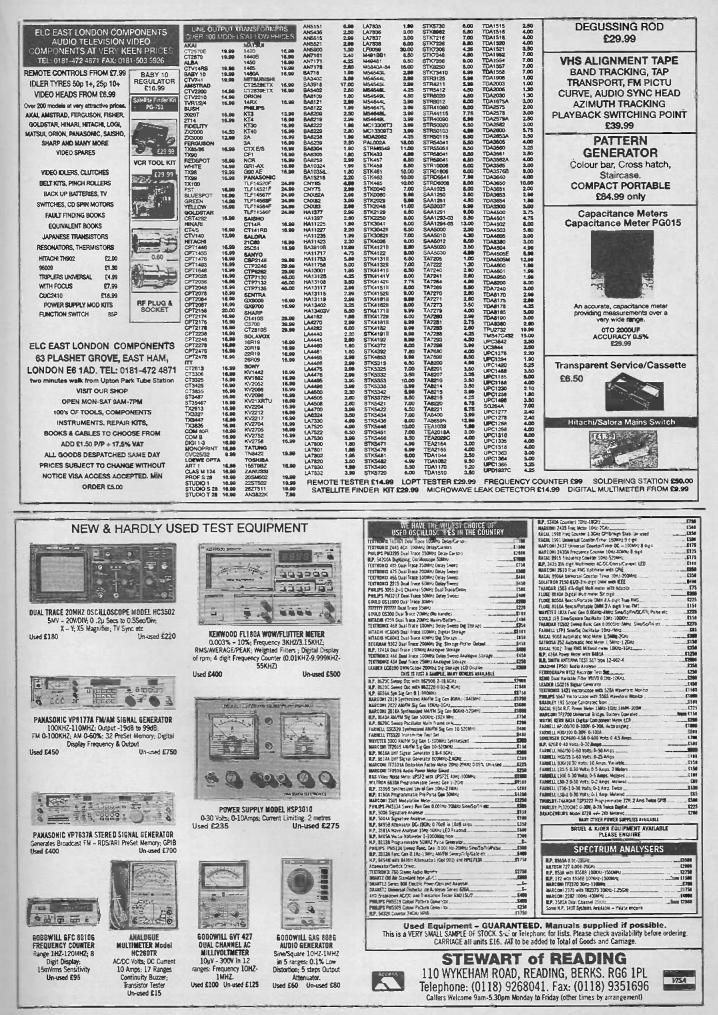
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CSN/74 L.S.D C.S.M/A L.7.J BC328 LLB BT228 C.2.6 MS218L C.0.8 STR0420 L149 TDA253A 4.7.0 THP3C L14 S8877 L.6.0 S25468 C.2.8 BC388 C.1.6 BT228000 1.3.8 STR0420 1.1.4 TDA3505 2.4.0 TP41C C.8.5 S28890 L.6.0 S20716 1.3.8 BC327 C.1.0 B742 L.2.4 BT228000 1.8.8 MS5655P 4.56 TD053V 1.3.7 TDA350 2.4.0 TTA27C L.0.0 A.7.7 TD1355A 2.4.0 TD14 BT228000 1.8.4 MC14066B 0.21 TA7205AP 2.37 TDA356A 3.90 TTP171A 1.25 S20124 B14 S2056 C.1.7 BC337 C.1.4 BF423 C.1.4 BF38 0.1.8 MC1426P 1.28 TA727P 2.28 TDA356A 1.7.4 TDA356A 1.7.4 TDA357A 1.7.9 TD171A 1.7.8 <td< td=""><td>258764</td><td>0.30</td><td>2SD400</td><td>0.34</td><td>BC3078</td><td>0.15</td><td></td><td>0.04</td><td></td><td></td><td></td><td>11.85</td><td></td><td></td><td>TDA2611AQ</td><td>1.32</td><td></td><td>1.82</td></td<>	258764	0.30	2SD400	0.34	BC3078	0.15		0.04				11.85			TDA2611AQ	1.32		1.82	
28891 E.BJ 250659A E.M4 B2302C E.H4 B7220 E.J2 B7229000 I.J3 H58555P E.BS TDA3505 2.40 FF42C E.SS 28892 0.55 250716 1.83 B6327 0.10 B7421 0.24 B7255 0.14 MK13002P 7.48 T9964V 1.47 TDA3560 3.38 THF40A 2.37 250121 0.14 B7422 0.19 B7255 0.14 MK14666B 0.21 TA1205AP 2.37 TDA355A 3.38 THF10AIA 1.35 250136 0.14 B7423 0.14 B7299 0.18 MC14066B 0.21 TA1227P 2.28 TDA355A 3.38 TH71AIA 1.25 250137 0.35 250955 6.47 B6369 1.48 B7499 0.18 MC124062 1.37 TM227P 2.78 TDA3555 2.74 TDR47032P8183 1.19 1.19 1.19 1.11 TDA4556 2.74 TDA3556 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>0.69</td><td>STR01816</td><td></td><td>TDA2653A</td><td></td><td></td><td>2.14</td></t<>												0.69	STR01816		TDA2653A			2.14	
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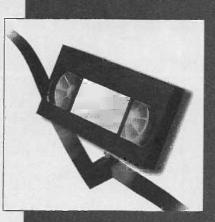
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Reports from Chris Watton John Edwards John Pitt-Francis Keith Evans Michael Maurice Brian Storm Gerald Smith Mike Orr Michael Brett Graham Richards and John Coombes

Samsung VI375

This machine was dead. There's a repair kit for the power supply, called the 6 WINNER1 kit – it's available from Samsung or CPC. When we fitted one the machine worked but the brightness of the clock display varied. In fact it sometimes almost went out. Replacing D109 and C118 in the power supply cured this problem. C.W.

Akai VS425

This machine was brought in because the display was dim. As usual, the cause was the 56μ F capacitors C446 and C447. Once these had been replaced however the machine was dead. Great! The power supply connector 201 had correct voltages, but the powerdown detector was operating because the $15\Omega 23V$ feed resistor R221 was open-circuit. It supplies TR205. C.W.

Ferguson FV61B

This machine was dead. A check at pin 1 of connector BW06, where -25V should be present, produced a reading of only about -2V. As this

VCR Clinic

is an unswitched rail, this suggested that there was a fault in the power supply. Checks at the output rectifiers showed that there was a short-circuit across the 14V line. Transistor TP91 (BCP53-16 or 2SA2010) was found to be shortcircuit and RP91 (1.5Ω safety) open-circuit. Once these two items had been replaced the machine powered up normally. C.W.

Sony SLV270

This machine was dead with no display. Checks in the power supply showed that C1325 (1 μ F, 100V) measured only 0.7 μ F while C1326 (47 μ F, 63V) measured 19 μ F and was very leaky. J.E.

Sharp VC9300

This machine refused to accept a tape because the 'tape-in detect' leaf switch, which is mounted on top of the carriage, was buckled. A new switch restored normal operation. It's available from Willow Vale under part no. 27354BT. J.E.

Samsung VI710

There were no functions and no display because the STK5333 regulator chip didn't provide any switched voltages. The 25V input from the bridge rectifier was correct at pin 8, but there was no 30V input at pin 5. This comes from a separate winding on the mains transformer, via a rectifier diode and 560Ω resistor (R104). The resistor had gone open-circuit. J.E.

Amstrad UF30

This machine produced no channels or E-E signals – not even a test signal. When the standby switch was operated, the switched 5V supply at pin 2 of the tuner/ modulator/IF module TU01 rose to only 0.4V. The cause was traced to Q7005, which provides the switched 10V supply. It was short-circuit base-to-emitter. A BD131 was well able to carry out the task of the original 2SC3246 – and fitted nicely as well! J.P-F.

Sharp VC8300

The cassette lift would jam because the lift arms were out of sync, i.e. the left side was higher than the right. On investigation we discovered that the reciprocating collar (item 23) within the worm wheel had fractured. The part no. is LANGJ0009GEZZ - it's still available from Sharp! J.P-F.

JVC HRD230/Ferguson FV22L

The channels were slightly off tune: But when fine tuning was carried out and the channel was stored in memory it reverted to the original mistuned condition. The culprit was the MN1220 EPROM chip IC101, which is conveniently plugged in piggyback fashion at the rear of the front control panel. J.P-F.

Amstrad VCR9000

"Won't play tapes" is a common enough complaint from our customers. On this occasion the cause wasn't a mechanism fault. When we inserted our trusty blank cassette we saw that the drum wasn't rotating. Checks on the various voltage rails showed that there was no 5V supply. The 78M05 regulator chip IC1 on the main panel had failed. K.E.

Matsui VX2700

The customer complained about "tracking problems". In fact the playback picture was badly broken up. When we examined the operation of the mechanism in the playback mode it was apparent that someone had been fiddling with the back-tension arm. As a result, it jammed. After readjusting it and checking for correct tension we were able to see the original fault symptom – the capstan was running at the wrong speed. If the back tension, and hence the load on the capstan motor, was reduced manually the tape speed altered noticeably. A new DD motor assembly was required. K.E.

Panasonic NVJ35

This machine would go into the tuning search mode but wouldn't stop when a channel was reached. The cause of the fault was cracked print leading to pin 2 of the tuner/demodulator pack. A link across the crack solved the problem. M.M.

JVC HRD700/Ferguson FV26D

The reported fault was field roll in the playback mode. It's becoming quite common to find that the entry and exit guides in these machines are starting to work loose, so I set up the tape path. Then, while playing back a tape, I noticed a severe hum bar on the picture. It seemed to be intermittent. Checks showed that there was ripple on the switched 5V supply when the fault was present. A replacement STK 5481 power regulator chip restored normal operation. M.M.

Toshiba V813B

This machine's capstan motor was running slow. All that was required was to dismantle the motor and slightly lubricate its bearings. After that the machine worked correctly. M.M.

Matsui VX2500

The playback and E-E pictures were very poor. As this is one of the later versions with a scart socket, I tried a scart connection to the TV set. The picture was then OK. A replacement RF converter cured the fault. M.M.

Osaki VR300

Tape chewing was the complaint with this machine, which had come via another dealer. As the bottom edge of the tape was being crinkled, the dealer had replaced the pinch roller. This appeared to stop the creasing, but the sound was muffled and there was a lack of control pulses. On inspection I found that when the tape was loaded it was at the correct height with respect to the audio/control head, but when the pinch roller moved into position the tape rode up the AC head by about 1mm. The dealer had fitted a pattern pinch roller. Fitting the original type and arm assembly cured the fault, a new clutch completing the repair. M.M.

JVC HRD540

The clutch wouldn't engage correctly in the fast-forward mode. Instead, there was a grinding noise and virtually no torque at the tape spool. I found that the plate assembly was worn, a replacement restoring correct operation. M.M.

Panasonic NVHD90

This machine recorded the head switching point two thirds of the way up the screen. Suspicion naturally fell on the integrity of the field sync signal that's used to lock the phase of the head drum in the record mode. It was completely missing, the cause being a defective video processor chip (IC301, part no. VEFH29H). **B.S.**

Panasonic NVSD40

This machine rejected any video cassette it was offered. When it took the cassette in it would pause briefly then throw the cassette back out. This is a classic result of no capstan motor operation. But in this case the capstan motor was going too fast, as there was no 12V supply to the capstan motor's stator. The 2SD601 voltage regulator transistor Q2505 was found to be opencircuit. B.S.

Panasonic NVSD200

If one of these machines intermittently shows F04 or F05 or sometimes F06, check for dry-joints on the loading motor. In this particular case however the cause of the problem was a deformed contact on the mode switch plug-in connector, which stands up off the main board. **B.S.**

Panasonic NVHD650

This is the third of these machines we've had in with the remote control unit apparently failing to operate it. The reason is that the owner has selected the VTR2 mode from the on-screen graphics menu. When this is done, the VCR ignores all further commands from the remote control unit unless this is also changed to the VTR2 mode. Open the remote control unit's flap and press 'TV select' while also pressing 'cursor up' or 'cursor down'. This changes the data to match the VCR, and all in the garden is then rosy again. B.S.

Samsung SI3260

As the capstan didn't turn, this machine was damaging tapes. We found that D108 was going opencircuit under load. As a precaution we also replaced D109 and D110. **G.S.**

Nokia VR3722

There was no channel display and the machine wouldn't tune in. A quick check showed that the 33V supply was missing. The 33V regulator was OK, but C6010 nearby was going short-circuit. A replacement capacitor restored normal operation. G.S.

Samsung VIK320

Dead, no power and no clock display – an all too common set of symptoms with these machines. After fitting the power supply repair kit the power came up but the servo was drifting in both playback and record, as though there were no control pulses. A new servo chip (IC201) cured the problem. G.S.

Sharp VCM20

There was no clock display and no functions. When you encounter these symptoms in this model you will probably find that Q901 is short-circuit and R904 open-circuit. To prevent a recurrence of the fault Sharp has introduced a heatsink for Q901. The part no. for this is PRDAF1065UMFW. G.S.

JVC HRD830

This machine's power supply was buzzing badly. The cure was to replace C12 and remove the darkened glue from the Q1 heatsink area. G.S.

Nokia VR3716

After a while the sound produced by this machine was marred by wow. The cause was a faulty main clutch. **G.S.**

Panasonic NVJ40

The deck was jammed, with the tape wrapped around the head. There was nothing unusual about this, so the upper and lower deck service kits were fitted and aligned. I find the G deck alignment instruction video that's available from Charles Hyde and Son very helpful: it takes you through the procedure step-by-step – you simply use playback pause while carrying out the task described, then continue. When the service kits had been fitted everything worked normally apart from the fact that there was no auto stop at the end of rewind, play and fast forward. The microcontroller chip was calculating the speeds of the spool carriers accurately, because the tape speed was being reduced as the tape neared its end. But when the tape ran out the mechanism struggled to keep it going for a few seconds then the VCR entered the stop mode. This would not do the mechanism any good, and was probably the cause of the misalignment in the first place.

A scope check across the infrared 'lighthouse' transmitter produced a 2-5V peak-to-peak pulse at 25msecs. When we fitted a replacement the reading was 0-8V peak-to-peak and the auto stop worked correctly. **J.E.**

JVC HRD660

There was no play: the tape would be pulled out of the cassette in the normal way, but would not be positioned between the capstan and the pinch roller. As a result there was no forward tape motion. The pin that was responsible for this problem had parted from its plastic holder and was nowhere to be seen (the deck reference number is 47). It's reminiscent of the infamous limiter post used in some Matsui machines, and could also become a stock fault. J.E.

Panasonic NVSD40

This VCR was brought in because the tuner/booster pack produced a low-gain E-E output. This is not unusual. After fitting a replacement however the machine wouldn't tune in any stations. A check on the tuning voltage showed that the sweep was normal, so we assumed that the new tuner was faulty. It wasn't.

This model has a band-switching circuit, which is controlled by IC6710 on the syscon board. It should supply a low output to the band-switching chip, but the output was high. Replacing IC6710 restored correct operation.

A quick check for this is to short the relevant pin of IC6710 to chassis and see whether you can then tune in stations. M.O.

JVC HRD580

The customer complained about a rattling noise in the fast forward and rewind modes. I replaced the idler gear unit and clutch, but this didn't fix the problem. When I examined the small toothed gear at

the rear of the capstan motor closely I noticed a small, hair-line crack in it. As this gear is not shown as a separate part in the manual I considered a replacement capstan motor assembly. But the cost is quite high. So I spoke to a very helpful person at JVC Technical and was advised to order part no. PTU96031-678C - it's a gear kit. Installing this cured the fault. M.B.

Ferguson 3V54

The customer complained that this machine damaged tapes when it ejected them. It seemed that the slant poles didn't fully retract. Replacement of the loading sensor assembly, part no. PU35632A3 fixed the problem. I've also had this failure with Model 3V55, which uses the same part. M.B.

Hitachi VT65

Intermittent failure to record in colour was the complaint with this machine. Initial tests showed that the tape-in light was permanently illuminated. Further tests revealed a bad tape-end sensor. The cause of the "intermittent colour" was an extremely dirty video head drum. This was cleaned – the customer declined the quote for a replacement. M.B.

Amstrad VCR3000

Intermittent loss of stations and failure to store channels was the complaint with this machine. After exhaustive tests we condemned the X24C01P memory chip IC05. A replacement confirmed the diagnosis.

If you have a non-mechanical fault with one of these machines, linking pins 10 and 13 of CN601 will enable the entire mechanism to be removed so that checks can be carried out on the PCB. G.R.

Sharp VCH81H/ VCA113HM

Failure of the capstan motor is a common fault with these models and those from other manufacturers that use the same deck. So I asked myself why? If you have a dead capstan motor, look carefully at C6 (10µF, 25V). Early motors were not fitted with a leakproof capacitor. As a result, electrolyte gets on to the print between pin 12 of the motor IC (usually an M52440ASP) and the motor's input socket (where the ribbon is inserted). The print goes opencircuit, removing the chip's 12V supply.

With a good hot soldering iron and calm nerves the track can be linked and C6 replaced. But first remove any gunge. I've repaired several of these motors in this way.

One motor ran slow after the repair – it still did after cleaning and greasing the shaft and capstan. I found that R3, an 0.47Ω surface-mounted resistor, had gone high in value. Its replacement cured the fault. These motors are very similar to those used in Matsui and other machines.

Proper cleaning and lubrication of the capstan and shaft is very important. G.R.

Sharp VC9300

This old timer had been in for replacement of the reel motor and idler. It bounced, with the same fault description – intermittently shredding tapes. I soon found that when the fault occurred the supply to the reel motor went missing. But the machine would then run correctly for days! Fortunately I was able to spot the microscopic dry-joints at a couple of the pins of the reel drive chip IC7751. G.R.

Mitsubishi HSM40V

If the machine doesn't accept tapes, check the front-loading cassette housing. The item called JUT J (L-031, part no. 622D231010) can break or become disconnected because of excessive force when inserting a tape. If JUT J has broken, make sure that spring JUT is also fitted. When JUT J is faulty the tape flap won't open. Hence no loading and the tape being ejected. J.C.

Aiwa HVGX150

Failure to accept or eject a tape is generally caused by a faulty loading belt. In this case however the loading motor had seized. J.C.

Panasonic NVG7

Check the drum servo chip IC6387 if the drum motor hunts or runs fast in the forward direction.

If the tape laces up but the capstan motor doesn't rotate, just vibrating, check the AN3821K chip IC2001 by replacement. J.C.

JVC HRD530

You sometimes find that the halfloading arm is not able to extract tape from the cassette. The problem is caused by static. As a result of this, the tape sticks to the lid of the cassette. The cure is to replace the housing lid guide, part no. PRD43315. J.C.

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VCR4600 VIDEO & AUDIO PCB	£14.00	VCR5200 SWITCH PANEL	£4.00	PC2286/2386 PSU PCB	£18.00	DVR6641 DECCA (AMSTRAD VCR8800)	
VCR4600 POWER SUPPLY ASSY	£10.50	VCR5200 TIMER DOOR	£2.00	PC3086 MAIN CPU PCB	£30.00	OP. MANUAL (No VAT)	£2.00
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VCR4600 Mk I MAINS TRANSFORMER	£4.50	VCR6100 AUDIO PCB	£5.00	PC4386SX/5286 SOUND CARD Mk 2	£5.00	VCR8700 SERVICE MANUAL (No VAT)	£7.00
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PETER WATSON - THE TABLE'S ON FIRE!!!	19. BRIAN WATSON - RENT A QUIZ!
10. ALAN TEECE - I'M SURE HE EXISTS!!!	20. CLIVE SINCLAIR - I'VE PART EXED THE CS!!!
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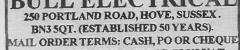
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What a Life!

It would be a lot simpler if TV sets didn't have owners. That would halve the problems. But we have to put up with both sorts, as Donald Bullock reports

Every time I see a chap who is going grey the wrong way round - from the crown of his head downwards - I know I'm in the company of a classic worrier. There are quite a few of them about. Eddie is one - forty five, emaciated and a complete stranger to self-esteem. He brought in a Samsung CI6229T colour TV set and stood there, looking downwards.

"It's only an inch tall" he said. I looked at him intently. "'Er said it's no good to anybody, only an inch tall."

"Let's take this one step at a time" I replied, noting down his name and telephone number. "What's only an inch tall?"

"The picture" he said. "It's my sister's set. 'Er wants me out o' the 'ouse. Says I'm crazy."

"How many beans make five?" I asked. He looked up.

"Beans?" he asked.

"Just leave it here" I said.

I pulled the set on to the bench and sought the field output chip, which turned out to be a TDA3654 on a pretty large heatsink. It was very hot indeed. A replacement restored the field scanning, but it still seemed hot to me. Before returning the set to Eddie 1 ran it for a couple of days and fitted an extension to the already huge heatsink.

When he came back to collect it he pulled out a purse and began poking about in it with his long fingers. They always do, these chaps who go grey the wrong way round.

"'Er said to get outa her house" he announced. "Said I'm crazy, keepin' fish in the bath."

"Do you keep fish in the bath?" I asked.

"'Course I do" he said. "'Ere, don't you start causin' trouble." And with that he strode out.

Salora J Chassis

Our next caller was Hank. He does a bit of servicing in a nearby village.

"Hey, you two are smart, aren't you?" he called out, "Sure are" I said, "and if we get

"Sure are" I said, "and if we get any smarter we're going to give this trade the slip."

"This Hitachi CPT2060 is fitted with the Salora J chassis" he said. "Christ" we said in unison.

"As it wouldn't tune I took out the little tuning board with the picture controls and the tuning circuit on it and soldered some very dry-joints. That brought back the search tuning, and the set will tune and store channel 10. But not the rest. Why's that?"

"Dunno" we said, and off he loped.

We could have been more helpful if the set had been dead. In this event we make sure that the set is switched off at the front button and plug it into the mains supply. If the little red dash in the display lights up, this tells us that the power supply is OK. So we move over to the line output side of the Ipsalo (integrated power supply and line output) circuit. If it doesn't light up we go first to the two 4.7Ω , 5W surge limiter resistors RB711 and RB713, then to the MJE13005/ BUW41B chopper transistors TB700 and TB701 which often go short-circuit. A clue that this fault is about to occur is provided by the fact that the set takes an increasingly long time to start up.

These sets can fail repeatedly if the repair is not done properly. It's essential to replace the two 4.7μ F, 63V electrolytics CB712 and CB726 that couple the base drives to the chopper transistors. We use the type from Willow Vale. Make sure that you apply heatsink compound to the chopper transistors, and that all three solder tags on the heatsinks are well soldered to the panel – they are used as circuit links. Then check the whole power section for dry-joints.

When we think we've repaired the set and it seems to be working, we switch it off then plug it back into the mains supply. If the dash comes on we know we've succeeded and that the set will spring to life at switch on.

If we suspect the line output side of the Ipsalo circuit we go to the 0.33μ F scan coupling capacitor CB532 first. Its left-hand pin becomes dry-jointed. This capacitor is to the right of the square control cutout on the main panel, four inches from the top of the chassis.

All sorts of faults occur when one or more of the legs of the huge heatsink/partition screen bccome dry-jointed. The screen is silver coloured and wraps around the bottom left-hand corner of the chassis. This item is also used as a conductive link for the print on the panel.

Norman's Mitsubishi

Our next customer was Quiet Norman Glutton. Short and squat, he likes to eat. And eat. He brought in this Mitsubishi CT2124BM colour set.

"He don't switch on like 'e used to" he said.

I leant forward. "So how does it switch on now?" I asked.

"Different" he said.

I filled my lungs. "Right" I said.

"An' the colours be wishy-washy" he added. Then he looked about and fished his penknife from his pocket.

"What's the pasties like from over the road?" he asked. And with that he waddled off.

By the time hc came back, carving into a pie, we had his set on the bench. Sussing out the 'wishywashy picture' didn't take long. His kids had fully upped every control on the remote handset. But he was right: the set didn't switch on as these sets should. Instead of coming to life when the on-off switch was pressed it went into standby. To make it come on we had to press the standby button.

I dived into the power supply panel, which is to the right of the main chassis. A 100µF, 50V electrolytic (C964) had leaked so much that its legs had rotted away. A replacement cleared the fault, and by the time the job was ready to go Quiet Norman had finished his fourth pie.

Another fault we've found to be quite common with this model is loss of tuning memory. To deal with this look for IC702 and check for 5V at pin 1 and -30V at pin 2. If either voltage is missing, check back to the power supply and then, if necessary, replace the chip.

Cassandra Grant

It was stark and awful yesterday morning. Then Cassandra Grant glided in. The sun shone, the breeze dropped, blossoms burst from their buds, songbirds sang and the world fell into soft focus.

"I need your help, Mr Bullock" she purred.

"I know" I said, understandingly. "And what would you like me to do?"

"Repair my Grundig TV" she breathed, in her husky voice. I need it as soon as possible."

The set was a TSS340, which is fitted with the CUC3400 chassis. It was dead, with the 800mAT fuse SI624 in the feed to the chopper transformer open-circuit. We declared the BUTIIA chopper transistor T661 guilty without trial, and sure enough it was short-circuit. So we fitted a replacement, which blew up as soon as we switched the set on again. Time to look farther in the chopper circuit. In this version of the chassis C667 in the snubber network consists of two 2.2µF, 385V capacitors that are connected in series. One of them had dried up completely, while the other had fallen to 0.5µF in value. Replacing

them both cleared the fault. So we phoned the lovely Cassandra to tell her the good news.

Half an hour later a gangling, white-faced piece of string appeared at the door.

"I've called for Cassandra's set" he whined. "Carry it to the car, will you? I've got a bad back."

I did his lackeying and watched them depart. In my day a prat like that wouldn't have aspired to even a Pansy Potter or Keyhole Kate.

A Matsui Portable

Terry Tic came in carrying a Matsui 1455 14in. colour portable. "Like a bladdy bomb" he announced, "just like a bladdy bomb". Then he departed.

Steven tried the set and found that it was dead: inside there was a Snoddy's job card. "Blew up in standby" it said. C301, a small 47μ F, 63V electrolytic that lives by the line output transformer. had disintegrated – it's the reservoir capacitor for the supply to the field output stage. Its innards were everywhere. And C310, an 0.0022 μ F, 600V damping capacitor that sits by the line driver transformer, had melted. We replaced them and started the set up using the variac. There was a rustle of EHT but nothing else.

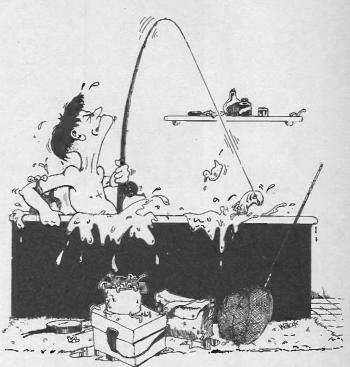
When we checked the voltage across C301 it was negative to chassis! Further checks in this supply showed that the surge limiter resistor R310 (10Ω fusible) was open-circuit. After replacing it we had a 50V supply but the set was still dead.

It seemed logical to check the two field output transistors, Q302 (2SC2073) and Q303 (2SA940). They were both short-circuit. After replacing them and carrying out a few more checks we dared to switch on again. There was still field collapse.

I left it to Steven. After spending about four hours on it he stood up and shook his head. He looked shattered. "Can't understand it" he said. "I've replaced or checked just about everything". Then he mused: "wonder if the field scan coils have gone as well?"

There was a similar set under the bench. He borrowed the scan coils and fitted them to the 1455. Up came the field scan, and after some adjustment we had an excellent picture.

"You've got to give Snoddy's one thing" Steven said, "they know which jobs to grab and which ones to turn down".



"Said I'm crazy, keepin' fish in the bath."

"And that's everything" I said. Then Terry returned. Steven pulled up the 1455 for him and noticed that he was carrying another identical set.

"I won't go on having that set done, Mr Bullfrog" he bawled. "It was only my son's computer monitor. I've found another one for him at the car boot sale. Cost next to nothing. Just put 'im back together and I'll take it out of your way."

A Call to the Bar

The phone rang. It was the Horseflies, who run our local pub. Their lad had managed to yank the coaxial plug off the aerial lead. As Greeneyes had come in to tidy up, Steven and I decided to go off together.

Having fixed the lead we were about to depart when we saw Pervy Fletcher, a right shallow, extrovert showman.

"Ah, Donld" he rasped, "let me get you a drink!" He guzzled the last of his and ordered a round. "These two look singularly dry to me" he commented.

Then a one-eyed fellow lurched in, looking the worst for drink.

"Hm... inebriated" observed Pervy. "If he's any trouble, leave him to me."

We made a hurried departure. I keep telling Horsefly he should put more water in the beer if he wants to avoid trouble... **Reports from**

Hugh Cocks

and Steven

Leatherbarrow



Satellite Notebook

Pace MSS200

We've had very few problems with this model so far. This one was brought in by its owner who complained that it was "dead". It seems that the trouble had arisen because the mains socket made intermittent contact with the plug. A new socket had been installed, but the receiver then refused to play ball. The mains fuse was intact, and nothing looked the worse for wear.

When I connected the receiver to the mains supply I heard a 'chirp' every second or so from its power supply, also a distinct 50Hz hum. This led me straight to the mains bridge rectifier's reservoir capacitor C54 (47 μ F, 400V), which was as open-circuit as they come. A new one restored normal operation.

One thing I don't have here is a variac, which could be considered essential to minimise semiconductor device turnover when mending Pace power supplies! To get round this problem I carry out basic checks before applying power, then connect the receiver to the mains supply for only a second. If all is well, a 'beep' should come from the power supply (plus, normally, a slight indication from the front display). If nothing happens, a fault must be present and the circuit must be rechccked. Don't be tempted to leave the power on any longer, or disaster may strike! H.C.

Only One Polarity

Regular readers may recall Professor Magrew who lives farther down the coast and, amongst other things, installs dishes and does general electronic repairs. I recently sold him a Cambridge LNB with a C120 circular flange to fit to a prime-focus dish. A couple of days later he rang up to say that "the LNB you sold me picks up only the vertical channels". He later brought in the Cambridge LNB complete with the feedhorn used on the dish. The cause of the problem was immediately obvious. The LNB was attached to an old magnetic polariser which had a rectangular flange. This effectively knocked out the second polarisation.

I removed the flange and the polariser's works (they normally push out of the tube fairly easily with a few sharp taps). The LNB had to be set back from the feedhorn a little way because of mechanical difficulties – the original polariser body was the ideal length for the job. This produced good results on all channels.

There's a small hole in the polariser's body, where the original wires entered. This small diameter hole doesn't seem to degrade reception, but seal it up with some glue. **H.C.**

Pace PRD800

The label attached to a Pace PRD800 (branded Thorn Sat 120) simply said "power supply problems, doesn't respond to repair". I could see that C5, C7 and C8 had been replaced, along with the chopper control chip UI and the BUT11A chopper transistor Q1. The fuse was intact, and Q1 wasn't short-circuit. The other components that often die with Q1 and U1 (D11, R8 and R14) were all OK and appeared to be the original ones. For good measure I changed C5, C7 and C8 again, also U1, and checked for track continuity around U1. To be fair, a good job had been made of the previous replacements and there were no damaged tracks. When I powered the receiver I heard a rapid "ping, ping, ping", indicating the probability of a short-circuit. But none could be found, and the

rcceiver worked normally when the 5V and 12V lines were powered from an external source.

Time to return to the power supply. While checking the chip components on the copper side of the PCB I noticed that R129 (220Ω) was cracked. It's connected between the base and emitter of Q1. A replacement restored normal operation. H.C.

Pace VC100 VideoCrypt Decoder

This is the first Pace stand-alone VideoCrypt decoder, which was later superseded by the VC200. The power supply, on a small PCB, is identical to that in the SS9200 receiver, with the same infamous pink mains transformer – though it seems to be much more reliable in this less power-consuming application. The decoder PCB, which is not unlike the SS9000/9200 one, sits atop the video in/out PCB on plastic spacers. I've had a few problems with the VC100.

This particular one lived on top of a D2 MAC IRD. The complaint was of "poor pictures that had gradually become worse". By some miracle the D2 MAC unit was still functioning, and the quality of its baseband video output to the decoder was OK. Time to take the lid off the VC100.

The Sky News video quality was dreadful. Fortunately the decoder comes to life on this channel, seeing Sky's VideoCrypt data though not having to decode the picture. With non-VideoCrypt channels the baseband video is simply passed in and out via the scart socket – unlike the old Thomson sloping-front decoder, which helpfully provided a clamped video output signal whatever was fed into it. A scope check on the quality of the video signal that arrived at the VideoCrypt PCB from Q8, the last stage on the video processing board, showed that it was bad. It was also bad at the first stage. The culprit was C2 (100μ F, 16V), which couples the baseband video from the scart socket to the base of Q1.

For good measure I also replaced the 1μ F electrolytic in the power supply – the one that gives problems with SS9000/9200 scries receivers. Its reference number is C520 in the VC100.

I sited the decoder well away from the MAC IRD when I reinstalled it – and expect the latter to come in for attention any day now. H.C.

Things People Say . . .

A customer asked whether the number of channels her Pace receiver was able to receive could be reduced "as we only watch seven programmmes at most". She figured that a lot less electricity would be required to power a seven-channel rather than a 250-channel receiver, leading to a big saving on her electricity bill...**H.C.**

Eclipse Season

We've recently been through the few days in October when the sun passes behind the geostationary satellite arc (this also happens in March). When this occurs the signals become much weaker for some minutes, as the sun is a much stronger source of radio energy. It's really extra-terrestrial jamming! I always mean to mark the dates in the workshop diary, but it never gets done. We usually receive calls over several days, at around 11.15 a.m., complaining about "snowy pictures". This can lead to wasted service calls - it's amazing how many people seem to watch TV at that time of the day!

The other rude reminder occurs during an installation, when trying to find Astra at around 11 a.m. This can lead to abortive LNB changes. The first entry in the 1997 diary will be the 'solar outrage' dates, next due in early March. **H.C.**

Amstrad SRD510

For once a dead unit that wasn't a C612 (220 μ F) or R602/3 (both 47k Ω) job! The cause of no outputs from the power supply was traced to the CNY17F optocoupler IC601. When a replacement had been fitted all outputs except the 12V supply were present. The dead short across this line was caused by failure of C283, an 0.1 μ F disc ceramic

Amstrad 1000 Satcorder

Crushed video with rolling pictures during satellite reception was the complaint with this combined VCR/satellite receiver. As we had no circuit diagram we had to rely on a freezer and heat foray. This led us to CA05 (100μ F, 25V) which was open-circuit.

A few days later another of these units came in with the same complaint. Several other electrolytics had to be replaced this time to restore the unit to full working order. They were all mounted on the decoder board at the rear of the machine, and all were partially or completely open-circuit. This was in no small part because of the heat that collects in this area and the poor ventilation. We used 105°C capacitors. S.L.

Pace PRD800

For failure to decode the pay channels with no decoder messages, replace the SP973T8C chip U20. It's an ADC chip that can also be responsible for picture distortion/ low contrast – as if the gain of the LNB is low. S.L.

PRD800/900 Tuning Problems

We've been contacted recently by several people about inability to tune in all the new Granada channels via Astra 1D. While Talk TV at 10.861GHz can be received, Good Life at 10.844GHz won't appear. The Sky Movies tuning in operation last year, at 10.877GHz, didn't give any problems however.

All the installations involved date from early 1994. The cause of the problem is a combination of receiver and LNB. Later PRD receivers and their clones have selection of the old 10GHz or new 9-75GHz LNB local oscillator frequency in the installation menu. The on-screen graphics indicate tuning down to 10-7GHz with both types of LNB, but the tuner fitted in production runs at this time won't tune down to 700MHz. Very late PRD receivers have a '700MHz' tuner, enabling a 10GHz LNB to cover the Astra 1D band. Astra 1D LNBs were beginning to be installed at this time, but older 10GHz units were being offloaded at low prices. Hence the combination.

The effect when a 10GHz LNB and an earlier tuner is used is that tuning ceases at around 10.860GHz, though the tuning graphics carry on down to 10.7GHz, at first sight suggesting a fault. The easiest solution is to fit a new LNB or an Astra 1D converter. Installation of a new 700MHz tuner would be a more clegant solution, but its cost would without doubt exceed that of a new LNB.

The exact low point of the tuner's range varies. Some go as low as an IF of 800MHz (receiving down to 10.8GHz). Others get down to 10.877GHz, the Sky Movies Gold/Weather channel. H.C.

Pace DVR500

This digital receiver had been brought over from Holland for reception of the Dutch channels. Within two weeks of installation it failed in this task, when the electrical power supply to the house had suffered a repeated series of on-off, on-off cuts. Everything else connected to the supply withstood the onslaught. The owner was keen to avoid sending his receiver back to Holland for repair if possible, so I agreed to have a look. Unfortunately I had no service information, as the receiver is so new.

The primary side of the power supply was familiar however. So was the violently blown fuse! The chopper device is the TOP202 used in MSS100 series receivers, though in this case it's clipped to a heatsink and is referred to as U700 on the PCB. Plastic rivets to hold the PCB to the chassis have gone, being replaced by stout screws. The transformer is quite large, no doubt to be able to handle the increased current demand, and an optocoupler is used in the regulation circuit.

It was no great surprise to find that the TOP202 was dead short. I removed it and checked the HT electrolytic and rectifier diodes, which were all OK, also a 47Ω surface-mounted resistor that's linked to the TOP device. It presumably serves the same purpose as R2 in the MSS100, determining with C4 in this model the loop response and power-up delay. On one occasion with an MSS100 I found that this resistor had been damaged when the TOP202 had failed.

Since everything else appeared to be OK, I replaced the TOP202 and the fuse and gingerly applied power. Fortunately all was well – and the customer was greatly relieved. The receiver is now left disconnected from the mains supply except when in use. This means that you have to search for its 'default frequency' every time power is applied (see article on the DVR500 in the January issue), which can take a few seconds, but the inconvenience is worthwhile.

The TOP device seems to be susceptible to failure under these conditions – I had the same problem with an MSS100 a few months ago (see *Television*, October 1996, page 895). One can't help wondering how it will fare in remote areas where the power supply may be variable. Where the mains supply is very rough, it might be an idea to use an uninterruptible power supply (UPS) consisting of a 12V DC to 230V AC inverter, a 12V battery and a charger fed from the incoming mains supply. **H.C.**

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

Safety Checks

This letter is a warning to those who service and repair electrical products. The need to carry out proper Class 1 and Class 2 safety checks where appropriate is probably overlooked by many engineers and service departments. A check on fuse ratings, for correctly wired plug tops, and a glance at the condition of the mains lead is just not good enough, as I discovered recently.

Having completed a repair on a JVC VCR, I checked for insulation safety between its mains plug and external metal parts. I was surprised to hear loud beeps from my tester, warning me of a potential hazard. Under test conditions a complete breakdown between the primary and secondary sides of the chopper power supply circuit existed. On investigating the cause of the problem, I found that adhesive used during component assembly had hardened and crusted into a conductive compound. The components concerned had to be removed and the black, hardened gunge stripped from the PCB. When all traces of the adhesive had been removed, a retest showed that all was well.

It's not uncommon for adhesives used on PCBs to turn black with age and become conductive, causing all sorts of circuit faults. I strongly recommend the purchase of a good PAT tester for the workshop. Most



component suppliers stock them, and it must work out cheaper than a hefty fine!

The correct use of these testers must be understood when dealing with sensitive electronic equipment. In the case quoted above we are not talking about flash tests to show the potential hazard. Mervyn Deeley, Wolverhampton.

Sharp VC-MH60HM

In the November VCR Clinic, page 44, Michael Dranfield suggested fitting the heatsink from a Ferguson 9000 chassis sound output transistor to Q901 in the Sharp Model VC-MH60HM. I must point out that great care is required with any alteration here. Because the VCR is a Class 2 product, the heatsink must have a minimum gap of 3mm between itself and any conductive part that the user can touch, for example the top cabinet or mechanism. This distance also applies to primary/secondary isolation, though this is not particularly relevant here.

To improve long-term reliability, a heatsink for Q901 is available from Willow Vale etc. under part number PRDAF1065UMFW.

Customer Satisfaction

I would like to compliment Farnell Electronic Components of Leeds (telephone number 0113 263 6311) whose level of service is outstanding. Although the company does not deal specifically with TV components, its two inch thick colour catalogue lists a wealth of components, tools, test equipment etc. They are all of the highest quality, from major manufacturers.

Here are a few examples. Safety resistors from Philips are listed at less than 6p each, while the little blue ceramic disc capacitors used in many TV sets are 16p each. Compare that with your regular suppliers. Prices are fixed for the duration (six months) of the catalogue.

There is no minimum order value for an account holder – if you want to order just a 60p transistor, Farnell will oblige. You can phone 24 hours a day, seven days a week and speak to a real person. If you order a capacitor that's out of stock, the technical department will select an equivalent with the required specification and phone back to check whether it's suitable. Some items can be ordered on a 14-day sale-or-return basis, which is handy if you want to try out test equipment before ordering it.

Most orders arrive next day, but special delivery is available at extra cost. I phoned Farnell recently, after blowing up a piece of equipment on a saturday afternoon, to order one IC and one transistor. I told the sales assistant that the order was yery urgent, and was told that the £2.30 worth of components could be delivered by courier within two hours.

My account with Farnell was opened by fax within ten minutes. If you are not dealing with the company, you don't know what you are missing! Michael Dranfield, Buxton, Derbyshire.

RGB-VGA Conversion

Chris Laudan has raised an interesting point in connection with my article in the September issue on an RGB-VGA conversion for the Microvitec/Reuters CMV125MV monitor. He mentions that some computers with VGA cards may not always use VGA syncs when running DOS rather than Windows programs. As a result, his monitor conversion had a field sync problem with some programs. My own computer did not present this problem, perhaps because I don't use any DOS programs that are more than about four years old.

Chris points out that PC hardware information is available on the Internet at

http://www.comp.sys.ibm.pc.hardw are.video

Readers may find some useful tips there. Many thanks to Chris for drawing this to our attention. *Ray Porter, M.Sc., C.Eng., MIEE, Stourbridge, W. Midlands.*

What's New?

We are constantly hearing about the tough time the brown goods manufacturers are having. I put the blame squarely on them however. Over the past few years they have bombarded us with the latest technology, whether we want it or not. We are told that we all need high-definition TV sets in our homes. Do we? Is Mr Average, when he gets home from work, really going to appreciate the slightly higher definition while watching his favourite soap? I think not. Some of the homes I visit have viewers who are quite content to watch programmes all night on a set with a soft tube, the picture being so bad that its content is quite hard to make out.

Our present system, when viewed with a modern flat-screen receiver, is quite adequate. And do we really need widescreen? Again I think not. Those who manufacture these sets are likely to end up with very modest sales figures, the sets being bought mainly by those who want to keep up with the Joneses or have more money than they know what to spend it on.

Look at all the video formats on discs we've seen launched over the past fifteen years. How many have survived long enough to produce a healthy profit? None!

The situation has been as bad with audio formats. The Sony Mini Disc is an excellent product, but is too expensive for the average music lover. Only the broadcasting industry has adopted it - for jingles, short recorded works etc. The Philips Ditigal Audio Cassette system failed to get anywhere. It was another excellent product looking for a market that simply didn't exist. The last I heard, these products were being cleared out at 199. DAT is still around in small quantities, being used mainly by industry and remaining too expensive for the general public.

Most good-quality standard cassette recorders in Hi-Fi stacks can produce music to suit the quality required by all but the fussiest music lovers. Why change for the sake of change?

The CD format reproduces music faithfully, with any distortion at such a low level that it is totally imperceptible to the listener. We are now to be presented with the Digital Video Disc, which will contain the video of your favourite recorded album as well as the music itself. Do you really want to watch as well as listen? Most CD buyers will probably play their discs a dozen or more times. They are unlikely to want to watch the same information more than a couple of times. This is borne out by the number of secondhand VHS Music Videos found on market stalls and at car boot sales. Most people tire of them quickly.

DVD players are unlikely to be cheap, while the discs will probably be more expensive than the average CD. So why change from the excellent CD format? It's as good as anyone needs for music reproduction – up to 77 minutes of it on one handy-sized piece of plastic.

And what about all those CDs that music lovers have amassed over the past ten or so years? Are we expected to throw them away and replace them with the same data in another format? Look how long vinyl lasted after the introduction of the CD. They still make Hi-Fi units with record decks!

What are manufacturers to do, I hear you ask, if they can't introduce new products to keep their workforces employed? Well, the policy of introducing new formats where existing ones are perfectly adequate has certainly not worked over the past five years. Perhaps the industry should try to come up with an entirely new product that we really do need in our lives, something we don't yet know about. Over the past century, manufacturers that have managed to do this have been the successful ones. Has anyone any ideas about what we won't be able to live without during the next decade? And does it have to be to do with computers?! Mike Goodall, Ely, Cambridgeshire.

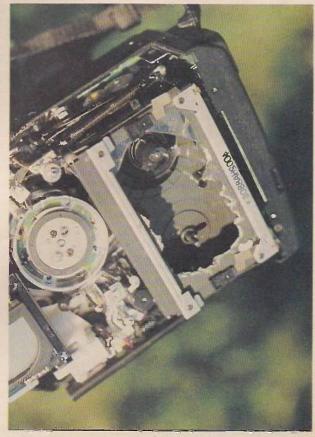
Cassette Extraction

In his article on Customer Reliability in the October 1996 issue Brian Storm asks for suggestions as to why his customer had removed a VHS cassette with a kitchen knife. Along with the rest of the trade, we often find cassette trays that have suffered at the hands of customers -- probably for no better reason than that they don't wish to pay the 50p fine for late return of a hired film. The short answer to most of these occurrences is "because some customers are complete idiots".

I recently had a far more worrying example of the tape extraction syndrome with a dead Sharp camcorder – see photograph. It still contained most of the cassette, but before sending the unit in for repair the customer had torn away the top of the housing and wrecked the mechanism in order to destroy the actual tape.

Now this had just got to be something far more serious than footage of his girlfriend with no knickers on. Can anyone out there advise me where we stand as repairers if we fail to report any suspicions we may have to the police? And what would happen if my suspicions turn out to be unfounded? Would the customer's lawyers come down on me like a ton of bricks?

Recent news of the Belgian child pornography ring, and the continuing Fred West saga, make me more than a touch uneasy. *Cornered of Norfolk.* The damage done to a Sharp camcorder when its owner wanted to remove a tape.



Refurbishing RC Handsets

Handsets come in for a lot of misuse and can end up in poor condition. This detracts from the value of the equipment they control. Thus handset refurbishment makes economic sense. Malcolm Burrell provides some suggestions on how to go about it



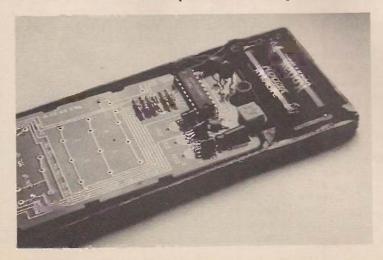
Presentation is all important if you want to obtain a good price for second-hand equipment. It can make the difference between £15 at a car boot sale and £50 through a shop display. 'Clean, gleaming and free from damage' is the key to making the

right first impression even before a set is switched on. I recently acquired an attractive Samsung 14in. colour portable. It operated perfectly apart from a singing transductor. This was easily dealt with. I removed the transductor, coated it with resin then refitted it. No more singing. But the set was obviously intended for remote control use, and the handset had been badly neglected – see photograph above.

A section of plain PCB was used to repair the battery compartment.

The Damage

Inspection showed that the latched battery compartment cover had long since been replaced with a scrap of metal that was held in place with adhesive tape. This item forms



the bridge to link the two AAA-size batteries. In addition the face of the handset had been left close to a heat source, creating some distortion, while one of the keypad buttons had been worn to half its normal height. Finally, the sprayed grey surface had become badly scratched and worn, exposing the black plastic base.

As it wasn't worth buying a programmable replacement handset, thought was given to restoring the appearance and operation of the existing handset to a reasonable condition, using items available in my workshop.

Polyester Filler

DIY stores and motor accessory shops stock many types of polyester filler. It's intended for the repair of ornaments, gutters etc. and for minor car body repairs. With care the filler can be applied and carefully honed to achieve a virtually invisible repair to even a very small item, or moulded to create a new surface.

Battery Compartment Repair

When I fitted new batteries I found that the unit worked electrically. So far so good. The main problem was to repair the battery compartment. As the case consisted of two shells that were held together with a couple of screws, it seemed sensible to fill the space vacated by the missing cover and rely on screw removal for the occasional battery replacement.

The unit was dismantled into its main component parts: the shells, the PCB, the infra-red window and the key pad. A small section of Plasticard, which can be obtained from hobby shops, was inserted in the wall of the battery section of each shell, then covered with polyester filler. A bridge to link both batteries was then devised, using a' small section of copper-coated PCB. This was inserted in

WORKSHOP

one shell, after which I checked that the batteries could be inserted and worked reliably. A further application of polyester filler was used to secure it.

The Key Pad

The key pad had been moulded from rubber. It had carbon contacts beneath each button, positioned to cover the required PCB tracks. All was in order apart from the defective button. This was built up, using several small layers of polyester filler to increase its height gradually. When dry the button was smoothed to shape using an emery manicure board. The only problem was that the repaired button's grey tone was lighter than that of the other buttons. A coat of grey Humbrol modelling enamel put that right – I made sure that the flexible rubber base of the pad remained untouched.

The Handset Face

More subtle treatment was required to correct the warp of the handset top. The facia with its lettering was masked with adhesive tape (removal is better if this can be accomplished without damage). Further applications of polyester filler were then used to fill the concave surface produced by exposure to excessive heat.

Finishing

Fine wet and dry paper was used to smooth the polyester filler to shape when it had hardened. With the selfadhesive tape still masking the facia, I then applied a thin layer of primer. Once this had dried silver paint was sprayed on to produce a satisfactory overall finish. Minor defects in the surface became apparent at this point. Further filling, smoothing and painting put this right.

When the casing was dry I reassembled the key pad,



infra-red window and PCB into the unit. The batteries were next inserted, after application of a little petroleum jelly (or silicone grease) to their contacts to inhibit oxidation and possible intermittent operation in the future. Both shells of the handset were then screwed together. Finally, the unit was thoroughly tested.

The handset after repair.

In Conclusion

Today's viewers expect to be able to operate equipment by remote control. Quite apart from this, it's now cheaper to manufacture receivers with infra-red remote control than to incorporate dedicated rotary controls. But remote control units are subject to considerable abuse and suffer **from** neglect. This can put someone off the purchase of a secondhand receiver that is in every other respect acceptable.

Handset restoration to a reasonable, though probably not as-new, standard will increase the potential resale value of any equipment.



TELEVISION FEBRUARY 1997

Long-distance Television

DX conditions and reception. Satellite sightings and news. Equipment notes and other matters. Roger Bunney reports

ovember brought us fog, frost, rain, high winds and, for some, snow. The chilly month was matched by an equally chilly period of reception. Even the Leonids meteor show failed to provide the usual welcome boost, at least during the periods when I was monitoring the bands - and the clear nights in mid-November produced few meteor trail sightings. I received Lopik ch. E4 daily via tropospheric scatter, which at least confirms that this Dutch transmitter is still in operation. The poor Sporadic E log is as follows:

11/11/96	MTV (Hungary) ch. R1; RTS (Serbia) E3; RAI (Italy) IA; YT (Ukraine) R2
14/11/96	A cast
19/11/96	RAI IA; an uuidentified
	programme on ch. R1.



Tropospheric and meteor scatter activity were both very quiet.

Satellite Sightings

A new satellite, Eutelsat's Hot Bird 2, appeared in our eastern skies on December 3rd, when John Locker (Wirral) received test transmissions. The Eutelsat test film was being transmitted at 11.797GHz horizontal and 11.845GHz vertical, with audio at 6.6MHz. The transmissions came to an end at around 2300 hours. A politically significant point perhaps is that the test slot was at 29°E, which Eutelsat claimed some years ago via the ITU. Astra is now seeking a 28.5°E slot for its Astra 2 satellites. Eutelsat will obviously defend its claim strongly. Hot Bird 2 has now joined Hot Bird 1 and Eutelsat II F1 at 13°E

Though there are encouraging prospects in the equipment field for future sat-zapping in the digital era, the change to digital technology is not helping in the short term, with a noticeable fall in the number of news feeds compared to say a year ago. Fortunately many of our old favourite hunting grounds are still active. Eutelsat I F4 at 25.5°E still provides analogue programme feeds for example. I logged the "Children in Need" night on the 22nd, when the SIS03 and SIS05 trucks were active in Melrose and Stornaway respectively from 2100 hours onwards. The next day Miss World hit Bangalore: the whole event was distributed across Europe via Eutelsat II F2 at 10°E, using the 11.165GHz horizontal transponder, from 1500 GMT on. The technical quality wasn't always too hot. Poor picture quality, at times

resembling a worn VHS tape, can be seen via the new APNA TV feed from Orion Atlantic (37.5°W) at 12.670GHz vertical. This downlink first appeared in early November and was well established with programme offerings by the end of the month. A caption seen on the 29th mentioned loss of the analogue carrier that night for some hours with a digital feed continuing. Late in November the ident changed to APNA TV/FMS INTL. A mystery sighting via Orion on the 27th consisted of a colour-bar pattern with "Media Casting" and Frenchlanguage captions inlaid.

John Locker comments on the German D-box (digital decoder) which is now becoming available. outside Germany. The latest software provides a greater range of FEC and bit rates, enabling various news feeds from Eutelsat, Intelsat etc. to be received. One problem that has come to light is lack of compatibility between digital equipment and triple/quad band LNBs. Several types of LNB seem unable to lock to digital signals could this be a stability problem?

John has seen the new Fox News with various feeds via Intelsat K (21.5°W, in the FSS band). The BBC still appears via Orion 1 (37.5°W), using BBC SIS (sound in syncs) which will not lock using a standard EBU SIS decoder. Noel Edmonds inserts for his Houseparty programme are often carried via Orion 1. In late October the same programme featured a game from the Wessex Super Bowl, Basingstoke. It was relayed by the BBC UKI 121 SNG unit midafternoon (at 12.669GHz vertical). Roy Carmen (Sandown) watched

Aerials

Beirut

Middle

Today.

East

an Italian OB feed via Intelsat 705 at 18.5° (11.133GHz horizontal). It featured an unusual game that was played by hand using a half-sized snooker table. Roy thinks it's called Stravechio - does anyone have any details of this game? He has also seen a European distribution feed from the MIR space station, via Eutelsat II F4 at 7°E. The frequency was 11.091GHz and the transmission was in clear PAL with clear audio. A rare mid-afternoon catch he had on the afternoon of the 26th was "Goonhilly 1cc Uplink to PanAmSat 3 Trans 7EK Downlink 12731 H PAL VBW 18MHz Audio 6.6 + 7.2 J17". There is still much to be seen despite the arrival of digital transmission.

Terrestrial News

UK: Two companies are now using MMDS (microwave terrestrial transmission of cable programming) in the southern UK, the Convergence Group around Burgess Hill and Eurobell Holdings in West Kent. The material transmitted includes analogue and digital TV the Internet and phone services. The exact frequencies used are not known, but MMDS generally uses the 2.5GHz band. A small dish or long Yagi aerial with head downconverter would be required for reception. This method of distribution is useful in country areas where cabling is too expensive. Palestine: The ch. E30 Ramallah transmitter is at present carrying test programming from 0500-0800 GMT: from midday to closedown at 2300 hours it takes the main Gaza TV feed.

Portugal: There are now two versions of the RTP-1 service, the main nationwide one from Lisbon and a regional one from Oporto. The latter carries the national version from mid afternoon. Both produce regional opt-out news. Separate programme feeds are available for Madeira and the Azores, which both generate some of their own programming. USA: The first terrestrial digital HDTV transmissions are due to start in early 1997 from the Washington WETA-TV site. The transmitting equipment is being installed by Harris Corporation. The call sign will be WETA-HD **Czech Republic:** The Premiera commercial TV service, which has been on air since 1993, closed down at the end of December. It will be replaced by a new network in early 1997

Germany: During the next

tropospheric opening watch out for the 24-hour local TV station Dresden Fernsehen on ch. E59. It opened in mid-1996 and runs at 10kW ERP.

Amateur Radio: More 50MHz amateur radio activity in Iceland is expected soon now that the lowband VHF TV links have moved to cable. Ireland has lifted many restrictions on 50MHz operation, on a trial basis. In Italy, the power limit in the 50-51MHz band has been lifted from 10W to 300W.

Satellite TV News

Eutelsat's Hot Bird 2 is now in position at 13°E, with twenty 120W Ku band transponders that can handle analogue or digital signals. There are two service zones, Widebeam which covers all Europe, North Africa and the Middle East as far as the Gulf States, and Superbeam which is aimed at western and central Europe. The transponders can be switched from one beam to the other. More than half are expected to be used for digital TV broadcasts to small receiving dishes.

A new MTV Europe channel should be available throughout the continent by January 1997, similar in content to the US M2 channel. It's expected to join the Murdoch package later in the year. The German SAT-1 channel intends to launch SAT-2 as mainly a repeat free channel.

GE Americom is discussing with the Gibraltar government a proposal to base a new worldwide twelvesatellite network there. It has requested from the ITU allocations at 23, 15 and 10°W, and at 3, 37.5, 47, 51, 97, 100.7, 105.3 and 108.2°E, for Ku band operation. GE hopes to build a large satellite Earth station and production centre in Gibraltar.

Hughes Space has won the contract to build and launch AsiaSat-3 during the winter of 1997, slotting in at 122°E with 28 C band and sixteen Ku band transponders. A contract will shortly be on offer to build ArabSa 2C, to orbit at 26°E with 20 Ku band transponders exclusively for TV use. ArabSat 2B was launched in November and is in position at 30.5°E, mainly for TV use, with 34 C and Ku band transponders. It covers the Middle East, India and other parts of Asia.

Orbital allocations are being sought from the ITU for Ka band (17.7-20-2GHz) operation. The band is expected to be used for regional TV/radio transmissions and



two-way interactive services. The high frequencies would mean a greater tendency to rain fade and signal drop-out in moist conditions. Intelsat, Eutelsat and Luxembourg have filed for numerous slots. Other applicants include Spain, Cyprus, Italy and Turkey.

An offset dish in Bandula Gunasekera's garden (Sri Lanka). Note the elevation, to look for Ku band signals from the PAS4 satellite at 68.5°E.



Tel: 01202-738232 Fax: 01202-716951



An APNA TV test transmission – nice to have an analogue signal from Orion 1 Atlantic at 37.5°W.

Digital Boxes

Take-up of the German Kirch service D-box (digital decoder) has been less enthusiastic than anticipated – only 4,000 subscribers have taken up the digital service at the time of writing. This has left nearly 100,000 decoders on the shelves, some of which have started to get into the hands of enthusiasts – they can be adjusted to resolve both news feeds and broadcast TV.

Experience in New Zealand with Pace, Panasat and Scientific Atlanta decoders has not been too

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Broughfame Ltd. 115A St John's Hill, Sevenoaks, Kent TN13 3PE Tel: (01732) 743400 Fax: (01732) 743335 E-Mail: R@Broughfame.Tel Me.com encouraging, but the recently introduced Thomson SK888 seems to be capable of receiving all types of MPEG transmissions there and will adjust to the non-DVB US DirecTV programmes and news feeds. It has third generation MPEG chips and built-in search facilities for FEC and bit rates. According to Bob Cooper (SatFACTS) the receiver has been built for ease of use - point and zap with your remote control unit - while providing the multi-satellite enthusiast with flexible coverage of many types of digital signals.

Equipment Notes

Some issues ago I mentioned a digital threshold extender for satellite use, with a claimed threshold of 0.5dB. It has apparently enabled Hot Bird and Astra to be received in Africa and East Brazil, and S band Insat programming to be received in Germany, lifting a watchable colour signal from virtually noise level. I didn't give an address, as it's an expensive unit, but several enquiries have been received. Anyone interested should contact NKM, PO Box 1705, 79507 LORRACH, Germany - telephone 07621 18571, fax 07621 18840.

The Triax BB Grid/Wolscy Colour King are well proved favourites amongst UHF TV-DXers. They consist of a wideband four-bay stack that covers the entire UHF TV band including the amateur 435MHz allocation. Gain of a single bay is typically some 10-11dB, with a shallow peak perhaps 2dB higher mid-band. HS Publications has now introduced a DX Grid that features an added half-wave director in front of each dipole, increasing the gain by an additional 1-1.5dB. For further information contact HS Publications at 7 Epping Close, Derby DE22 4HR (phone 01332 381 699).

Those who want to use a ferrite polariser with a non-variable polarisation receiver can obtain from Alban Electronic Ltd. the inline polariser controller type PC108. This is inserted in series with the coaxial LNB feed. There's a +/switch and a variable skew control, with twin terminals for the two-wire polariser connections at the LNB head assembly. An insertion loss of less than 2dB is quoted over the 950-2,050MHz IF band. The controller operates in the 12-18V range at ±140mA. Price is £59 plus postage and VAT. Oddly, the unit uses BNC instead of the standard F

sockets – F to BNC adaptors can be obtained from Maplin however. For further details contact Alban Electric Ltd. at 6 Caxton Centre, Porters Wood, St. Albans, Herts AL3 6XT (phone 01727 832 266).

Computer Interference

Computer interference has been a major problem for TV-DXers, particularly in Band I. It was worse a few years ago. Dave Lauder runs the RSGB's EMC committee, a hard-working group that looks into and wherever possible solves interference problems. Computers in the amateur radio shack nowadays work alongside receivers that are often sceking ultra-weak radio signals. It's been found possible to tame the interference from a computer to allow such weak-signal working.

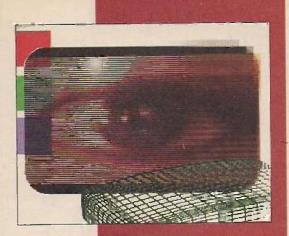
l would recommend readers to seek out the EMC columns in Radio Communications December 1996 and February 1997. They describe how to make you or your neighbour's computer quiet. Radio Communications is published by the RSGB, Lambda House, Cranbourne Road, Potters Bar, Herts EN6 3JE (phone 01707 659 015).

TEP

Six News, the 6m radio amateur bulletin, recently reported that the first 50MHz TEP (transequatorial propagation) for some time was received in the UK on September 24th, from the V51VHF beacon in SW Africa at 50-018MHz. TEP occurs as evening approaches and the sun sinks slowly towards the west. Solar radiation decreases, and the daytime F1 and F2 layers merge to form a single layer. As the layers merge. the MUF (maximum usable frequency) rises considerably and can reach the lower VHF spectrum. Incident signals, such as low-band TV, hit the now diffused F layer and are reflected, often via several paths. If the signal is a TV transmission, the result is reception of a rather smeary/multiple image picture.

TEP is a north-south phenomenon, signals from the south of the equator being reflected to Europe and vice versa. As radiation increases with the start of the new solar cycle, MUFs and TEP will increase. TEP occurs mainly in winter. For UK DXers, the time when it is likely to be present is around 1700-2100 hours. The Zimbabwe ch. E2 Gwelo transmitter has been a TEP visitor to the UK at this stage in past solar cycles.





Reports from B.D. Andrew Philip Blundell Graham Thompson and John Pitt-Francis

Screens

Be careful when cleaning monitor screens. Some require special treatment – look out for a slightly blue screen, the same as a camera lens.

Some screens have a plastic sheet stretched across them. This can give the appearance of a dirty screen or a worn out tube. Try running a scalpel around the edge of the CRT to see if the sheet can be peeled off. You will be surprised! B.D.A.

Epson Colour Printer

Fig. 1: Typical pin voltages for the LM1203N video controller chip.

12 1	28-12V
5-5V • 2	27 0-4V
5-5V • 3	26 • 3-1V
2-3V 4	25 • 3V
2-5V • 5	24 • 2-2V
2-3V 6	23 12V
0V 7	22 • 0-4V
2.50 08	21 - 3+1V
2-3V 09	20 • 3-1V
2-5V 10	19 2-2V
2-34 11	18 0-4V
5-9V •12	17 3-1V
12V • 13	16 3V
30 14	15 2-2V D189

If the colours don't change, check the small plastic peg under the print ribbon holder. The cheapest repair, better than the original, is to replace the plastic peg with a domed copper rivet. Drill a hole the same size as

> the rivet, where the peg broke off, and glue the rivet in position in the ribbon holder – adjust for depth

under the holder. B.D.A.

Monitor Chips

Many standard TV integrated circuits that will be well known to readers are used in monitors. There are however several widely used monitor chips that are not found in TV sets. Since monitor circuit diagrams are often difficult to obtain and service manuals can be expensive, readers might find pin voltage details for some of these ICs helpful. We start off with the LM1203N video

Monitors

controller chip, see Fig. 1. Pin functions are as follows:

1

2

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12V supply Decoupling Decoupling **B** input B clamp capacitor R input Chassis R clamp capacitor G input G clamp capacitor Bias voltage output Contrast control 12V supply Clamp pulse input G clamp bias input G output G clamp feedback G gain R clamp bias input R output R clamp feedback R gain 12V supply B clamp bias input **B** output B clamp feedback B gain 12V supply

AOC 4VIR

Field collapse was the problem with this monitor. Checks around the TDA8172 field output chip showed that its supplies were present but its drive was missing when I injected a signal the field scan opened up. The drive comes from a TDA9102C chip. As my Mauritron monitor book contains a circuit diagram for the GoldStar 1715 that uses this chip, I was able to find out which pin does what. Field sync was entering at pin 14, and there was a field ramp at pin 13, but there was no field drive output at pin 15. A new TDA9102C chip (it must be a C version) from Grandata restored the field scan. P.B.

AOC MM4135

This dead monochrome monitor was making strange noises. On investigation I found that C708 $(47\mu F, 400V)$ had leaked over the board. C314 (2·2 μ F, 50V nonpolarised) had done the same. This was not quite the end of the story, as R702 was open-circuit. After replacing these items I had a working monitor. G.T.

Apple M9102Z/D

This monitor would intermittently die. The cause of the trouble was dry-joints at the regulator attached to the rear chassis, near the mains input socket. The circuit reference number is 7108. **G.T.**

RIF ON 1782G

This fault could apply with any monitor. There was intermittent loss of sync because some of the pins in the D socket had been pushed in. RIF stands for Royal Information Electronics. G.T.

Eizo T662 NA2080

There was evidently some problem in the power supply section of this 21 in. monitor, as the standby LED was winking and there were no voltages at the outputs from the HT chopper circuit. There are actually two chopper circuits. A fault in the LT one was traced to D64, a 4.8V zener diode which had gone shortcircuit. A replacement restored life to all departments. J.P-F.

Dell Ultrascan D1428HS

There was no width or pincushion correction control – over scanning in fact. The cause was traced to IC302 (LM358N) and Q353 (2SD669A). When these two items had been replaced all the controls worked correctly. J.P-F.

Compaq 444

There was no green content in the display. We found that the BF423 transistor Q764 in the green drive stage was short-circuit collector-toemitter. A replacement restored the full range of colours. J.P-F.

Mitsubishi SDC322C

There was a degaussing buzz but no display. R909 in the start-up feed had gone open-circuit. We replaced R908 and R909, which are connected in series, with a single $470k\Omega$, 1W resistor. J.P-F.

TELEVISION INDEX/DIRECTORY AND FAULTS DISCS PLUS REPRINTS SERVICE

INDEX DISC

Version 4 of the computerised index to TELEVISION magazine covers Volumes 38 to 46 (1988 – 1996). It has thousands of references to TV/VCR fault reports and articles, with synopses. A TV/VCR spares guide, an advertisers list and a directory of trade and professional organisations are included. The software is easy to use and very quick. It runs on any IBM or compatible PC with 512K RAM and a hard disc. Price £30 (3.5"HD, alternatively 3.5DD" or 5.25" if required) Those with previous versions can obtain an upgraded version for £15. Please quote the serial number of the original disc.

FAULT REPORT DISCS

Each disc contains the full text for TV, VCR, camcorder, satellite TV and CD fault reports published in individual volumes of TELEVISION, giving you easy access to this vital information. Note that the discs cannot be used on their own, only in conjunction with the Index disc: you load the contents of the Fault Report disc on to your computer's hard disc then access it via the Index disc. Fault Report discs are now available for Volume 39 (November 1988 – October 1989); Volume 40 (November 1989 – October 1990); Volume 41 (November 1990 – October 1991); Volume 42 (November 1991 – October 1992); Volume 43 (November 1992 – October 1993); Volume 44 (November 1993 – October 1994); Volume 45 (November 1994 – October 1995); Volume 46 (November 1995 – October 1996). Price £15 each (3.5"HD, alternatively 3.5"DD or 5.25" if required).

REPRINTS

Reprints of articles from TELEVISION back to 1986 are also available: ordering information is provided with the index, or can be obtained from the address below. Hard copy indexes of TELEVISION are available for Volumes 38 to 46 at £3.50 each.

All the above prices include UK postage and VAT where applicable. Add an extra £1 postage for overseas EC orders, or £5 for non-EC overseas orders. Cheques should be made payable to SoftCopy Ltd. Allow 28 days for delivery (UK).

SoftCopy Limited, 1 Vineries Close, Cheltenham GL53 ONU, UK. Telephone 01242 241 455

Answer to Test Case 410

- See page 245 -

Well done Doc Colin! The Canon UC9Hi camcorder has two video output modes, YC via the S connector and composite video via the yellow-coded phono socket. The connecting lead in usc was a special one, wired for scart-S operation with the luminance signal at pin 20 and the chroma signal at pin 15. This is fine with a suitably configured high-band VCR, but no good at all with a standard VHS machine such as the NVF65. The latter is designed to receive composite video at scart pin 20, and sorely missed the chroma signal here. A scart to three phonos lead was prescribed: this enabled colour VHS copies to be made by the VCR. The special lead worked well when connected to the TV set, once the latter's software had been set to S/scart mode for the AV2 input.

Miss Jones's problem was also solved with a scart lead, an ordinary one this time from the VCR to the TV set. At programme change the Hitachi C2546 interrogates the incoming teletext signal and composes from it a station ident caption. The off-tape playback text pulses are too corrupt, because of limited bandwidth and timing jitter, to decode into a meaningful caption. The timing jitter was also responsible for the faulty message box's lateral twitch. The Hitachi set doesn't attempt to caption pictures it receives via a scart lead, and by way of a bonus switches automatically to the AV mode when playback starts.

NEXT MONTH IN TELEVISION

THE PACE MSS100 SATELLITE RECEIVER

This budget-price model from Pace is nevertheless a sophisticated receiver. It uses some interesting new chips to get almost everything on to one compact main PCB. The chopper chip has just three pins and incorporates a power MOSFET. Most video and audio processing is carried out by a Thomson STV0056 LSI chip that also provides supervisory functions. J. LeJeune takes a look at the technology used.

SERVICING THE MITSUBISHI CT2964/2965STX

John Coombes provides a step-by-step fault diagnostic guide for these interesting sets. They use different power supplies, the 2965's being based on a master-slave chopper control chip arrangement.

FORUM: TECHNICAL TRAINING

Steve Beeching argues that the introduction of the new NVQ system could have an adverse effect on the technical competence of those employed in the brown goods servicing industry.

TOSHIBA SERVICE BRIEFS

More practical know-how from Toshiba Technical.

SOLDERING STATION REVIEW

Donald Bullock tests the Vann Draper SL30 soldering station. It was designed taking into full account the needs of a busy workshop and was found to meet every practical requirement well.

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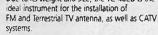
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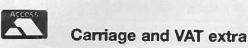
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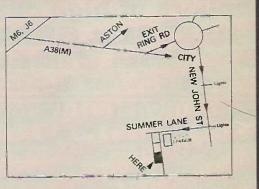
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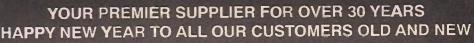
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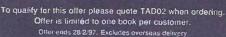
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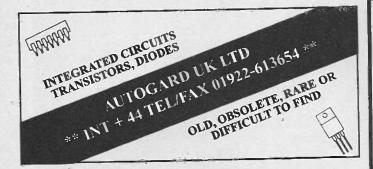
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TDA1543	£1.00 £2.00	BY229 BY255	£0.06 £0.05	HA11485ANT HA118041NT	£1.50 £1.50	
TDA2460 TDA2582	£1.00	BY299/200	£0.05	HA1196	£0.50	
TDA2562 TDA2541	£1.00	BY299/800	£0.13	HA51338SP-1	£2.00	
TDA2600	£2.00	BYT71/800	£0.15	HA51338SP-3	£2.00	
TDA2611A	£1.00	BYV19-30	£0.15	HCF4520	£0.50	
TDA2613	£1.00	BYV28-200	£0.15	HCF4520BE	£0.50	
TDA3048	£1.00	BYV95	£0.03	HD6140425 J11	£0.50	
TDA3564	£3.00	BYV95B	£0.04	HEF4029BP	£0.20	
TDA3565	£3.00	BZW - C110	£0.50	HEF4093	£0.20	_
TDA4650	£3.00	BZW83 - C20	£0.03	HE4528BP	£0.15	
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Infra-red TX1				TX100 C Yellow		
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		ACE G4-B to A		-		1
		et RM933E Vide			£30.00	
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			1	VA308 and I	battery	
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TX86		}	£4			
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£10 each		ICC5 Tube Base on Par ICC5 Decoder Panel		h £5.00		NYO	Amstrad Tuner UE33-B01 TX10 Focus Units	£3.0 6 for £1
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136771 each	671 each		2SC3973B	30p	TC1632, TC1642, TC	2232, TX2034.	Turntable Satellite Modulator TV Sound 5.5 MHz MPM 1000T	£1.
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135085	6362		2SC7350	15p	TX2200, TX2234, TX TX2636, TX3300, RC			ost £5.
136795	6383	TDA3800 £4.00			TNQ1411/2	£8.00 each	New TX80. No tuner	£15. £12.
	36481 36482	TDA3803.A £4.00	80v/t	15p	HITACHI sets	HANDSETS	FV 31R Head	-2
35063	36761		2SD200	£2.00	CLE871A £5.00	Amstrad Export £3.00	Ferguson FV31R Remote and Power Supply FV31R Dis	£5. play
	36831 36832		2SD401	£1.00	STR6020 £6.00 SS2000AF	Amstrad U/V £3.00	Remote and Power Supply FV31R Dis Panel Post £2	£5
34002	36922		2SD716	£1.00	line o.p. £1.00		Quartz Halogen	
	36943 36962	TD.44505NE £3.00		30p	2SC940 £1.0 BU105/04 80	Amstrad 4700 £5.00	500w, 200v. For outdoor lamps	£ļ
36797	41 2078/25		2SD789	30p	BU108 £1.00	0 Amstrad 4000 23.00	AMSTRAD	
133752	AT 2076/78 AT 2077/81-£15	TDITTE.	2SD820	£1.00	BU124 50 BU126 80	IQ081 GEC £3.00	Plastic Front with Flap 8.900	53
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	TFB 3069D TFB 4023D		2SD1264	£1.00	BU206 £1.0	0 BSB £1.50	1810587 PA1 UK	£3
34393	TFB 4039AD	and the second sec	2SD1200 2SD1398	£1.00	BU207 £1.0 BU208 80	1000 40.00	KT3/K30 Tripler	£5.
	TEB 4066 AD		2SD1335	£1.00	BU208A £1.5	0 167000 \$5.00	U/V Tripler	£4
35372 35701	LOPTS		2SD1415	£1.00	BU208D 90 BU222 £1.0	SRD 2 £1.00	Grundig Tripler with Focus Pot	£7
432351	EIO EACH		2SD1432	£1.00	BU326 £1.0	0 SRD 3 £1.00	Grundig Universal Tripler	
432211	Y 260482		2SD1453	£1.00	BU407 60 BU508A 90	P T780 £2.00 P SRD 4 £1.00	Upright Printed Circuit type	£7
432491	2435121		2SD1576	£1.00	BU508AF £1.0	0	BG 2087-642-1005 Triplers	£7 £7
432871 432851	FERGUSON		2SD1577	£2.00	BU508D 80 BU705 £1.0		BG 2032-642-3002	-
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v & video Hand Set brion TV & Video Handset	£2.00	£4	11/2 me		BUK454/600 £2.0 TDA3047 £1.0	N0 06D4-025-001	TATUNG universal tuner 205. or cqv with aerial socket	£
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Amstrad – Long Chatsis an *ower Supply Models 1991/ Terguson Switch Mode Train 7886, TX100 CC5 Ferguson Switch Mode Trans 3112-338-32642 29 DC and 24v DC Power egulated	£3.00 1992 1sformer TX85, each £5.00 1c £4.00 Supply £2.00	6B513A Hitachi Mains Switch Scart to 4 Phone Leas SXT2302234 Sat. Tu Base Band Min	with Stand-by Is 1 ¹ /2m ner with	£4.00	with Base Band, Vid AMSTRAD Long C Display Panel 1992/	leo Out £6.00 Thassis 1993 £4.00	Mains input choke for TX9 £ TX100 REMOTE PANEL No. 564131C M293B/ and SAA5012 £10.00 etc	
Amstrad – Long Chassis an Nodels 1991/ Models 1991/ erguson Switch Mode Train TX86, TX100 CC5 Ferguson Switch Mode Trans 3112-338-32642 2v DC and 24v DC Power egulated Ferguson U/V Camcorder 1	£3.00 1992 1sformer TX85, each £5.00 1c £4.00 Supply £2.00	6B513A Hitachi Mains Switch Scart to 4 Phone Leas SXT2302234 Sat. Tu Base Band Min	Is 1 ¹ /stn ner with	£2.50 .£4.00	with Base Band, Vid AMSTRAD Long C Display Panel 1992/	leo Out £6.00 Thassis 1993 £4.00	Mains input choke for TX9 £ TX100 REMOTE PANEL No. 564131C M293B/ and SAA5012 £10.00 etc LEADER LMV-181A milli volt (cost £255) 240v mains inpu	meter
Instrad – Long Chassis an tower Supply Models 1991/ Jerguson Switch Mode Train X86, TX100 CC5 Ferguson Switch Mod Trans, 3112-335-33642 29 DC and 24v DC Power egulated Ferguson U/V Cameorder 1 Sattery VA3109 9.6v	£3.00 1992 tsformer TX85, each £5.00 fc £4.00 Supply £2.00 800 MA £4.00	68513A Hitachi Mains Switch Scart to 4 Phone Leas SXT2302234 Sat. Tu Base Band Min	with Stand-by Is 1 ¹ /2m ner with SHOPSTEIGN SHOPSTEIGN	£2.50 	with Base Band, Vid AMSTRAD Long O Display Panel 1992/ COMPONENTS DEBURYNESS, ESSE CC - SUBJECT TO AV	leo Out £6.00 Thassis 1993 £4.00 C X SS3 8AF XAILABILITY	Mains input choke for TX9 £ TX100 REMOTE PANEL No. 564131C M293B/ and SAA5012 £10.00 ctc LEADER LMV-181A milli volt (cost £255) 240v mains inpu Electronic volumeter (Imv F.S.) Im	meter
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