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Long-distance TV

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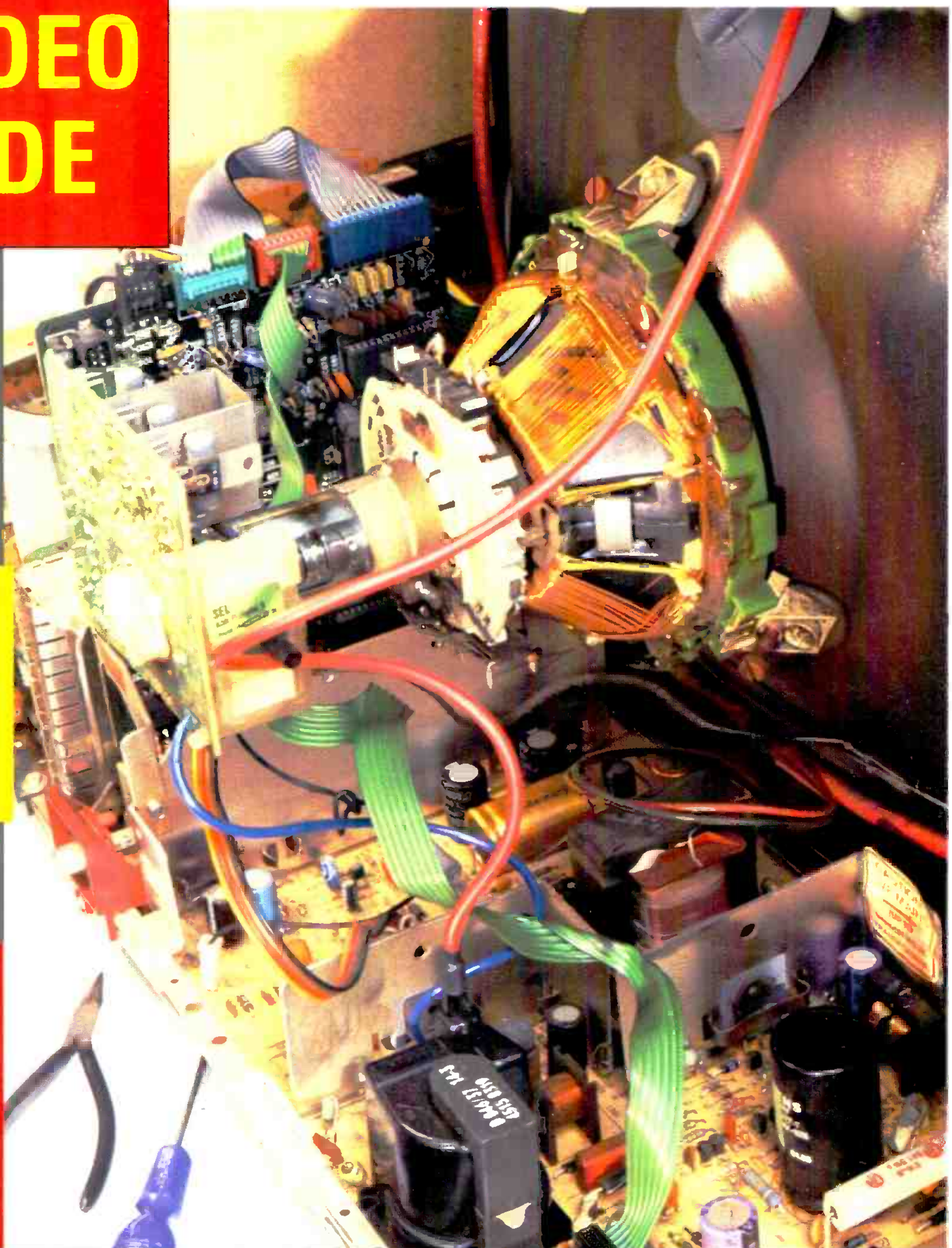

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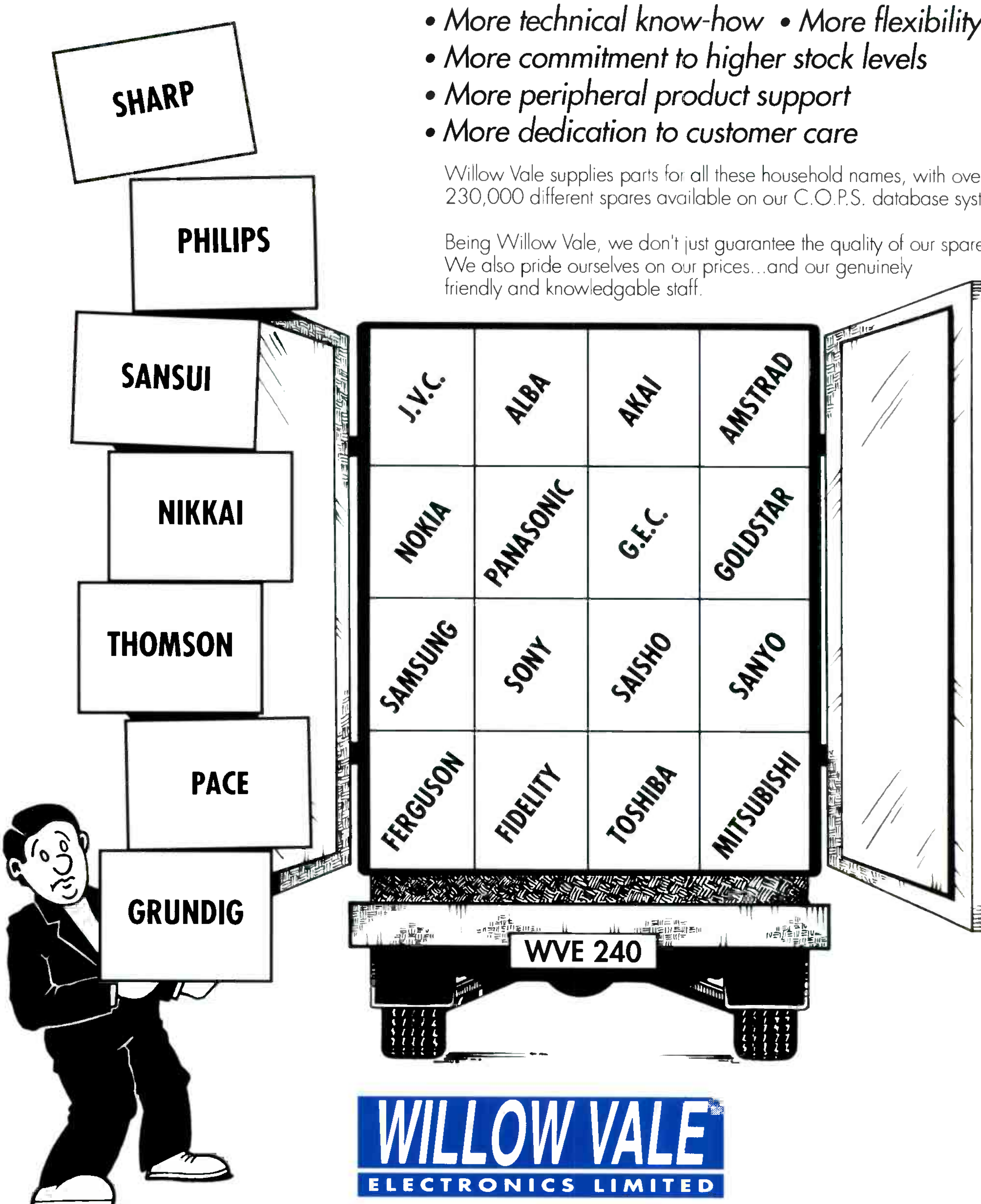

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APRIL 1995
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March 15th

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ACY19	48p
AD149	60p
AF125	50p
AF139	30p
AF239	30p
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BB205B	24p
BC107	8p
BC108	8p
BC109	8p
BC109C	10p
BC140	20p
BC141	20p
BC142	20p
BC143	20p
BC147	8p
BC149	8p
BC159	8p
BC160	30p
BC171	10p
BC172	10p
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BD331	40p
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TIP150	90p
TIP151	60p
TIP2955	42p
TIP3055	42p
TIPL763A	200p
TIPL791A	80p
TIS61	15p
TIS90	15p
TIS93	20p
VK1010	88p
VN10KM	60p
ZTX107	11p
ZTX108	11p
ZTX109	12p
ZTX212	20p
ZTX300	10p
ZTX301	16p
ZTX302	10p
ZTX303	20p
ZTX304	10p
ZTX320	20p
ZTX501	13p
ZTX502	10p
ZTX503	18p
ZTX504	25p
2N696	26p
2N697	22p
2N698	40p
2N78	22p
2N914	28p
2N930	18p
2N1131	28p
2N1132	28p

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2N1613	24p
2N1711	24p
2N1893	30p
2N2102	50p
2N2218A	24p
2N2219	24p
2N2221	23p
2N2222	23p
2N2369	15p
2N2484	15p
2N2646	40p
2N2904	20p
2N2905	20p
2N2906	18p
2N2907	18p
2N3019	28p
2N3053	18p
2N3054	40p
2N3055	38p
2N3055H	50p
2N3442	85p
2N3702	9p
2N3703	9p
2N3704	9p
2N3705	9p
2N3706	9p
2N3707	9p
2N3710	12p
2N3711	12p
2N3771	85p
2N3772	90p
2N3773	100p
2N3799	18p
2N3819	29p
2N3903	11p
2N3906	11p
2N4031	25p
2N4401	12p
2N4403	12p
2N5061	20p
2N5088	20p
2N5192	50p
2N5241	500p
2N5245	45p
2N5294	30p
2N5296	30p
2N5448	12p
2N6107	40p
2N6292	40p
2N6385	120p
2N6403	160p

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Part	Price
BY127	8p
BY133	8p
BY164	40p
BY179	35p
BY184	32p
BY206	11p
BY207	9p
BY227	19p
BY228	28p
BY298	15p
BY299	18p
BY448	20p
BYX10	15p
BYX55/600	25p
BYX70/500	32p
OA47	10p
OA91	10p
OA202	10p
IN4001	3p
IN4002	3p
IN4003	3p
IN4004	3p
IN4005	3p
IN4006	3p
IN4007	4p
IN4148	2p
IN5400	9p
IN5401	8p
IN5402	8p
IN5403	8p
IN5404	8p
IN5405	11p
IN5406	12p
IN5407	12p
IN5408	12p
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RGP30	16p
SKE4F2/06	60p
SKE4F2/08	80p
SKE4F2/10	100p
SR2M	60p

I.C. SOCKETS

Part	Price
8 PIN	5p
14PIN	6p
16PIN	7p
18PIN	10p
20PIN	12p
22PIN	13p
24PIN	14p
28PIN	16p
40PIN	18p

ZENERS

Part	Price
400 mWatts	
2V7 to 39V	5p
1.3 Watts	
2V7 to 39V	9p

CRYSTALS

Part	Price
Freq in MHz	
2.4576	180p
3.276	115p
4.0	110p
5.0	130p
10.0	140p
11.0	250p
12.0	120p
14.756	200p
15.0	160p
24.0	250p

VOLTAGE REGULATORS

Part	Price
7805	25p
7806	25p
7808	25p
7812	25p
7815	25p
7818	25p
7824	25p
7905	25p
7906	30p
7908	30p
7912	30p
7915	30p
7918	30p
7924	30p
78L05	24p
78L08	24p
78L12	24p
78L15	24p
78L18	24p
78L24	24p
79L05	35p
79L08	35p
79L12	35p
79L15	35p
LM309K	100p
LM317T	100p
LM323K	350p
78H08KC	800p
79H12KC	700p
79HGKC	800p

VALVES

Part	Price
DAF96	100p
DY87	80p
EBF80	60p
ECC84	80p
ECH84	90p
ECL84	100p
EF183	75p
EF184	85p
EL500	100p
EY86	70p
EY87	70p
EY88	80p
PC97	100p
PCC85	60p
PCF80	100p
PCF801	110p
PCF806	115p
PCH200	100p
PCL81	65p
PCL82	80p
PCL84	60p
PFL200	110p
PL36	120p
PL83	60p
PL84	80p
PL95	180p
PY81	100p
PY500A	190p

LEDs

Part	Price
3mm	
RED	5p
YELLOW	8p
GREEN	8p
5mm	
RED	5p
YELLOW	8p
GREEN	8p

RECTANGULAR LEDs

Part	Price
5mm × 2.5mm	
RED	5p
YELLOW	8p
GREEN	8p

OPTO COUPLERS

Part	Price
4N37	48p
4N38	68p
AN203	210p

BRIDGE RECTIFIERS

Part	Price
W005	16p
1A/50V	
W01	18p
1A/100V	
W02	19p
1A/200V	
W04	21p
1A/400V	
W06	23p
1A/600V	
W08	28p
1A/800V	
BR81D	33p
2A/100V	
BR82D	33p
2A/200V	
BR84D	37p
2A/400V	
BR86D	43p
2A/600V	
BR88D	43p
2A/800V	
BR32	43p
2A/200V	
BR34	43p
2A/400V	
BR36	44p
2A/600V	
BR62	80p
6A/200V	
BR64	72p
6A/400V	
BR251	150p
25A/100V	
BR252	165p
25A/200V	
BR254	185p
25A/400V	
BR256	200p
25A/600V	
BR258	240p
25A/800V	
BR351	185p
35V/100V	
BR352	200p
35V/200V	
BR354	220p
35V/400V	
BR356	230p
35V/600V	
BR358	260p
35V/800V	
BY164 1.5A/	
100V	40p
BY176 1.5A/	
800V	40p

TRIACS

Part	Price
TIC206D	60p
4A/400V	
TIC225D	69p
6A/400V	
TIC226D	68p
8A/400V	
TIC236D	85p
12A/400V	
TIC246D	105p
16A/400V	
TIC253D	190p
20A/400V	
TIC263D	205p
25A/400V	

THYRISTORS

Part	Price
2N5061	20p
0.8A/60V	
TIC116C	59p
8A/300V	
TIC116D	70p
8A/400V	
TIC126D	75p
12A/400V	
TIC126M	90p
12A/600V	
C106D	28p
4A/400V	
BR103	37p
BR303	85p
BT106	180p
BT119	100p
17088	200p
17089	200p
17127	200p
15/80H	230p
15/85R	230p
SG264	800p
SG613	1600p

COMPUTER ICs

Part	Price
Z80ACPU	100p
Z80ADMA	200p
Z80ACTC	140p
Z80ASIO-1	210p
Z80ASIO-2	210p
75107	65p
75110	75p
75113	100p
75122	110p
75154	100p
75162	700p
75182	95p
75183	95p
75195	185p
2114	150p
2532	200p
2716	100p
2732	200p
2732A	220p
2764	150p
27C64	200p
27128	150p
27256-25	150p
27512	300p
4116	40p
4164-15	80p
4164-12	90p
41256-15	80p
41256-12	100p
41256-10	110p
41464-12	150p
6116	80p
6264-10	210p
62256-12	300p
6502A	360p
65C02	930p
6522	280p
6800	210p
6802	220p
680	500p
36808	500p
6809	500p
6810	150p
6818	380p
6821	130p
6840	290p
6845	200p
6850	90p
8085A	300p
8086	500p
8088	480p
8156	300p
8224	240p
8226	240p
8250	750p
8251	200p
8253	160p
8257	220p
8271	3400p
8279	270p
8283	400p
8284	440p
8287	260p
8288	650p
8748	700p
8755	800p
8T26	95p
8T28	110p

LINEAR ICs

Part	Price
AN203	210p
AN210	165p
AN214Q	170p
AN228	280p
AN252	150p
AN259	250p
AN262	140p
AN271	230p
AN274	250p
AN301	330p
AN303	250p
AN304	360p
AN315	210p
AN316	350p
AN360	100p
AN362	140p
AN366	150p
AN610	160p
AN3312	350p
AN3821K	600p
AN3822K	600p
AN3990K	300p
AN3991K	400p
AN5025	250p
AN5033	400p
AN5132	250p
AN5150	400p
AN5151	600p
AN5215	100p
AN5256	150p
AN5262	175p
AN5265	80p
AN5352	600p
AN5411	450p
AN5421	150p
AN5429	420p
AN5512	100p
AN5515	160p
AN5520	550p
AN5521	100p
AN5612	200p
AN5613	200p
AN5615	300p
AN5620	250p
AN5622	275p
AN5625	400p
AN5712	180p
AN5722	140p
AN5730	160p
AN5732	120p
AN5753	130p
AN5763	450p
AN5790	240p
AN5791	225p
AN5836	450p
AN5900	130p
AN6135	120p
AN6247	200p
AN6270	400p
AN6300	600p
AN6306	380p
AN6320	180p
AN6332	320p
AN6341	200p
AN6344	440p
AN6350	610p
AN6359	500p
AN6360	320p
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AN7130	75p
AN7140	170p
AN7145	195p
AN7146	210p
AN7154	180p

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AN7222	75p
AN7254	150p
AN7256	250p
AN7310	60p
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LM319	165p
LM324	30p
LM335Z	120p
LM339	35p
LM348	50p
LM358	45p
LM380	80p
LM381	150p
LM382	130p
LM386	60p
LM387	100p
LM393	45p

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LM741MET	45p
LM747	55p
LM1889	300p
LM1894N	200p
LM3900	40p
LM3909	100p
LM3914	160p
LM3915	160p
LM3916	270p
L200	200p
M491BB1	500p
M494B1	700p
M50115P	320p
M50117P	500p
M50119P	525p
M50784	300p
M50786	500p
M50790	600p
M51161	300p
M51381P	200p
M51387P	800p
M51544	150p
M51848	150p
M54523P	200p
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MB3756	150p
MB3759	200p
MB8719	360p
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MC1496	65p
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NE555	20p
NE556	40p
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NE565	110p
NE567	115p
NE571	290p
NE592	85p
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Part	Price
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STK465	720p
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Part	Price
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U427B	70p
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UPC574	60p
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Part	Price
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JAPANESE TRANSISTORS

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
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2SA1380	75p	2SC1010	225p	2SC1735	70p	2SC2271	30p	2SC2751	270p	2SC3280	200p	2SC3895	400p	2SD837	55p	2SD1288	175p	2SD1825	60p
2SA1381	100p	2SC1012	75p	2SC1739	800p	2SC2274	15p	2SC2752	140p	2SC3281	200p	2SC3897	650p	2SD838	300p	2SD1289	250p	2SD1843	100p
2SA1382	120p	2SC1013	170p	2SC1740	10p	2SC2275	50p	2SC2767	300p	2SC3284	600p	2SC3907	250p	2SD841	110p	2SD1291	400p	2SD1846	350p
2SA1385	180p	2SC1014	140p	2SC1741	35p	2SC2278	70p	2SC2769	400p	2SC3293	85p	2SC3927	250p	2SD844	200p	2SD1292	60p	2SD1849	325p
2SA1386	400p	2SC1030	150p	2SC1755	90p	2SC2290	1800p	2SC2773	700p	2SC3298	50p	2SC3950	120p	2SD845	250p	2SD1297	300p	2SD1850	325p
2SA1423	30p	2SC1047	20p	2SC1756	35p	2SC2291	40p	2SC2774	500p	2SC3299	120p	2SC3953	60p	2SD850	170p	2SD1302	20p	2SD1858	40p
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2SB546	45p	2SC1106	180p	2SC1815	10p	2SC2316	150p	2SC2808	40p	2SC3317	350p	2SC4056	350p	2SD868	260p	2SD1347	70p	2SD1910	280p
2SB560	25p	2SC1114	415p	2SC1819	70p	2SC2320	10p	2SC2810	360p	2SC3323	480p	2SC4106	200p	2SD870	190p	2SD1348	65p	2SD1911	300p
2SB561	50p	2SC1115	280p	2SC1826	60p	2SC2324	120p	2SC2812	40p	2SC3327	60p	2SC4123	450p	2SD871	300p	2SD1350	150p	2SD1913	50p
2SB562	25p	2SC1116	290p	2SC1827	60p	2SC2329	480p	2SC2814	40p	2SC3331	25p	2SC4124	250p	2SD879	60p	2SD1376	125p	2SD1929	60p
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2SB595	55p	2SC1161	110p	2SC1833	40p	2SC2333	200p	2SC2825	900p	2SC3345	100p	2SC4236	550p	2SD882	25p	2SD1380	100p	2SD1941	500p
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2SB600	500p	2SC1165	750p	2SC1845	15p	2SC2344	150p	2SC2832	300p	2SC3355	50p	2SC4301	550p	2SD895	200p	2SD1391	250p	2SD1978	50p
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2SB705	200p	2SC1213	15p	2SC1875	220p	2SC2369	100p	2SC2879	3200p	2SC3383	80p	2SD257	195p	2SD923	360p	2SD1400	280p	2SJ50	425p
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2SB791	280p	2SC1308K	350p	2SC1929	180p	2SC2459	50p	2SC2929	280p	2SC3417	90p	2SD381	50p	2SD973A	70p	2SD1425	260p	2SJ117	550p
2SB795	60p	2SC1312	40p	2SC1940	110p	2SC2470	65p	2SC2934	75p	2SC3419	120p	2SD388	150p	2SD985	120p	2SD1426	160p	2SJ119	700p
2SB825	135p	2SC1317	15p	2SC1941	27p	2SC2481	120p	2SC2937	250p	2SC3420	80p	2SD389	60p	2SD986	120p	2SD1427	180p	2SJ161	650p
2SB861	110p	2SC1318	10p	2SC1942	350p	2SC2482	20p	2SC2938	235p	2SC3422	75p	2SD400	14p	2SD1012	40p	2SD1428	220p	2SJ162	680p
2SB882	180p	2SC1325	400p	2SC1944	350p	2SC2483	120p	2SC2939	400p	2SC3423	60p	2SD401	50p	2SD1020	40p	2SD1429	410p	2SK19	45p
2SB886	90p	2SC1327	20p	2SC1945	350p	2SC2484	185p	2SC2944	300p	2SC3446	150p	2SD402	120p	2SD1021	120p	2SD1430	280p	2SK40	50p
2SB950	180p	2SC1328	15p	2SC1946	1500p	2SC2491	200p	2SC2958	50p	2SC3447	200p	2SD415	55p	2SD1022	400p	2SD1431	400p	2SK49	50p
2SB951	190p	2SC1342	15p	2SC1947	450p	2SC2495	1900p	2SC2962	800p	2SC3456	200p	2SD424	350p	2SD1024	130p	2SD1432	400p	2SK55	100p
2SB1009	110p	2SC1345	15p	2SC1957	70p	2SC2498	50p	2SC2979	160p	2SC3457	125p	2SD426	150p	2SD1030	75p	2SD1433	750p	2SK68	100p
2SB1077	180p	2SC1346	100p	2SC1959	10p	2SC2500	25p	2SC2987	250p	2SC3459	180p	2SD427	350p	2SD1031	70p	2SD1438	140p	2SK73	75p
2SB1109	100p	2SC1358	270p	2SC1967	1300p	2SC2502	200p	2SC2988	150p	2SC3460	180p	2SD438	35p	2SD1046	200p	2SD1439	165p	2SK106	40p
2SC182	75p	2SC1359	15p	2SC1969	160p	2SC2519	60p	2SC2995	60p	2SC3461	350p	2SD467	15p	2SD1047	180p	2SD1441	280p	2SK107	40p
2SC372	25p	2SC1360	70p	2SC1970	100p	2SC2527	300p	2SC2999	50p	2SC3466	225p	2SD468	15p	2SD1051	130p	2SD1445	200p	2SK118	50p
2SC380	10p	2SC1364	25p	2SC1971	400p	2SC2534	150p	2SC3001	1400p	2SC3468	70p	2SD471	20p	2SD1060	130p	2SD1450	60p	2SK125	100p
2SC382	50p	2SC1383	25p	2SC1972	600p	2SC2535	300p	2SC3012	300p	2SC3481	300p	2SD525	50p	2SD1062	150p	2SD1451	260p	2SK133	650p
2SC388A	60p	2SC1384	20p	2SC1973	150p	2SC2538	100p	2SC3019	320p	2SC3482	275p	2SD526	70p	2SD1063	200p	2SD1452	350p	2SK134	415p
2SC394	60p	2SC1393	20p	2SC1983	75p	2SC2540	1900p	2SC3025	500p	2SC3486	275p	2SD545	18p	2SD1064	250p	2SD1453	140p	2SK135	415p
2SC403	25p	2SC1394	15p	2SC1984	150p	2SC2542	300p	2SC3026	550p	2SC3502	100p	2SD549	120p	2SD1065	160p	2SD1455	250p	2SK147	160p
2SC454	15p	2SC1398	55p	2SC1985	100p	2SC2545	55p	2SC3030	300p	2SC3503	50p	2SD551	300p	2SD1069	150p	2SD1457	165p	2SK150	150p
2SC458	10p	2SC1400	50p	2SC1986	100p	2SC2546	25p	2SC3037	125p	2SC3504	120p	2SD555	500p	2SD1071	450p	2SD1459	120p	2SK163	40p
2SC460	10p	2SC1403	500p	2SC2001	15p	2SC2547	65p	2SC3038	125p	2SC3505	240p	2SD560	50p	2SD1073	350p	2SD1468	60p	2SK168	40p
2SC461	15p	2SC1407	550p	2SC2002	15p	2SC2550	50p	2SC3039	80p	2SC3506	250p	2SD571	20p	2SD1088	150p	2SD1479	200p	2SK176	800p
2SC495	45p	2SC1413	150p	2SC2003	20p	2SC2551	70p	2SC3040	260p	2SC3507	650p	2SD575	530p	2SD1094	520p	2SD1487	225p	2SK192	45p
2SC496	25p	2SC1419	50p	2SC2004	20p	2SC2552	60p	2SC3042	300p	2SC3509	750p	2SD600	30p	2SD1110	225p	2SD1491	100p	2SK195	150p
2SC497	85p	2SC1429	50p	2SC2021	10p	2SC2553	200p	2SC3057	150p	2SC3518	120p	2SD601	40p	2SD1111	20p	2SD1494	300p	2SK197	140p
2SC515	100p	2SC1444	275p	2SC2022	110p	2SC2555	120p	2SC3058	2500p	2SC3519	250p	2SD602	60p	2SD1113	225p	2SD1496	350p	2SK214	170p
2SC535	30p	2SC1446	55p	2SC2023	180p	2SC2562	90p	2SC3068	60p	2SC3531	225p	2SD612	50p	2SD1128	200p	2SD1497	230p	2SK216	200p
2SC536	20p	2SC1447	70p	2SC2026	30p	2SC2563	200p	2SC3070	35p	2SC3549	200p	2SD613	70p	2SD1133	100p	2SD1497-02	350p	2SK218	400p
2SC558	275p	2SC1448	100p	2SC2027	200p	2SC2564	230p	2SC3074	200p	2SC3552	300p	2SD636	10p	2SD1135	75p	2SD1505	120p	2SK240	140p
2SC563	120p	2SC1449	120p	2SC2028	75p	2SC2565	260p	2SC3075	150p	2SC3568	200p	2SD637	15p	2SD1138	50p	2SD1507	60p	2SK312	750p
2SC605	100p	2SC1450	200p	2SC2029	120p	2SC2568	120p	2SC3077	120p	2SC3584	200p	2SD638	15p	2SD1140	40p	2SD1509	100p	2SK315	70p
2SC619	100p	2SC1454	250p	2SC2037	50p	2SC2570	30p	2SC3086	150p	2SC3595	220p	2SD639	20p	2SD1142	350p	2SD1511	100p	2SK320	120p
2SC641	80p	2SC1470	120p	2SC2053	120p	2SC2571	350p	2SC3089	130p	2SC3605	60p	2SD640	350p	2SD1148	175p	2SD1519	250p	2SK323	130p
2SC644	10p	2SC1472	40p	2SC2055	150p	2SC2577	110p	2SC3101	750p	2SC3606	100p	2SD655	18p	2SD1159	90p	2SD1521	70p	2SK386	600p
2SC647	300p	2SC1473	15p	2SC2058	20p	2SC2578	170p	2SC3112	35p	2SC3607	150p	2SD661	60p	2SD1160	150p	2SD1541	350p	2SK405	450p
2SC681	250p	2SC1474	45p	2SC2060	60p	2SC2579	110p	2SC3114	40p	2SC3636	280p	2SD666	25p	2SD1163A	220p	2SD1548	450p	2SK413	500p
2SC683	35p	2SC1475	60p	2SC2061	75p	2SC2580	175p	2SC3116	75p	2SC3657	400p	2SD667	20p	2SD1164	75p	2SD1554	170p	2SK415	500p
2SC708	100p	2SC1505	80p	2SC2068	60p	2SC2581	225p	2SC3117	120p	2SC3659	600p	2SD668	120p	2SD1168	270p	2SD1555	170p	2SK429	180p
2SC710	15p	2SC1507	45p	2SC2071	140p	2SC2588	600p	2SC3122	50p	2SC3668	120p	2SD669	35p	2SD1169	280p	2SD1556	400p	2SK511	450p
2SC711	15p	2SC1509	35p	2SC2073	40p	2SC2590	40p	2SC3148	185p	2SC3675	100p	2SD673	350p	2SD1173	350p	2SD1564	100p	2SK513	325p
2SC730	350p	2SC1514	35p	2SC2075	60p	2SC2591	50p	2SC3149	180p	2SC3678	280p	2SD676	250p	2SD1185	400p	2SD1565	75p	2SK531	350p
2SC732	40p	2SC1515	60p	2SC2078	95p	2SC2592	200p	2SC3150	125p	2SC3679	180p	2SD716	80p	2SD1186	400p	2SD1571	170p	2SK534	700p
2SC733	15p	2SC1520	45p	2SC2085	100p	2SC2603	10p	2SC3151	230p	2SC3680	380p	2SD717	180p	2SD1187	250p	2SD1572	100p	2SK537	900p
2SC735	40p	2SC1541	110p	2SC2086	60p	2SC2610	60p	2SC3152	130p	2SC3685	450p	2SD718	85p	2SD1189	55p	2SD1576	250p	2SK538	450p
2SC738	15p	2SC1545	120p	2SC2092	100p	2SC2611	30p	2SC3153	230p	2SC3687	600p	2SD722	240p	2SD1190	150p	2SD1577	250p	2SK539	1100p
2SC739	150p	2SC1567	40p	2SC2094	1200p	2SC2621	70p	2SC3156	350p	2SC3688	550p	2SD725	270p	2SD1191	120p	2SD1579	120p	2SK555	400p
2SC761	110p	2SC1568	35p	2SC2097	2300p	2SC2625	190p	2SC3157	200p	2SC3692	150p	2SD734	15p	2SD1192	90p	2SD1589	60p	2SK556	500p
2SC762	150p	2SC1569	55p	2SC2099	2500p	2SC2626	600p	2SC3158	260p	2SC3715	480p	2SD741	120p	2SD1196	150p	2SD1590	100p	2SK557	400p
2SC783	85p	2SC1570	40p	2SC2118	1100p	2SC2631	20p	2SC3159	200p	2SC3717	120p	2SD743	130p	2SD1197	150p	2SD1591	310p	2SK566	475p
2SC790	50p	2SC1571	50p	2SC2120	10p	2SC2634	10p	2SC3164	350p	2SC3729	450p	2SD756	100p	2SD1207	40p	2SD1593	125p	2SK695	550p
2SC792	380p	2SC1573	25p	2SC2131	550p	2SC2636	40p	2SC3169	150p	2SC3746	100p	2SD757	120p	2SD1210	280p	2SD1595	160p	2SK719	300p
2SC805	225p	2SC1580	600p	2SC2141	60p	2SC2637	120p	2SC3170	300p	2SC3747	120p	2SD758	140p	2SD1211	120p	2SD1608	210p	2SK724	600p
2SC828	20p	2SC1583	25p	2SC2153	40p	2SC2640	1800p	2SC3173	180p	2SC3752	250p	2SD762	100p	2SD1218	75p	2SD1609	70p	2SK725	600p
2SC829	15p	2SC1586	540p	2SC2166	80p	2SC2653	100p	2SC3175	150p	2SC3781	150p	2SD763	140p	2SD1223	75p	2SD1632	500p	2SK727	1200p
2SC839	20p	2SC1617	340p	2SC2168	120p	2SC2654	180p	2SC3178	175p	2SC3783	400p	2SD768	180p	2SD1225	120p	2SD1637	50p	2SK735	600p
2SC870	100p	2SC1623	50p	2SC2188	70p	2SC2655	75p	2SC3179	70p	2SC3787	100p	2SD772	200p	2SD1227	40p	2SD1647	40p	2SK758	300p
2SC898	275p	2SC1624	60p	2SC2200	250p	2SC2656	550p	2SC3181	200p	2SC3789	75p	2SD773	20p	2SD1229	250p	2SD1649	260p	2SK787	1100p
2SC930	15p	2SC1626	55p	2SC2221	650p	2SC2660	100p	2SC3182	120p	2SC3790	120p	2SD774	30p	2SD1237	300p	2SD1650	180p	2SK794	500p
2SC941	15p	2SC1627	15p	2SC2228A	60p	2SC2665	200p	2SC3199	40p	2SC3795	175p	2SD777	400p	2SD1246	20p	2SD1651	150p	2SK872	650p
2SC943	160p	2SC1628	75p	2SC2229	15p	2SC2668	10p	2SC3209	120p	2SC3798	220p	2SD784	650p	2SD1247	40p	2SD1663	450p	2SK903	500p
2SC944	140p	2SC1634	50p	2SC2230	80p	2SC2671	100p	2SC3210	550p	2SC3807	120p	2SD786	100p	2SD1248	270p	2SD1666	90p	2SK1057	600p
2SC945	10p	2SC1669	100p	2SC2233	100p	2SC2681	170p	2SC3211	220p	2SC3811	80p	2SD787	20p	2SD1251	180p	2SD1667	120p	2SK1058	800p
2SC950	40p	2SC1674	15p	2SC2235	60p	2SC2682	70p	2SC3212	260p	2SC3832	200p	2SD788	30p	2SD1263	90p	2SD1668	120p	2SK1117	250p
2SC959	225p	2SC1675	90p	2SC2236	20p	2SC2688	27p	2SC3225	50p	2SC3833	250p	2SD789	20p	2SD1264	55p	2SD1677	300p	2SK1118	225p
2SC980	40p	2SC1678	80p	2SC2237	540p	2SC2690	75p	2SC3244	45p	2SC3853	220p	2SD792	400p	2SD1265	75p	2SD1730	350p	3SK45	100p
2SC982	20p	2SC1683	100p	2SC2238	45p	2SC2705	50p	2SC3246	50p	2SC3854	250p	2SD794	33p	2SD1266	180p	2SD1732	400p	3SK51	100p
2SC983	120p	2SC1684	30p	2SC2240	15p	2SC2710	50p	2SC3259	350p	2SC3855	220p	2SD795A	140p	2SD1267	55p	2SD1739	275p	3SK59	100p
2SC1000	20p	2SC1685	30p	2SC2258	30p	2SC2712	20p	2SC3260	220p	2SC3857	500p	2SD811	450p	2SD1271	55p	2SD1740	125p	3SK74	50p
2SC1001	950p	2SC1729	900p	2SC2259	60p	2SC2716	50p	2SC3261	230p	2SC3858	550p	2SD819	200p	2SD1271A	225p	2SD1748	90p	3SK77	50p
						2SC2719	25p	2SC3262	280p	2SC3870	200p	2SD820	250p	2SD1272	200p	2SD1760	80p	3SK81	50p
						2SC2721	120p	2SC3263	280p	2SC3883	280p	2SD821	550p	2SD1273	50p	2SD1762	50p	3SK85	160p
						2SC2738	200p	2SC3264	390p	2SC3884A	300p	2SD822	290p	2SD1275	50p	2SD1773	160p	3SK88	70p
						2SC2740	450p	2SC3269	50p	2SC3886A	400p	2SD826	30p	2SD1276	60p	2SD1783	100p	3SK121	150p
						2SC2749	350p	2SC3270	50p	2SC3890	150p	2SD836	60p	2SD1277	190p	2SD1796	180p		

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REPLACEMENT VIDEO HEADS

Model	Price
AIWA	
AV66/AV77	1200p
G700	1100p
G900	1500p
AKAI	
VS105, 112, 115, 116, 125, 126, 201, 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8, VSP82	1350p
VP7100, VS9300, VS9500, VS9800	650p
VP77, VP88, VP7100, VP7200, VS9700, VS9800	1400p
VS1, VS2, VS3, VS4, VS5, VS10, VSP1	1350p
VS33, VS35, VS37, VS38, VS53, VS55, VS66, VS765, VS767, VS768	2400p
VS512, VS515, VS516	2800p
VS465	2600p
VS11, VS12	1400p
VS6, VS8, VS9	2400p
VSX9	2500p
VSF600, VSF650	3600p
VS155, VS165	2500p
VS20, 22, 24, 25, 26, 27, 422, 426, 427, VSF10, VSP9	1400p
VSR9	1500p
VS109, VS603, VS606, VS607	2500p
VS75	2500p
ALBA	
VCR4000, VCR5000, VCR6000	1650p
AMSTRAD	
VCR4500, VCR5200, VCR9000, TVR1	1100p
VCR7000	1100p
VCR6000, 6100, 6200, 8600, 8602, 8700, DD8900, 8904, TVR4	1200p
TVR2, TVR3, VCR4600, VCR4600 MKII, VCR4700	1150p
AUTHENTIC	
N850	800p
AWA	
ATVI	800p
BAIRD	
8900, 8901, 8902, 8903, 8906, 8922, 8928	650p
8904, 8923, 8924, 8925, 8929, 8935, 8943, 8944	650p
8909, 8912	800p
8930, 8931, 8933, 8940	800p
8942	2300p
8945	2000p
8947, 8948	1600p
8950	1700p
VC141L	3000p
VH582	7000p
BLAUPUNKT	
RTV100, 200, 202, 211, 214, 222, 224, RTX100, 200	800p
RTV301, RTX250, RTV333	800p
RTV306, 307, 309, 311, 315, 316, 520, 707	1650p
RTV310, 311A, 312, 317, 319, 320	1100p
RTV324, RTV325	1550p
RTV328	1850p
RTV424	3500p
RTV434, RTV444	3900p
RTX260, RTX720, RTV330	2300p
RTV454, RTV740	5000p
RTV478	3700p
RTV520, RTV530	1800p
RTV535, RTV560, RTV570	2000p
RTV635, RTV660, RTV670, RTV730	3000p
CR1000, CR1200, CR1500	4650p
CR1800	4100p
RTV321, RTV322	1700p
RTV338	2800p
RTV348	2700p
RTV404, RTV414	3000p
RTV640	3000p
RTV750, RTV800, RTV900	3500p
RTV810	4400p
RTV910	4500p
BOSCH BAUER	
VRH50	1000p
VRP20	1000p
VRP25	1000p
VRP30	3350p
CANON	
VR10	1000p
VR30A, VR30B, VR30E, VR40A	3350p
DAEWOOD	
912, VCR12, VCR30, VCR32, VCR50, VCR52	1800p
VCP11 RAF	1800p
DECCA	
8300	1000p
8400, 8500	650p
DUAL	
EVR101	2300p
VR70, VR71, VR74, VR81, VR90, VR91	650p
VR85, VR96	2300p
VR97	3300p
VR80, VR92	650p
VR93	2450p
EDISON	
VC2130, 2133, 2135, 2140, 2830, 2930, 2932, 2934, 3122	650p
VK2132, VK2512	2300p
VK2436, VK2340	650p
VK2530, VK2532, VK2631, VK2541	1600p
VK2632	1700p
VK2637	3050p
VKH2545	2450p
VKH2639, VKH2439	3300p
FUNAI	
E11, 1100, VIP1000, 1400, 3000, 5000, VCR4000, 4500, 4800, 5200, VCR5600, 6400, 6600, V1, V25	1100p
VCR4600, VCR5400, VCR5800	1200p
VCR5480, 5843, 8007, VIP2500A, 3000A, 6000, 150	2000p
VCR4530, VCR6000, VCR6100, VCR6800, VCR6803	1300p
VCR8103, VCR8107	2200p
VIP300A MKII	1900p
FISHER	
FVHP420, 510, 520, 530, 615, 618, 620, 622, 710, 711, 715, 720, 721, 722, 730, 830, 905, 906, 908, 910, 911, 915, 916, 918, 5000, 5001, 5005, 5050, 5075	1150p
VBS3500, 7100, 7500, 7600, 9900, VBR330	2000p
VBS7000, VBS7100, VBS9000	2000p
FVHP500, 711, 715, 721, 722, 730, 830, 5100, FVHD720	1100p
FVHP725, 830, 980	2500p
FVHP990	2700p
FVHP975	2400p
FVHD40, FVHD140, FVHP1, FVHP10, FVHP20	1150p
FIDELITY	
HQS200, VCR600, VCR6100, VR900, VR9100	1500p
VCR100	1100p
VTR1000	1100p
GOLDSTAR	
8000 3HSSDB	1900p
GVH51, GVH122, VCP4000, VCP4100, VCP4200	1300p
GHV1232, 1233, 1241, 1242, 1243, 1244, 1245, 1246, 1290, 1291, 1295, 1296, 1891, 8210, 8215, GVHP1240, 1241, 1247, 1248, VCP400, VCP4130, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316, 4320, 4321, 4326	1300p
G.E.C.	
4000H, 4001H, 4002H	1200p
V4001H, V4004	1200p
V4005H	1500p
GRANADA	
CS1, DS2	1600p
VHSAH1	1100p
VHSAH3	2400p
VHSAN3	800p
VHSAY3	1200p
VHSBH1, VHSCH1	2100p
VHSBP1	850p
VHSBY3	2600p
VHSD52	1600p
VHSEH2	1600p
VHSEY1, VHSEY2	1400p
VHSFG2, VHSFG4	1300p
VHFS1, VHSFS2	1300p
VHSTJ1, VHSTJ2, VHSTJ3, VHSWJ3, VHSYJ2	700p
VHSVH4, VHSWH1, VHSXH1, VHSYH2	1600p
VHSWJ1, VHSXJ3	700p
GRAETZ	
4312, 4605, 4905, 4912, 4913, P4833, TR4605, TR4812, TR4905, TR4912, TR4913, TR4914, TR4943	650p
4935, 4943, 4963, 4985, 4993, TR4833, TR4935, TR4985, TR4993	650p
4920, 4927, 4930	1700p
4946, TR4906, TR4916	1600p
TR4994	2300p
TR4995	3300p
GRUNDIG	
VS410, 450, 460, 500, 505, 510, 520, 521, 530, 546	1600p
BARCELONA, MVS400, 440, 500, 600, SE5100, 6100, 6110, 9100, TVR4500, 4510, 5510, VS400, 440, 500, 505, 510, 518, 600, 610, 5180, VS6190, 700, 900	1400p
MADRID, SE5140, VS540, VS5480	3000p
MVS550, 620, VS550, 620, 630, 640, 790, 930, 940	2400p
VS120	2300p
VS680	4600p
VS160, VS740	4400p
VS170	4600p
MVS660, SE6160, VERONA, VS660, VS6690	3500p
MVS710, 720, 910, SE7120, 9120, VS710, 720, 800, 810, 910, 920	1700p
HINARI	
VXL2, 3, 4, 20, 35	1150p
VXL5, V20H	1300p
VXL6	1500p
VXL7	2200p
VXL8, 9, 10, 11, 90, VCR34H, VTV200	1300p
HITACHI	
VT11, 14, 15, 16, 30, 33, 34, 330, 340, 503, 640, 5030, VTP10, 30	1000p
VT7, VT17, VT18, VT19	2200p
VT35, VT38, VT39	2400p
VT100, 110, 111, 112, 113, 115, 118, 120, 125, 128, 220, 225, 400, 405, 410, 413, 414, 415, 418, 510, 518, 520, 525, 526, VTM625, 626, 725, 726, 728	1400p
VT3000	800p
VT4000, 4200, 5000, 5500, 5600	1100p
VT77, 680, 6500, 6700, 6800, 7000, 8000, 8030, 8040, 8100, 8300, 8500, 8700, 9000, 9300, 9500, 9700, 9900	1000p
VT8, 9, 56, 57, 570, 575, 576, 580, 585, 588	3400p
VT65	2400p
VT130, 135, 138, 145, 250, 255, 258, 420, 425, 426, 428, 430, 431, 435, 438, 535, 536, VTL30, 301, VTM630, 635, 636	2000p
VT52, VT60, VT61E, VT62E, VT63, VT64, VT640	1300p
VT168, VT150, VT260, VT498 (4 HEAD)	2600p
VT530	2500p
VT522, VTM620, VTM622, VTM720, VTM722, VTM822	1900p
VT660E	2600p
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HV1000, HV2000, HV3000	650p
HV4000, HV7000, HV8000p	
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VR3605, 3905, 3935, 3943, 3954, 3958, 3985, 3993, 4993	650p
VR3833, 3912, 3913, 3914, 3963, 3975, 4913 VRP3833	650p
VR3986	2000p
VP3826, 3906, 3916, 3926, 3946, 3948	1550p
VR3927	1400p
VR3976	2300p
VR3977	2700p
VR3984, VR3994	2300p
VR3995, 3997	1800p
VR3917	1400p
VR3730, VR3731, VR3749	2500p
VR3918, VR3919, VR3938	1500p
VR3920, 3701, 3719, 3720, 3721, 3759, 9720	2000p
VR3907, VR3908	1600p
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HRD565, HRD566, 3V48	2450p
HRD725, HRD755, 3V43, 3V53	3150p
8930, 8931, 8933, 8940, 3V29, 3V30	700p
8945	2400p
3V00, 8902, 8903, 8909, 8912, 8922	1000p
FV31	1500p
FV37, FV43H, HRD860	3500p
BR7000E, BR7000S	2800p
HR7200, 7300, 7350, 2650, BR6200	700p
HRD455	2000p
HRD520	1400p
HRD300, 400, 580, 600, 620, 650	2300p
HR4100	1000p
HRD150, HRD830	3300p
HRD250, HRD257	2700p
3V32, 8942, HR7655	2300p
HRD180, 190, 230, 610, 3V59, FV12L, FV20B, 26, 30, 32, 33, VC141L	2450p
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HRD530, HRD700, FV14T	3100p
GRC1, GRC2, 3V41	2800p
HRD330, 337, 440, 637, 641, 660, HRFC100, FV44L	2100p
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KV901, KV903, KV905	650p
KV917	2450p
LOGIK	
VR960	1500p
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LOEWE	
OC410, OC420, OC440	2400p
OC50, OC55, OC60, OC65	1500p
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9225, 9256	1800p
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9272, 928217	2700p
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928017, 928077, 928097, 929107, 928117	1700p
9253	2500p
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9284, 9295, VR3701, VR3721, VR3731, VR3761	2100p
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VX500E, 800A, 810A, 820, 80A, 770B, 773E	1200p
VCRL3, VX730, VX750	1450p
VX735, VX755, VX990	1500p
VX735A, VX765, VX850	1750p
VX600	1100p
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HS306, HS318, HS710	1600p
HS307	2600p
HS319	2500p
HS330	2600p
HS400	2800p
HS349, HSE31, HSE32, HSB31	2400p
HS411	2900p
HSE30, HSB30	2400p
HS338	2200p
HSE10, HSE11, HSE20, HSE21, HSE41, HSB10, HSB20	2200p
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HS200	650p
HS337, HS347	1500p
HSE12, HSE22, MX1	2200p
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NV8050, NV8051	2800p
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AG6340	2400p
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V110, V333	2000p
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V1305	2450p
V380	2300p
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MITSUBISHI
- HS200, HS300, HS301, HS302, HS303, HS304, HS310, HS320, HS330, HS700 — 200p
- HS306, HS307, HS318, HS319, HS337, HS338, HS347, HS349, HS400, HS410, HS411, HS412, HS421, HS710, HSB10, 20, 30, HSE10, 20, 30, 70 — 200p
- HSE11, HSE12, HSE21, HSE22, HSE31, HSE32, HSE41, HSE51, HSE52 — 200p

NATIONAL PANASONIC
- NV100, 180, 300, 332, 333, 340, 366, 600, 688, 777, 788, 3321, AG6010, 6015, 6100, 6200, 6400, 6800 — 200p
- NV230, 250, 260, 280, 370, 380, 430, 431, 433, 450, 460, 465, 470, 480, 630, 650, 730, 770, 780, 810, 830, 850, 870, 890, 2000, 2010, 3000, 7000, 7200, 7800, 8050, 8150, 8200, 8300, 8400, 8600, 8610, 8620, NVG14, NVG7, 10, 12, 15, 18, 30, 130, 400, AG1000, 1050, 1200, 1500, 2100, 2200, 6810, NVH70 — 200p
- NVG9, NVG120 — 200p
- AG6840, NVH65, 75, NVJ30, NVL20, 23, 25, 28, NVG300, NVF65, NVF70, NVFS1, NVFS100, NVG19, 20, 25, 33, 40, 50 — 200p
- NVD48, NVD80, NVG21, NVG45 — 200p

N.E.C.
- N830, 831, 832, 833, 895 — 200p
- PVC2300, 2400, 740, 744, 746, 760, 764, 766 — 200p
- DX1000, 1600, 2000, 3000, N9012, 9013, 9014, 9018, 9033, 9034, N9053, 9054, 9055, 9066, 9110, 9120, 9510, 9520, 9530, 9610 — 200p

ORION
- VH1, VH2 — 200p
- VC150, 180, VH3, 33, 200, 201, 205, 212, 250, 254, 288, 300, 303, 312, VH404, 555, 700, 704, 712, 770, 780, 844, 900, 1000, 2948, 3030, 3312, VHF2A, VP2948 — 200p
- COMBI15000, 16000, HV03, LVH50, NEVH, NEVHM, NEVHML, TVP230RC, VCP, VH04, 30, 103, 300, 358, 360, 362, 400, 416, 512, VH530, 532, 535, 536, 600, 630, 635, 640, 666, 730, 735, 744, 774, 790, 800, 820, 850, 888, 893, 900, 930, 940, 942, 974, 1012, 1040, 1050, 1060, 1070, 1100, 1120, 1204, 1440, 1500, 1660, 1800, 2004, 2151, 2308, 2204, 2400, 2500, 2600, 2700, 2960, 2970, 3050, 3060, 4000, 4008, 4010, 4012, 4015, 4020, 4300, 5020, VP10, 200, 220, 225, 245, VR821, 925, 1032, 2949, 2959, 2957, 2966, 2979, 2980, VTV300, VXL20, 25, 30 — 200p

PHILIPS
- VR6460, VR6920 — 200p
- VR2020, VR2021, VR2022, VR2023, VR2024 — 200p
- VR6711 — 200p
- VR6540 — 200p
- DV856, 586, VR702, 703, 6485, 6589, 6785, 6880, 6948 — 200p
- VR445, VR6442, VR6542, VR6843, VR6943 — 200p
- DV464, VR2220, 2300, 2324, 2330, 2334, 2340, 2350, 2414, 2480, VR2485, 2486, 2489, 2490, 2498, 2840, 6462, 6463, 6464, 6560, 6660, 6860, 6861, 6862, 6863 — 200p
- N-1700, VR2870 — 200p
- VR2025, VR6580 — 200p
- VR6548, VR6648 — 200p
- PRESSURE ROLLER ASSEMBLY PS403-40205, DV186, 190, 286, 291, 292, 486, 471, 562, 582, 571, 761, VR201, 202, 203, 302, 303, 305, 6180, 6182, 6185, 6285, 6290, 6291, 6293, 6362, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, 6676, 6760, 6761, 6762, 6870, 6970, 6975, 86B1, 63SB7, 68SB4, 71SB4, 72SB8, 92SB31 — 450p

SANYO
- VHR1100, 1150, 1200, 1300, 1500, 2100, 2300, 2500, 2700 — 200p
- VTC5000, 6150, 5300, 5350, 5400, 5500, 6000, 6500, 9100, 9300, VTCM10, 20, 11, 21, 31, 50, VPR5800 — 200p
- VHR3100, 3300, 3310, 3400, 3700, 3800, VHRD500, 700 — 200p
- VTC3000 — 200p
- VHR4100, 4150, 4200, 4300, 4350, 4770, 5100, 5200, 5300, 5350, 5700, 7100, 7200, 7500, 7530, 7540, 7800, 8100, 8200, 8250, 8500, VHRD4400, 4410, 4500. 4600, 4610, 4710, 4890, 6700, VHRS700 — 200p
- VCR100 — 200p

SHARP
- VC200, 381, 384, 385, 386, 388, 390, 393, 800, 2300, 3300, 6000, 6200, 7300, 7700, 7750, 8300, 9100, 9300, 9500 — 200p
- VC300, 387, 402, 471, 473, 477, 481, 482, 483, 486, 488, 496, 500, 571, 573, 581, 582, 583, 584, 585, 8481, VC5F3, VC5W20E, VCA1031 — 200p
- VC600, 651, 681, 682, 684, 685, 693, 699, 700, 772, 760, 779, 780, 781, 782, VC782MK2, 783, 785, 786, 787, 793, 800, 7810, 7822, VCT72, VC6F3, VC6V3, VCA100, 102, 104, 131, 140, 170, 202, 203, 211, 234, VCA303, 501, 602, 5011, VCD801, 802, 851, 852, 881, 882, VCM73, VCT73 — 200p
- VC220 — 200p
- VCA10, 30G, 60, 103, 105, 106, 211, 244, 505, 605, 615, 1031, VCD806, 810, 815, VCH80, 865, 910, VCS1000, VCT310, 410, 610, VCT1314, 5313 — 200p

SAISHO
- VHL3, VR1000, VR2000, VR2500, VR3800 — 200p

SALORA
- SV6500, SC6600 — 200p
- SV7300, SV8200, SV8300, SV9200, SC9300 — 200p
- SV7400, 8400, 8420, 8500, 8520, 8550, 8600, 8620, 8700, 8710, 8720, 8800, 8830, 9500, 9600, 9810 — 200p
- SV8000, SV8100 — 200p
- SV601, SV800, SV900, SV901, SV6910, SV9800, SV9900 — 200p
- SV6700, SV8710, SV8750, SV9700 — 200p
- SV6800, 6900, 8820, 8850, 8870, 8910, 8920, 8970 — 200p

SAMSUNG
- SV716, 717, VB510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 900, SV910, VI610, 520, 611, 616, 621, 626, 900, 910, VX510, 520, 616, 617, 619, 626, 627, 629 — 200p
- SVX301, 303, 305, 307, 319, 322, VB710, 770, 971, 8220, 8225, V1730, 1790, 18220, 18225, VX710, 712, 720, 730, 750, 770, 790, 825, 970, 971, 972, 8220 — 200p

SANSUI
- SVR5030 — 200p
- SVR7010 — 200p

SIEMEN
- FM350, FM352, FM355 — 200p
- FM361, FM362, FM363, FM364 — 200p
- FM391, FM392, FM394, FM461, FM462, FM464, FM468, FM561 — 200p
- FM484, FM485 — 200p
- FM585, FM602, FM604, FM622, FM624, FM627 — 200p
- FM600 — 200p
- FM204, 303, 304, 314, 325, 328, 374, 375, 376, 384, 386, 388, 404, 424, 428, 429, 488, 489 — 200p
- FM556, FM558, FM560, FM562, FM564, FM574, FM578 — 200p
- FM601, 603, 605, 607, 608, 617, 619, 620, 621, 623, 625, 626, 628, 630, 632, 634, 636, 638, 639 — 200p

SOLAVOX
- NCVR1000, NCVR5000 — 200p

SONY
- SLC5, 6, 7, SL3000, 8000, 8080, 8200, SLJ10, SLT6ME, SLT7ME — 200p
- SLC9, 20, 24, 30, 33, 44, SLHF100, SLF1, 11, 20, 25, 30, 60, 100, 200, SLF60PS, SLF90E, SLHF150, 850, SLK88, 95, SLT20ME, SLT30ME, SLT50ME — 200p
- BMC100, BMC200, BMC500 — 200p
- SLV201, 202, 301, 302, 401, 402, 801, 802 — 200p
- SLV210, 270, 273, 275, 300, 353, 373, 410, 415, 474, 656, 715, SLV757, 777 — 200p
- SLV256 — 200p

TELEFUNKEN
- A920, 930, 932, 835, 940, 960, 980, 990, 1200, VR925, 930, 940, 950, 971, 975, 980, 1920, 1925, 1930, 1940, 1950, 2920, 2925, 2930, 2931, 2935, 2941, 2960, 2970, 2671, 3935, 3945, 3950, 3965, 3975, 4935, 4940, 4942, 4945, 4970, 6000, 7921, 7926, 7929, 7931, 7932, 7970, 7971, 7979, 7980 — 200p
- VR1935, VR2915 — 200p
- VR1970, VR1980 — 200p
- VR400, 410, 440, 449, 450, 510, 519, 540, 549, 610, 640 — 200p
- VR520, 529, 530, 535, 539, 560, 620, 630, 650, 920 — 200p

THOMSON
- SV1000, TX8500, V320, 321, 323, 326, 342, 343, 351, 352, 353, 360, 364, 368, 410, 430, 450, 510, 520, 530, 540, 620, 630, 640, 4200, 4210, 4230, 4240, 4260, 4300, 4340, 4400, 5500, 5540, 6000, 8540 — 200p
- TX8000, V309, 316, 357, 309, 410, 411, 3801, 4100 — 200p
- V333, V340 — 200p
- VX300, 301, 302, 305, 306, 312, 3301 — 200p

TOSHIBA
- DV55, 57, 61, 63, 65, 66, 67, 71, 73, 74, 75, 77, 81, 83, 85, 86, 93, 94, 80, 90, 96, 97, 200, 202, 205, 207, 300, 309, 500, 509, 700 — 200p
- V5470, V5480 — 200p
- V108, V109, V199, V209, V609 — 200p
- PRESSURE ROLLER ASSEMBLY – PS403-40205, V91, V95 — 450p

VCR BELT KITS

AKAI
- VP7100, VS9300, VS9500, V9700, VS9800 — 120p
- VS1, VS2, VS4, VS5 — 100p
- VS10 — 65p
- VSX9, VS105, 112, 115, 116, 205, 220, 24, 244, 245, 247, 248, VS250, 512, 515, 516 — 300p
- VS22, VS23, VS25, VS35, VS37, VS38, VS53, VS55, VS66 — 100p
- VS4, VS6 — 150p
- VSA77 — 140p

AIWA
- AV66 — 125p
- AV77 — 140p
- G700 — 160p
- G900 — 180p

ALBA
- VCR40000 — 130p
- VCR5000, VCR6000 — 105p

AMSTRAD
- TVR123, VCR4600, VCR4700, VCR5200 — 140p
- VCR7000 — 80p
- VCR6000, 6100, 8600, 8602, 8603, 8604, 8700, 8704, 8714, 8800, 8804, 9000, 9340, DD8900, DD8904, TVR4 — 160p

AUTHENTIC
- N850 — 120p

BLAUPUNKT
- RTV100 — 200p
- RTV200, RTV222, RTV224 — 90p
- RTV202, RTX200 — 150p
- RTV322, RTV248 — 100p
- RTV306, 307, 309, 310, 311, 312, 328, 414, 434, 444, 707 — 135p
- RTV211, RTV214 — 140p
- RTV324, RTV325 — 65p
- RTV315, RTV316, RTV319, RTV320, RTV317 — 50p
- RTV301, RTV333, RTV338, RTV404, RTV424 — 85p

BONDSTEC
- BT100 — 110p
- BT300, BT310 — 170p
- BT350 — 140p
- BT50 — 150p

BOSCH-BAUER
- VRH50 — 100p
- VRH60 — 140p
- VRP20 — 180p

DAEWOOD
- VCR12, VCR32, VCR52 — 110p
- VCR30DAP — 150p
- VCR30DBD, VCR500BD, VCR50DFD, VCR50DFP — 170p

DECCA
- VR8300 — 90p
- VRH8945DK — 80p

DUAL
- VR4430 — 90p
- VR91, VR93, VR97 — 75p
- VR70, VR71, VR74, VR81, VR90 — 85p
- VR80 — 90p
- VR96 — 85p

FERGUSON
- 3292, 3V00, 3V01, 3V16, 3V22, 8900, 8901, 8904, 8906 — 135p
- 3V23, 8923, 8924, 8929 — 65p
- 3V29, 3V30, 8930, 8931, 8933, 8940 — 90p
- 3V31, 3V32, 8941, 8942 — 85p
- 3V35, 3V36, 3V38, 3V39, 3V49, 8943, 8944 — 85p
- 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948 — 65p
- 3V43, 3V44, 3V58, 3V65, 8950, 8951, FV10, FV11, FV12, FV13, FV14, FV20, FV21, FV22, FV26, FV32, CV141L — 80p
- FV31R — 125p

FIDELITY
- HQS200, VCR600, VCR6100 — 180p
- VCR100 — 160p
- VTR1000 — 100p

FINLUX
- VR2005, VR2010, VR2020, VR2025, VR2040 — 105p
- VR2008 — 160p
- VR3009 — 140p

FISHER
- VBS7000 — 245p
- VBS9000 — 120p
- FVHP520, FVHP530, FVHP420 — 60p
- FVHP615, 618, 620, 622, 710, 711, 720, 721, 722, 725, 730, 840 — 100p
- FVHP905, 906, 908, 910, 911, 915, 916, 918 — 100p
- VBR330, VBS7500, VBS7600, VBS9900 — 100p
- VBS3500 — 75p

FUJITSU
- HS760, HS750, VGX715, VGX720D — 160p

FUNAI
- V1, V25, VCR4600, 4800, 5200, 5400, 5600, 6400, 6600, VIP3000, VIP5000 — 160p
- VCR4530, 5840, 5843, 6800, 6803, 8007, 8103, VIP150, 6000 — 160p

G.E.C.
- 4005 — 100p
- V4004 — 100p

GOLDSTAR
- GHV1221, 1232, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 8210, 8215, VCP4100, VCP4130 — 80p
- GHV1290, 1291, 1295, 1296, VCP4000, 4200, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4320, 4321, 4325, 4326 — 120p

GRANADA
- VHSAH1, VHSAH3 — 100p
- VHSVH4, VHSWH1, VHSXH1 — 60p
- VHSYH2 — 50p
- VHSBH1, VHSCH1 — 150p
- VHSBP1 — 135p
- VHSAN3 — 110p
- VHSDS2 — 125p
- VHSAY3 — 125p
- VHSBY3 — 100p
- VHSEY1, VHSEY2 — 70p
- VHSCC1 — 100p
- VHSDP1, VHSFV2 — 80p
- VHFTJ1, VHSTJ2 — 150p
- VHSTJ3 — 65p
- VHSWJ1, VHSWJ2 — 120p
- VHSXJ3 — 85p
- VHSFJ2 — 140p
- VHSFS1, VHSFS2 — 130p
- VHSFG1, VHSFG4, VHSF63 — 180p

GRUNDIG
- MVS400, MVS440, VS400, 410, 440, 441, 450, 456, 460 — 55p
- VS180, 200, 220, 226, 262, 265, 267, 2X40800, 0850, 0880, 1600, 2000, 2080, 2200, 2280, MVS200RC — 90p
- VS150 — 160p
- VS310, VS315, VS320, VS326, VS340, VS345, VS380 — 85p

HINARI
- VXL2 — 80p
- VXL7, VXL8, VXL9, VXL10 — 180p
- VXL4, VXL35 — 70p
- VXL5, VXL6 — 160p
- VXL3, VXL20 — 90p

HITACHI
- VT11, 14, 17, 19, 33, 34, 35, 38, 39, 88, 165, 330 — 90p
- VT5000, VT5500 — 120p
- VT7000, VT8000, VT8300, VT8500 — 60p
- VT680, VT6500, VT6800, VT9300, VT9500, VT9700, VT9900 — 80p
- VT52, VT57, VT61, VT62, VT63, VT64, VT65, VT85, VT86, VT640 — 120p
- VT3000 — 120p
- VT100, 110, 111, 113, 115, 118, 120, 125, 128, 130, 135, 138, 145, 150, 168, 175, 220, 225, 250, 255, 258, 260, VTL30 — 130p

I.T.T.
- VR3605, VR3905, VR3935, VR3954, VR3985 — 90p
- VR3913, VR3914 — 70p
- VP3826, VR3906, VR3916, VR3926, VR3946, VR3948, VR3976, VR3986, VR3995, VR3997, VR6948 — 65p
- VR3927, VR3977 — 65p
- VR3993, VR3994 — 75p
- VR3963 — 65p
- VR3912 — 130p
- VR3917 — 150p
- VR3929, VR3968 — 85p
- VR3907 — 100p
- SVR3799, VR3520, 3701, 3719, 3720, 3721, 3730, 3731, 3749, 3759, 3761, 3781 — 90p
- VR3908 — 180p
- VR3918, VR3919, VR3958, VR3998 — 115p

J.V.C.
- HR3300, HR3330 HR3360, HR3660, HR4100 — 130p
- HR7200, HR7300 — 70p
- HR7350, HR7600, HR7610, HR7650, HR7655 — 75p
- HR7700 — 75p
- HRD110, HRD111, HRD120, HRD121, HRD225 — 90p
- HRD140, 150, 157, 158, 160, 250, 257, 455, 565, 566, 725, 755, HRP50 — 65p
- HRD170, 180, 210, 230, 300, 320, 321, 330, 337, 350, 370, 400, 430, 440, 441, 530, 700, 750, 950, HRS5000, 5500, 9000 — 65p

VCR BELT KITS / REPLACEMENT VIDEO LAMPS

VCR Belt Kits

Model	Price
HRD520, 600, 620, 637, 641, 650, 830	95p
HRD540, 550, 580, 660, 860, 960, HRS5800	130p
KENWOOD	
KV901	70p
KV903	90p
LOEWE	
OC11, OC40	95p
OC410, OC420, OC440, OC460	130p
OC50, OC55, OC60, OC65, OC70, OC75	120p
LOGIK	
VR955	180p
LUXOR	
9245, 9251	130p
9252	140p
9253	140p
9254	100p
9255	130p
9256	130p
9270, 9271, 9273, 9274	115p
9272, 9280	140p
9281, 9284, 9285, 9292, VR3701, 3721, 3731, 3761, 3781	95p
MATSUI	
VX850	75p
MITSUBISHI	
HS200	200p
HS300, 301, 302, 307, 310, 337, 338, 347, 349, 411, 412, 421, HSB10, 20, 30, HSE10, 20, 30, 70	150p
HS303, HS304, HS306, HS307, HS330, HS400, HS700	150p
HS318, HS319, HS410	130p
N.E.C.	
N830, N831, N832, N833	100p
N895	80p
PVC2300, PVC2400	180p
DX1000, 1600, 2000, 3000, N9012, 9013, 9014, 9016, 9033, 9034, 9053, 9054, 9055, 9066, 9110, 9120, 9510, 9520, 9530, 9610	95p
NATIONAL PANASONIC	
NV300, NV332, NV333, NV340, NV366	125p
NV777, NV788	100p
NV2000, NV2010, NV3000	130p
NV7000, NV7200, NV7800	95p
NV8600, NV8610, NV8620	145p
NV230, 250, 280, 430, 431, 433, 450, 460, 465, 470, 730, 770, 810, 870, 890, AG1000, 1050	125p
NV370, NV380, NV480, NV630, NV780, NV830, NV850	100p
NV600, NV688, AG6010, AG6015	110p
NVG7, 10, 12, 14, 15, 18, 30, 130, 400, NVH70	70p
NORDMENDE	
V100, V140	70p
V1000M, 1005M, 1205, 1215, 1235, 1245, 1305, 1403, 1405, V1500P, 1503, 1505K, 1805K, 2000D, 2405, 2500H, 3000H, V3405H, 3105, 4405H, 5000, 8005, 900, 905	65p
V1001, 1005, 1015, 1025, 1035, 1041, 1055, 1065, 1105, 3005, 304, 5005, 502, 503	80p
V101, V102, V103, V112, V141, V142, V301, V302	90p
V110, V333	110p
V1500T, V2000B, V2000P, V400H	95p
V250, V460, V9460, V20035542, V20035543	130p
V300, V303, V380	75p
V500	75p
ORION	
COMBI15000, 16000, NEVHM, TVP230RC, 900MVH1012, VH1030, 1040, 1060, 1070, 1100, 1120, 1440, 1500, 1660, 1800, 2150, 2308, 2400, 2500, 2600, 2700, 2960, 300, 358, 360, 362, 4010, 4015, 4016, 4020, 4300, 5010, 5015, 530, 535, 536, 630, 635, 640, 730, 735, VP220, 225, 245, VR1032, 2966, 2980, 821, 925, VXL25	30p
NEVHL, VCP, VH1204, 2004, 2204, 3050, 3060, 4008, 400, 4012, 412, 512, 600, 666, 744, 774, 7905, 800, 820, 900, 974, VP200, VR2949, 2956, 2957, VXL20	90p
VC150, 180, VH1000, 200, 201, 205, 212, 250, 254, 288, 300, 303, 3030, 312, 33, 3312, 404, 555, 700, 704, 708, 712, 770, 780, 844, 900, VHF2, VH3	80p
VH1, VH2A	150p
PHILIPS	
VR6460, VR6920	170p
VR6540	100
DV186, 286, 291, 292, 468, 471, 562, 571, 761, VR201, 202, VR20DV1, 20DV2, 20RW7, 25BO1, 25BO2, 302, 303, 305, VR30DV2, 35BO2, 35BO3, 635B7, 715B4, 715B5, 715B8, VR865B2, 915B2, 925B3, VR6180, 6185, 6285, 6290, 6291, 6293, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, 6676, 6760, VR68SB4, 86SB1, 92SB3	85p
VR6442, VR6542	70p
VR2025, VR2580	100p
VR445B9, BR445B920, VR445B922, BR6843	100p
VR6548, VR6648, VR49SB620, VR644869S	110p
SABA	
VR6420, 6435, 6440, 6460, 6480, 6620, 6770, 7200, 8420, 2A10, 70, 2B20, 3B20, 4A10, 4B20, 6A10, 6A70, 6B20, 8B20	65p
VR6004, 6005, 6011, 6014, 7004, 7011, 7014, 8011, 8014, BERLIN	90p
VR2000, VR6000, VR6012, VR7000, VR7720, PVR6068	130p
VR5005, VHR7000	135p
VR6006, 6007, 6008, 6009, 6015, 9016, 9018, 6038, 7006, 7007, 7016, 7018, 9006	65p

Model	Price
VR6010, VR9010	70p
VR6020, VR6022, VR6023, VR6028, VR7730	75p
VR6024	75p
VR6520, VR6540, VR6560	90p
VR6710, VR6720, VR6735, VR8720	130p
VR6720, VR6730, VR6760, VR6775, VR6780	160p
SAISHO	
VR2000, VHL3	90p
VR3800	75p
SALORA	
SV6500	100p
SV6600	150p
SV8000	120p
SV8100	60p
SV8500, SV8520, SV9500	150p
SV7400, SV8400, SV8420, SV8550	120p
SV6700, SV8710, SV8750, SV9700	120p
SV6800, 6900, 8810, 8820, 8870, 8910, 8920, 8970	95p
SV8600, 8620, 8700, 8720, 8830, 9600, 9810	130p
SAMSUNG	
SV716, 717, V1616, V1621, V1626, VX616, VX617, VX619, VX626, VX627, VX629	85p
VB520, 510, 610, 616, 617, 619, 620, 626, 627, 629, VI510, 520, 611, 616, 621, 626, VX510, 520	100
VB900, VB910, V1900, V1910	110
PX980, 981, 982, SE9001, SV9001, SVX307, 319, 322, VB770, 8220, 8225, V1770, 790, 8220, 8225, VK8220, VPX31, VX750, VX790, 8220, 8225	135p
SVX301, 303, 305, SX7301, VB710, 971, V1730, 710, VX712, VX720, 730, 970, 971, 972	230p
VX9880	110p
SANYO	
VTC5000, 5150, 6000, 6500, VTCM10, 11, 20, 21, 30, 31, 50	75p
VTC5300, VTC5350, VTC5400, VPR5800	100p
VTC5500	95p
VTC9100, VTC9300	220p
VTC1100, 1300, 1500, 1100, 1150, 1200, 1300, 1500	90p
VHR2100, VHR2300, VHR2500, VHR2700	150p
VHR3100, 3300, 3310, 3400, 3700, 3800, VHRD500, 700	110p
VHR4100, 4150, 4200, 4300, 4350, 4770, 5100, 5200, 5300, 5350, 5700, 7100, 7200, 7500, 7530, 7540, 7800, 7810, 8100, 8200, 8250, 8500, VHRD4400, 4410, 4500, 4600, 4610, 4710, 4890, 6700	90p
SHARP	
VC200, 384, 385, 386, 388, 390, 9300, 9500, 9700	100p
VC7300, VC7700, VC7750, VC7800, VC8000	150p
VC8300	150p
VC300, 387, 471, 473, 481, 482, 483, 486, 488, 496, 8481	80p
VC402, 500, 571, 573, 581, 582, 583, 584, 585, VCSF3	80p
VC600, 651, 682, 684, 685, 693, 783, VC6F3, VC6V3	70
VC772, 779, 781, 782, 785, 786, 793, 800, 7810, 7822, VCA100, VCA102, 104, 131, 140, 170, 202, 203, 234, 501, 602, 5011, VCD806, 810, 815, VCH80, 865, 910, VC51000, VCT310, 410, VCT1314, VCTS312	115p
SIEMENS	
FM350, FM352, FM355	60p
FM484, FM485	55p
FM391, FM392, FM394, FM462	100p
FM461, FM464, FM468, FM561	150p
FM361, FM362, FM363, FM364	120p
SONY	
SLC6, SLJ10, SLT6ME	140p
SLC5, SLC7, SLJ7, SLJ9	140p
SLC9, SL8000, SL8080, SLT50	165p
SL8000E, SL8080E, SL8200, SL8600	175p
SLV255	95p
TELEFUNKEN	
VR400, VR410, VR440, VR449	130p
VR450, VR540, VR549, VR640	70p
VR520, VR529, VR620, VR920	70p
VR530, VR535, VR539, VR550, VR630, VR650	75p
A940, VR1925, 1930, 1940, 1950, 2960, 925, 930, 940, 950	90p
A920, VR1970, 1980, 2920, 2925, 2930, 2970, 7921, 7926, 7931, 7970, 7971, 7980, 970, 7981, 975, 980	65p
A1200, 930, 932, 935, 960, 980, 990, VR2931, 2935, 2941, 2971, 3935, 3945, 3950, 3965, 3975, 4935, 4940, 4942, 4945, 496, 5VR4970, 6000, 7932, 7959, 7979	65p
VR1935	100p
VR2915	90p
THOMSON	
SV1000, V410, 430, 450, 510, 520, 530, 540, 620, 630, 640, 4240, SV5540	65p
TX8000, V309, V357, VK411	75p
TX8500, V342, 343, 351, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, 5500, 6000, 8564	90p
V320, V321, V323, V326, V4200, V4300	90p
V333	100p
V340	90p
V4100, VK308, VK309, VK410	120p
VK300, VK301, VK302, VK303, VK305, VK3301	135p
VK312	65p
TOSHIBA	
V55, V57	85p
V33, V31, V51, V53, V9600, V9680	85p
V61, V63, V65, V66, V67	150p
DV80B, DV80D, V71, 73, 74, 75, 81, 83, 85, 86	120p
V108, V109, V199, V209, V609	120p
V91G, V95G	115p

Replacement Video Lamps

Models & Description	Order Code	Price
UNIVERSAL VIDEO LAMP 9V 80mV (310mm WIRES)	VL01	25p
PANASONIC VIDEO LAMPS	VL02	35p
SHARP VIDEO LAMPS	VL02	35p
HITACHI 5381682 (VT63, VT64) VIDEO LAMPS	VL04	135p
AIWA, AKAI, ALBA, AMSTRAD, BLAUPUNKT, FERGUSON, FIDELITY, FISHER, FUJITSU, FUNAI, G.E.C., GOLDSTAR, GRANADA, GRUNDIG, HINARI, HITACHI, ITT, JVC (HRD SERIES), MATSUI, MITSUBISHI, NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA, SAMSUNG, SANYO, SHARP, SIEMEN, SONY, TELEFUNKEN, THOMSON, TOSHIBA	VL05	150p
AKAI, GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 8912, 8922, 8925)	VL01	25p
BLAUPUNKT, ORION (VH1, 2A), NATIONAL (NV200, 2010, 3000, 7000, 8150, 8200, 8400, 8600, 8610, 8620), SHARP (VC2300, 6000, 6200, 6300, 7300, 7700, 8000, 8300)	VL02	40p
AKAI (VS10), GRANADA (VHSXJ3), ITT (VR3993, 3994), JVC (HR2650, 7600, 7610, 7650, 7655), TELEFUNKEN (VR530, 535, 539, 550, 630, 650), THOMSON (V309, 316, 357, VK309, 411, TX8000), FERGUSON (3V31, 8941, 8942)	VL06	40p
AUTHENTIC (N850), DECCA (VR8300), GRANADA (VHSTJ3, WJ1, WJ3), ITT (VR3913, 3914, 3963), JVC (HT7200, 7300, 7350, 7700), TELEFUNKEN (VR450, 520, 529, 540, 549, 620, 640, 920, 1920), THOMSON (V4100, VK308, 309, 312, 410), FERGUSON (3V23, 29, 30, 8923, 8924, 8929, 8930, 8931, 8940)	VL07	40p
GRANADA (VHSAY3), SHARP (VC200, 381, 384, 385, 386, 388, 390, 9300, 9500, 9700)	VL08	60p

PANASONIC MODE SWITCHES

NV2000, 2010, 7000, 7200, 7800 (VSS0048)	£3.50
NV230, 260, 430, 810, 870, 2300, 4300 (VSS0110)	£2.25
NV830 (VSS0091)	£2.10
NV300, 333, 340, 366, 688, 777, 778 (VSS0060)	£3.75
NVG21, 25, NVH65, NVD80 (VSS0175A)	£2.00

ON/OFF MAIN SWITCHES

GRUNDIG
PART NO: 29703, 29102
USED ON: C7500, C7500TT, C8500, C8502, C8712, C8714, C8894, M68-190/99, M70-195, P40-345, ST66-1602, T55-340, V7722
PRICE: £3.00

ITT
PART NO: 13/1074
USED ON: CP0200, 0211F, 0323, 0323/1, 0341/14, 0345F, 0351/1, 0361, 0361/1, 9350, CT0500, 0500/1/T, 0500T
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PART NO: LFC 005
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MATSUI/SAISHO
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PHILIPS
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SONY
PART NO: (POWER SWITCH + REMOTE SWITCH)
USED ON: KV1612 MK1, KV1612 MK2, KV1614, KV2052, KV2056, KV2062, KV2068, KV2212, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV2752PE3, KX20PS1, KX20PS2, KX27PS1
PRICE: £3.50
PART NO: (POWER SWITCH + REMOTE SWITCH)
USED ON: KV2022, KV2024
PRICE: £3.25
PART NO: (POWER SWITCH)
USED ON: KV1810 MK1, KV1810 MK2, KV1820, KV1822, KV2000 MK1
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PART NO: (POWER SWITCH 26mm)
USED ON: KV1400, KV1440, KV2040, KV2060
PRICE: £2.00
PART NO: (POWER SWITCH 21mm + REMOTE SWITCH)
USED ON: KV2020
PRICE: £2.50
PART NO: 2 PIN (FUNCTION SWITCH)
USED ON: KV1612 MK1, KV1612 MK2, KV2052, KV2056, KV2212, KV2215, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV275PE3, KV2756PE3
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USED ON: VARIOUS
PRICE: £0.50

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	MZ366960J2	IT02
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HITACHI	6861471	IT03
	6861482	IT04
	6886971	IT05
JVC/ FERGUSON	PU 48967B	IT06
	PU 51380	IT07
	PU 51402A	IT08
	PU 55373	IT09
	PU 55374	IT10
NATIONAL PANASONIC	VXP 0329	IT11
	VXP 0343	IT12
	VXP 0344	IT13
	VXP 0401	IT14
	VXP 0433	IT15
	VXP 0463	IT16
	VXP 0521	IT17
	VXP 0581	IT18
SANYO	1430662T15620	IT19
SHARP	NIDL005GEZZ	IT20
	NIDL0006GEZZ	IT21
	NPLY0107GEZZ	IT22

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AMSTRAD

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FERGUSON & JVC

3V42/43
HRD455/HRD725

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

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

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

3V31/3V42
HR7600/7610/7650/7655

Contents	*Economy Kit Contents*
BELT SET. T/U REEL TABLE TYRE. PINCH ROLLER. REEL IDERL. T/U CLUTCH. T/U IDLER. TENSION BAND. VIDEO LAMP	BELT SET. T/U REEL TABLE TYRE. PINCH ROLLER. REEL IDLER TYRE. T/U IDERL TYRE. T/U CLUTCH
Order Code: SK33 £12.00	**Order Code: SK34** £5.50

3V35/36/38/39/49
HRD110/111/120/121/225

Contents	*Economy Kit Contents*
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER. REEL IDLER. TENSION BAND	BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER TYRE. REEL IDLER TYRE
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3V29/3V30
HR7200/7300/7350

Contents	*Economy Kit Contents*
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLER. T/U CLUTCH. T/U IDLER. TENSION BAND. VIDEO LAMP	BELT SET. T/U REEL IDLER TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLE TYRE. T/U IDLER TYRE. T/U CLUTCH
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3V44/45/48/53/54/55/57
HRP50/HRD140/150/158/160
HRD250/257/565/566/755

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. CLUTCH MECHANISM. TENSION BAND	BELT SET. PINCH ROLLER
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FISHER

FVHP905/906/907/908/910/911/916/918

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FVHP615/618/620/622/710/711/715/716/720/721/722/725/
730/830/840

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. IDLER. GEAR IDLER UNIT. TENSION BAND	BELT SET. PINCH ROLLER. IDLER TYRE
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HITACHI

VT11/VT33
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VIDEO SERVICE KITS *(Cont.)*

VT11/VT33

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VT52/61/62/63/64/65/85/86/640

Contents	*Economy Kit Contents*
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Order Code: SK49 £14.00	**Order Code: SK50** £3.25

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

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

PANASONIC

NV2000/NV2010	NV7000/NV7200/NV7800
Contents	*Contents*
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES	BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES
Order Code: SK03 £6.25	**Order Code: SK02** £5.50

NV300/NV330/NV333/NV340/NV366
Contents
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRE
Order Code: SK01 £5.50

NV2000/NV2010

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. FF IDLER. PLAY IDLER. TENSION BAND. VIDEO LAMP	BELT SET. PINCH ROLLER. IDLER TYRE. PULLEY TYRE
Order Code: SK13 £8.00	**Order Code: SK14** £4.50

NV7000/NV7200/NV7800

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. IDLER UNIT. PLAY IDLER. TENSION BAND	BELT SET. PINCH ROLLER. IDLER TYRE. CLUTCH TYRE
Order Code: SK11 £8.50	**Order Code: SK12** £4.20

NV300/NV330/NV333/NV340/NV366

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. IDLER UNIT. PLAY IDLER. TENSION BAND	BELT SET. PINCH ROLLER. IDLER TYRE. PLAY IDLER TYRE
Order Code: SK15 £7.50	**Order Code: SK16** £4.00

NVG7/NVG9/VNG10/NVG11/NVG12/NVG14/NVG15/NVG16/
NVG18/NVG30/NVG120/NVG130/NVG400/NVH65 (PX/ACY/
AG1810 (P/K)

Contents	*Economy Kit Contents*
LOADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER. TENSION BAND	LOADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER TYRE
Order Code: SK27 £8.00	**Order Code: SK28** £4.00

NV332

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

NV230/250/260/280/430/450/460/470/650/810/890/
AG1200PK/AG1500PK

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. IDLER. TENSION BAND	BELT SET. PINCH ROLLER. IDLER TYRE
Order Code: SK23 £6.00	**Order Code: SK24** £3.50

NV600/NV688

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. PLAY IDLER. FF/REW IDLER. TENSION BAND	BELT SET. PINCH ROLLER. PLAY IDLER TYRE. FF/REW IDLER TYRE
Order Code: SK25 £12.00	**Order Code: SK26** £6.00

NV730/NV770

Contents	*Economy Kit Contents*
SLOT IN BELT. LOADING BELT. PINCH ROLLER. IDLER UNIT. TENSION BAND	SLOT IN BELT. LOADING BELT. PINCH ROLLER. IDLER TYRE
Order Code: SK19 £6.50	**Order Code: SK20** £4.00

NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. IDLER. TENSION BAND	BELT SET. PINCH ROLLER. IDLER TYRE
Order Code: SK21 £6.00	**Order Code: SK22** £3.00

NV777/NV788

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. IDLER UNIT. TENSION BAND	BELT SET. PINCH ROLLER. IDLER TYRE
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VIDEO SERVICE KITS *(Cont.)*

SHARP

VC381

Contents	*Economy Kit Contents*
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VC500/VC571/VC581/VC582/VC583/VC584/VC5F3

Contents	*Economy Kit Contents*
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VC781/VC7810/VC7822/VC785/VC786/VC793/VC800/
VCA100/VCA102/VCA104/VCA202

Contents	*Economy Kit Contents*
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Order Code: SK64 £13.50	**Order Code: SK65** £6.25

VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700

Contents	*Economy Kit Contents*
BELT SET. PINCH ROLLER. REEL DRIVE UNIT. TENSION BAND	BELT SET. PINCH ROLLER. REEL DRIVE UNIT TYRE
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Replaces Philips Part No's: 138-10229, 2.4V – 90mAh	180p

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FE TX90 WHITE	1650p	LOT06
ITT D307/37 EQ	1600p	LOT07
BLAUPUNKT 210	1600p	LOT08
GRUNDIG 2922010	1600p	LOT09
ITT CVC800/1/3	1500p	LOT10
ITTD218/37 EQ	1600p	LOT11
NORMENDE 5255	1600p	LOT12
SABA 81000 200	1600p	LOT13
SALORA T236 EQ	1650p	LOT14
SABA 811-50-24	1600p	LOT15
SABA 770223500	1600p	LOT16
TELEFUNKEN AT1	1450p	LOT17
TELEFUNKEN EQ	1400p	LOT18
SALORA FM0218B	1600p	LOT19
NORMENDE 5255	1600p	LOT20
ITT CVC 1150/1	1500p	LOT21
ITT COMPACT 80	1500p	LOT22
FE TX100 GREEN	1450p	LOT23
HINARI CT4/5 5113	1500p	LOT24
SELECO 6320410	1600p	LOT25
BLAUPUNKT 8667	1600p	LOT26
ITT COMPACT B1	1450p	LOT27
ITT CT3326 MUL	1500p	LOT28
ITT D066/37 EQ	1600p	LOT29
ITT 3546 EQ	1500p	LOT30
LUXOR 5810110	1600p	LOT31
SABA 849380920	1600p	LOT32
HITACHI 2434141 CP	1450p	LOT33
FE TX100 110 D	1700p	LOT34
HANTAREX 28021	1600p	LOT35
SHARP C3700 EQ	1600p	LOT36
HITACHI 2432981 CP	1500p	LOT37
FERGUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cm Used On: 51K2, 51J8, 51J7, 41H3, 41H3, 41H2, 51K3	1650p	LOT38
PANASONIC TLF14567F Used On: TC2043, TC2243, TX300	1850p	LOT39
PANASONIC TLF14568F Used On: TX2231, TX2244	1850p	LOT40
PANASONIC TLF14584F Used On: TC2210, TC2160, TX1752, TX2112 TX2112, TX2162, TXC22	2350p	LOT41
PANASONIC TLF14586F TC1651, TC2051, TC2061, TC2253, TC2263, TX5500	2350p	LOT42
HINARI Used On: CT15	1600p	LOT43
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VS1-2, VS4-5, VS15	T-UP IDLER	BV327815	500p
VS3, 6, 12, 59, 59			
V9700	IDLER	BV321979	600p
VS125, 126, 155,	IDLER ASSY	MZ366960J2	900p
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VS22, 38, 105, 112, 115, 116, 206, 220			
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VP7100, VS9300	UNLOADING	PU46381	£4.00
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VP7100, VS9300	REW IDLER	PU46380	500p
VS9500, VS9800			
VP88	IDLER	BV336067	£5.00
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VS15, 58			
VS23, 35, 37, 53, 55	CLUTCH	ML373043	1100p
VS66, 75, VSA77			
VS9700	FF IDLER	BV321761	£3.20
VS9700	REW IDLER	W321762	£4.25
AMSTRAD			
VCR7000	IDLER	150280	£1.50
TVR1, VCR4500	CLUTCH	150873	£3.75
VCR4600, VC5200, VCR9000			
TVR1, VCR4500	GEAR HOLDER	151284	£3.50
VCR4600, VCR5200, VCR9000			
TVR1, VCR4600	REF CLUTCH		£3.50
VCR5200			
VCR6000, VCR6100	CLUTCH	153202	£3.80
VCR4500, VCR9000	CLUTCH		£4.00
VCR4500, VCR4600	MOD KIT	(TAPE CREASING)	300p
VCR4700			
MOD KIT TAPE CREASING FOR AMSTRAD			
VCR4500, 4600, 4700			£3.00
FERGUSON			
3V00, 3V01, 3V16	T-UP IDLER	PU47752	£4.50
3V22, 3292, 8900, 8901, 8904, 9806			
3V16, 3V22	T-UP IDLER	PU49280	£5.50
8903, 8909, 8912, 8922			
3V23, 3V29 3V30,	REEL IDLER	PU48967	175p
3V31, 3V32, 3V35, 8923, 8924, 8929, 8930, 8931, 8940, 8941, 8942			
3V23, 3V31	ROLLER ASSY	PU49042A	350p
3V29, 3V30, 3V31	T-UP IDLER	51402	100p
3V32, 3V35, 3V36, 3V38, 3V39, 3V49, 8930 8931, 8940, 8941, 8942			
3V29, 3V30, 3V31	T-UP CLUTCH	PU51380	200p
3V32, 8930, 8931, 8940, 8941, 8942			
3V35, 3V36, 3V38	REEL IDLER	PU55374	200p
3V39, 3V49, 8943, 8944			
3V35, 3V36, 3V38	T-UP CLUTCH	PU55373	150p
3V39, 3V49, 8943, 8944			
3V58, 3V59, 3V64	IDLER ARM	PU58645	£2.25
3V65, FV10, FV11, FV12 FV13, FV14, FV20, FV21, FV22, FV26			
FV30, FV32, FV33, 8950, VC141L			
3V42, 3V43	CLUTCH ASSY	PU55822	1200p
3V43, 3V44, 3V45	CLUTCH ASSY	PU57658	1050p
3V48, 3V53, 3V54, 3V55, 3V57, 8947, 8948			
3V42, 3V43, 3V44	T-UP CLUTCH	PU56043-1-4	240p
3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948			
3V42, 3V43, 3V44	SUPPORT CLUTCH	PU56044-1-5	160p
3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948			
3V00, 3V01, 3V16	LOADING IDLER	PU43681	£4.00
3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909			
8912, 8922			
3V00, 3V01, 3V16	REW IDLER	PU46380	500p
3292, 8900, 8901, 8904, 8906			
3V16, 3V22, 8902	IDLER	PU49281	£1.70
8909, 8912, 8922			
FISHER			
FVHP420, 520, 530	FF-REW PULLEY	HI638531	80p
FVHP615, 618, 620	COMP. IDLER ASSY	FI1430420400300	£220p
FVHP622, 710, 711, FVHP720, 721, 722, FVHP725, 730, 830			
FVHP840,905, 906, FVHP908, 910, 911, FVHP915, 916, 918			
FVHP615, 618, 620	GEAR IDLER ASSY	FI1430490400900	380p
FVHP622, 710, 711, FVHP720, 721, 722			
FVHP725, 730, 830, FVHP840			
FVHP615, 618, 620	REEL T-UP ASSY	FI1430410400900	£5.50
FVHP662, 710, 711, FVHP720, 721, 722			
FVHP725, 730, 830, FVHP840			
FVHP905, 906, 908,	GEAR IDLER ASSY	FI1430490402400	275p
FVHP910, 911, 915, FVHP916, 918			
FVHP975, 980, 990,	IDLER	FI1430420400700	300p
FVHP999, 5000, 5005			
FVHP5050, 5075, 5100			
FVHD40, 55, 140	REEL DRIVE ROLLER		£6.00
FVHP1, 10, 20			
FVHP975, 980, 990	CLUTCH	F12430510404200	£9.50
FVHP420, 520, 530	IDLER		£2.80
FVHP420, 520, 530	TAKE UP IDLER		290p
FVHP990	LOADING GEAR		90p
VBS3500	REEL DRIVE PULLEY		£3.20
VBS3500	IDLER		250p
VBS7000	REW IDLER		95p
GOLDSTAR			
GHV1221, 1232, 1240	CLUTCH GEAR	435038A	£2.50
GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000,			
GHV8200, 8210, 8215, GHVP51, VCP4100, 4130			
GHV1221, 1232, 1240	IDLER		110p
GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000,			
GHV8200, 8210, 8215, GHVP51, VCP4100, 4130			
HINARI			
VXL3, VXL20	REEL IDLER	40000009	110p
VXL2	IDLER		110p
VXL4, VXL35	IDLER		£2.75
VXL4, VXL35	CLUTCH		£6.50
VXL4, VXL12, VXL25	LIMITER POST		£1.30
VXL30, VXL35, VTV300			
VXL5, VXL6	CLUTCH		£3.75
VXL5, VXL6	GEAR HOLDER		£3.50
VXL7, VXL8, VXL9	CLUTCH		£3.80
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VT11-33, VT63-64	CLUTCH ASSY	6879515	£7.50
VT14, 17, 19, 38, 57, 86, 88, 34, 35, 39, 52, 61			
62, 65, 85, 330, 640, VT16S			
VT120-220, 100, 110	CLUTCH ASSY	6886824	£7.50
111, 113, 115, 118, 200		6886972	
125, 128, 130, 135, 138, 145, 150, 175, 225, 250			
255, 258, 260, VTL30			
VT8000 8300, 7000	FF-REW IDLER	6413663	£2.80
VT8500-8700			
VT8000-8300, 7000	PLAY IDLER	6414221	290p
VT8500-8700			
VT8000 8300, 7000	FF-REW PULLEY	6383531	80p
VT8500-8700			
VT9300 9500, 6500	FF-REW IDLER	8681471	250p
VT680, 6800, 9700, 9900			
VT9300-9500, 6500	PLAY IDLER	6861482	230p
VT680, 6800, 9700		6861481	
VT 9900			
VT9300-9500, 9700	IDLER	681505	230p
VT9900, 6500, 680, 6800	IDLER	687043	£3.80
VT11-33, VT63-64	FF-REW IDLER	6886971	125p
VT14, 16S, 17, 19, 34, VT35, 38, 39, 52, 61, 62			
VT65, 85, 86, 88, 330, 640			
VT1000, 110, 111, 113	FF-REW ARM	6886792	240p
VT115, 118, 119, 120, 125, 128, 130, 135, 138, 145, 150			
VT175, 220, 225, 250, 255, 258, 260, VTL30			
VT400, 405, 410, 413	FF-REW ARM	6897094	£1.30
VT414, 415, 418, 420, 425, 426, 428, 430, 4[illegible], 435			
VT438, 450, 498, 510, 518, 520, 525, 526, 53[illegible], 535			
VT536, 540, 545, 546, 548, 570, 575, 576, 580, 585			
VT588, VTM625, 626, 630, 635, 636, 640, 645, 646, VTS80, 85			
VT400, 405, 410, 413	CLUTCH BASE	6896951	£3.25
VT414, 415, 418, 420, 425, 426, 428, 430, 431, 435			
VT438, 450, 498, 510, 518, 520, 525, 526, 530, 535			
VT536, 540, 545, 546, 548, 570, 575, 576, 580, 585			
VT588, VTM625, 626, 630, 635, 636, 640, 645, 646, VTS80, 85			
VT3000	T-UP IDLER (LARGE)		£4.50
VT3000	REW IDLER		£6.00
VT680, 6500, 6800	FS-BRAKE	6861505	230p
VT9700, 9900			
HITACHI TV			
OUTPUT MUDULE HM 6251			£5.50
OUTPUT MODULE HM 6232			£8
JVC			
HR330, 3660, 4100	T-UP IDLER SML	PU49280	£5.50
HR7200, 7600, 7650	T-UP CLUTCH	PU53462A	220p
HR7655, 7300, 7350, 7610			
HR7200, 7300, 7350	REEL IDLER	PU48967	175p
HR7600, 7610, 7650, 7655, 7700			
HR7600, 7610, 7650	ROLLER ASSY	PU49042A	350p
HR7655, 7700			
HR3300, 3660, 4100	T-UP IDLER LRG	PU47752	£4.50
HR7200, 7600, 7650	T-UP IDLER	PU51402A	100p
HR7655, HRD110, HRD111, HR7300, 7350, 7610, HRD120-121, 225			
HRD110, HRD120 121,	T-UP CLUTCH	PU55373	150p
HRD225, HRD111,			
HRD110, HRD120-121,	IDLER ARM	PU55374-3-8	200p
HRD225, HRD111			
HRD170, 180, 210, 230	IDLER ARM	PU58465	£2.25
HRD320, 370, 400, 430, 470, 530, 700, 750, 950, 3000			
HRS5000, HRS5500			
HRD455, HRD725	CLUTCH MECH	PU558822	1200p
HRD140, 150, 157, 158	CLUTCH MECH	PU57658	1050p
HRD160, 250, 257, 565, 566, 755, HRP50			
HR3300, HR3330	REW IDLER	PU46380	500p
HR3660, HR4100			
HRD140, 150, 157, 158	TAKE UP CLUTCH	PU56043-1-4	240p
HRD160, 250, 257, 455, 565, 566, 725, 755, HRP50			
HRD140, 150, 157, 158	TAKE UP CLUTCH	PU56044-1-5	160p
HRD160, 250, 257, 455, 565, 566, 725, 755, HPR50			
MATSUI			
VX730, 735, 750, 755.	CLUTCH	850A00005	420p
VX810, 820, 850, 880, 990			
VX730, 735, 750, 755	LIMITED POST LEVER		£1.30
VX770, 800, 810, 880	ASSY		
VX990			
VX800A, VX900	IDLER REEL		£1.50
VX800A, VX820	REEL UNIT CLUTCH		280p
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HS306, 307, 318, 319,	GEAR ASSY	522B00201	£6.25
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HS337, 338, 347, 349	IDLER	552B01701	325p
HS411, 412, 421, HSB10, HSB20, HSB30, HSE10, HSE20, HSE20, HSE30,			
HSE70			
HS306, 307, 318, 319	IDLER	641C34301	£2.00
HS400, 410, 710			
HS347, 349, 412	IDLER	522902002	£3.00
HSB10, HSB20, HSB30, HSE10, HSE20, HSE30, HSE70			
HS337, 338, 411, 421	IDLER	552B01801	320p
HS200	TAKE UP IDLER (LARGE)		£4.50
HS200	UNLOADING IDLER		£4.00
HS200	REWIND IDLER		£6.00
HS306, 307, 318, 319	SUPPLY REEL	522A00101	£3.20
HS400, 410, 710	DISK		
HS306, 307, 318, 319	TAKE UP REEL	522A00102	£3.20
HS400, 410, 710	DISK		
HS320	REEL DISK	522C06301	£3.00
HS337, 338, 411, 421	REEL DISK	522P00601	£5.00
HS300, 301, 302, 310	PULLEY	522C05201	£2.25
HS306, 307, 318, 319	GEAR WHEEL	641D71101	£1.50
HS400, 410, 710			
HS306, 307, 318, 319	GEAR WHEEL	641D71001	£1.50
HS400, 410, 710			
NEC			
N830, N831, N832, N833	TAKE UP CLUTCH		150p
N830, N831, N832, N833	TAKE UP IDLER		100p
N830, N831, N832, N833	REEL IDLER		200p
N895	TAKE UP IDLER SMALL		550p
N911, N915, N916, N917	REEL DRIVE PULLEY		350p
N9012, 9013, 9014, 9016, 9033, 9034, 9054, 9055, 9066, 9110			
N9510, 9520, 9530, 9610			
NATIONAL			
NV322, NV600, NV688,	IDLER UNIT	VXP0463	£2.75
NV777, NV788, NV332, AG6100, 6200, 6800, 6810			
NV300, NV333, NV340	IDLER ARM	VXL0997	£3.60
NV366			
NV300, NV330, NV333	IDLER UNIT	VXP0401	60p
NV340, NV366			
NV300, NV330, NV333	PLAY IDLER	VXP0433	£2.75
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NV300, NV332, NV333	ACTION GEAR	VDG0016	£0.60
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AG6010, AG6015			
NV333, NV688, NV2000	LOADING GEAR	VXP0325	£2.00
NV3000, NV7800			
NV300, NV332, NV333	INTERMEDIATE GEAR	VXG0017	£0.65
NV340, NV366, NV600, NV777, NV788, NV2000, NV2010, 3000, 7000			
AG6010, AG6015			
NV330, NV333, NV340	CAM GEAR	VXG0158	£1.00
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NV230, NV250, NV260	IDLER ARM	VXP0521	110p
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NV630, NV650, NV730, NV780, NV810, NV830, NV850, NV870			
NVG7, NVG9, NVG10, NVG11, NVG12, NVG 14, NVG15, NVG16, VG18			
NVG30, NVG400, AG1000, AG1200, 1500, 1810, 2100,			
AG2200, NVH65, NVH70			
NV370, NV430, NV870,	CAM GEAR	VDG0200	£1.20
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NV730, NV770	IDLER UNIT	VXP0581	£2.50
NV2000, 2010 3000	IDLER UNIT	VXP0331	80p
NV2000, 2010, 3000	IDLER UNIT	VXP0329	80p
NV2000, NV3000	CAM GEAR	VDG0069	£1.00
NV7000, 7200, 7800	IDLER UNIT	VXP0344	75p
NV7000, 7200, 7800	CLUTCH	VXP0343	300p
NV8150, 8200, 8300,	IDLER UNIT	VXP0245	80p
NV8400, 8600, 8610, 8620			
NV8200, 8400, 8600	PLAY IDLER	VXP0243	80p
NV8610, 8620			
NV8620	CLUTCH	VXP0343	250p
NV332, NV600, NV688	IDLER	VXPO488	300p
NVG20, NVG21, NGV25	PULLEY UNIT	VXP0767	400p
NVG40, NVG45			
NV230, NV250, NV280	WORM WHEEL	VXP0604	160p
NV430, NV450, NV460, NV465, NV650, NV730, NV770, NV810			
NV870, NV890, AG1000			
NV370, NV380, NV630	IDLER	VXP0523	300p
NV780, NV830			
NV370	CLUTCH GEAR	VXP0595	£1.00
NVG7, NVG11, NVG12	WORM WHEEL	VXP0691	£1.50
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NV2000, 2010, 3000	LOADING GEAR	VDG0035	£0.60
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NV230, NV250, NV370	LOADING GEAR	VXP0520	£1.50
NV430, NV450, NV460, NV630, NV730, NV770, NV780, NV810			
NV830, NV890, NVG7, NVG10, NVG12, NVG15, NVG30, NVG120			
NGV130, NVG400, NVH70, AG1000			
NV230, NV250, NV260	CLUTCH GEAR		£2.50
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NVG7, NVG10, NVG11, NVG12, NVG14, NVG15, NVG18, NVG30			
NCG120, NVG130, NVG400, NVH70, AG1000			
NV230, NV250, NV260	LIMITER ROLLER		£1.50
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NV465, NV630, NV650, NV777, NV780, NV788, NV810, NV830, NV850,			
NV870, NV890, NV2000, NV2010, 7200, 7800, NVG7, NVG10, NVG12,			
NVG14, NVG15, NVG18, NVG30, NVG120, NVG130, NVG400, NVH70,			
AG1000			
ORION			
MULTIPLE MODELS	IDLER	850A200004	280p
MULTIPLE MODELS	IDLER	850A200005	420p
VC150, VC180, VH200	IDLER		110p
VH201, VH205, VH212, VH250, VH254, VH288, VH300, CH303, VH312			
VH404, VH555, VH700, VH704, VH708, VH712, VH780, VH844, VH900, VH3,			
VH33			
SAISHO			
VR605, VR800, VR900	CLUTCH	850A20000	420p
VR1100, 1200, 1600, 2500, 3200, 3300			
VR3500, 3600, 3800	LIMITER POST		£1.30
VR1100, 1200, 1600, 2500, 3200, 3300, 3500, 3600, 3700			
VR605, VR800, VR900	IDLER		280p
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VR705, VR805, VR905	IDLER		110p
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VHR1110, 1150, 1200	IDLER	143-0-662T-14730	£5.00
VHR1300, 1500			
VTC5000, 5150, 6000	FF-REW IDLER	143-0-741T-20001	250p
VTC6500, VTCM10, M11, M20, M21, M30, M31, M50			
VTC9100, VTC9300	IDLER	143-0-551T-01400	95p
VTC9300	FF ROLLER ASSY	143-0-547T-00200	200p
VTCM10, M11, M20, M21	REEL DRIVE PULLEY	143-0-662T-10350	£5.00
VTCM30, M31, M50			
VHR2100, 2300, 2500	IDLER	6130374899	300p
VHR2700			
VTC5000, 5150, 6000	PULLEY	143-0-662T-01201	£5.20
VTC6500			
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VHR3100, 3300, 3310	REEL DRIVE	143-0-662T-15621	350p
VHR3400, 3700, 3800	ROLLER		
VHRD500, VHRD700			
VPR5800, VTC5300	LOADING ROLLER	143-0-661T-03800	80p
VTC5400			
VTC3000	FWD LIMITER		£3.50
VTC3000	IDLER		750p
SHARP			
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	IDLER	NIC [illegible]006GEZZ	110p
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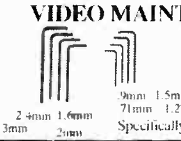

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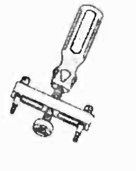

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TP621	RC 621	850p
TP630, TP650	RC 650	850p
TP660	RC 660	850p
TP661	RC 661	850p
HITACHI		
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A514790	RC 901	850p
A5088470	RC 902	800p
A518612	RC903	900p
SCL002	RC904	850p
C2096	RC 905	850p
A511940	RC 906	800p
655602H	RC 907	850p
ITT		
IFB13, 14, 15	RC 143	875p
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RG306	RC 306	825p
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JAVA (7180)	RC 184	850p
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939P/03607, 939P/03609	RC 140M	850p
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SATELLITE	RC 550	850p
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390C9500	RC 339	900p
ORION		
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JXGE	RC 878	850p
JXDE	RC 884	850p
VHR2300	RC 890	850p
RC628	RC 865	900p
SHARP		
G0121CESA, 123CESA, 204, 251	RC 140M	850p
SIEMENS		
FC616	RC 130	850p
FC631	RC 132	850p
FC742	RC 164	900p
SONY		
RM604, RM605, RM606	RC 140	850p
32 CHANNEL	RC 140M	850p
RM613	RC 141	850p
RM632, RM636	RC 160	850p
TATUNG		
FXA	RC 877	850p
RC70	RC 883	750p
FX70 FASTTEXT	RC 894	850p
TELEFUNKEN		
FB632	RC 632 ST	850p
FB639	RC 639 ST	850p
THORN/FERGUSON		
3V35-42	RC 342	850p
3V31-32	RC 344	850p
3V57-58	RC 628	900p
TX10 TEXT	RC 732	750p
TX10 STEREO TEXT	RC 738	750p
TX9-90-100	RC 740	750p
3V55, FV11	RC 783	900p
TX100 FASTTEXT	RC 785	800p
TX100 STEREO FASTTEXT	RC 789	800p
PROFESSIONAL	RC 790	800p
TOSHIBA		
CT937	RC 950	850p
CT9117	RC 951	850p
201R4B	RC 952	850p

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

FUSES

CURRENT RATING	ORDER CODE	PRICE
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5A	FUSE34	100P
13A	FUSE35	100P
20MM CERAMIC TIME LAG		
3.15A	FUSE41	100P
4A	FUSE42	100P
5A	FUSE43	100P
6.3A	FUSE38	100P
8A	FUSE39	100P
10A	FUSE40	100P
32MM CERAMIC SLOW BLOW		
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15A	FUSE46	210P
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HA1397	2.60	STK2129	7.00	SAA1293-03	8.50	TDA3654	1.99	MJ2955	0.75	2SC2577	1.20
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HA13117	2.99	STK4142II	7.75	TA7264	4.99	TDA4950	1.99	2N3055	0.75	2SC3944	1.60
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HA13119	2.99	STK4152II	9.00	TA7270	2.50	TDA7240	3.00	2SA769	1.30	2SD400	0.20
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LA4476	2.99	STK5325	7.00	TA8201	3.50	UPC1182	1.10	2SA1232	1.80	2SD1047	2.00
LA4495	3.95	STK5332	3.50	TA8207	3.25	UPC1185	6.00	2SA1265	1.50	2SD1065	2.00
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LA4500	2.30	STK5338	3.99	TA8214	3.50	UPC1230	2.10	2SA1386	2.75	2SD1207	0.50
LA4505	2.60	STK5342	5.99	TA8215	3.99	UPC1238	1.80	2SA1535	1.60	2SD1276	1.20
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LA4700	3.99	STK5421	7.00	TA8220	6.75	UPC1241	3.50	2SB554	3.50	2SD1397	2.00
LA6324	2.50	STK5422	6.50	TA8221	6.75	UPC1277	2.40	2SB557	3.00	2SD1398	1.70
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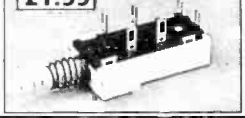

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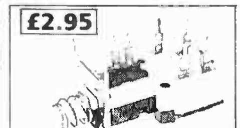

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TELEVISION

REED BUSINESS PUBLISHING

The Mayhem Business

Over the last couple of years electrical retailing has been one of the worst types of business in which to be. Despite some growth in the economy recently, consumers are still not feeling particularly happy and are unwilling to spend unless it's absolutely necessary. Combine this with the fact that the traditional video/TV market is a saturated one, with most households already having whatever equipment they feel they need, and you can appreciate the crunch situation that has arisen in electrical retailing. Had there been new products that everyone felt they had to have, things may have been rather different. But how often do such products appear on the scene? The radio receiver, the TV set, the VCR and the CD player are all items that have assured markets, though saturated ones. Things like camcorders and interactive video systems are not regarded as essentials. People feel that they can take them or leave them. Right now they are tending to leave them.

The problem for retailers is that there have been far too many outlets to cater for today's more limited demand. Just how did we come to have so many chain stores anyway? Probably because the prospects looked quite different in the boom times of the mid and late Eighties.

However that might be, retrenchment is the present order of the day. Too many shops chasing too few sales amounts, as Thorn EMI's chairman Sir Colin Southgate put it, to a "mayhem market", one in which "no one makes any money, either in or out of town". The result is the general contraction in the number of outlets, the most notable example being Thorn EMI's closure of its Rumbelows chain with the loss of some 2,500 jobs. Not only are the 285 Rumbelows stores to go, but also Thorn EMI's 36 Fona stores and its Focus concessions. Colorvision has closed nine stores, while Yorkshire Electricity and East Midlands Electricity have sold off their Homepower stores. Clydesdale collapsed over a year ago. Perhaps we may, after all these losses, be getting to the situation where the number of outlets is appropriate to the current market. We shall see.

Rumbelows went because it had been running at an annual loss of £12m over the last three years. Amstrad has recently announced a profits slump, which reflects high street conditions, while Comet's recently announced half-year sales declined ten per cent year-on-year. Dixons however seems to be getting it right, with improved results compared to a year ago. Thorn EMI's rental operations are also doing very well. It seems that when times are hard people prefer to rent rather than enter into hire-purchase commitments. Thorn EMI is also doing well out of exploiting a sort of half-way approach called rent to buy. It combines the advantages of rental with the possibility of purchase. In strict economic terms it makes no sense for the consumer, but it can be seen as a logical compromise when times are hard.

During the years 1986-88 the electrical retail sector did extremely well, recording double-digit sales increases year on year. The lively housing market and growth in personal income combined to produce boom conditions. At the same time there was an accelerating move from high street outlets to out-of-town superstores. According to Department of Trade and Industry figures, the number of electrical retail outlets fell from 16,800 in 1984 to 14,800 in 1993. During the same period the number of superstores grew from around 150 to over 600, increasing their share of the market from 6·6 per cent to almost twenty per cent. Rumbelows problem seems to have been that it remained over committed to the high street.

Are things now likely to settle down? The shake out should mean a more secure life for those who remain – provided they study their market opportunities and move as the market shifts. Sales of mobile phones and personal computers are doing very well, which means that there are markets to exploit. And the rental companies have been able to come up with offers that cater for particular market needs. Not all is gloom, though it's unlikely that we shall ever again see the easy money-making conditions of a decade ago in our trade.

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COVER PHOTO

This month's cover photograph shows the ITT DIGI-3 chassis. See servicing article on pages 398-402.

Teletopics

TERRESTRIAL TV GOES DIGITAL

NTL plans to build the first digital terrestrial TV network in the UK. At only moderate cost it will offer far more channels, with improved picture quality, than the present analogue services. The company, which provides the ITV and Channel 4 transmission facilities, is to invest millions of pounds in constructing a pan-UK network which should be completed in 1997. The BBC is being offered digital transmission facilities at less than £4.8m per service. Viewers will need a digital TV decoder, which will enable them to tune in to between twelve and thirty extra channels depending on the frequencies available locally.

DVDs

Toshiba has released some technical details of the Digital Video Disc (DVD) format it has developed with Time Warner (see Teletopics last month, page 314). Known as DVD-SD (for Super Density), the format uses discs that are formed by bonding together back-to-back two 0·6mm diameter discs, each of which can store up to 5Gbytes of data. This means that when used for playing movies each side will hold up to 142 minutes of MPEG-2 video and sound. The data transfer rate is variable, with an average speed of 4·69Mbits/sec. Laser wavelength is 635/650nm and the track pitch is 0·725μm.

DVD-SD can also be used to store broadcast programmes of a higher picture quality standard. For this application the average data rate is increased to 9Mbits/sec, each side then storing up to 74 minutes of video.

On the audio side DVD-SD can be used with the Dolby AC3 digital 5.1 Surround Sound format, offering up to eight audio channels and 32 subtitle channels. According to Toshiba the format can be used as a high-density CD-ROM and is compatible with existing CDs and LaserDiscs.

Nimbus Technology and Engineering (NTE) is to supply the high-density mastering system used to produce the DVD-SD discs. The company has been working with Toshiba and WEA Manufacturing Inc. (Time Warner's manufacturing arm) for over seven months: the first laser beam recorder was installed in February.

Despite the backing that the DVD-SD format has received, Sony and Philips are to go ahead with their system which will be launched next year.

PMI, the video arm of EMI, has launched digitally re-mastered versions of its first five Video CD titles. The new discs offer improved picture quality and additional features such as slow motion.

PALPLUS UPDATE

The PALplus group met in London recently to review the format's progress. Dr Albrecht Zeimer, chairman of the PALplus board, reported that fifty per cent of the upmarket TV sets being sold in Japan are widescreen models. Over 400,000 widescreen sets with a D2-MAC decoder were sold in France last year and a further 400,000 without such a decoder. Sales of widescreen sets in Germany are expected to reach 200,000 this year, rising to a million in 1996. Dr Zeimer expects PALplus to co-exist with digital TV systems for about twenty years.

Sony, Nokia, Philips, Grundig and Thomson will be showing PALplus sets at this year's Berlin electronics show. JVC will show a prototype PALplus S-VHS deck. The first custom PALplus chips will also be seen. The PALplus group has decided that there will be two types of PALplus sets: higher-priced sets will include Colourplus picture enhancement. A licensing policy is at present being developed by the group. More than 2,000 hours of PALplus programmes were transmitted in Germany last year. The number of hours will double this year. In the UK Channel 4 will transmit 400 hours of PALplus programmes and Granada 150 hours. Viewer reaction is being carefully monitored by UK manufacturers: most complaints about letterboxing come from those with large-screen TV sets.

CH 5 BIDS

Bids for the ten-year franchise to run Channel 5 are to be submitted by May 1st. Time Warner has withdrawn from the Channel 5 consortium that includes MAI and Pearson. According to a senior vice-president of Time Warner the company, which had previously been enthusiastic, has dropped out because of uncertainty on the technical side. A consortium that consists of Mirror Group Newspapers and the US NBC Superchannel is preparing a bid. Other possible bidders are News International/Granada and Virgin.

SATELLITE TV

According to GfK Marketing the number of UK households with satellite TV dishes grew by 465,000 last year, 14,000 more than in 1993. The total at the end of 1994 was 2,931,000.

Philex PLC, Philex House, 110-124 The Broadway, West

Hendon, London NW9 7BP (0181 202 1717, fax 0181 202 0014) has launched a new Astra 1D converter with RFS – remote function selection. This patented feature enables the converter to be sited away from the receiver, using the polarisation voltage shift that occurs during channel changes to provide automatic switching. The converter is compatible with all receivers that use dual-voltage polarisation switching, including the Amstrad SRD510 and 520. An integral double filter reduces interference from backwards radiation. The suggested retail price is £24.95.

Satellite Solutions, 1 Hartburn Close, Crow Lane Industrial Park, Northampton NN3 9UE (01604 787 888, fax 01604 787 999) has launched the Japanese-made Palcom SL7900 receiver/positioner which has a <4dB threshold adjustable in steps. Other features include a two-input, wide-range tuner; three scart connectors; Ku, C and S band operation; and an output that can be programmed for any channel in the u.h.f. band.

VIDEO TECHNOLOGY

Sony is extending its Mini Disc re-recordable disc technology to enable it to store still pictures. Called Picture MD, the new format enables up to 365 images with audio to be stored on the 2·5in. discs, using the JPEG still-image compression standard and Sony's ATRAC audio compression technology.

A new 3D display system has been developed by engineers at Sharp's Oxford research laboratories. There is no need to wear special glasses, and the view of the image changes when the viewer moves his head. This latter feature is implemented by monitoring the position of the viewer's head and adjusting the image projection accordingly. Novel light sources operate with standard TFT LCD panels mounted at right angles for the left- and right-eye images, which are combined for projection by a half-silvered mirror at 45° between the panels.

A new form of liquid-crystal display, known as the SPD (suspended particle display), has been developed by a US research company in collaboration with a team at Imperial College, London. The advantages over standard active-matrix LCDs are higher brightness with better contrast and viewing angles. The problem has been to stabilise the particles within the liquid: this has been solved by using colloidal-sized particles stabilised with a polymer. The display uses an electric field to control the orientation of the particles. Brightness performance is improved because light polarisers are not required.

NEWS FROM WILLOW VALE

Peter Bartlett, chariman and managing director of Willow Vale Electronics, has decided to retire to concentrate on other interests. The remaining members of the board have acquired the business. WVE has been appointed as a spares distributor by Grundig Satellite Communications Ltd. of Llantrisant, Mid Glamorgan.

The first video training tape for those servicing satellite TV equipment has been released by Willow Vale. It covers the Pace Models PRD800 and PRD900 and has been produced by Visions in conjunction with Pace. Running time is 55 minutes, price £19.99, order code 182028TT.

CORRECTION

Our aplogies for the omission of the last three words in the article on fax technology last month. They are "TV/video workshop".

Next Month in TELEVISION

FREE DATA CARD

Next month's issue includes a free cover-mounted data card that provides quick-reference details for STK series multi-regulators. These have been widely used in VCRs: it's useful to have pin and voltage details to hand for speedy fault diagnosis.

SERVICING THE HITACHI CPT1471/1473

These colour portables were sold in large quantities. John Coombes provides a quick service run-down on them.

INSTALLING A CD-ROM DRIVE

With the arrival of CD-ROM technology a PC without a CD-ROM drive and its associated stereo sound card is only half complete. David Botto explains how to add a CD-ROM drive, which can be done at modest cost. Strange acronyms and terms abound in the world of CD-ROMs: you need to understand them, if only to be able to explain to your customers what it's all about.

SATELLITE RECEIVER SERVICING

Jack Armstrong on common faults with the Grundig GRD150/250 range plus a page of servicing tips on satellite receivers.

TUBE TESTING

In these days of solid-state technology, how many remember about thermionic tube operation? Yet the tube is the most expensive item in a TV set. Les Austin on tube testers and what they can tell you.

CAMCORDER SERVICING

Keith Keeton on the Sony CCDF450 plus the usual faults page.

MORE ON THE ICC9 CHASSIS

Our concluding instalment on this chassis deals with the timebases and video processing plus some guidance on fault-finding.

Camcorner

Reports from David C. Woodnott Noel Evans and Keith T. Keeton

Sanyo VEMS1P

Known in some parts as the LEMSIP model, this one had its cassette mechanism in the half-ejected position. Removal of the LS mechanism revealed that the two plastic guide rails had fractured. So they and the ribbon cable that connects the two halves of the mechanism had to be replaced. When fitting a new ribbon attach it to the main mechanism first, leaving the other end free. When the mechanism has been refitted, solder the other end of the ribbon to the LS deck. This will avoid any tendency for the ribbon to twist. As mentioned before, realigning these mechanisms can be fun! **D.C.W.**

JVC GRAX5E

This camcorder had been dropped. As a result there was no camera E-E picture, though the machine worked correctly in all other respects. With this range of camcorders it's quite common for the camera section to detach itself from the main PCB after such treatment. In this case connector CN33 was damaged and had to be replaced. **D.C.W.**

Panasonic VWF15E Camera

This S-VHS camera didn't operate. Replacing the 1·5A ceramic fuse F1 on the audio PCB restored the input to the power supply PCB, with the standby LED alight, but there were still no video or audio output signals. Attention was focused on the power supply PCB which, like all the other subassemblies, can be detached from the mother PCB. The 5V and 9V outputs were present, but the 17V and 27V outputs were missing. The 27V supply is generated from the 9V supply, with Q7 operating as the driver for a d.c.-d.c. converter. Checks here showed that Q7 was leaky base-to-emitter while L6 had short-circuit turns. Other components that had to be replaced were C14 (180μF) in the 9V supply, R24 (24kΩ) which had increased in value to 68kΩ, D5 (27V supply) which was short-circuit and the control chip IC1.

Note that this power supply runs rather warm, and that the correct replacement components must be used. **D.C.W.**

Ferguson FC05/JVC GR45

This machine produced no pictures, either from the EVF or the AV connector. There was an audio output however. The playback f.m. signal was present at the input to the YC board, via the main board, but didn't appear at the outputs. We then found that the video mute line on the YC board was permanently high. The source of this signal is pin 51 of the mechacon controller chip, where it was correct. Failure of the buffer/inverter transistor Q409 was the cause of the permanently high mute signal. **D.C.W.**

Mitsubishi HSC40B

This well-engineered S-VHSC machine would remain powered up for only a few seconds. It's not an easy model to work on, as ribbon cables abound. Gently tapping the main PCB seemed to affect the fault – on occasions this would produce a period of operation. We eventually traced the cause of the trouble to Q409 and IC401, which were both dry-jointed at all pins. The only thing that was keeping them in contact appeared to be the large helping of goo beneath which they were burried. Beware! **D.C.W.**

Sony CCDTR60E

The reported fault was no camera E-E picture. In fact the chroma component of the E-E signal was present, but there was no luminance contribution. The cause was C305 which was disconnected at one end. Refitting it cured the problem – it's on the camera PCB. **D.C.W.**

Fujix-8 FF120SW

Intermittent colour dropout was the problem with this camcorder, a clean mono picture remaining when the colour was lost. Absence of a manual sent us in search of dry-joints on the main video processing board. Fortunately it's the top section of a layered structure. Flexing around the screened part of the board would instigate the fault: a closer inspection here showed that one of the pads for a surface-mounted resonator package had failed to flow solder. **N.E.**

Ferguson F801

We've had the following faults with this model:

No titler operation: Cause was a dry-joint at IC901.

No power: This can be caused by a faulty d.c.-d.c. converter. On occasions we've found that the 5V supply is o.k. at pin 72 of IC901 but not at the function switch block chip IC912 because pins 3 and 4 are shorted together. This error can result in failure of IC901.

Will not memorise title when powered down fully: Pins 5 and 6 of PG052 on the fuse PCB soldered together, so no voltage at pin 6. Lithium battery drains slowly.

Tape loads then unloads after a few seconds: As arms don't load fully the mode switch doesn't complete its cycle. Supply guide roller two bent at its base. Replace arm assembly (item 268).

Mechanism jams when loaded: Head support catches cylinder. Adjust or replace.

No power to mechanism: CP open-circuit.

Ejects partly then stops. Reloads after a few seconds: Arm operation pressure roller drive spring bent. Replace arm or pressure roller.

Pinch roller spools tape out: Washer on central gear idler missing. Replace.

Batteries don't charge – charge light flashes slowly: Faulty d.c. jack (SW101) fails to provide power.

Distorted sound and noise bars on playback picture: Faulty capstan. Replace. **K.T.K.**

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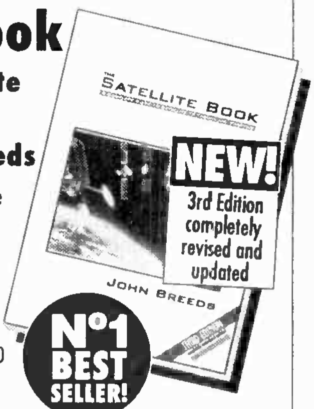

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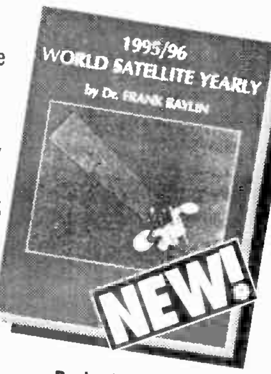

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Letters

RECHARGEABLE BATTERIES

There have been a couple of developments since I wrote on this subject in the February issue. When that article was being prepared I was trying out nickel metal hydride AA cells in my hand-portable cellphone. After using them for a couple of months I've come to the conclusion that they don't particularly like rapid charging. This is not a problem where NiMH camcorder batteries are concerned, as camcorder chargers don't usually use a high charging current, but the AA type would be best charged using a standard 'overnight' type NiCad charger. NiMH cells have now become available in the 'industrial sizes 2/3AA, 2/3AF, 4/5AF, AF and 7/5AF in addition to the standard AA type. This range is stocked by Farnell Electronic Components. No doubt the more familiar consumer sizes will follow shortly.

The NiCad button cells used for memory back-up are gradually giving way to lithium coin cells in industrial and professional equipment, for environmental reasons. It's probably only a matter of time before they appear in consumer equipment. As I mentioned in the previous article, attempting to charge a standard non-rechargeable lithium cell can have the most horrendous consequences. The resultant explosion will expel metallic lithium, which will react violently with any water that may be handy (guess what's the main ingredient of the human body!): lithium is a strongly alkaline metal, like its cousins sodium and potassium. Just to confuse things, a new rechargeable lithium system has been announced, with rechargeable coin cells in the same sizes as the standard types and the same terminal voltage. When dealing with lithium cells or batteries, great care will be needed to ascertain the type fitted before attempting any replacement.

In normal use NiCad batteries shouldn't really be discharged to below about 1V per cell: the deep discharge method mentioned in my article is used only when reactivating very lazy cells. My apologies for not making this clear. Dischargers (or conditioners as they are usually called) are available for specialised batteries but not for the usual domestic type. As well as my mobile phone I have a portable CD player and a conventional personal stereo. To keep this lot going I have two dozen AA cells and a rapid charger that does eight at a go. In order to keep my investment in good health I'm working on a discharger to suit AA and other sizes of NiCad cells. If it proves successful, I'll publish details in the magazine.

In connection with my article on workshop health elsewhere in this issue, a new type of lamp that's brilliant in both senses of the word has become available. Osram has introduced a mains-voltage halogen bulb which replaces standard GLS tungsten lamps. Called Halolux, it consists of a miniature version of the familiar tubular halogen lamp mounted inside a clear glass bulb shaped like, but a lot smaller than, the large octal-based valves used in the days when electronics was fun. The light is a brilliant white, which is ideal for close work, and the heat output appears to be less than that of the equivalent GLS lamp. I bought mine at Tesco, which stocks 60W and 100W Halolux bulbs. Incidentally, Halolux lamps impart a striking sparkle when fitted in cut-glass or lantern type lighting fittings.

Pete Roberts,
Runcorn, Cheshire.

TECHNICAL ADVICE

I would like to reply to John C. Priest (letters, February). Pardon the pun, but "Praise the Lord" at last we have someone who admits that service has to be paid for. Of particular interest to me is John's idea of technical help being chargeable through an 0891 type telephone number.

As most people in the trade are aware, the Willow Vale Techline was set up in 1993 to fill some gaps left in manufacturers' technical help to small independent service departments. We had a feeling that the response would be good, but little did we know how good, with more and more manufacturers passing their non-account queries to Techline. Recently we reached a hundred calls a day, and BT tells us that the number of calls getting an engaged tone is rising.

Much of Techline's success is due to the technical ability of Alan Dyson, and it's becoming clear that our staff will have to be increased, with engineers of the same calibre as Alan. They don't come cheap (though Alan will disagree).

If every technical query we received generated a parts order we would not have a problem. But it's a fact that much of our advice leads away from parts – telling you where to look for a dry-joint for example doesn't create much income.

So from May the telephone number for Techline will change to an 0891 type number, with calls costing 49p per minute. John Priest suggests that the average cost to a dealer would be around £5. The good news is that a survey of all the calls taken by Techline suggests that the average call will cost less than £2.

On average the call time is four minutes, and feedback from our customers suggests that we have a success rate of 60 per cent – in fact we feel that the success rate is nearer 75 per cent. Now you don't need a Philips SBC1848 calculator (stock code 48013A) at £8.50 to work out how much can be saved in not ordering the wrong part after days at the bench spent head scratching.

Mike Molloy, Director, Special Services,
Willow Vale Electronics Ltd., Manchester.

WHY NOT FAX FOR TECHNICAL ADVICE?

Manufacturers who have withdrawn access to technical information for those who are not their dealers must be of the opinion that their customers go only to their chosen dealers for service. How wrong can they be? In my corner of the South East, Comet, Currys and Dixons must sell the largest number of TV sets and VCRs produced by firms such as Sony and Samsung, to name but two manufacturers who withold technical information from non-dealers. But customers know as well as the rest of us that large organisations are not always the cheapest places to which to go for service work. This is where the one-man business, such as my own, fits into the picture.

I'm not a freeloader. Just give me a fax number for technical assistance and I'll write down all the relevant information with a credit card number. All I want is help when it's needed, at a reasonable cost. At the end of the day the manufacturer's customer will be happy, I'll be happy, and who knowns customer brand loyalty may have been gained.

So come on all you manufacturers, put *all* your customers needs first. Pull your heads out of the sand and move into the real service world of the Nineties. This could in fact be a nice little earner, with negligible capital outlay – you're probably already using a fax machine in the technical department.
R.J. Longhurst,
East Grinstead, West Sussex.

TEST TAPES

There was an error in my article on Test Tapes and Cassettes in the February issue. Under the heading "What to Record" on page 245 the input level for recording an audio signal should have read 850mV peak-to-peak (not 1·5V) when terminated with the 75Ω load presented by the VCR at its audio input socket.

During playback 850mV peak-to-peak is also the correct level when the measuring instrument has an input impedance of 75Ω. In practice it's simpler and easier to connect an oscilloscope, with or without a probe, directly to the VCR's audio output line: in either case the line is in effect unterminated and, with virtually all VCRs and camcorders, the peak-to-peak amplitude rises to approximately 1·5V.
Eugene Trundle,
St. Leonards on Sea, East Sussex,

LOSS ADJUSTMENT

I read with interest Robert Blair's article on insurance loss adjustment in the February issue. As he says, it is indeed unusual for us TV engineers to be able to sell our skills in any sphere other than our own. On having found a possible avenue to explore however he suggests a charge of £15. I had to check the date on the cover to make sure that I wasn't reading a 1975 issue. Has Robert Blair tried to get anybody, and I mean anybody, no matter how lowly his skills, to visit his house and perform a task for £15? How much is vehicle insurance around his way, and petrol? But he is certainly correct in saying that you won't become rich doing this work. At minimum however you must cover your costs and make a profit – that's business!

If you are willing to offer a service that a large company requires, the company will pay you for it. I know this from my own daily experience. To sell our skills for such a meagre sum makes a mockery of our profession and encourages the too common view that the trade can be learnt in a few weeks, less if you attend college.

The very act of visiting someone in his own home and playing the role of a policeman – for that is exactly how the customer will see it – is one that requires extreme tact and diplomacy, in addition to the necessary technical skill. This is what you are selling, and it commands a fair price.
Stephen Russell, AV Media Services,
Horns Cross, Kent.

SERVICING SATELLITE RECEIVERS

A typing error occurred in Chris Watton's note regarding a dead Echostar SR5500 on page 320 of the March issue (Satellite Notes). The value of R2 is correctly given as 100kΩ, but R1 should be 110kΩ. These resistors equalise the leakage currents through the large electrolytics and should be high-voltage types. The originals are carbon composition and are almost impossible to obtain. So I use Farnell type MFR4-100k in both positions and add an MFR4-10k in series with R1 to make up the value, which is critical.

It's also a good idea to replace the two small 100μF capacitors, using Farnell type part no. 148-851, since these cause the output voltage to change from its correct value of 5·05V. This information is taken from page 190 of *Satellite Secrets Revealed,* which is available from Davenham Satellite Systems at £19.95 – telephone 0606 49 085.

An error crept into my own article in the same issue, on page 347. The 100Ω surface-mounted resistor referred to is beneath R5, i.e. on the underside of the board where R5 is on the top side. The text suggests that it *is* R5! Hope this is now clear.
Jack Armstrong,
Manchester.

TAXAN MONITORS

While some manufacturers are less than helpful, others couldn't provide a better service. I had been having problems with a couple of Taxan monitors and needed parts. Just ring 0344 861 644 and ask for Zanna or Paul. Believe it or not, they'll send you drawings and fault-finding guides free! It's a pity that other computer companies are not the same. Wake up IBM and Compaq!
Alan Bonhomme,
AB Computers, Walsall.

SONY AGAIN

John Pitt-Francis (letters February) couldn't get anyone at Sony to discuss a fault on the telephone. The company's attitude does present problems. I wrote to complain about a socket which is fitted to most of Sony's products that have an external d.c. input. A spring contact had fatigued, shorting out the battery pack. Having had difficulty finding a socket of identical pattern from a number of sources, I asked Sony whether a replacement could be supplied – other firms have often given me a pleasant surprise by posting a replacement without charge. No so Sony. I was told that the company is unable to condone any repair carried out by unauthorised personnel. Now amongst other things I do have a couple of degrees and experience in the trade. Replacing a failed d.c. socket doesn't tax me. But pointing these things out got me nowhere. I've now replaced the socket with one of the wrong pattern, with the aid of some short wire links, and believe that this is a more sturdy item than the original. If Sony is listening, I did get the wires round the right way, and it works.

It's sad that the service trade in the UK today isn't so buoyant that it can afford to turn work away. Unfortunate then that a company such as Sony won't discuss faults in its equipment over the phone and seems to want to restrict even the most simple repairs to itself.
Andrew R. Churchley, B.Sc. (Tech.), Ph.D, C.Eng.,
Appleton, Cheshire.

WORDPERFECT WP6.0 FOR WINDOWS

An error crept into my reply to Peter Tomlinson's letter last month (see page 322). WP6.0 for windows requires a minimum of 8Mbytes of RAM (not 4Mbytes) in the PC for reasonable operation, a 386 processor etc.
David Botto,
Poole, Dorset.

Test Case 388

Doesn't time fly? It seems just a few short years ago that the Ferguson TX100 chassis was introduced. In fact it first appeared over ten years ago, and the Ferguson products of today bear not the slightest resemblance to the British-designed stalwarts of the TX era – notwithstanding the inexplicable use of the TX90 designation for a currently-produced Ferguson chassis of Thomson design.

Many TX100 series sets are still going strong, though in most cases the picture tube shows the effects of long use. The one that sat on Cathode Ray's bench had been a previous visitor to the workshop. According to the job card its problem this time was excessive picture width. Sure enough with the set on test the picture looked to be about six inches wider than the screen allowance – this particular set was a large one, with a 23in./59cm 110° tube.

Big pictures are generally caused by high supply voltages, thought CR, so he went to the power supply section of the chassis to measure the h.t. voltage. The reading at C129 should be 119V. It was correct to within a few volts. Reducing the setting (RV13) decreased the width, though not to the correct extent, and also introduced two unwanted effects: pincushion distortion at the sides of the screen, and a picture with an even more tired and weary look to it, obviously because the tube was being underrun.

The lack of EW correction gave CR a new idea however. He turned to the EW modulator section, which is incorporated in 110° sets like this one. It's on a pluggable subpanel that contained a TIP110 driver transistor (TR73), some shaping and control components and a very tired-looking pair of inductors (L701 and L702) whose soldered joints were dry and crystallised. After removing this subpanel, CR found that the Darlington type TIP110 transistor was short-circuit collector-to-emitter. So he replaced this item and resoldered the coils – having thoroughly cleaned and fluxed their leadouts. The other three transistors on the subpanel checked out o.k., as did the modulator diode D701 and the associated capacitors C702 and C703.

With the subpanel back in place and the set switched on, CR was pleased to see that the trouble appeared to have been cured. After resetting the h.t. for 119V he found that correct width and picture geometry could be obtained by adjusting the presets on the subpanel, though the settings were a long way from the original wiper positions. The tube's emission had stabilised when the set had been running for about half an hour, and CR thought that the picture didn't look too bad considering the set's age. He put it on the delivery rack and turned to a sick Hitachi.

He hadn't seen the last of this TX100 however! Four days later it was back on the awaiting-repair shelf, with a note that said "wide picture, as previously". On test the symptoms were seen to be the same as before. CR went straight to the EW driver transistor TR73, which had failed in exactly the same way as the original one. After fitting another TIP110 the scan amplitude was again correct. But the transistor failed during a soak test. Pouncing on it, CR found that it was too hot to touch. Could there have been a batch problem with the TIP110s in store, or was there a contributory cause elsewhere? For the answer, see page 414.

Servicing the ITT Digi-3 Chassis

Chris Watton

In this final article in the present series we'll look at the Digi-3 chassis. There are fault notes at the end for all three chassis we've covered. The Digi-3 chassis is able to drive, 21, 24 and 28in. tubes. All sets have teletext and some have hi-fi sound. The main panel contains the power supply and the line and field timebase. Three panels plug into it: an i.f./tuner module, an audio output and interfacing panel, and the digital signal processing panel.

Service Adjustments

There are very few controls, as most adjustments are carried out via the remote control unit. In the alignment mode this becomes the service processor. As the original unit will probably have been replaced by the time the set arrives on your bench, a list of the relevant functions and the button to push is given below. The LED channel display gives an indication of the mode.

To set up the receiver, feed in a suitable test signal and move the small lever switch (the mode switch) on the digital panel to the SE position. The display will read SE. A preset in the power supply adjusts the operating voltages. Set it for a reading of 133V at the cathode of D795. The other adjustments can then be carried out. All settings are altered by using the volume ± buttons. The adjustment sequence is not important, though the geometry adjustments are best carried out in the order given below.

(1) Vertical shift. Button 1, display U1. Adust for correct top position.

(2) Height. Button 2, display U2.

(3) Field linearity. Button 3, display U3.

(4) Width. Button 4, display H1.

(5) Pincushion correction. Button 5, display H2.

(6) Trapezium correction. Button 6, display H3. Repeated pincushion and trapezium adjustments may be required.

(7) First anode (G2) voltage adjustment. Button 7, display C. There are three LEDs above the display, red, yellow and orange. Use R536 to adjust the G2 voltage for a flashing yellow LED. If the red LED is lit the voltage is too low, if the orange LED is lit it's too high. A stationary picture is essential, as varying beam current upsets this adjustment.

After setting the first anode voltage, set the gun cut-off points. Determine the most sensitive cathode. This cannot be adjusted – any attempt will give '– –' in the display. Set the other cut-off points to match the fixed one.

(8) Red cut-off. Button 8, display C1.

(9) Green cut-off. Button 9, display C2.

(10) Blue cut-off. Button 2 (twenties), display C3.

Next adjust the drives. Alter only the predominant colours: at least one setting must be left unchanged.

(11) Red drive. Button treble +, display C4.

(12) Green drive. Button text i, display C5.

(13) Blue drive. Text button, display C6.

(14) Decoder reference oscillator. Button bass –, display F. Adjust for near-stationary colour.

Finally, load the new information into the memory by pressing the TV key (the one that should return the set from the text to the TV mode). SE will reappear in the display. Return the mode switch to normal operation.

The Power Supply

These sets use a discrete-component chopper circuit that provides mains isolation. It's similar to the circuit used in the 80R chassis – see Fig. 1. The following output voltages are provided: 133V h.t. (I); 5V (III); 8V (IV); 17V (VI); –17V (VII); 43V (IX). The other supply lines in the set are either derived from these or from the line output stage. They are 12·6V (V); 16·8V (VIII); 13V (X); –13V (XI); 220V (XIII). The LOPT also provides the e.h.t., focus and first anode voltages. A bridge rectifier produces 300V for the chopper circuit, which also has a 12V line on the primary side. A separate bridge rectifier and regulator provide a 5V (I) supply for the control circuit (microcontroller IC1401 and the associated components).

At switch on the bridge rectifier D703-6 charges its reservoir capacitor C705 to approximately 300V. At the same time C714 charges via R731. The link via T733 to the base of T721 switches it on and transistors T726 (the chopper driver) and T742 (the chopper transistor) switch on. Because of T742's inductive load, the voltage across R743 rises linearly. When it reaches 0·7V transistors T716 and T711 conduct. Since T711 shorts the base and emitter of T726 it switches off, removing the drive at the base of T742 which also switches off. The energy stored in the transformer is then released, driving the rectifiers on the secondary side of the circuit.

When T726 switches off its collector voltage falls very rapidly, taking the base of T721 negatively via R726 and C726. Thus T721 switches off. With T742 off there's no voltage drop across R743. T716 and T711 switch off, removing the short-circuit across the base and emitter of T726. T726 cannot switch on again however until T721 conducts. This depends on the time taken for C726 to charge via R733. Once it does, T726 and T742 switch on again, building up energy in the transformer.

The conductive T721 switches T722 on via C718 and R724. These transistors latch on. Meanwhile C743 is

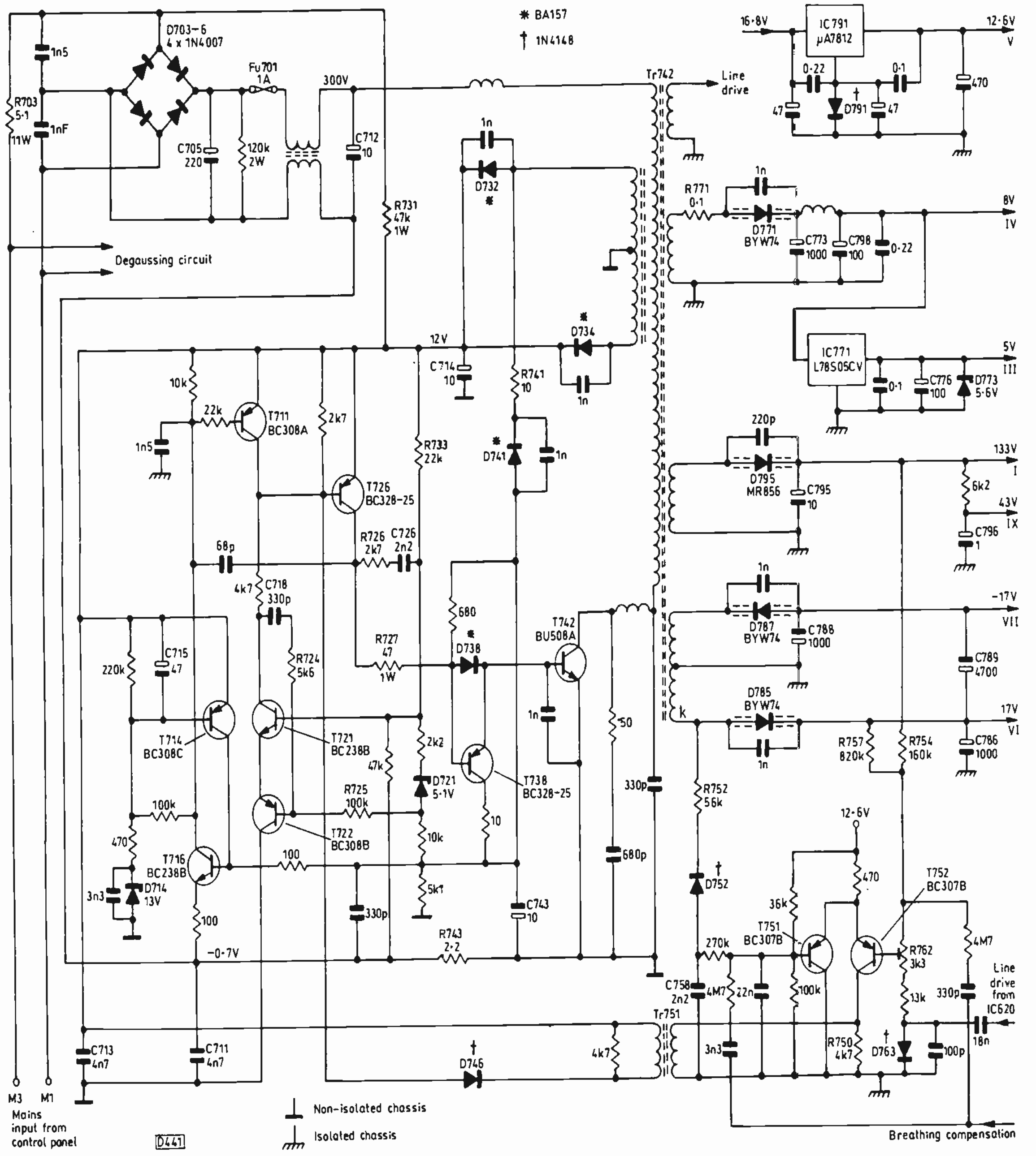

Fig. 1: The chopper power supply circuit used in the ITT Digi 3 chassis.

charged negatively via D741. Thus T716 is switched on only when the voltage across R743 exceeds 0·7V. As the energy in the transformer builds up between cycles, the charge across C743 increases and eventually zener diode D721 is biased on. This switches off T722 via R725, and as a result the chopper switch off is initiated by T721 instead of T716/T711. In this way T742's collector current is limited at a certain level and the output voltages are stabilised at about 80 per cent of their normal level.

Once the set is running normally T726 is switched on by a drive waveform from the DPU2540 deflection processor chip IC620 via T752 and pulse transformer Tr751. T752 acts as an error detector/pulse width modulator. The point at which it switches on when the drive waveform is applied to its base depends on the d.c. conditions at its base and emitter. Base bias is set by R762 (set h.t.) which is taken to and thus samples both the 133V and the 17V supplies. Thus variation in these supply voltages with loading changes adjusts the conduction point of T752 and the on/off time of T742 to compensate. T751 also varies the biasing. A negative voltage derived from tag k of the transformer via D752 is applied to the base of T751. This adjusts for mains voltage fluctuations, which are instantly reflected by the transformer. There is also an input to the circuit from the beam sensing point in the line output stage (breathing compensation).

As with the other chassis we've looked at in this series, the line output transistor is driven by a secondary winding on the chopper transformer.

Overload Protection

In the event of an overload the 'electronic fuse' will operate. Transistors T716/714/711 provide this trip action, sensing the voltage across R743. If the overload is permanent, the charge developed across C715 when T716 conducts will build up until the point is reached when T714 switches on. T714 and T716 then latch on, with T711, and the drive to the chopper is removed. The power supply will not start up again until C715 has discharged. To do this, switch the set off for a minute or connect a 15kΩ resistor across C715. To operate the power supply with the electronic fuse disabled, leave the 15kΩ resistor in place then switch on. This can be useful when you are trying to assess the source of an overload. Never leave the resistor in place if it makes the set come on.

The HF Module

The h.f. module, type TCU-CCU, differs from those used in the earlier sets. It contains a frequency-divider chip in addition to the u.h.f. tuner and i.f. section. This module's important pins are: TZ6 12·5V input; TZ7 0-30V tuning voltage input; TZ14 12·5V output; TZ15 1·3-14·2MHz f/64 frequency-divider output; TZ16 5V input; TZ23 CVBS output; TZ30 audio output. There are also various earthing pins.

As with previous h.f. modules, you can get trouble with the PCB/can soldering and the electrolytics can give up. But the problems are fewer than with the previous modules. Once again if you don't fancy repairing one of these cans MCES of Manchester will do a good job for you.

The Interface/Audio Output Panel

The interface/audio output panel carries the set's input/output signal links and the audio demodulator and output stages. Various slightly different boards have been used – they are all similar. Power for the TDA2040 audio output chips is applied at pins ST3 –17V, ST2 17V and ST1 chassis. The demodulated audio signal goes to the digi board from which processed L and R audio signals return to this board. There's an audio muting circuit which is controlled by the microcontroller chip IC1401. It works by shorting out the inputs to the audio output chips. The mute control input is at pin 5 of socket BN: 12V here mutes the sound, 0V gives normal sound.

There are two 14503 switching chips on the panel, one for the audio signals and the other for video. The audio chip switches between scart and tuner inputs. Plug DN is the connection to the digital signal processing panel. Pins 5 and 7 are the tuner signal inputs, pins 6 and 8 are the scart audio inputs. The video routes are via the other chip, IC3004. Tuner video comes in at pin ST10, passing through the chip from which it finally emerges at pin 15. It goes in at pin 12, comes out at pin 14, goes back in at pin 5, comes out again at pin 4, passes through transistor T3031, returns at pin 2 then passes out from pin 15 to transistor T3039. It goes to the digi board via pin 12 of plug DN.

Scart audio and video inputs are selected by a control voltage from the microcontroller chip IC1401. It enters the panel at pin 4 of plug BN, then goes via transistor T3032 to pins 9 and 11 of the two switching chips. At plug BN the voltage levels are 5V for TV, 0V for AV: after T3032 the levels are 12V for TV, 0V for AV. The RGB inputs from the scart socket pass straight through this panel to the digital signal processing board. The status switching input at pin 8 of the scart socket passes via transistor T3982 to the mircrocontroller chip, which tells the switches on the interface/audio output panel which state to be in.

The Control Panel

The control panel houses the microcontroller chip, a memory chip, a tuner interfacing chip and the remote control receiver chip. It's coupled to the digital signal processing board, messages being passed between them. The control panel is mounted behind the customer control unit. It has five main functions, as follows.

First on/off power switching. A small mains transformer, fed from the mains on/off switch, feeds a bridge rectifier and 78L05AC regulator which produces the 5V standby supply (I). A relay circuit controls the mains power feed to the main chassis. The relay is controlled by the on/off output at pin 5 of the microcontroller chip IC1401. It's also controlled by a momentary contact on the mains switch. This activates the relay at receiver switch on. Thereafter IC1401 takes over control. There are two transistors in the relay circuit, T1403 and T1404.

Photodiode D1411 detects the infra-red remote control signals, passing them to the TBA2800 receiver/amplifier chip IC1404. The output from this is fed to pin 12 of IC1401 and also, via plug DB2, to the digi board.

IC1403 (MEA2901) is the tuner interfacing chip. It converts digital information from IC1401 into an analogue voltage to control the varicap tuner. IC1403 receives 12·6V at pin 7, 16·8V at pin 13 and the 33V tuning supply at pin 14. The tuning supply is stabilised by a ZTK33B regulator which is linked to the 43V supply via R1459. Channel up/down commands from IC1401 enter IC1403 at pins 3 and 2 respectively: the tuning voltage output appears at pins 15 and 16 which are connected together.

Memory chip IC1402 (different types are used in different models) stores the customer audio and video settings, the tuning information and the alignment information. It's a reprogrammable, non-volatile device that can be responsible for various faults. When ordering a replacement it's essential to quote the part number, which is on a white label stuck to the chip, as the preprogramming is done at the factory. Fitting an incorrect chip can lead you astray.

The SEL02 microcontroller chip IC1401 is responsible for the operating and tuning systems. It receives a supply from the on-board 5V regulator at pin 27. This supply is also used by the emitter-follower T1401 which feeds the 4MHz crystal clock oscillator signal (at pin 1 of IC1401, the crystal being X1401) to the digi board. The standby LED circuit is also fed from this rail. IC1401 receives, at pins 2, 29 and 40, 5V from the main chassis: this voltage appears once the power supply is up and running. IC1401 controls the keyboard, the display and the LEDS. The IM bus is connected to IC1401, the memory chip IC1402 and the digi board.

Output Stages

The line and field output stages, the EW modulator and the RGB output stages are all conventional and have some similarities with the Compact 80 series.

The Digi Board

There are eight i.c.s on the digital signal processing panel, as follows:

IC610 MCU2600 master clock generator: This generates, with crystal X610, a 17·734MHz clock signal which is fed to all the other chips on the panel.

IC620 DPU2540 deflection processor: This is fed with the composite video signal, in digital form, and produces the line, field and EW correction drive signals. The line drive is fed to the chopper circuit. There's a return safety voltage at pin 25, via connector DV1. In the event of field collapse, this will operate the blanking circuit. Check here

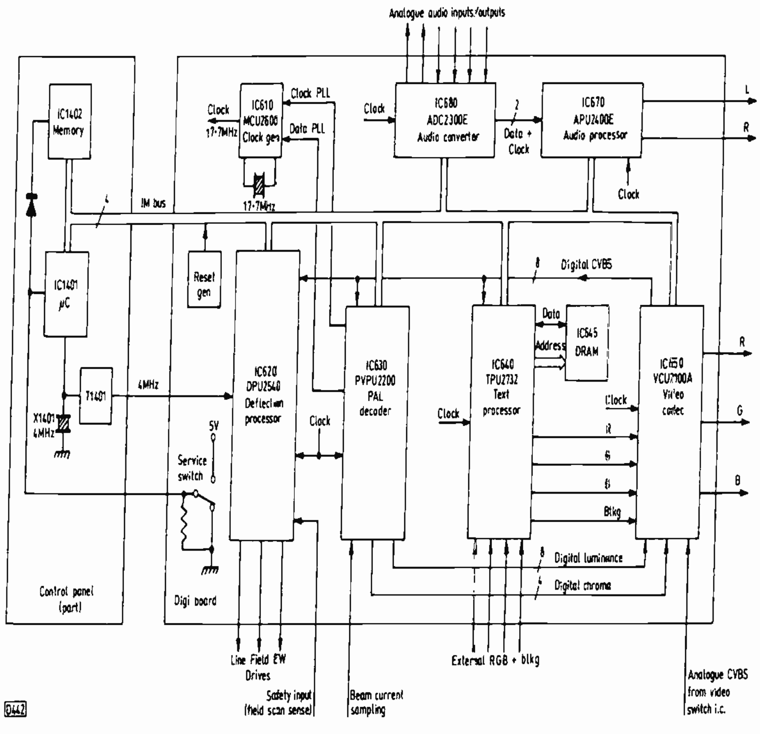

Fig. 2: General arrangement of the digi board.

if the symptom is no raster with the tube's heaters alight.

IC630 PVPU2200 PAL video processor: This separates the digital composite video signal into its chroma and luminance components and carries out PAL decoding. It also carries out automatic black-level adjustment, with feedback from the RGB output stages on the tube base panel at pins 15 and 16.

IC640 TPU2732 teletext processor: In addition to teletext decoding this chip accepts the RGB signals from the interfacing/audio output panel. It provides RGB plus blanking outputs, either text of AV, at pins 6-9.

IC645 HM4816AP-7 DRAM: This memory chip operates with IC640 as a page store.

IC650 VCU2100A video codec: This converts the analogue composite video signal to digital form, which is then fed to IC620 for sync purposes, to IC630 for PAL decoding and to IC640 for teletext processing. It receives RGB plus blanking inputs from IC640 and separate digital luminance (8 bits) and chroma (4 bits) inputs from IC630, converting them to analogue RGB outputs at pins 28, 27 and 26 respectively.

IC670 APU2400E audio processor: After digital audio signal processing this chip produces analogue L and R outputs at pins 19 and 20 respectively.

IC680 ADC2300E audio converter: This chip receives the demodulated and external audio inputs and converts them to digital form for feeding to IC670. It also carries out signal selection in conjunction with the MC14053 audio switch on the interface/audio output panel.

There's a reset pulse generator on this board, consisting of transistors T691 and T692 and the associated components. The reset pulses are fed to the IM bus which links all the chips on the digi board and the microcontroller and memory chips on the control panel. The IM bus has four lines, clock (4MHz), data, ident and reset.

This is a simplified summary of what goes on in the digital signal processing section of the receiver, but when faced with the unfamiliar it's useful to know which of these large chips does what. Note that they are all MOS devices. Fig. 2 shows the general arrangement. The digital audio data is sent from IC680 to IC670 in serial form: IC680 incorporates a parallel-to-serial converter while IC670 has a serial-to-parallel converter.

The clock chip IC610 can give some misleading results, and the memory chip IC1402 on the control panel is often the cause of trouble. As the reset and supply lines are common to all the chips on the board it should be necessary to check them at only one point – unless there's broken print. The supplies are as follows: 12·5V at DV15, 5V (III) at DV17, 8V at DV16 and 5V (II) at DV18.

FAULTS LISTS

We'll conclude this article with faults lists for the three chassis that have been covered in the series.

Compact 80R Chassis

Dead set: Check C701, D712 and D714.

Dead set with electronic fuse in operation, works when this is overridden: Check C703.

Dead set, electronic fuse in operation: Line output transformer faulty or a short across one of the supply lines on the secondary side of the chopper circuit.

No picture: Lack of the sandcastle pulses at the decoder chip because of field collapse or failure of T401 (BC238B).

Excessive width: EW modulator driver transistor T536 (BD135) short-circuit.

Monoprint B Chassis

Dead set: Check D733, IC701, R715, R721, D702.

Dead set, tripped: Line output transformer faulty or a short across one of the supply lines on the secondary side of the chopper circuit.

Dead set, primary side of the power supply o.k.: Check D733 and C734.

Set appears to be in standby but the e.h.t. is present: Check C772.

Set is stuck in standby: Check C715.

Intermittent dead set: Check pins of chopper transformer.

Poor starting: Check C701 and C707.

Low h.t., set runs but no e.h.t.: Line output transformer defective. Look at the line output transistor's collector waveform. If ragged with lots of spikes the LOPT is suspect.

Cuts out, intermittently looses channel memory: Replace 5V regulator IC1405.

No on-board control: The keypad may be defective. Cleaning it may cure the fault.

No teletext, though the indicator comes on when teletext is selected, and channels won't change: Replace the DPU2540 chip on the teletext panel.

Digi-3 Chassis

Dead set: Check the chopper transistor T742. A defective DPU2540 deflection processor chip can drive the chopper/line output stage at the wrong frequency with the result that the power supply shuts down.

Dead set, h.t. very low: C535 (1nF) short-circuit.

Dead set, chopper transistor blows: Change all the bridge rectifier didoes (D703-6).

Dead set, R519 burnt up: Replace D513 (BY448).

Dead set, tripped: Check the rectifiers that produce the ±13V supplies (D547-8).

Dead set, line output stage fault: Check for shorts across the secondary supplies before condemning the line output transformer. Disconnect the scan plug to check the power supply.

Dead set, electronic fuse in operation: Various faults that load secondary circuits will activate the electronic fuse, i.e. faulty field or audio output chips or digi board faults.

Intermittent tripping: Check the value of R754 (160kΩ).

Poor starting: Replace C714 (10µF).

Intermittent standby: Check the 5V regulator (IC1405) on the control panel.

No picture or sound, e.h.t. present: D771 short-circuit.

Field faults: Can be caused by the 5V regulator chip IC771 (L78S05CV).

Unlinear field scan: Replace the 6·8V zener diode D411.

Picture shifted downwards: Another fault that can be caused by the 6·8V zener diode D411.

Line at top of screen: Replace R431 (330Ω).

Line phase faults: C209 and C234 in the h.f. module, also dry-joints in this module, will cause apparent line timebase faults.

Intermittent loss of remote control operation: Check T1410 (BC238C) on the control panel.

Intermittent loss of colour: Replace the MCU2600 chip IC610.

Incorrect colour: IC630 (PVPU2200) or crystal X610.

No colour: Memory chip on the control panel (IC1402).

No picture or sound: Was caused by the video switch chip IC3004 on the interface/audio output panel.

Weak picture: Was caused by T1013 (BF493), one of the feedback transistors on the tube base panel.

Poor resolution: Can be caused by the VCU2100A codec chip IC650 on the digi board.

Blank raster: Can be caused by the VCU2100A chip IC650 on the digi board.

No tuning: Likely to be caused by the MEA2901 tuner interface chip IC1403 on the control panel.

Noisy picture, low gain: Can be caused by the memory chip IC1402 on the control panel.

No tuning, channel display o.k.: Microcontroller chip IC1401 faulty.

No text: Can be caused by failure of D403 (1N4148).

Corrupt text: IC640 (TPU2732) faulty.

Text information displaced: IC640 (TPU2732) faulty.

Horizontal lines on the picture: The MEA2901 tuner interface chip IC1403 on the control panel faulty.

Picture unstable: Deflection processor IC620 (DPU2540) faulty.

Most sound faults: The APU2400E audio processor chip IC670 faulty.

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Further Confessions of a TLO

Mark Paul

"Look mister, whatever your name is." She paused.

I gave her my name again.

"I don't care what you say, get this bacon off my television" she continued.

Her plea did not refer to a new low in the trade, a high street shop that sold consumer electronics as an adjunct to being a butchers. Rather it was an emotional cry from the heart of a customer whose TV set was suffering from amateur radio interference. Before I could reply there was another outburst.

"Look. I've written to him, the Troublevision repair man has checked the set, and I've even had two government men around checking for radiation and leakage. This is the end. I've reached my limit.

She left and went upstairs, leaving me alone at the living room window. I was in a modest semi-detached house in a leafy suburbia, looking out with hatred at the cause of my problems – a 20ft mast with a crosshatch array of Yagis, reflecting dipoles, dishes, rods and whatever else could possibly be attached. The whole assemblage of bits and bobs cast a long, ominous shadow, even with a late morning sun, across the back lawn and straight into the house. As I looked, the gantry slowly started to rotate towards me, as if reading my mind. I shook my head. Reading far too much Asimov, I thought. Yet there it was, fascinating to behold as it slowly swayed on its mount, a monster-like Meccano set gone mad.

It seemed to me that life can be very lonely for a TLO. What was I doing here anyway?

Angelique

The phone had rung the evening before. It was Head Office. The all-important Customer Relations Office, which is linked with that other world of crazies, Marketing Department.

"Hello there, this is Angelique Matthew-Henry here". Where do they get these names, I thought to myself. "Look" she continued, "we've got this customer having a bit of a problem with interference from somewhere on her television."

"What kind of interference?" I asked.

"You know, lines on the picture stuff. Probably only aerial trouble. McGurgle's the name and she thinks it's to do with a butchers next door – at least that's what I think she meant. She was a bit excited when I spoke to her."

"You mean something like thermostat interference" I suggested.

"That's it! Probably faulty switching."

This was all I needed, an Angelique telling me there was a faulty thermostat. She wouldn't know one from a hen.

"So what do you want me to do?"

"I think you'll have to play it by ear when you get there."

Wonderful. A great help.

"Out of interest, where is 'there'?"

"Redcar in Yorkshire. Not far from you really. I promised the customer you'd be there tomorrow."

'Not that far really'. Had she no sense of geography and distance?

"I've spoken to the Interference People" she continued. "They'll send someone along to be with you. The dealer has also been contacted and says he will be present. Please send us a report on the outcome for our files. Byeee."

Where do they come from I asked myself. Surely genetic engineering is not that advanced...

On the Day

It had been a long drive, of over 200 miles, which had meant an earlier than usual start – always a painful experience. And I was now beginning to feel the effects as I gazed out of the window.

Reality came back with a sudden loud noise as the living room door burst open. As I swung round I caught my first sight of Mr McGurgle.

He probably looked worse than he was. At least that was my earnest hope at the time as, with a smile, I stretched out my hand and introduced myself. He stood there like a mountain, at least 6·5ft high. As he took my hand it disappeared inside a mass of calloused flesh. I considered myself lucky to get it back again.

While I was taking in this spectacle Mrs McGurgle was moving about excitedly, giving in a garbled fashion a potted history of the events to date. She regularly pointed wildly out of the window at the cause of her discomforture, referring to it in language that even Rab C. Nesbit wouldn't recognise.

I wondered whether Mr McGurgle would like Angelique's home phone number. For a brief moment I let my mind wander down dark avenues of thought as I considered what I would do if I ever got out of this alive.

Mr McGurgle glowered at me, then at the TV set, then at the mast and finally at his wife who was waving her arms about and carrying on remorselessly. He simply bellowed "shut up, woman".

This sort of direct approach in such a situation can have a very positive effect, breaking the tension and sharply focusing everyone's mind on the current problem. I decided to move slowly towards the door.

En route I was arrested by Mr McGurgle who addressed me with a stare. "All right, what's the score?" He was a man of few words.

I explained, gently, that as the manufacturer's representative I was on this bright-light mission to give whatever assistance was necessary to the dealer who, by the way, was in a better position to accept any legal proceedings under the Sale of Goods Act. But any such action would be unnecessary, as he would sort out the problem once he arrived with the engineers from the DTI.

As I finished this little presentation there was a sudden gust of wind that whistled and moaned through the swaying gantry. We all turned and looked at the common enemy. This brief pause in the proceedings was interrupted by the chiming of the front door bell.

Visitors

The now calmer Mrs McGurgle disappeared into the hall to open the front door for the visitors. Mr McGurgle and I fell silent as we waited expectantly for the next phase in the drama to start.

"Mrs McGurgle?" a man's voice enquired. A very smooth and confident voice.

"Yes."

"Good morning. I'm Nick the Greek from Troublevision, come to have a look at your television. I believe you met these two men on their previous visit."

"Hello again Mrs McGurgle. Still got trouble then?" said one of the 'government men' in a fatherly tone.

The outside door closed and the three men entered the lounge, to be confronted with the presence of Mr McGurgle. Mrs McGurgle came in behind them and almost collided with their collective backs as they came to a halt.

"This is my husband" she volunteered.

There was a frozen moment of time as the little group took in the situation. The body language of all three visitors clearly indicated that this would be the right time to take early retirement. But the moment of tenseness passed quickly, and Nick the Greek was once again wearing his 'double-glazing' smile.

"Mr McGurgle, I'm Nick the Greek from Troublevision." He thrust out his hand, to be encompassed by that massive paw.

"And my name's Cranford" a tall government man said, "and this is Mr Manners", pointing to his frowning and much shorter colleague, "but please just call us Mutt and Jeff." He finished with a strained smile. I noted that neither of them offered his hand. Chickens!

I introduced myself to them and laid the ground rules for the game by saying that 'we' were sure that between them 'they' would be able to solve the problem.

I must break in here to explain things to all you aspiring TLOs. In my experience it's always good practice in such a situation to be seen as fully identified with the customer and his needs as quickly as possible. Being one with the customer polarises the relationships and produces the following advantages:

(1) The 'real enemy' is registered in the customer's mind and stays that way whatever the future developments.

(2) Your company gets the kudos for a successful outcome while the now recognised enemy gets kicked in the event of failure.

(3) The TLO-to-customer bonding thus established generally produces a cup of tea and improves your self-preservation count.

Nick didn't know quite how to take this pronouncement of mine. His fading smile showed that he knew something had happened, though he couldn't put his finger on it. Mutt and Jeff just grunted.

Down to Business

Things then got gown to business rapidly. Under the watchful eye of the McGurgles, with whom I was sharing a mug of tea, there was a confab followed by Jeff leaving the house to head for the Ham's shack to co-ordinate the investigation from there. Nick tried to look busy by switching the set on, cycling through the channels and producing a circuit diagram.

A few minutes later there was a crackle and hiss from the little walky-talky that Mutt held in his hand, with a voice that sounded vaguely like Jeff's.

"Mutt? Over."

"Read you Jeff. Over."

"Preliminary checks on equipment and installation seem good. Rigg impedance matching normal. Harmonic radiation within spec on analyser. Equipment leakage acceptable. Frequency counter verifies accuracy of crystal control. Equipment earth-bonding to water pipe good. Double screening on sensitive bits. Ham's licence o.k. Over."

I was watching Mrs McGurgle who seemed to twitch at the technical phrases. Mr McGurgle looked mesmerised.

"Ask the Ham to start transmitting. Over."

Almost immediately the picture broke up, with complete loss of sync and a very heavy superimposed pattern. The loudspeaker tried desperately to say something, but only an odd noise came through. Mrs McGurgle, witnessing her bane, went into the beginnings of another fit.

Mutt took command of the situation. "Is this the problem you're having, Mrs McGurgle?" It was hardly a tactful question

From the corner of my eye I saw Mr McGurgle shift his position, his hand gripping tighter the now empty mug. To delay the missile launch I asked soothingly "does it happen on all channels?" Mutt blinked and returned to the task in hand.

"Jeff. Tell the Ham to keep transmitting on that frequency, then come over here with the gear. Over and out."

With the return of Jeff things began to heat up. Mutt and Jeff started the ritual of trying to capture the unwanted signal. As we sat there watching – by now Nick had joined me and the McGurgles on the settee with a second mug of tea – we felt a sense of awe. The two men raced around the television set, fitting then removing various traps, aerial braidbreakers, stub filters and so on. The receiver was moved first this way then that. There were ferrite rings, large and small, on the mains lead, the extension speaker leads, the aerial lead and the scart lead. After each manoeuvre both men would pause and stare intently at the screen.

Time went by. The speaker still produced a choked-off rasping noise. and the picture was still buried beneath moving lines. The government men were beginning to slow down.

As I viewed the scene before me I couldn't help feeling a shade uneasy. The area around the television set, which was now positioned near the centre of the room, looked like a cross between the Battelship Galactica and a plumber's merchant. But what really brought the situation to a critical state was when Mutt asked Mrs McGurgle is she had a roll of baconfoil he could use.

Mayhem

All mayhem then broke out. Mrs McGurgle jumped up and started to shout, gesticulate and question the parentage of the 'bacon'. Mr McGurgle rose slowly from where he was sitting and, with the determination of a man who has a plan, strode over to Jeff who was trying yet another filter. With one hand he gripped Jeff's lapels, lifted him bodily away from the television set and dumped him on the settee next to me. He then threw into the garden, through the window which was open behind the receiver, adjustable traps, breakers, ferrite rings, leads, tools, equipment and anything else he could lay his hands on – all the while muttering threats of murder.

Nick from Troublevision felt that he had a duty to protect the receiver, which was on rental, and stood over it like a dog guarding his bone. Cool I thought.

Mutt was half-heartedly trying to get Mr McGurgle to desist. He oscillated nervously between the window and the door, not knowing which way to go as the noise of crashing equipment continued.

I sat there on the settee, still holding the half empty mug of tea, like an island of peace amidst the stormy sea. Mrs McGurgle was in a frenzy, while Mr McGurgle was totally absorbed in the task of ridding his home of all intrusive technology. Mutt held his face in his hands and was ready to weep as his prized technology was being scattered across the wet earth. Jeff, who had been beneath the set, attempted to rescue his precious rings before they whizzed out of the window. Nick, with his circuit diagram tucked under one arm and one eye on Mr McGurgle, was struggling to lift the receiver off its stand to safety.

Ah me! Such is life I thought as I rose and laid down my mug, saying my goodbyes – which no one heard – as I left. "Play it by ear" she had said!

TV Fault Finding

Reports from Philip Blundell, AMIEIEE, John C. Priest, David Chaplin, Dave Mackrill, Glyn Dickinson, John Edwards, David Belmont, Michael Dranfield, Tony Ashworth, Keith Evans and Terry Lamoon

Philips 26CE2080/05T (2A Chassis)

Other engineers often bring me one of these sets with the following 'fault' condition. The set is dead, and if the power supply is run up with a dummy load the bulb lights then gradually dims and goes out. What they've usually done is to fit the wrong degaussing thermistor. Sets fitted with 110° tubes require a dual-thermistor that consists of one positive and one negative temperature coefficient element. The correct part no. is 4822 116 40033. **P.B.**

Mitsubishi CT2155

If the picture has horizontal bars superimposed on it check around the 12V regulator IC902 for ripple. You'll probably find that C920 (470μF, 25V) has dried up. **P.B.**

Philips CP110 Chassis

For ragged verticals check C2633 (100μF) by replacement. It decouples the supply to the line driver stage. **P.B.**

Panasonic TC2622 (U3W Chassis)

The complaint about this set was of persistent intermittent field collapse over a long period of time. The underside of the main PCB certainly showed evidence of much previous work in the area of the field output transistors Q402/Q403 and the jungle chip IC501. As flexing the heatsink plate on which the field output transistors are mounted momentarily restored full scan the relevant area of print was desoldered with braid and cleaned up and major components in the area were removed, scraped and tinned. Then everything was refitted. A general check of the print was carried out, using a strong magnifier and lamp, and any doubtful areas were resoldered.

On test the symptoms were exactly as before. Voltage checks again showed that under the fault condition the field output pair of transistors were not conducting, though drive was present at pin 9 of IC501 and all relevant resistors measured correctly. To cut a long story short, the lower transistor (Q403) of the output pair had an intermittently open-circuit base-emitter junction. With a meter clipped across the transistor's base and emitter pins, while it was out of circuit for diode checks, a pull on the base pin opened the connection. Releasing the pin restored the reading. A new 2SD837 restored permanent field scanning. **J.C.P.**

JVC AV21F1EK (JX Chassis)

Our field engineer found that this set would come on for ten seconds, with the LEDs lit but no raster, then go off again as a result of the operation of the power supply protection shutdown circuit. As he could find no shorts in the power supply or the line output stage he uplifted the set for workshop attention.

With the set on the bench the preliminary findings were first confirmed then plug R on the power supply panel was disconnected to isolate the 127V feed to the line output stage. A 60W bulb was fitted as a dummy load instead. On test we found that the h.t. supply rose to 123V before the power supply shut down. When plug Q was removed, disconnecting the 27V feed to the audio PCB, the power supply came on and stayed on. When the dummy load was disconnected there was a normal picture. A new TA8216AH audio power amplifier chip (IC801) cleared the fault. **J.C.P.**

Ferguson TX90 Chassis (20in version)

This set would intermittently display a narrow, rippling picture. When the fault was present the h.t. was low and the set-h.t. control RV224 had no effect. Inspection showed that heat had darkened the PCB in the vicinity of the boost regulator circuit. More to the point, the track between diodes D112 and D114 had cracked. When the track had been repaired the h.t. was reset to 115V. All was then well. **D.C.**

Grundig P55-245 (CUC2401 Chassis)

Sound but no picture, with a smell of burning, was the report on this set. The owner said that a new mains switch had recently been fitted. We found that the previous repairer hadn't tied back the twin lead that conveys the mains voltage to the main PCB. It was lying alongside the line output transformer's e.h.t. overwinding. As a result there had been arcing, and both the lead and the transformer had subsequently burnt. A new LOPT had to be fitted. All the leads were properly dressed well out of harm's way. **D.C.**

Huanyu 37C3

The chopper transformer whined: otherwise the set was dead. A check showed that the full h.t. reached the collector of the line output transistor. We eventally found that L782, which is in series with the line output transistor's emitter connection, was dry-jointed. **D.C.**

Pye 68KE3985/05M (Philips CP110 Chassis)

This set is used, with a VCR, in the lecture theatre of our local D.G. hospital. The lecturers had complained that there was a loud whistling once the set had warmed up. Hot-melt glue on the line linearity coil ensured silence. **D.C.**

Hitachi G8Q Chassis – Warning

In this chassis the mains bridge rectifier's reservoir capacitor C906 (220μF, 385V) retains a heavy charge for several days. If the power supply isn't working it charges to the usual 300V or so. With normal operation this drops to around 170V. Before cold testing or carrying out any resoldering C906 should be discharged, using a 1kΩ resistor –

otherwise you may soon regret not having done so.

If you are lucky, you'll receive only a nasty shock. But if, for example, the pins of Q902 (SGSIF344) are momentarily short-circuited a small spark can occur. This may damage the UC3844 chopper control chip IC901. If power is then applied without replacing this chip fuse FS901 may blow together with Q902, ZD901 (BZX79-C27) and D905 (BYD33D). Guess how I found out! **D.M.**

Philips CF1 Chassis

Rolling was the complaint with one of these sets. There was in fact lack of field sync, as the picture could be made to roll down or up. Most of the sync processing is carried out in the TDA2577A chip but, since this chip is becoming hard to obtain, we decided to check any relevant peripheral components. R3379 and C2377 form the field sync pulse integrator: when checked C2377 (10μF) was found to be almost open-circuit. **G.D.**

Sanyo CTP7132 (80P Chassis)

If the 2SD871 line output transistor has gone short-circuit, replace C312 (10μF) in the power supply and check the other two small electrolytics before switching on again. Also clean the line hold control (under the control flap), as little fingers twiddling this often lead to failure of the line output transistor. If the latter fails again at switch on, the line output transformer is suspect. If a picture does appear it will probably be slightly out of focus. The transformer is again to blame – the tubes have a long life in these sets.

The cause of field collapse is usually the 2,200μF field scan coupling capacitor C445 going open-circuit. **G.D.**

Matsui 14/16/2060

Intermittent sound is a very common fault with these sets – though it never seems to occur in the workshop! The cure is to remove connector JA03 on the audio/AV switching PCB, throw it away and solder the wires directly to the panel. **G.D.**

Alba CT744

The line output transformer in these sets has a short life. Replacements are quite cheap, but beware! If the overwinding has broken down lots of volts will have been sent down the beam limiter and contrast control lines. In one case we had to replace R425 (0·68Ω, 1W), R435 (10kΩ), R383 (220Ω), IC301 (TA7698AP), R419, R424 (10kΩ), D302/3/4 and D409 (all 1N4148) as well as the transformer. All this after we'd given an estimate!

To avoid the same mistake, check closely around the LOPT and the colour decoder chip for burnt resistors. **G.D.**

Matsui 1422

The cause of a dead set or a buzzing power supply is almost always C617 (4·7nF, 1kV), a blue disc ceramic capacitor. Also check C612 which lives next door. Faulty ones will have started to crack, but this isn't always visible with the component in situ. It's easy to mistake this fault for an overload in the line output stage. The surge limiter resistor will fail if the set is left on. **G.D.**

Hitachi G6P Chassis

This set refused to do anything other than produce a snow-filled raster. Operation of the remote and manual controls had no effect, and there were no on-screen graphics. So we carried out checks around the M50432551SP microcontroller chip IC1101. There were normal scan pulses when commands were present, a 4MHz clock signal was present at pins 33 and 34 and there was a ripple-free supply at pin 42. But there was no movement at any of the data output pins. So there was nothing for it but to replace the chip. Fortunately the set was happy with its new brain and burst into life – I didn't even have to tune it in. **J.E.**

Saisho CM16R

This set was dead with the standby indicator on. A replacement STK7308 chopper chip (IC501) restored normal operation. **J.E.**

Philips 2A Chassis

There was normal sound but just a blank screen. When the first anode control was turned up there was a full raster with flyback lines. Scope checks around the TDA3561A colour decoder chip IC7300 showed that there was a video input at pin 10 but no RGB outputs at pins 12, 14 and 16. A new chip restored the picture. **J.E.**

Toshiba 255T7B

We found that the line output transistor Q404 (ON4408) was short-circuit, the cause being dry-joints at plug/socket 570. Intermittent field collapse is another fault you get because of dry-joints at this plug. **J.E.**

Boots CTV1417R

This set was dead apart from a squealing power supply. The cause of this was the 2SD1426 line output transistor which was short-circuit. When a replacement was fitted the set came to life but there was no sound and a blank screen. So we turned up the first anode preset and found that there was field collapse. R234 (47Ω) was discoloured and charred though it measured all right. Its distress was caused by a short-circuit 12V zener diode (ZD212). The set worked normally when we'd replaced these two items. **J.E.**

Solavox 141

There were no signals, just snow. A check showed that the tuning voltage was missing at pin VT of the tuner. We didn't have a circuit diagram, but as the tuning and channel preset circuitry is on the front vertical panel this seemed to be a good place to start. As luck would have it there was a very sad looking 470kΩ resistor (R010) – the colour bands could just be recognised. It read open-circuit and on fitting a replacement the set's tuning was restored. **J.E.**

Hitachi G6P Chassis

One of these sets would sometimes fail to start up from standby at switch on. The cause was a dry-joint at R1172 (1kΩ), which is connected between pin 38 of the microcontroller chip IC1101 and the collector of Q1103. To come out of standby at switch on, Q1103 momentarily connects pins 2 and 38 of IC1101. **J.E.**

Decca/Tatung 130 Chassis

The picture displayed by one of these sets looked as if the contrast or the tube's emission was low. We traced the cause to R425 and R426 (both 68kΩ) however. They are in the beam limiter circuit and were both open-circuit. **D.B.**

Hitachi C2564N

A crackling noise from the speakers was the complaint with this set. The cause was traced to IC4010 which was intermittently giving a low-voltage output. **D.B.**

Hitachi C2519R (G8Q Chassis)

One of these sets lost its green picture content intermittently. The cause was a defective green output transistor. As we didn't have the BF459 in stock we replaced all three RGB output transistors with BF462s. **D.B.**

Philips 14GR1021 (GR1-AX Chassis)

This set was dead with no line drive. We found that the small choke (L5524, 1·5mH) in the supply to the line driver stage had failed. It's fitted by the side of the line output transformer. One taken from a scrap set cured the fault. **M.Dr.**

Ferguson TX90 Chassis

Here's a quick summary of various faults we've had:

Field collapse or linearity faults: Replace D106 if leaky. Its type varies between different models.

Bad ripple on picture and hum on sound: Check the 12V regulator IC105's output. This must be spot on at 12V. If not, replace it.

Ragged verticals, condition improves if the brightness/contrast is reduced: Replace C189 (22µF, 50V) in the power supply. It dries up.

Intermittent failure of R4050 (Model 20E1): Check/replace TR107, TR108, D112, D114, D110 and R267 in the power supply, D113 and D125 associated with the line output transistor, and check for dry-joints at the line scan coupling capacitor C193. This last item may have changed value because of heating and thus be in need of replacement.

Field collapse or partial collapse with no video information displayed: Check at the collectors of the RGB output transistors to see whether the supply contains line-frequency hash. If line ripple is present here replace C190 (22µF), the reservoir capacitor for the 175V supply. In addition to powering the RGB output transistors this supply is used to bias the field output stage.

No colour: Disable the colour-killer by fitting a shorting link across R156. If this produces unlocked colour bars, check whether R171 (270kΩ) is open-circuit.

Dim picture, the contrast and brightness controls having no effect: The beam limiter is operating. Check whether R233 (470kΩ) is open-circuit.

No signals: Try changing the SL1432 SAWF driver before condemning the tuner. **M.Dr.**

ITT Compact 80R-DSP Chassis

The power supply was running at the wrong frequency, with a loud whistle and all the output voltages low. We thought we'd cured this one by resoldering the pins of the little feedback pulse transformer Tr712. Two weeks later the set bounced, with the same fault. This time the transformer had to be replaced. We assume that the resoldering heat the first time round had temporarily healed a defect within the transformer. **M.Dr.**

Hitachi C2574TN

There was a faint purple band through the picture, noticeable only on very dark scenes. The cause was ringing in the chroma delay line (DL501) – scope checks showed that the band was actually a reflection of the burst signal. The cure was a new delay line, part no. 2164051. **T.A.**

Matsui 2092T

The cause of a set which is slow to start from cold or completely dead is usually R507 (1MΩ) in the power supply. For added reliability R506 (820kΩ) should also be replaced. **T.A.**

Sony KV2972U (AE2B Chassis)

Random on-screen display characters would appear on the picture. By swapping over panels with a working set we found that the cause of the fault was on PCB M2. A look at the circuit diagram showed that the on-screen and teletext displays originate from the SDA5273P chip IC2002. A replacement (part no. 875926258) cured the fault. **T.A.**

Matsui Remote Control Units

A problem has arisen recently with several Matsui TV models. During production a number of changes were made to the basic chassis, including two different types of microcontroller chip. This can create a problem should the remote control unit have to be replaced, as the two chips operate with different codes. The chips can be easily be identified by the fact that the OEC1021A or B has 64 pins while the OEC6021A, B or C has 42 pins.

Before ordering replacement remote control units for these sets, always find out which type is required by checking the microcontroller chip type. Alternatively if the old RC unit is available you'll find its part number printed at the bottom right-hand corner of the fascia. The following list shows the type of RC unit required for each set. **T.A.**

Model	*IC type*	*RC part no.*
1476	OEC1021A orB	076L067040
	OEC6021A	076L078040
1492	OEC1021B	076G047210
	OEC6021B	076R077080
2076R	OEC1021B	076L067140
	OEC6021C	076L078020
2092T	OEC1021B	076G047240
	OEC6021C	076R077070

Toshiba 1400TBZ

When the channel was changed this set would display a picture for a fraction of a second followed by a blue screen. After checking all the inputs to the M34300-583SP microcontroller chip ICA01 I decided to replace it and was pleasantly surprised to find that the fault had been cured. The chip's part no. is 23319016. T.A.

Beko 10214

This Turkish-made portable suffered from a field fault: the picture had shifted downwards in the raster, a bright glow coming from the top of the screen. Any attempt at adjusting the vertical shift control simply blanked out the screen. The cause of the fault was R725 (150kΩ) which had risen in value to around 240kΩ. T.A.

Toshiba 2505DB/2805DB

We've had this fault several times now. On the first occasion the customer complained of intermittent loss of signals accompanied by a blue screen (mute mode). He said that the fault occurred after five minutes, but it actually took three hours to appear. I was able to instigate the fault by carefully tapping the tuner. As I didn't have a replacement tuner I decided to attempt a repair.

I removed the tuner and used a magnifying glass to examine the soldering. The crystal in the pre-scaler circuit appeared to be dry-jointed. Resoldering it cleared the fault. T.A.

Samsung CI5013T (P58SC Chassis)

Stuck in standby was the complaint with this set. Checks in the power supply revealed that the 16·5V and 12V outputs were missing. As these are switched on by the system microcontroller chip RIC01 we checked here and found that the required switch-on voltage was missing. Unfortunately the service manual is of little help in this connection as there are no voltages or waveforms. Since microcontroller chips are expensive and seldom fail we decided to persevere with our blind investigation in this area.

The two most important things for the operation of such a chip are its 5V supply and the clock signal derived from an associated crystal. The 5V supply was o.k. Replacing the 10MHz crystal put matters right. K.E.

Sanyo CBP2152

On occasions one of these sets would fail to come out of standby. It also suffered from disturbance on the picture and random channel changing. After fruitless checks in the power supply we decided to take a look at the army of zener diodes between the front panel 'tac' switches and the system microcontroller chip. By disconnecting each one it turn and watching the results we found that D746 was the culprit. A new 6·2V zener diode restored correct operation. K.E.

Matsui 1420A

If the problem with one of these sets is intermittent field scan, check for cracks near the line output transformer, where the securing lugs go through – especially near R437 and D409. This is becoming a common problem. T.L.

Hitachi C14-P216 (G7P Mk 2 Chassis)

The complaint with this set was that it went off after twenty minutes to half an hour. Sure enough, that's exactly what it did. After removing the back I did the technical tap bit. This revealed a perfect dry-joint at capacitor C711, the reservoir capacitor for one of the supplies derived from the line output transformer. Resoldering it cured the problem. T.L.

Pace SS9000 Series Modification for Use with the Global ADX Plus Frequency Converter

Nick Beer and Ian Bowden

Many satellite receivers produced up to last year are not able to tune to the Astra 1D transmissions. In many cases the quality, lack of features and poor reliability of such sets means that replacing them is no great hardship. The Pace SS9000/9200 ranges however are superb receivers that many would like to keep.

Global Communications has produced a box of tricks to facilitate this. The original Global ADX frequency converter has been available for some time now. To get full coverage of the Astra 1D channels you really need to use an enhanced LNB with a 9·75GHz local oscillator instead of a standard LNB with a 10GHz oscillator. This means two things. First, obviously, that the tuning points will shift up by 250MHz, with the result that the display for each channel will be that much out. Secondly that with most receivers the upper Astra 1B channels, such as UK Gold, will be lost above the tuning range.

To overcome this latter problem Global has introduced the ADX Plus converter. With a standard 10GHz LNB it operates in exactly the same way as the ADX, shifting the 1D channels up by 500MHz into 1A space. It has to be switched in or out therefore, depending on which channel is required. This is done either by operating the switch on the front of the unit or by remote switching, which with some receivers can be achieved by connecting the black wire from within to pin 8 of the satellite receiver's TV scart or D socket and then, in the case of the Pace models covered here, using the TV/Sat button for switching.

If the ADX Plus is configured (by means of an internal switch) for use with an enhanced 9·75GHz LNB, Astra 1D upconversion is no longer required. When switched in, the ADX Plus now downconverts the 1B channels. This means that when tuning the receiver the 1A, 1C and 1D must be tuned in at +250MHz and the 1B channels at –250MHz. Then, every time a 1B channel is required, the ADX Plus must be switched in. When in use a red LED at the front comes on.

Thus the problems with day-to-day operation of our receivers that are equipped with the ADX Plus are twofold. First the customer must identify the 1B channels and press the TV/Sat button. This is a rather cumbersome procedure to say the least. Secondly when this is done the audio and video outputs from the scart socket will be lost – which is a problem when the customer uses this connection for stereo sound.

Automatic Switching

We felt that it ought to be fairly simple to make the switching automatic on channel change, i.e. program the switching for each preset via the menu. This can be achieved as long as the MAC-AUX decoder facility isn't required.

The circuit we designed uses the MAC switching line from the microcontroller chip. Unfortunately this is inverted to drive the load in the receiver, working the wrong way round for us, i.e. low for on. What we want is to take this line to pin 8 of the TV scart socket and arrange for it to go high to switch on the ADX Plus converter. We could have done it the other way round, but this would have meant setting all the non-1B channels to MAC via the menu's baseband option. As there are more 1A/C/D channels it doesn't seem logical to have to set them all to MAC. So we adopted the circuit arrangement shown in Fig. 1, using a DTC124 digital transistor to switch between 12V and chassis (0V). The switching thus operates in the preferred manner. We also arranged for permanent output from the TV scart socket by putting a positive voltage on the switching line.

As Fig. 1 shows, the extra three components required can be easily fitted by making use of very conveniently placed links provided by Pace. The whole job can thus be done by opening up the receiver and removing the VideoCrypt decoder, which can be unplugged. There is no

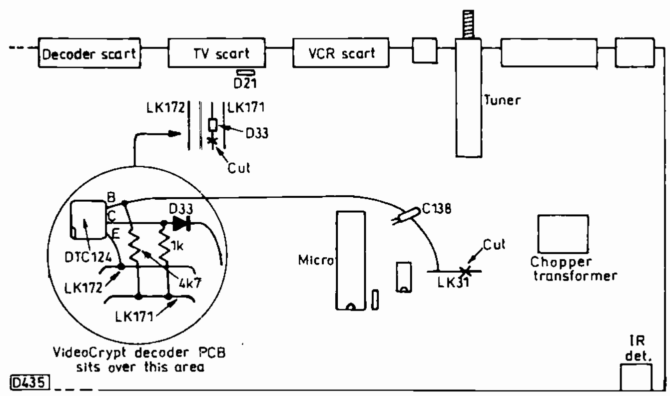


Fig. 1: Automatic frequency conversion switching circuit for Pace SS9000/9200 series receivers. Pin 8 of the decoder scart socket switches high when MAC-AUX is set on the menu.

need to remove the main PCB, as access to the copper side is not required.

Fitting the Extra Circuitry

With the receiver viewed from the front, cut link LK31. Cut D33's anode connection as close to the board as possible. Solder the emitter of a DTC124EA transistor to LK172 – endways down. Solder a 1kΩ, 0·25W resistor between LK171 and the collector of the added transistor/the anode of D33 – these two items must also be soldered together. D33 can be turned to the transistor's leg simply by slipping some sleeving over it to prevent it shorting to the adjacent link. Solder a 4·7kΩ, 0·25W resistor between LK171 and the base of the transistor, and a single sleeved wire from the latter point to the left-hand side of the cut link LK31. By routing this lead as shown, C138 can be bent over to hold it in place.

If required, the switching line to pin 8 of the VCR scart socket can be disabled by cutting the connection at one end of D21.

The single lead from the ADX Plus unit can be fed through the slot in the rear case beside the TV scart socket and soldered to pin 8 inside, or alternatively it can be integrated into the scart plug used in the socket. Naturally this switching line to the TV set should not be connected – cut the lead to the TV receiver inside the plug and isolate it.

Testing

Fit a 9·75GHz LNB, reset the tuning for the different satellites' channels as described above, set the i.f. offset and switch all the 1B channels to MAC-AUX baseband. You should then find that when changing from non-1B channels to 1B channels the LED comes on and perfect reception is obtained. The customer doesn't know the difference!

The ADX Plus retails for £25-£30. If you charge £30 or so for carrying out this modification you are still talking about considerably less than the cost of a new Pace receiver. Remember that whichever way you go a new LNB will be required.

Help Wanted

The Help Wanted column is intended to assist readers who require a part, circuit diagram 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: Lower head drum assembly (or the complete assembly if possible) for the Ferguson 3V46 portable VCR. David Woodnott, Spring Cottage, Iron Hill, Dunkirk, Faversham, Kent ME13 9PD. 0227 751 594.

Wanted: PSU and regulator boards (must be in full working order) for the Ferguson 3V43 VCR. Also full set of circuit diagrams (including the RC and text panels) for the Philips G11 chassis. Kieth Sargeant, 128 London Road, Stanway, Colchester, Essex CO3 5HD. 01206 563 471.

Wanted: Two servo and two MDA panels for the Ferguson 3V30/Baird 8930 VCR, new or used in serviceable condition. G.H. Brown, 12 Cranwell Road, Greasby, Wirral, Merseyside L49 3PP. 051 678 6183.

Wanted: Circuit diagram or service manual for the Tektronix 422 scope. V. Smith, Smith Electronics, 175 Lyon Park Avenue, Wembley, Middx HA0 4HD. 0181 902 5447.

Wanted: Service manual for the JVC BR6400TR-R industrial video recorder. R. Miller, 65 West Road, Oakham, Rutland LE15 6LT. 0572 770 038.

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

Wanted: Circuit diagram for the Sanyo Model CTP3132W TV receiver (a photocopy will do). D. McGee, 8 Lower Dunbar Street, Wick, Caithness.

Wanted: Service manual for the Matsui Model VX6600 VCR – to borrow or a decent photocopy. John Thompson, 3 Compass Road, Beverley High Road, Hull, Yorks HU6 7AH. 0482 856 034.

Wanted: Digital tuning board for the B & O 5502-8902 TV set, or a complete set of spares. Stuart Adamson, 48 Crosshill Road, Strathaven, Lanarkshire ML10 6DS. 0357 20 049.

Wanted: The small spring that's part of the loading arm assembly in the Ferguson 3V35 VCR. F.S. Yarham, 18 Ivel View, Sandy, Beds SG19 1AU.

Wanted: Service information for or help with the Vivanco video editing processor. Also a new or used line output transformer (part no. TLF14610B) for the Panasonic Model TC482. G. Steel, TJS Electronics, 185 Charter Road, Chippenham, Wilts SN15 2RF. 01249 448 796.

Wanted: Service manual and 2SC4834 transistors or equivalents for the Sony KV529MN1 multi-standard TV set. Lee Aitcheson, 36 St Paul's Road, London N1 2QW. 0171 354 3290.

For sale: Retired TV/radio engineer has for sale vintage radio and TV valves, TV tubes, radio sets, test equipment, meters etc. Also amplifiers, speakers, video spares, CB radios, professional reel-to-reel tape recorders, colour TV sets complete and spares, pre 1981. Ask for Ken or Paul, 0934 622 238.

Wanted: Handset for the Akura TV Model CX25; PSU panel for the Doric Mk 4 chassis; parts for an Hitachi VT17 VCR or a faulty machine. E.J. Edwards, 43 Hoose Court, Market Street, Hoylake, Wirral L47 5AB. 0151 632 0614.

Wanted: Line output transformer for the Matsui Model 1460. J. Currie, 9 Woodside Walk, Strathaven, Lanarkshire ML10 6HL. 01357 22 862.

Wanted: Mains transformer for the Fisher FVHP906 VCR. Justin Johns, 28 Woodland Road, Neath, West Gamorgan SA11 3AL. 01639 638 629.

Wanted: Line output transformer (part no. 37-001541-38L) for an apparently unknown portable TV set, the Aiko CT18. Mark Grogan, 46 Beardsworth Street, Blankburn, Lancs BB1 5PL. 01254 664 828 (day), 01254 264 640 (evenings).

Wanted: Remote control unit for the Dynatron 24706EK/052 24in. TV set. Serial no. of the remote control unit is RC5525. Set is understood to be fitted with the Philips 2A chassis, with teletext. F.C. Bailey, 2 Elmridge, Leigh, Lancs WN7 1HN. 01942 675 299.

Wanted: Service manual/circuit diagrams (photocopy would do) for the Canon E80 camcorder. Peter Ewens, The Service Centre, Woods Way, Goring by sea, West Sussex BN12 4QY. 01903 262 499 or 0585 205 100.

Wanted: 1986-1991 copies of *Television* and February and June 1992 and March 1993 issues. J. Roose, 16 Bois de Valbonne, F-06560 Valbonne, France. 33 93 120 872 or fax 33 93 120 404.

Wanted: Nashua YSH06 switch-mode power supply chip IC1 for the Nashua F820/Philips 3500/Ricoh fax machine manufactured around 1988-89. PCB is no. FAX-4ME-CIC. Or the power supply or a fax for spares. Any information would be welcome – parts sourcing, output voltages etc. or diagrams. Brian Nicholson, 8 Rushden Road, Bletsoe, Bedford MK44 1QP. 01234 782 268.

Wanted: PCB PC240 DIN circuit and PCB PC241 main circuit, in working order, for the Hitachi Model CPT2568. Please phone Sam on 071 232 1177 or write to Sam TV Services, 117 Francis Avenue, Ilford, Essex IG1 1TT. State your price: willing buyer!

Wanted: D.C.-d.c. converter (IC711) for the Hitachi VT35 VCR and circuit diagrams for the Amstrad TVR2, Sony KV2200UB and B and O TV Model 7433. F.O. Tester, 31 Longsands Road, St. Neots, Cambs PE19 1SS.

Long-distance Television

Roger Bunney

January was an extremely wet month in the UK, and I can only assume that it washed away the E layer! Virtually no reports (three actually) of Sporadic E reception have come in. A minor Band I event occurred on January 28th, with unidentified programming. The Quadrantids provided only a slight MS lift, and you can forget about tropospheric reception.

A letter from Robert Copeman in Melbourne, Australia offers some encouragement, though there's no established relationship between conditions in the northern and southern hemispheres, i.e. it doesn't follow that if they have a good SpE season we will subsequently. There have been good SpE openings on most days during the current Australian season, with signals at up to Band II f.m., Samoa ch. A2 and most of the usual New Zealand low-band stations. Thank goodness that here in the UK satellite reception can offer us a wide variety of interesting signals.

For the record the 16:9 aspect ratio PALplus test pattern we illustrated recently in use by BRT (Belgium) is provided by the Philips PM5644/85 test pattern generator.

Interference

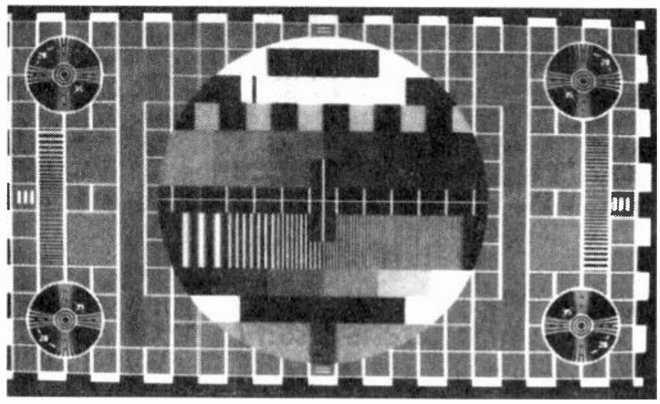
Interference is an increasing problem in the v.h.f. bands, particularly in built-up areas. At my own location office equipment, 49MHz baby alarms, thermostats, ignition and radiation from domestic items such as VideoCrypt decoders are all toublesome. Only channels E3/R2 and E4 can now be received – with background noise. As more of the spectrum is released for low-power devices, mobile and fixed communications etc. so the difficulties will intensify.

Band III also suffers, with PMR networks, and new domestic electronic devices are causing problems at u.h.f. The RSGB's EMC committee reports that the DTI has allowed a low-power device band at 433MHz. Appliances that will make use of this band include radio car keys for locking/alarms, garage-door openers and suchlike. One radio amateur investigating u.h.f. hash found that the Response Electronics RE3000 security alarm includes a super-regen u.h.f. receiver that produces radiation peaks every 820kHz, spreading both h.f. and l.f. and into the group A section of TV Band IV. Another amateur reports interference from a garage door opener – the Stanley Door Systems Model 1045. The receiver, operating at 173·3MHz, was picking up v.h.f. paging transmitters between 138-153MHz and re-radiating them at various points across the v.h.f. and u.h.f. bands.

These reports highlight the increasing problem of interference to TV reception. It's not getting any easier. We'd be interested in hearing from anyone else who has experience of or has any observations to make on the subject of interference intrusion.

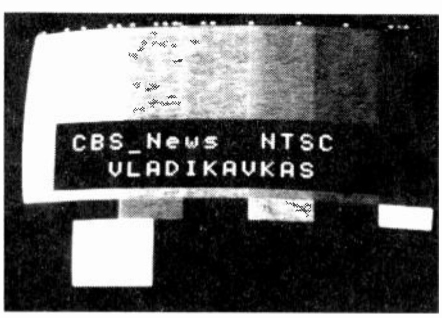
Satellite Sightings

Several readers have written to say that BBC World is now available via Eutelsat II F1 at 13°E (11·619GHz with mono audio at 6·6MHz, stereo audio at 7·02/7·2MHz). The signal quality is excellent – it cannot be missed. The new European Union channel that broadcasts the various proceedings of this organisation live is available via Eutelsat II F2 at 10°E. Tune to 11·084GHz horizontal: mono audio is at 6·6MHz with other carriers at 7·02MHz; 7·2MHz; and 7·38/7·56MHz Wegener Panda 1. Most of the meetings are in the afternoon: at other times a scrolling caption sequence lists events during the week ahead.



The 16:9 aspect ratio PALplus test pattern produced by the Philips PM5644/85 pattern generator.

Donald Lymn notes that the Microsoft programme via Intelsat K at 21·5°E, on the first and third Tuesday of each month at 1430 GMT, tends to change from one transponder to another. The early January transmissions moved from transponder 21 (used in December) to transponder 18. The programme content consists of various aspects of Microsoft software and its office use. Ian Waller reports that transmissions from the TV Sat craft at 19°W have ceased: it is thought that the craft will be sold to Sweden and moved to



Left: The events in Chechyna have produced many news feeds such as this 525-line SNG insert via Eutelsat II F3. This satellite's footprint just reaches the UK, where a 1·5m dish will produce noisy images. Centre: An RTL/TV1 test transmission via Telecom 2B at 5°W, using PAL. Right: Merry Christmas from the Reuters news team in Moscow via Eutelsat II F4 at 7°E. This is a sound-in-sync signal, stabilised by using a sync inserter.

the vicinity of 1°W to provide spot beams for Scandinavia.

January was an eventful month for satellite news feeds. The massive earthquake that devastated Kobe occurred on the 17th. Reuters relayed the first pictures via its usual 13°E broadcasters' feed. They came from a locked-off surveillance camera and showed the office suddenly shaking and furniture crashing about. The full magnitude of the disaster was apparent via many NHK feeds to Europe during the following days.

One reader was shocked by the coverage of the double suicide bombing in Israel on the 22nd. There were also reports from news teams on the battle for Grozny.

While monitoring the news from Israel via the Eutelsat circuit I noticed the caption "ABC Amman" on colour bars. This wasn't the US broadcaster but the Middle East bureau of the Australian Broadcasting Commission (confirmed by a later caption).

There have been new sightings via Eutelsat II F3 at 16°E. The Hungarian channel Duna TV is using the 11·596GHz horizontal transponder, while programmes uplinked from the Ukraine are present via the Slavenski Channel at 11·580GHz vertical. Our thanks to Roy Carman for this information.

Orion 1 Atlantic is now up and working. I've seen clear video on two channels, 11·618GHz horizontal with an NTSC Dallas Fort Worth Teleport and the Xerox Document University at 12·581GHz. It's encouraging that good old analogue transmissions are alive and well.

Numerous programmes dealt with the Fiftieth anniversary of the relief of Auschwitz by Russian troops on the 27th.

News Items

UK: Broadcasters in the UK and nine other countries have formed the EuroDAB Forum to press for the adoption of digital audio broadcasting as the standard for radio in the long term instead of analogue f.m. transmissions in Band II.

Russia: Ostankino is to become a joint-stock company called Russion Public Television, though the government will retain a 51 per cent holding. The plan to merge Ostankino and RTR (Russian State TV) has been put on hold.

France: The following TF1 transmitters are now using Nicam: Paris Tour Eiffel ch. L25; Lille L27; Toulouse L27; Rouen L23; Lyon L46; Clermont L22; Nantes L23; Bourges L23; Tours L65. The following should have Nicam by August: Marseilles L23; Saint Raphael L25; Chartres L55; Niort L28; Le Mans L24; Dyon L59. Bordeau L63; Rennes L39; Montpellier L56; Brest L27; Caen L22 should be so equipped by December. There is no information so far on relay transmitters below 20kW.

Czech Republic: TV Nova is to open a second channel called Supernova. Another independent broadcaster, TV Premiera, is in operation at Liberec, Zlin and Plzen, using low-power u.h.f. transmitters.

Switzerland: Now that Milan airport no longer uses ch. E36 radar the Swiss TSI is to use this frequency for an Italian-language transmitter at Castel San Pietro.

Poland: Bad news. Yet another Band I transmitter has bit the dust. Bydgoszcz has moved to ch. R4.

The EBU TV Station List

The EBU is now able to accept subscriptions for the *List of European TV Broadcasting Stations No. 39*. Send 70 Swiss Francs to the EBU, Case postale 67, CH-1218 Grand-Scaonnex GE, Switzerland. This well established work, with two six-monthly updates, covers all TV transmitters on air across Europe, North Africa and the nearer Middle East, from Megawatt power houses to milliwatt lamp-post relays.

It resembles a telephone directory. Alternatively it's available from the same source and at the same price as a disc, reference number TV 39 0395. A diskette user's guide is available for another 15 Swiss Francs.

The MIR Space Station

We have in the past reported reception by enthusiasts of signals from the Russian MIR space station. Information on MIR is provided nightly in the *Space Night* programme – tune to the BR-Bayern 3 transponder (11·140GHz horizontal) at 19·2°E.

It's possible to receive downlink TV pictures from MIR: Steve Birkill and myself have monitored them at 10·835GHz while John Locker has received them at 10·820GHz. Along with all the other changes in Russia, flight control monitoring has changed. Receiving stations aboard ships previously gave world coverage, but most of these have been recalled. Instead, reliance is placed on direct pick up from MIR by earth stations across Russia or via satellite links. Fortunately for us the ZSSRD-2/Cosmos 2054 satellite is in orbit at 16°W, though the orbit is inclined. This offers us direct access to the satellite when it crosses the Clarke Belt and is sending one of its infrequent and non-timetabled TV transmissions to Moscow. It's a matter of pure luck whether one happens upon a TV transmission, but it's very exciting when signals are received. There have been additional satellites in the past at 95°E and 160°W, but these proved to be less than durable.

When MIR is in line-of-site with Russia, communications and TV signals can be downlinked to any of six main Earth stations at Yepatoriya, Dzhusaly, Kolpashe-vo, Ulan-Ude, Ussuriysk and Petropavlovsk. There's further linking via the Gorizont network of almost geostationary satellites, which all send received data to the Kalingrad (Moscow) control centre via the Sholkovo central communications centre. MIR orbits the earth about every ninety minutes (sixteen times daily). Depending on MIR's orbital path, transmission access times vary from three to twenty minutes. The video downlink signals from MIR are in PAL form with a 2MHz bandwidth (they are transcoded to Secam at the Moscow control centre).

Enthusiast-quality reception, which means rather noisy, requires a dish with a diameter of at least 1m and an LNB with a noise figure of less than 1dB. Efficient frequency converters such as the Global ADX for Astra 1D make Cosmos reception easy.

Launches in particular bring TV transmissions from MIR. The launch itself may be carried by the Gorizont craft at 11° or 14°W, at 11·526GHz with right-hand circular polarisation. Because of this signals will be received with the LNB switched to either vertical or horizontal polarisation.

You can usually find Cosmos 2054 by monitoring the 11·835GHz data downlink. Look for black/white flashing lines. It seems that reception during the inclined orbital track is best at around 1000 hours – transmissions have been monitored at 1035-1050 GMT daily. MIR has also been seen as early as 0500, and at 1700 hours. A receiver capable of reduced i.f. bandwidth operation is ideal, particularly if it also has threshold extension. We would like to hear from anyone who has success with MIR reception.

Satellite TV News

Orion is now in operation at 37·5°W, transmitting corporate video presentations on east-bound feeds to Europe. Clear PAL/NTSC transmissions are being carried along with digitally-compressed video. The UK lottery will shortly use the satellite to obtain nationwide coverage.

Iran has now outlawed the ownership and operation of satellite equipment. Iranians were given four weeks to remove equipment or suffer fines of up to £1,000. It's reckoned that there were a quarter of a million private satellite installations in Tehran alone. The Syrian authorities are also unhappy about satellite reception and are considering a ban on all unlicenced satellite installations.

As Telecom 2B viewers will be aware, the LC1 news channel has signed an agreement with Canal Plus to join its programme package. Thus LC1 programming is now scrambled.

China has launched the Dongfanghong-3 TV/telecomms satellite which can transmit six TV channels. Intelsat 703 and 704 are now in operation at 177°E and 66°E respectively. 704 will be transmitting the TV output of Orbit International across the Middle East and into Europe via west spot beams. Signal levels in the centre of the beam covering central Europe as far as London approach 50dBW.

TV Asia has moved to Astra 1D and is transmitting in the clear to help established viewers retune and/or fit an ADX type frequency converter.

Answer to Test Case 388

– see page 397 –

The situation described in this month's puzzle is not an uncommon one in sets that incorporate EW geometry correction, and is not confined to any particular make or model. The principle of EW correction is to use a parabolic waveform to amplitude-modulate the line scan current. In this particular chassis modulation is carried out by TR73 in conjunction with bridge coil L701, modulator diode D701 and tuning capacitor C702. The second inductor (L702) acts mainly as a filter, to prevent line-scan energy reaching the driver transistor.

Problems with L701 upset the tuning of the EW bridge circuit. While correct (or passable) scan geometry can be achieved when this coil is defective, the losses are high and efficiency is low. A fault with L702 will impair its filtering action, putting the driver transistor at risk – at the very least running it under operating conditions for which it was not designed. When coils of this sort get hot, short-circuits between turns can develop. This is what had happened, with either one or both coils. It's very difficult to test or measure the condition: the only sure way of proving the diagnosis is replacement, though the clapped-out appearance of the windings provided a good clue.

With two new inductors and yet another Darlington transistor installed the set worked reliably. How many more years does it have in it?

Fault Notes for the Sony CCDF380

Keith K. Keeton

The following is a summary of the fault experiences we've had with this camcorder.

Camera

E-E picture smears vertically when camera is pointed at a bright light: DT79A hybrid i.c. on panel CV9 faulty. The substrate voltage appears to be out and the picture is slightly grainy.

E-E picture dark under low-light conditions, playback o.k.: DT79A hybrid i.c. on panel CV9 faulty. Gain was not changing to compensate for light level.

E-E picture dark, playback o.k.: Iris was fully open. Cause of the trouble was a dry-joint on panel CD17P.

E-E picture flickers like an old movie: Iris motor not damped because damping coil open-circuit. Lens section had to be replaced.

E-E titles will not memorise or change colour: D655 on panel CK19P faulty. Titler worked correctly with buttons to D656 shorted.

No E-E sound, playback o.k.: LA7293 chip IC451 on panel MA37P faulty (signal input but no output).

Record picture white. E-E and playback o.k.: Dry-joint at IC101 on panel CO2P. IC101 had an input signal but no output.

E-E picture red: IC605 on board CV9 faulty.

Camera/VTR

No record sound, E-E and playback o.k.: Hybrid chip IC401 on panel CO2P faulty.

Record/playback picture very bright, E-E picture o.k.: CX1200BQ chip IC203 on panel CV9 faulty.

Mechanism Faults

Grating noise with fast forward/eject/load: The LB gear block assembly rattled. Cause was a spring missing from the LB gear assembly.

Intermittent failure to eject: LB1631M chip IC504 on panel CO2P faulty. Tape would load half way then stop.

Failure to eject/load: Reel sensor on panel CC26P faulty. Remote commander said fault code 2. Loading arms came out half way then stopped. On another occasion the cassette assembly was slightly bent and had to be replaced.

When eject is selected the mechanism goes to fast forward before ejecting. Mechanism only half loads: No FG output from capstan sensor which was faulty – replace capstan.

Take-up reel spins fast during eject: Replace capstan motor – feedback faulty.

VTR

When a function is selected, i.e. playback, the screen goes black then the eject sign appears: The CXP80116 chip IC501 on panel CO2P was faulty. Pin 3 (VTR DD on) went low when the fault occurred, shutting down the VTR and camera DD on.

No video playback, sound o.k. E-E operation o.k.: C287 on panel CV9 faulty.

VTR picture smeary with grey lines. Playback and E-E o.k.: The sync pulses at pin 8 of IC201 occurred at 61μsec instead of 64μsec because the VCO was running slowly. Remedy was to adjust CV502 for the correct frequency.

Playback picture whites out. Melts sideways with h.f. playback: Replace faulty drum.

Black streaks on picture with own recordings. Playback otherwise o.k.: Deviation adjustment R204 on panel CV9 incorrect.

Excessive playback dropout; sometimes flashing white lines: The CX1200BQ chip IC203 on panel CV9 was faulty. Dropout pulses at pin 2 were detected, but no correction followed.

VTR/Camera

No playback colour, E-E o.k.: The CXA1200BQ chip IC203 on panel CV9 was faulty. Signal input at pin 3 was o.k. but no output.

No power to camcorder: We have experienced several causes of this condition, as follows.

(1) PS902/3 on panel PS225P open-circuit. Still no go when they were replaced. No output from the d.c.-d.c. converter which was faulty.

(2) PS902/3 on panel PS225P open-circuit. Still no go when they were replaced. Cause of the fault was the 2SA1385 transistor Q941 whose output was low.

(3) Pin 2 of W901 was shorted-circuit to chassis because the plastic earthing sheet behind the camera was shorting the capstan motor. Remedy is to insulate the pins from the sheet. Area of fault mechanism/panel CO2P.

TELEVISION

TV/VCR SPARES GUIDE SPRING 1995

The following list gives spares department addresses and telephone numbers or, where these are the same, service department or head office addresses and telephone numbers. Also included are details of various spares distributors.

Aiwa UK Ltd., Unit 5, Heathrow Summit Centre, Skyport Drive, West Drayton, Middx UB7 0LY.
0181-897 2425
Fax 0181-899 0055.
See also CPC and Willow Vale.

Akai UK Ltd., Haslemere Heathrow Estate,12 Silver Jubilee Way, Parkway, Hounslow, Middx TW4 6NF.
0181-897 6388
Fax 0181-759 6118.

Akura. Spares available from Akura Components Ltd., 44 Deerdykes View, Westfield, Cumbernauld, Glasgow G68 9HP.
01236-457 022
Fax 01236-457 053.

Alba Radio Ltd., Harvard House, 12 Thames Road, Barking, Essex.Spares for Alba, Bush, Goodmans, some Hinari and some Brother microwave.
0181-557 9085
Fax 0181 507 2132
See also Willow Vale.

Ambassador. Brand name used by Sentra Electronics.

Amstrad. Spares available from CPC Ltd., Chas Hyde & Son Ltd., Willow Vale and Amstrad PLC, Brentwood House, 169 Kings Road, Brentwood, Essex CM14 4EF.
01277-209 509
Fax 01277-209 559.

Autovox. See Comet Group plc.

Beko (UK) Ltd., 40 Caxton Way, Watford Business Park, Watford, Herts WD1 8QZ.
01923 818 121
Fax 01923 819 653.

Beon Corporation, 6-10 Badenheath Place, Westfield Industrial Estate, Cumbernauld, Glasgow G68 9HX.
01236-728 845
Fax 01236-738 477.

Beovision/Beocord. Bang and Olufsen UK Ltd., Eastbrook Road, Gloucester GL4 7DE.
01452-307 377
Fax 01452 423 693.

Binatone International Ltd., Binatone House, 1 Beresford Avenue, Wembley, Middx HA0 1YX.
0181-903 5211
Fax 0181-903 5521.Trade only.

Blaupunkt. Merrivale Television Services, 1 Lockside, Tatbank Road, Oldbury, Warley, W. Midlands.
0121-544 6250
Fax 0121-552 1503.Trade only.

Bush. See Alba Radio Ltd. Also HRS and Willow Vale.

Canon UK Ltd., Unit 4, Brent Trading Centre, North Circular Road, London NW10.
0181-459 1266
Fax 0181-459 4202.

Cathay. Spares from Diamond Television.

Commodore. Spares available from CPC.

Comet Group plc., Service Dept., Unit 5, City Park Ind. Estate, Gelderd Road, Leeds LS12 6DR.
01132-311 024
Fax 01132-311 463.

Connexions UK plc., Unit 3, Travellers Close, Travellers Lane, Welham Green, Herts AL9 7LE.
01707-272 091
Fax 01707-269 444.

Contec CTVs sold by Dixons. Spares available from Mastercare Components.

CPC Ltd., Component House, Faraday Drive, Fulwood, Preston, Lancs PR2 4PP.
01772-654 455
Fax 01772-654 466.
Official spares stockists for Aiwa, Alba/Bush, Amstrad, Citizen, Commodore, Epson, Ferguson, Fidelity, Finlux, GEC, GoldStar, Goodmans, Hinari, Ingersoll, ITT, Logic, Luxor, Matsui, Nokia, Olympia, Olivetti, Orion, Osume, Pace, Philips, Pye, Saisho, Salora, Sinclair, Sony, Toshiba and Triumph. Other spares available.

Crown. Some spares available from HRS.

Daewoo Electronic Sales UK Ltd., Unit 640, Winnersh Triangle, Wokingham, Berks RG11 5TP.
01734-272 272
Fax 01734-699 000.
Note: Daewoo brand products only, not OEM products. For the latter, refer to the original distributor.
See also Willow Vale.

Dansai TV and Video spares available from NEI.

Decca. See Tatung (UK) Ltd. and Wizard Distributors. Spares for chassis up to and including the 110/115 series available from D&S Electronic Services, Building 15, Unit 4, Stanmore Industrial Estate, Bridgnorth, Salop WV15 5HR.
01746-766 641.

Definition. Spares available from Wiltsgrove Ltd.

Denon. Hayden Laboratories Ltd., Hayden House, Chiltern Hill, Chalfont St Peter, Gerrards Cross, Bucks SL9 9UG.
01753-888 447
Fax 01753-880 109.

Diamond Television, 15a Rodbourne Road, Dodbourne, Swindon, SN2 2AG
01793-497 591
Fax 01793-431 687.

Doric. Some spares available from Granada Rental Services.

Dynatron. Pre 1981 sets see Philips Service, post 1981 sets spares from SEME.

Elftone Electronics Ltd., 4 Beresford Avenue, Wembley, Middx HA0 1YZ
0181-902 6222
Fax 0181-903 5011.

Etron. Brand name used by Nikkai Imports Ltd.

Expert. Sets use Tatung, GEC, or Luxor chassis.

Ferguson Ltd., Service Division, Crown Road, Enfield, Middx EN1 1DZ.
0181-344 4412
Fax 0181-344 4452. Trade only.
See also CPC, HRS, Chas Hyde, Willow Vale and Wizard.

Fidelity. Spares available from SEME, HRS, CPC, Wizard and Willow Vale.

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Component House
Faraday Drive
Fulwood, Preston
Lancs. PR2 4PP
Tel: 01772 654455
Fax: 01772 654466

Finlux. Spares available from NCS and CPC.

Finlandia. Spares available from UK Rental and Retail Ltd.

Fisher. Spares available from Sanyo UK Sales Ltd., Sanyo House, Otterspool Way, Watford, Herts.
01923-222 244
Fax 01923-818 251.

Fujitsu General, 154 Great North Road, Birchwood Industrial Estate, Hatfield, Herts
01707 272 841
Fax 01707 273 111. Spares available from HRS.

GEC. Spares available from CPC, HRS, SEME.

General. See Fujitsu General

GoldStar UK Sales Ltd., Goldstar House, 264 Bath Road, Slough SL1 4DT.
01753-691 888
Fax 01753-693 061.
See also CPC, Granada Rental Services and Willow Vale.

Goodmans. See Alba Radio Ltd. Also CPC.

Granada Rental Services, Unit 37, Roman Way Industrial Estate, Preston, Lancs PR2 5BD.
01772-651 551
Fax 01772-655 801.
Spares for Finlandia, Granada, Grundig, Hitachi, Salora TV, Sanyo, Sony, Tashiko. Trade only.

Granada. Spares available from Granada Rental Services.

Grundig International Ltd., Mill Road, Rugby, Warwickshire CV21 1PR.
01788-577 155
Fax 01788-562 354. Account holders only supplied.
See also Granada Rental Services and Willow Vale.
Spares for VCR4000 and SVR4004 ranges available only from Willow Vale.

Grundig Satellite Communications Ltd., Unit 10, Llantrisant Business Park, Llantrisant, Mid Glamorgan CF7 8LF.
01443-220 220
Fax 01443-237 206.
See also Willow Vale and Wizard Distributors.

Harwood. Spares available from HI Group, Express Way, Whitwood, Nr. Wakefield WF10 5QJ.
01977-603 333
Fax 01977 603 159.

Hinari. Spares available from CPC, Chas Hyde, SEME.

Hitachi Sales (UK) Ltd., Hitachi House, Station Road, Hayes, Middx UB3 4DR.
0181-569 1975
Fax 0181-569 1441.
See also Chas Hyde, Granada Rental Services, Willow Vale and Wizard.

HMV. Sets use Ferguson or Fidelity chassis.

HRS Electronics Ltd., Electron House, 100 Great Barr Street, Birmingham, B9 4BB.
0121-766 6668
Freefax orderline 0800-212 179
Truedata orderline 0121-753 0600.
Wide range of video, audio and television spares including Bush, Crown, Ferguson, Fidelity, GEC, Hitachi, Nikkai, Pace, Philips, Pye, Saisho, Sanyo, Sharp, Tatung, Toshiba and many more. Also all leading domestic appliance brand spares. Trade only.

Chas Hyde & Son Ltd., Prospect House, Barmby Road, Pocklington, Yorks YO4 2DP.
01759-303 068
Fax 01759-303 620. Sole non-account distributor for Sanyo and Hitachi. Approved distributors for Ferguson, Matsui, Philips, Saisho and Toshiba. Some spares available for other brands. Trade only.

Indesit. Spares no longer available from manufacturers/agents.

ITT. Spares available from NCS. See also CPC and Wizard.

JVC (UK) Ltd., JVC House, JVC Business Park, Eldonwall Trading Estate, Priestley Way, Staples Corner, London NW2 7BA.
0181-450 3282
Fax 0181-452 2534. Trade only.
See also Willow Vale.

Kenwood. See Trio-Kenwood (UK) Ltd.

Konica, Plane Tree Crescent, Feltham, Middx TW13 7HD.
0181-751 6121
Fax 0181-755 0681.

Korting. Spares available from Telefaults, St Michael's Road, Pitts Hill, Turnstall, Stoke-on-Trent ST6 6LS.
01782-813 757
Fax 01782-835 762.

Lloytron Electronics Ltd., Service Dept., Laltex House, Matthews Street, Ardwick, Manchester M12 5DT.
0161-272 8833
Fax 0161-272 8844.

Logik. Brand name used by Dixons. See Mastercare Components, CPC, HRS.

Loewe-Opta. Spares available from Wizard.

Longreach Marketing Ltd., Riverside Business Park, Lower Bristol Road, Bath, Avon BA2 3DW.
01225-444 894
Fax 01225-448 676. Distributors of satellite equipment.

Luks Industrial Company UK Ltd., 1/3 Mollins Court, Westfield, Cumbernauld, Glasgow G68 9HP.
01236-457 989. Ext.18.
Fax 01236-457 919.

Luxor. Spares available from NCS, CPC and Willow Vale.

Marconiphone. See Ferguson Ltd.

Marantz Hi Fi UK Ltd., Kingsbridge House, Padbury Oaks, 575/583 Bath Road, Longford, Middx UB7 0EH.
01753-680 868
Fax 01753-680 428.

Mastercare Components Division, Maylands Court, Maylands Avenue, Hemel Hempstead, Herts HP2 7DE.
01442-888 444
Fax 01442-888 145.

Matsui. Brand name used by Currys and Dixons. Spares available from Mastercare Components, CPC, Chas Hyde and Wizard.

Metz. No UK source of spares. Manufacturers address: Metz Werke Gmbh 2 Co., D8510, Furth, Germany.

Minoka. Spares available from Luks Industrial Co. UK Ltd.

Mitsubishi Electric (UK) Ltd., Travellers Lane, Hatfield, Herts AL10 8XB.
01707-276 100
Fax 01707-278 859.
See also Willow Vale.

Morphy Richards Technical Services Ltd., 6 Albany Parade, Brentford, Middx.
0181-560 5331
Fax 0181-569 7737.

Murphy. Spares available from Diamond Television for TV sets beginning with CTV and VCR 7101. Some sets fitted with Fidelity chassis. Older sets fitted with Rediffusion chassis. Earlier sets fitted with Rank chassis (some spares available from HRS).

National, National Panasonic. See Panasonic.

NCS, Bridgemead Close, Westmead Industrial Estate, Westmead, Swindon, Wilts SN5 7YG.
01793-511 636
Fax 01793-485 406.
Account holders only.

NEC. Spares available from SEME.

NEI, Network Spares Division,

Unit 6, Southfork Industrial Park, Dartmouth Way, Leeds LS11 5JL. **0113 277 4310** Fax 0113 277 4312. Trade only.

Nikkai. See NEI. Also HRS, SEME, Willow Vale and Wizard.

Nokia. Spares available from NCS and Willow Vale.

NordMende. Spares available from Ferguson Ltd. In Ireland EID Ireland Limited, Longmile Road, Dublin 12. **010 353 145 65222.**

Olympus Optical Co. (UK) Ltd., 2-8 Honduras Street, London EC1Y 0TX. **0171-253 2772** Fax 0171-251 6330. Trade only.

Orion. Sole UK spares distributor CPC Ltd.

Osaki. Brand name used by Rumbelows. Spares available from Granada Rental Services. Spares for models VCR31,VCR32, VCR33 available from Diamond Television.

Pace Micro Technology Ltd., Victoria Road, Saltaire, Shipley, West Yorkshire, BD18 3LF. **01274-532 000** Fax 01274-537128. Spares available from HRS, CPC, Willow Vale and Wizard.

Panasonic (UK) Ltd., Panasonic House, Willoughby Road, Bracknell, Berks RG12 4FP. **01344-860 133** Fax 0344-861 598. Non-dealer orders handled by SEME Ltd., School Lane, Buckingham, Bucks MK18 1HD. **01280-823 523** (trade) Fax 0280-814 916 **01280-822 755** (retail). Also Willow Vale.

Philips Service, P.O. Box 97, City House, 420/430 London Road, Croydon CR4 4QX. **0181-686 5414** Fax 0181-681 0796. Account holders only supplied. See also CPC, Granada Rental & Retail Ltd., HRS, Chas Hyde, Willow Vale, Wizard.

Pioneer High Fidelity (GB) Ltd., Pioneer House, Hollybush Hill, Stoke Poges, Slough SL2 4QP. **01753-789 789** Fax 01753-789 534. See also SEME.

Prinz. Brand name used by Dixons. See Mastercare Components.

Proline. Brand name used by Comet Group plc.

Pye. See Philips Service.

Radionette. See Tandberg.

Roadstar (UK) Ltd., Roadstar House, Tavistock Industrial Estate, Ruscombe Lane, Twyford, Berks RG109NJ. **01734 321 032** Fax 01734 343 011.

Roberts Radio Co. Ltd., Molesey Avenue, West Molesley, Surrey KT8 0RL. **0181-979 7474** Fax 0181 979 9995. Spares available from SEME.

Saba. Spares available from Blair's Electrical Services, 13 Belgrave Road, Dresden, Stoke-on-Trent ST3 4PR. **01782-599 377** 01782-599 378.

Saisho. Brand name used by Dixons. See Mastercare Components, CPC, HRS, Chas Hyde, Willow Vale and Wizard.

Salora. Spares available from NCS and Granada Rental Services.

Samsung Electronics UK Ltd., Industrial Unit A, Stafford Park, Shropshire TF3 3BJ. **01952-207 171** Fax 01952-293 459. Also Willow Vale and Wizard. Belfast Agents Michael Black, 33 Somerton Industrial Park, Dargan Crescent, Duncrue Industrial Estate, Belfast. **01232-370 587.**

Sansui. Spares available from Willow Vale Electronics Ltd. Also Diamond Television for Video SV77.

Sanyo UK Sales Ltd., Sanyo House, Otterspool Way, Watford, Herts WD2 8JF. **01923-222 244** Fax 01923-818 251. See also Chas Hyde, Willow Vale.

Schneider. Spares available from Wizard.

Seiko. Audio spares from Diamond Television.

SEME Ltd., Units 2E and 2F, Saxby Industrial Estate, Melton Mowbray, Leics LE13 1BS. **01664-65 392** Fax 01664-63 976. Wide range of spares including Ferguson, Fidelity, GEC, Hinari, NEC, Nikkai, Philips, Pioneer, Pye, Roberts Radio and Sentra. Trade only except for Fidelity and NEC cabinet parts. Official Panasonic stockists – for separate address and telephone number see under Panasonic.

Sentra. Spares for pre-1991 models available from Electrontechnik, Mandale Mill, Beacon Road, Wibsey, Bradford BD6 3DQ. **0274-693 331.** Post-1991 spares available from Roadstar (UK) Ltd, Roadstar House, Tavistock Industrial Estate, Ruscombe Lane, Twyford, Berks RG109NJ. **01734 321 032** Fax 01734 343 011. See also SEME.

Sharp. Spares available from Willow Vale Electronics Ltd.

Siemens. Spares for Model numbers beginning FF available from Mastercare Components. Spares for Model numbers beginning FC available from John Langman Ltd., 111/117, Victoria Street, Bristol BS1 6AX. **01272-298 040** Fax 01272-251 528. Trade only. Spares available in Ireland from Appliance Care Limited, Unit 4, Ballymount Drive, Ballymount Road Industrial Estate, Dublin 12. **010 353 145 02655.**

Sinclair. Spares available from CPC.

Skantic. Spares available from NCS.

Solavox. Brand name used by Comet Group plc.

Sonatel. Brand name used by Morphy Richards Consumer Electronics Ltd.

Sony UK Ltd., Spares Division, PO Box 58, Newbury, Berks RG13 4LX. **01635-860 000** Fax 01635-874 099. Account holders only supplied. Spares are available from SES at Oldbury **0121-544 8818,** Dulwich **0181-693 9622,** Glasgow **0141-554 2751,** Leeds **01132-527 387,** Staines **01784-466 111.** See also CPC, Chas Hyde, Granada Rental Services, Willow Vale.

Steepletone Products Ltd., Park End Works, Croughton, Nr Brackley, Northants NN13 5RD. **01869-810 081** Fax 01869-810 784.

Sunkyong Europe Ltd., Cedar House, Vine Lane, Hillingdon, Middx UB10 0BX. **01895-272 200** Fax 01895-813 282. Trade only.

Tandberg. R.D.E. Tandberg, Holly Tree House, The Green, Full Sutton, York YO4 1HW. **01759-372 795.**

Tashiko. Brand name used by Granada. Spares available from Granada Rental and Retail Ltd.

Tatung (UK) Ltd., Service Division, Stafford Park 10, Telford, Shropshire TF3 3AB. **01952-290 111** Fax 01952-292 096. Trade only. Spares also available from HRS.

Technics. See Panasonic (UK) Ltd.

Telefunken. See Ferguson. Spares in Ireland available from EID Ireland Ltd. – see under NordMende.

Teleton. See Fujitsu General.

Thomson. TV and VCR spares available from Willow Vale. In Ireland spares are available from EID Ireland Ltd. – see under NordMende.

Toshiba (UK) Ltd., Toshiba Technical Centre, Units 6/7 Admiralty Way, Southern Trading Centre, Camberley, Blackwater, Surrey GU15 3DT.
01276-694 000
Fax 01276-600 521.
Trade only. See also CPC, Granada Rental Services, HRS, Chas Hyde, Willow Vale and Wizard.

Trical. Brand name used by Hinari Consumer Products Ltd.

Trio-Kenwood (UK) Ltd., Kenwood House, Dwight Road, Watford, Herts WD1 8EB.
01923-816 444
Fax 01923-819 133.

Triumph. Brand name used by Currys. See Mastercare Components, CPC.

Ultra. See Ferguson Ltd.

Uniden. Eurosat Distribution Ltd., Oxgate Lane, London NW2 7JA.
0181 452 6699
Fax 0181 452 6777.

Venturer. Audio spares available from Diamond Television.

Willow Vale Electronics Ltd., 11 Arkwright Road, Reading Berks RG2 0LU.
01734-876 444
Fax 01734-867 188.
Spares stockists for Alba, Amstrad, Ferguson, Fidelity, GEC, GoldStar,Grundig International, Grundig Satellite Communications, JVC, Mitsubishi, Nikkai, Nokia, Pace, Panasonic, Philips, Pye, Saisho, Samsung, Sansui, Sanyo, Sharp, Sony,Thomson, Toshiba. Other spares available.
Also at Enterprise Park, Reliance Street, Newton Heath, Manchester M10 OAL.
0161-682 1415
Fax 0161-682 9031.

Wiltsgrove Ltd., 28-29 River Street, Digbeth, Birmingham B5 5SA.
0121-772 2733
Fax 0121 766 6100.
Sole distributor for Definition brand. Official distributor for CME, Futek, Iroda, Konig, Nikkai, Philex and Thorn.

Wintronics. Limited amount of spares available from Lloytron Electronics Ltd.

Wizard Distributors, Empress Street Works, Empress Street, Manchester M16 9EN
0161-872 5438 or
0161-848 0060
Fax 0161-873 7365.
Spares stocked include Akai, Alba, Amstrad, Decca, Ferguson, Fidelity, Grundig Satellite, Hitachi, ITT, Loewe, Matsui, Mitsubishi, Nikkai, Pace, Philips, Pye, Saisho, Samsung, Schneider, Sentra, Sharp, Sony, Tatung, Toshiba. Trade only.

Yamaha Electronics (UK) Ltd., Yamaha House, 200 Rickmansworth Road, Watford, Herts WD1 7JS.
01923-233 166
Fax 01923-244 930.

General/miscellaneous parts suppliers

Allparts Distributors, 101 Rocky Lane, Tuebrook, Liverpool.
0151-260 4825.

AZ Electrics, 183 Acre Lane. Northampton, NN2 8DX
01604-841 871
Fax 01604-454 871.

Chromavision, 95 Langworthy Road, Salford, Manchester M6 5PH.
0161-736 6333.

Economic Devices, 32 Temple Street, Wolverhampton WV2 4AN.
01902-712 083
Fax 01902-29 052.

East London Components, 63 Plashet Grove, East Ham, London E6 1AD.
0181-472 4871.

Electromail, PO Box 33, Corby, Northants NN17 9EL.
01536-294 555
Fax 01536-405 555.

Electrovalue Ltd., Unit 3, Central Trading Estate, Staines, Middx.
01784-442 253.
Fax 01784-460 320.
Northern branch 680 Burnage Lane, Manchester M19 1NA.
0161-432 4945
Fax 0161-432 4127.

Express TV Supplies, The Mill, Mill Lane, Rugeley, Staffs WS15 2JW.
01889-577 600
Fax 01889 575 600.

Farnell Electronic Components, Canal Road, Leeds LS12 2TU.
01132-636 311
Fax 01132-633 411.

GGL Components, PO Box 72, Unit 7, South John Street, Carlisle, Cumbria CA2 5AL.
01228-39 693/20 358
Fax 01228-515 127.

Grandata Ltd., KP House, Unit 15, Pop In Commercial Centre, Southway, Wembley, Middx HA9 0HB.
0181-900 2329
Fax 0181-903 6126.

J.W. Hardy, 231 Station Road, Stechford, Birmingham B33 8BB.
0121-784 8478.

Harrison Electronics, Century Way, March. Cambs PE15 8QW.
01354-51 289
Fax 01354-51 416.

Irwin Electronics, Unit 200, JC Albyn Complex, Burton Road, Sheffield S3 8BX.
0114-273 9622.

JJ Components, 63 The Chase, Edgware, Middx HA8 5DN.
0181-952 4641.

KSA Wholesale Components, 582 Green Lane, Small Heath, Birmingham B9 5QG.
0121-772 2834.

LRC (Spares), 3-5 Whitfield Street, London W1P 5RA.
0171-323 2107.

Manor Supplies, 172 West End Lane, London NW6 1SD.
0171-794 8751/7346
Fax 0171-431 5578.

Marapet, 1 Hornbeam Mews, Gloucester GL2 0UE.
01452-532 253.

MPS Electronics, PO Box 777, Rayleigh, Essex SS6 8LU.
01702-554 171
Fax 01702-553 935.

Nikko Electronics, Dalbani House, 257 Burlington Road, New Malden, Surrey KT3 4NE.
0181-336 0566.

T. Powell, 16 Paddington Green, London W2 1LG.
0171-723 9246.

PV Tubes, 104 Abbey Street, Accrington, Lancs BB5 1EE.
01254-236 521/232 611
Fax 01254-395 361.

RS Components, PO Box 99, Corby, Northants NN17 9RS.
01536-201 201
Fax 01536-201 501.

Vista Electronics, Unit 1B, Wingate Grange Industrial Estate, Wingate, Co. Durham S28 5AH.
Tubes: **01429-837 100.**
Components: **01429-838 057**
Fax 01429 837 101.

What a Life!

Donald Bullock

Life is funny – if you don't weaken. It doesn't seem so long ago that I managed to give our local newspaper the slip and wheedled my way into Foyles Furnishing store. In the early Fifties old Tom Foyle's shop housed the biggest and best television business in the city. Television was new, and it was big business. And since every set then produced was a trouble timebomb the shop needed, and had, a fair-sized service department.

If there was one thing that I enjoyed as much as scribbling it was tinkering with wires. I was happy indeed when Foyles took me on as a workshop lackey and vanboy.

I can still remember my first solo service call. It was to a local pub. The landlady, Mrs Brawler, was rough, loud and wayward. And always somewhat sloshed. But no one at Foyles would tell her so – she spent a lot of money at Foyles.

The Faulty Ferguson

She had this 14in. Ferguson set, a Model 932 or 934 I seem to recall. There were two similar models, hers being the one with flywheel line sync. It had about twenty two valves but still had difficulty locking to the ITV signal, which crawled from Sutton Coldfield to our city in Band III.

Anyway, back to the story. One day Mrs Brawler rolled into the shop in a nasty mood and asked to see the service manager. He was afraid to see her, and the only mug in the workshop was me. So I was sent down to the showroom, where Mrs Brawler was amusing herself pounding the ivories of some new pianos.

"I've come to help with your television problem" I announced.

"You don't look to me as if you could do much about it" she replied. "ITV slipped all over the place last night, then it collapsed to a bright line across the screen. That's not what I pays you good money for. The set's here more than it's with me. I've a good mind not to go on having it."

She eventually departed after I'd promised her that something would be done. When I went back upstairs the service manager handed me an ECL80 and a screwdriver, and explained which of the many valves to change. I had to walk there, but felt too important to mind.

The Field Call

Mrs Brawler's sitting room was even scruffier than her pub. Her TV set sat on a mountain of shoes and other things in the corner. When I'd got the back off I juggled the ECL80 about and to my amazement restored the field scan. Then I gripped the chassis and picked up the aerial lead by the coaxial plug, learning the hard way about live chassis. I tried again and got a picture. Fortunately the ITV signal was good that day. Mrs Brawler was delighted.

"You don't look up too much" she said, "but you've got more brain than all the others there put together. That service manager would have taken the set away and sat on it for a month. Come on with me."

We went down to the bar, which was closed. She gave me a pound out of the till, then poured me a whisky.

"I don't, er. . . drink whisky" I said.

"You do when I gives it to you" she said.

And I did. And another. And that's all I'm going to say about that day.

Steven's Approach

This reflective spell was brought about by son Steven who decided, two or three years ago, that he wanted to learn the trade. He started to work beside me, and the speed at which he picked things up astonished me. He's now taken a nearby shop, where I'm allowed in from time to time to sweep up and make the tea.

There are differences about the way in which things are done. He's polished and professional. He bobs about a lot, has a thousand books to hand and uses proper job cards that I can't even fill in. I prefer my way of doing it. Just keeping still, jotting the customer's name, address and telephone number on a bit of paper and having a yap and laugh with some of them. He seems to attract a different type of customer – younger, brighter, better off and more go ahead. Ah well.

The Rev Goode

The phone rang and I decided to answer it.

"Which Mr Bullock is that?" asked a fruity voice.

"The wrong one" I said.

"Good" the voice said. I squinted into the earpiece. "The Reverend Goode here. My daughter's new boyfriend borrowed her GoldStar video. It now accepts a tape partially then rejects it. I'll be along in half an hour."

And he was. The machine he brought in was a player only, not a recorder. I examined the cassette carriage and saw that when a cassette is inserted its lower front edge should depress two levers, one on each side. This releases a pair of spring-loaded levers, easing the tape transport mechanism into the playing position. Because of some rough handling the levers were bent and the cassette was barred. Bending them back gently restored proper operation. It had taken only a minute, and the Reverend had seen it all. I put the machine's top back and handed it to him.

"I shall remember your kindness, my son" he said, "and bear this in mind – what a man feels in his heart, he is."

"Oh, er, yes" I said.

A Spotty Video

A dapper little man then danced in.

"How d'ye doo" he yelled. "Nubb's the name, Naylor Nubb. And I don't mind telling you I have a problem. It's spotty. It works all right but it's spotty."

"Let's have a look at it then" I replied.

He darted out to his car and returned with an Osaki VCR33 VCR. "Oh God" I said.

"Picture's covered in spots" he shouted. "Spots, spots, nothing but spots."

Then he departed and I opened up the Osaki. It played, but the picture was, as he had said, a mass of spots. And there was no rewind or fast forward.

I decided to get the tape transport right first, and examined the idler. It made contact, but the spools didn't move. Cleaning it made no difference. So I took the bottom off the machine, de-gooed the mechanism then lubricated it. This did the trick, and a video head clean cured the spotty picture.

The Shed Door

Just as I'd finished the Osaki the phone rang. I answered it and heard nothing but silence. Then Dr. Beckett came on. He's nearly ninety and a bit soft in the head. Since I repaired his old radio he seems to think I'm an odd job man.

"My shed door is jammed half open" he said, "and the drain smells."

"Right" I said. Off he went. I lifted the phone and dialled.

"Sam? Your Pa's been on again. Shed door jammed, drain stinks."

I put the phone down and turned around to see Creepy Gertrude Global beside me. She seems to materialise out of thin air, and it's always bad news.

Gertrude's Panasonic

"It's my video recorder" Mr Bulbous, "it's going like hell." She had this Panasonic NV430 in her arms.

When she'd departed I put the machine on the bench and tried it. She was right. The capstan rotated at a ridiculous speed. And it did this with all functions. I looked out the manual and homed in on IC2. When I applied freezer to it the capstan slowed to normal. When I heated it the capstan raced off again. We had a similar machine in the rack, so I borrowed the chip and fitted it in the NV430. The fault was still present.

What next? I peered about and spotted C9, a 1μF, 60V electrolytic. Switching my brain from logic to prejudice, I proceeded on the basis of an old principle of mine – distrust low-value electrolytics. To confirm my prejudice I took the electrolytic out and checked it with my bridge. It read exactly 1μF. I stopped and thought. Then I stopped thinking and replaced it anyway. The fault had been cured.

As I was boxing it up Gertrude reappeared and the phone rang. I lifted it but got only silence. By this time I was beginning to feel a bit frayed.

"I've had enough of this" I shouted, and put the phone down.

Gertrude drew back. "Can't you do it?" she asked. "My husband said it was only a condenser."

"No such thing as 'can't' around here" I snapped. "But you're dead right, it was a condenser. It's been done and the charge is twenty pounds."

"Twenty pounds for half an hour's work?" she whimpered. "How much are condensers. About sixpence each, aren't they?"

"Cheaper than that" I said. "They grow on trees. But you have to know which one. It's the diagnosis that takes time, and I don't live on air."

She came up with the tenners, but I could detect that she was less than convinced about it.

Astra 1D Upgrades

Jack Armstrong

The fourth Astra satellite, 1D, which was launched at the end of 1994 is co-located with the other three at 19·2°E. As far as Astra is concerned it simply adds another sixteen channels to those already available. But there are problems in practice.

The frequencies used (10·7-10·95GHz) are beneath the designed operating band of most LNBs. Thus to be sure of receiving all the channels available from Astra the dish owner is likely to have to change his LNB to an 'enhanced' type whose local oscillator runs at 9·75GHz and, possibly, upgrade his receiver to a 'wideband' type with a tuning range of 1·1GHz (950-2,050MHz).

Many existing 'standard' LNBs do have a useful gain at the Astra 1D frequencies however, though the noise figure may not be as good as at the higher frequencies. This is both good news and bad news. The good news is that, simply by adding a frequency converter such as the ADX made by Global Communications, it's possible to obtain the full range of Astra channels using a standard receiver with a narrowband tuning range (800MHz).

Interference

The bad news is that because the local oscillator of a standard LNB drops the Astra 1D frequencies by 10GHz its outputs with this satellite will coincide with the top end of the u.h.f. TV band. In theory this might not be too bad, since f.m. is used for satellite transmissions and a.m. for terrestrial ones. But in practice many satellite TV viewers are experiencing severe interference. Table 1 indicates the satellite transponder frequencies that, after downconversion by the LNB, overlap with u.h.f. TV channels. If your local transmitter uses any of these channels, the output from a standard LNB may cause interference to the u.h.f. TV picture.

Table 1: Astra 1D/u.h.f. channel overlapping.

Astra transponder	*Centre frequency (GHz)*	*U.H.F. channel*	*Vision carrier (MHz)*
49	10·714	51	711·25
50	10·729	53	727·25
51	10·744	55	743·25
52	10·758	57	759·25
53	10·773	59	775·25
54	10·788	61	791·25
55	10·803	62	799·25
56	10·817	64	815·25
57	10·832	66	831·25
58	10·847	68	847·25

The interfering signals will be present along the satellite cable whenever the LNB is powered. With LNBs that use voltage-switching to alter the polarisation, channels of only one polarisation will be present at one time. With 13V fed to the LNB the vertically-polarised channels are selected, while with 17V fed to it the horizontally-polarised channels are selected. Thus changing the polarisation voltage or removing the supply to the LNB will eliminate the interference caused to particular u.h.f. TV channels. To eliminate the interference at source, the LNB will have to be replaced with an 'enhanced' type with a 9·75GHz local oscillator. The lowest frequency present along the cable will then be above the highest u.h.f. TV channel and direct interference will be removed – though intermodulation could still be a problem.

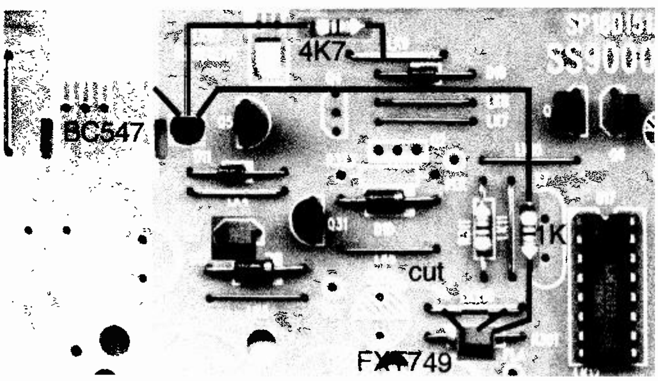

Fig. 1: Modification to Pace SS9000/9200 series receivers to remove the LNB supply in the standby mode.

A partial solution is simply to remove the supply to the LNB. You could do this by disconnecting the LNB cable, but it's not a very elegant solution! Satellite receivers such as those made by Amstrad switch off the LNB supply in the standby mode, but receivers made by Pace do not.

Figs. 1 and 2 show how this feature can be incorporated in the most common Pace receivers simply by adding a few components. The reason Pace prefer to maintain LNB powering even in standby is to ensure frequency stability. It also keeps the ice (a cause of failure incidentally) off in winter. Since Amstrad seems to get away with no LNB supply in standby however, you might consider the risk worthwhile with Pace receivers if it rids you of the interference. Bear in mind that the LNB supply will be restored when the receiver is in the timer mode waiting to record a programme.

With the Pace SS9000/9200 range the modification requires the addition of two transistors and two resistors on top of the PCB, see Fig. 1. It's important to disconnect the receiver from the mains supply before working on it or removing any of the other connections. Solder the emitter of a BC547 transistor to the metal side of the infra-red sensor screen and its base to link LK9 via a 4·7kΩ resistor. Solder an FXT749 transistor across link LK210 as shown. This link may consist of an inductor or a resistor. It must be cut to leave it open-circuit. Finally solder a 1kΩ resistor between the collector of the BC547 transistor and the base of the FXT749 transistor.

A similar modification for the later Pace PRD range is as follows, see Fig. 2. Solder an FXT749 transistor across diode D17, with its emitter at the rear and its collector

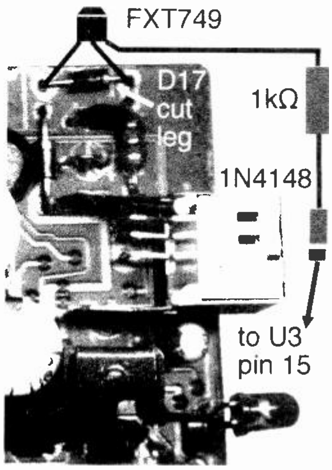

Fig. 2: Modification to Pace PRD series receivers to remove the LNB supply in the standby mode.

(the centre lead) at the banded end of D17. Cut one leg of D17. Solder a 1N4148 diode with its cathode lead (banded end) to pin 15 of U3: connect the other end of this diode via a 1kΩ resistor to the FXT749 transistor's base lead.

Such modifications provide a partial solution to interference problems with Astra 1D. But they don't help you to view the programmes!

Astra 1D Reception

Earlier receivers in the Pace PRD range can be upgraded to make them compatible with the output from an enhanced LNB – at a cost. If the serial number label contains the inscription "2GHz" the tuner module has a bandwidth that extends to 2GHz and the receiver will be capable of working with an enhanced LNB. But if the unit is not fitted with the latest microcontroller chip, which allows for selection of either a 10 or 9·75GHz local oscillator frequency to match the LNB in use, the frequency display in the tuning menu will be incorrect. Even if the label doesn't say so, the tuner unit inside may be a 2GHz type. Look at the top edge of the tuner. If the code number begins G77, the tuner is a 2GHz type. G75 means an expensive replacement job.

Thus with perhaps a new tuner, microcontroller chip and a few internal track and resistor modifications an early PRD receiver can be upgraded. What about even earlier Pace receivers?

Although it's possible to fit a 2GHz tuner to say an SS9000, there's no microcontroller chip available to allow the full tuning range to be achieved. No doubt a pulse subtraction circuit could be added in the phase-lock loop feedback line, but none exists at present (any takers?).

By far the simplest method of achieving Astra 1D reception in such a situation is to use an external (to the receiver) frequency converter. Several types are available. They all use a similar approach, shifting the relevant block of frequencies up or down by 500MHz so that the LNB's output is always within the receiver's tuning range of 950-1,750MHz. Various good, low-cost types have been introduced, but perhaps the most versatile is the ADX Plus made by Global Communications. This provides the options of frequency shifting up or down. Because of this it can be used with a standard or an enhanced LNB.

In order to watch the Astra 1D channels however you must get out of your chair to switch the converter on. Alternatively you can connect a wire from it to pin 8 of the satellite receiver's TV scart socket then use the remote control unit's TV/Sat button. This method works, but you have to remember which channels are tuned to Astra 1D and press the TV/Sat button accordingly. The system can confuse some people – and cannot be readily used with a receiver that already uses the TV scart socket or has no TV/Sat button.

A More Elegant Solution

Davenham Satellite Systems has come up with a more elegant solution that requires a tiny PCB assembly to be fitted inside the receiver. It provides an additional menu option, enabling you to select Astra 1D and store the relevant channels. Once the circuit has been added, 12V is fed to pin 14 of the decoder scart socket to which the frequency converter can be connected. Operation is then fully automatic, so that selecting the appropriate channel number is all you have to do.

The PCB assembly uses surface-mounted components and is hardly bigger than a postage stamp (see Fig. 3).

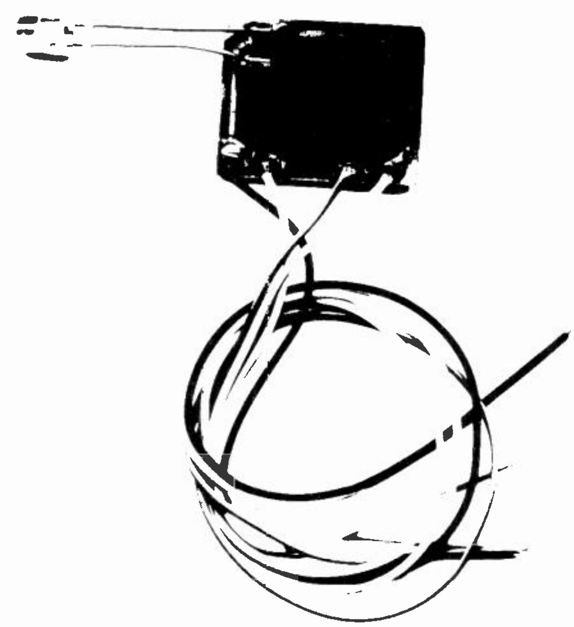

Fig. 3: The Davenham Satellite Systems AutoSelect unit.

Solderless versions with hook connectors are available: so all that's necessary is to remove the top from the receiver and clip the unit in.

Version A suits the Amstrad SRD510, SRD520 and SRX320.

Version B suits the Pace SS9000/9200 series, the Ferguson SRV1, the Grundig GIRD2000/3000, the Nokia SAT1500 and the Maspro SRE250S.

More information on converting Pace or Amstrad receivers for Astra 1D operation is available from Davenham Satellite Systems, 1 Firth Fields, Davenham, Norwich, Cheshire CW9 8JB, telephone number 0606 49 085. Send two stamps for a list of satellite spares and accessories. Trade enquiries are welcome.

VCR Clinic

Reports from Philip Blundell, AMIEEIE, John C. Priest, Ed Rowland, Terry Lamoon, Roger F. White, Nick Beer, Savio DaCosta, John Hepworth, Denis Parsons, David Belmont and Michael Dranfield

JVC HRD580

This machine had a sound fault. Operation in the E-E and record modes was o.k., but playback produced only a loud hum. Checks around the BA7765 sound chip showed that there was a problem with the switching lines – Q6's collector didn't go low for playback. The command comes from pin 34 of the main microcontroller chip IC601, where we found that the voltage rose to only 9V instead of 12V for playback. IC601 (JPC2002B-263) was faulty. **P.B.**

GEC V4100/Hitachi VT11

Although the take-up reel rotated this machine thought that it didn't. By removing the Hall-effect reel sensor and using a magnet to test for an output change I was able to prove that the sensor was o.k. All was revealed when the reel was removed: the magnetic ring had come loose and moved out of position. A blob of glue soon had it back in its rightful place. **P.B.**

Toshiba V110B

For no E-E tuning, just snow on the screen, check for 30V at power supply test point BP08. If it's missing the items to check are DP04 (ZTK33B) and RP03 (2·2kΩ). **P.B.**

Philips VR502

This machine had an intermittent fault: the capstan would occasionally start to rotate uncontollably. If this happened when a tape was threaded it would be moved though the drum didn't rotate and the rest of the circuitry would be shut down. If it happened without a cassette the lift mechanism would lock and the capstan clutch would slip. The fault condition would last for five minutes or so after which it would clear and the machine would be fine for days.

Board swapping enabled me to prove that the cause of the fault was on the family board. With the machine in the service mode while the fault was present I found that the microcontroller chip read the deck state correctly but seemed unable to control the capstan motor. New tape servo and interfacing chips made no difference.

Two signals, CAP and CREV, control the tape servo chip. Resistor/capacitor integrating networks are used to DA convert these signals. C2316, a 22nF surface-mounted capacitor, was found to be intermittently leaky – it read 6kΩ when faulty. **P.B.**

Akai VSF280

This machine came into the workshop to have the drum replaced. On test however we found that there was a substantial hum bar on the screen in the playback mode: it was much less noticeable in the E-E mode. Scope checks on the supply lines showed that the problem related to the IDL9/12V line (pin 6 of power supply plug 1). Bridge rectifier diodes D5-8 and D10, 12, 17, 18 were all o.k., as were capacitors C3, C8 and the 2SD2061 series regulator transistor TR3. We then noticed that the regulation control comes from the main (A) PCB via pin 5 of plug 1. The operational amplifiers in IC201a/b (type NJM455BL) are involved with this. Replacing IC201, also the 5·3V zener diode D204, restored correct voltages and removed the hum bar.

Note that the lead/pin numbering (1-12) of plug P1 on the power supply panel is the reverse of that at the corresponding connector WF201 on the main (A) PCB. This can be confusing when checking voltages at both ends of the harness. Another point is that individual leads of the harness can rub against the lower edge of the aluminium heatsink that carries TR2/4, causing possible damage to IC201. As a precaution, put a couple of turns of vinyl tape around the harness to act as a sleeve. **J.C.P.**

Toshiba V213B

This machine led us quite a dance. The complaint was of intermittent loss of sound during playback. On test we found that the sound was lost a few minutes after the start of playback, then returned for random periods of time till the end of the tape. We started by confirming that the fault occurred with both prerecorded tapes and the machine's own recordings, a check with another machine showing that the fault occurred in only the playback mode.

As this is not a Nicam or hi-fi stereo machine we were concerned with normal linear audio circuits. Voltage checks on the audio PCB didn't provide any clues. Fortunately there was a Toshiba V212B, with an identical audio PCB, in the workshop. Swapping over the audio PCBs proved that the cause of the fault was not in this area. A similar step cleared the audio/control head.

We refitted the original audio board and monitored pin 3 of connector B002 – the mute line. This proved that the loss of audio was being caused by operation of the mute circuit. Tracing the source back brought us to the TDA8128 chip IA01, the muting chip which monitors the video playback signal at pin 1 and the power on at pin 4. Pins 3 and 6 feed field and line sync to the on-screen display chip IA40, while pin 5 supplies the mute control output to various other circuits. The composite video signal at pin 1 looked all right, but as there's no waveform in the manual we couldn't be sure. We checked the buffer transistor TN01 then ordered a new TDA8128.

During our wait for this chip we checked and rechecked the tape path in case playback f.m. variations, masked by the digital tracking, were the cause of the mute circuit operation. No luck. But we also noticed that the E-E signal varied a bit sometimes – white areas of some programmes tended to go a bit negative. Adjustment of the E-E level control PN39 didn't help matters: in fact at one end the contrast would start to fluctuate with picture content. Other things we noticed were that the amount of dropout increased the longer the machine was left on, while the sound sometimes dropped out within thirty seconds of the start of playback and didn't return. Also if the upper drum rotation was momentarily impeded during a period of sound muting this would trigger sound restoration for a few seconds, and that if the picture displayed at that time had a mainly dark content the sound would remain on until the scene changed or the luminance level rose, when the sound would again be muted.

By the time that the TDA8128 arrived – it made no difference when fitted – suspicion had already turned to the AN3248NK luminance processor chip IN01. A scope check on the composite sync output at pin 1 showed that there were wide amplitude variations as the picture contrast varied. We replaced the chip along with CN37 (22µF) and CN43 (3·3µF) which provide coupling and decoupling around the a.g.c. detector/amplifier area of the chip. This cured all the symptoms, with no more sound dropouts, consistent and adjustable E-E and improved video record/playback quality.

The Toshiba part number for this chip is 70010966. If you order the service manual you'll also need the one for Model V212, as the former gives only the variations from the basic model. Part numbers are 780-050 and 783-050. Incidentally freezing IN01 had no effect on the symptoms. The customer, who is also in electronics, was highly intrigued to learn that a fault in the video processing could cause loss of sound without any noticeable loss of picture quality. So was I! **J.C.P.**

Sharp VCA105

We get quite a few of these machines in the workshop with the complaint that either the mechanical functions are faulty or, as with this machine, a tape is jammed inside. Dirty mode switch contacts are the usual cause. The best cure is to remove the switch assembly, dismantle the switch, then clean the contacts using a fibre pen or a cotton bud moistened with methylated spirit. Simply squirting cleaner into the switch does not always provide a permanent remedy. The markers on the rotary centre piece must be aligned when the assembly is refitted – otherwise the assembly will not go back into place.

When we'd done all this we connected the machine to the mains supply and inserted a cassette. Everything seemed to be fine until play was selected. We then found that the capstan ran far too fast. The control chip had failed. This meant a new capstan motor, more than doubling the cost of the repair. **E.R.**

JVC HRJ205/400/600

White static spots are becoming a common problem with these machines. The JVC cure is to replace the drum brush assembly: if the fault persists you can fit a special cap. The most important thing is to remove all grease in the contact area and clean thoroughly. **T.L.**

General VGX520/Panasonic NV430

The playback picture had a moving band, like a hum bar, in which the colour was missing. The cause was traced to C1003 and C1007 on the power supply PCB. **R.F.W.**

Goodmans TX1100

The capstan motor ran slow intermittently, as though there was a problem with the control pulses. I eventually traced the cause to C509 on the power board. It decouples the 5V supply. **R.F.W.**

Ferguson FV12/JVC HRD230

The capstan motor was free-running. It would lock only occasionally, when the machine had warmed up (after five minutes). Use of freezer in the servo area was inconclusive. Replacing C25 and C26, both 4·7µF, finally cleared the fault. **R.F.W.**

Finlux VR5250/Philips VR212/3 (IDM2/3 deck)

This machine came in with an unlaced tape stuck in it. I disconnected the loading motor and then used a battery to power it, winding the mechanism through its modes to eject (with a few turns on the capstan motor flywheel at the right point to take up the loop of tape). This confirmed that there was no mechanical problem.

A cassette could be inserted, but no other functions were possible. The drum failed to spin and the display, consisting of only the time and the symbol shown in Fig. 1, flashed when any function was tried – even install. The drum was clearly not being turned on: its switched 8V supply was missing, the cause being traced back to incorrect communication on the I2C bus. In fact the cause of the fault turned out to be the TMP47C167ON timer microcontroller chip IC7101. During the bus fault-finding process I replaced the syscon microcontroller chip first though! A point to note is that the service mode couldn't be entered: maybe this should have suggested trying IC7101 first. **N.B.**

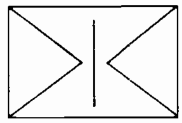

Fig. 1: The flashing display symbol in the Finlux VR5250/Philips VR212 fault report.

Sharp VC381HM

This old-timer apparently cut out intermittently. The customer said that it often happened, usually preceded in play by a still frame/pause. This suggested that the capstan was stopping. The first fault I found however was that the cassette-down switch was defective, causing all deck functions to cut out. After replacing this the machine was put on soak test. It was ages before the capstan fault showed up. Its cause turned out to be a dry-joint at pin 1 of IC7006. I resoldered all the connections as they were going the same way. **N.B.**

Pye 2SB11

There were two faults with this machine. First the r.f. loop-through signals were severely attenuated, and secondly the playback audio level was very low. The second fault was an easy one: the audio/control head was dirty. The first fault was not difficult either, but the failure was quite interesting. There was no 5V supply to the amplifier section of the r.f. amplifier/modulator because the series choke L510 on the main board was open-circuit. **N.B.**

Panasonic NV7200

As the operation of the capstan motor was not stable the pictures in both the playback and record modes were unstable. When I opened the machine up I found that all the chips in the servo department had been replaced. As a first step I checked the supplies and found that the voltage on the 45V line read low at 35V, falling to 25V. C1010 and C1013 had dried out, replacements restoring normal operation. **S.DaC.**

JVC HRD1520

The picture was unstable because the exit guide was loose.

As the plastic boss that holds the guide unit and the arm drive was loose the guide wouldn't sit in the slot. A new boss cured the problem. **S.DaC.**

Panasonic NVG21

This machine was dead because C1018 (47µF, 50V) which provides the supply for IC1001 was open-circuit. It's best to replace C1022 and C1025 as well. C1022 can be responsible for patterning on the screen. **S.DaC.**

Sony SLVX20/30/50 series

If one of these machines comes in with a blue screen problem, i.e. when playing a tape all you get is a blue screen, clean the audio/control head. The cause of the problem is that the CTL pulses are of low amplitude. I've recently had the problem with five of these machines. A worn AC head will produce the same symptom. **S.DaC.**

Saisho VR605/Matsui VX500/Hinari VXL3

When the power button was pressed the timer mode flashed and the standby light came on. Connector 6D2 on the front panel had dry-jointed connections. **S.DaC.**

JVC HRD520/540/1540 series

Failure of the tape to be wound back into the cassette when stop/eject is pressed, leaving a loop in the machine, is becoming a common problem with these VCRs. The cause is the mode switch. **S.DaC.**

Amstrad DD8900

There were no functions with this double-decker VCR, though both decks would accept a cassette. The display showed only the cassette-in indicators and a row of flashing dashes in the clock section. The display board has a 19-way ribbon connector. I had a spare board with a 21-way connector so I tried this, fitting the ribbon between pins 1-19. There were now no display functions at all, but when I looked at the display closely I saw that all the segments were lit very dimly. This suggested that there was a power supply fault. C27 (33µF) in the power supply module was open-circuit, a replacement putting matters right. **J.H.**

Baird 8942/Ferguson 3V32

After watching this machine operate for a bit I realised that it was loading, unloading and ejecting too fast. So I checked regulator Q16's output which should be 14V, with 12V across zener diode D34. Instead of 14V there was 25V! Replacing D34 put that right. The end sensors also had to be replaced, and there was yet another fault: the machine ejected tapes in the timer mode. The cause of this final fault was that pin 32 of IC3 was open-circuit (the reading was 9V). When IC3 had been replaced the machine worked normally in every respect. **D.P.**

Goodmans VCR1000

This machine ruined tapes. On inspecting the tape path I saw that there was some oxide lodged in the groove of the tape guide that runs around the head drum. This was cleaned off, and the heads and tape path were also given a clean. When I pressed my finger lightly on the right-hand spool there wasn't a lot of torque, so I cleaned the pinch roller and rewind pulley. Everything then seemed to be o.k. during a soak test, with no tape snagging. **D.P.**

Baird 8930/40/Ferguson 3V29/30

There were no clock functions and the machine was stuck on channel 1. Disconnecting the machine from the mains supply didn't do any good, so off came the top cover. This revealed that there had been some spillage on the tuner/timer board, around IC201. One of the chip's pins almost disintegrated when touched. I cleaned the area with alcohol and repaired the pin connection with a piece of wire. This brought success, though a guarantee couldn't be given of course. **D.P.**

Saisho VR2000/Matsui VX900/Orion VHX

If there are no E-E signals – it looks as if the VCR is in the camera mode but the channel LEDs light up – replace circuit protector ICP201 (N20). **M.Dr.**

Hinari VXL5

If the machine is dead with no clock display and no power-on signal to the power supply, check whether the 33V zener diode D504 in the power supply is short-circuit. **M.Dr.**

Hitachi VTM740

If there's a loud squealing in the fast forward and rewind modes, dismantle the capstan motor, clean the capstan shaft and bearing and lubricate with one drop of Castrol DWF. We've had this fault a few times now. **M.Dr.**

Philips VR6462

E-E sound o.k. but no playback sound should lead to a check on C2027 (330µF, 16V) on the audio PCB. You will probably find that it's short-circuit. To avoid further trouble replace it with a 25V type. **M.Dr.**

Panasonic NVG40

As there was no always 12V supply this machine produced no signals, not even via the r.f. loop-through. Q04 in the power supply was open-circuit. **D.B.**

Ferguson FV68

There was intermittent right-hand channel distortion during a Nicam transmission. The cure for this is to fit 5·6pF capacitors (part no. 50876240) in positions CM50 and CM51. **D.B.**

Samsung VIK310

When this machine came in the mechanism was out of alignment. After realigning it I found that the carriage would go back and forth on its own. The BOT sensor, which is mounted on the main PCB, also acts as a tape inserted sensor. It was dry-jointed. **D.B.**

Matsui VX888

There was an intermittent fault with this machine: if a completely rewound tape was inserted the machine would sometimes eject it. The end sensors were both found to be leaky, replacement curing the trouble. **D.B.**

Inside the Ferguson ICC9 Chassis

Part 2

Mark Paul

In this instalment we'll look at the scart interfacing circuitry, the audio signal processing and the microcontroller section of the chassis.

The Scart Interface

Different versions of the ICC9 chassis have either one or two scart sockets. The scart interfacing circuitry enables the signals from the tuner or external AV signals to be selected. The video input may be in RGB, S-Y/C (separate luminance and chroma) or CVBS (composite video, blanking and sync) form. With CVBS or S-Y/C inputs switching is done by an HEF4052B CMOS chip, IX01, under the control of the microcontroller chip IR01. When the inputs are in RGB form they are taken straight to the STV2160 chip IV01, with switching controlled by the fast blanking input at pin 16 of the scart socket.

Scart socket AV1 is fully wired to the Cenelec standard. When fitted, the AV2 scart socket functions as a video link, being arranged specifically for use with cameras/VCRs. It provides standard video/audio and S-Y/C inputs, with pin 8 controlling the input selection and automatic 16:9 aspect ratio signal detection, and video/audio outputs from socket AV1 to give loop-through facilities for camera/VCR editing and dubbing. This loop-through facility continues to be available in the standby mode.

In addition front panel sockets provide a link for other external equipment, enabling CVBS, S video and audio signals to be looped through to the AV2 socket. Although the AV1 and front socket inputs are wired in parallel, it's not possible to make connections to both at the same time.

Scart Circuitry

The scart interfacing circuitry with a single scart

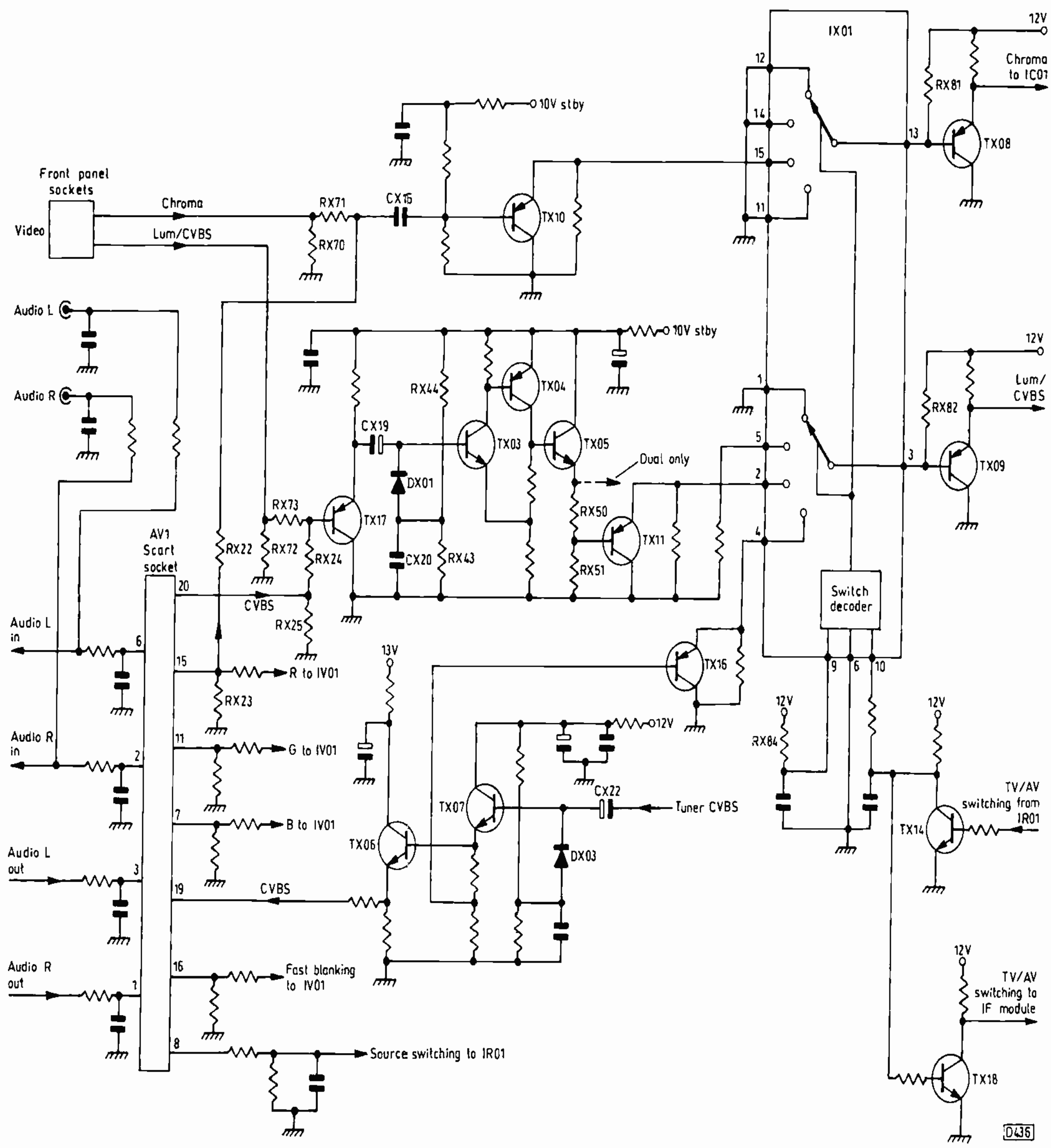

Fig. 1: The mono scart interface circuit.

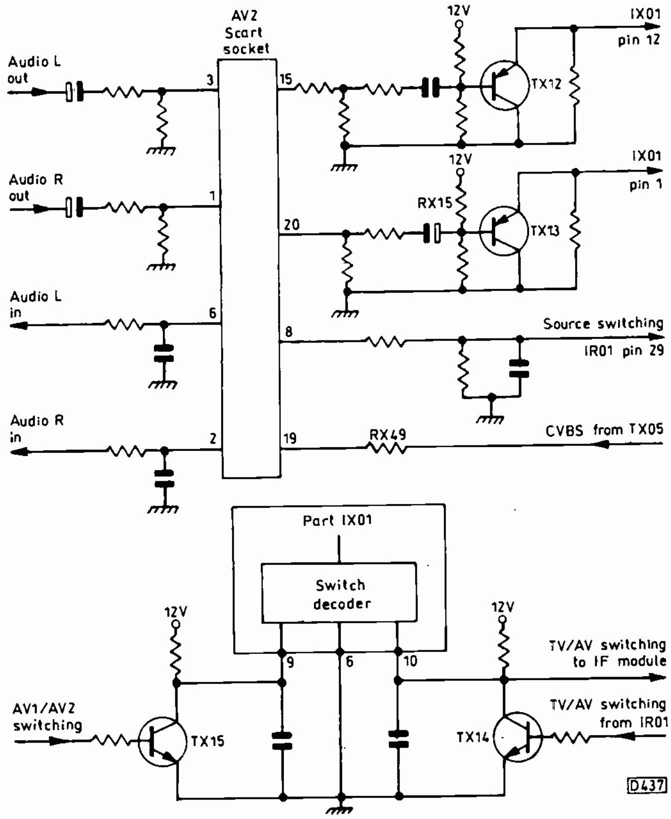

Fig. 2: Scart interface circuit differences when a second scart socket is fitted.

connector (AV1) is shown in Fig. 1 (most of it remains the same with two scart sockets, the differences and additional circuitry being shown in Fig. 2). The CVBS or S luminance input at pin 20 of scart socket AV1 or the front video socket is taken to the resistor network RX24/25 or RX72/73. There are equivalent networks for the S chroma inputs – RX22/23 and RX70/71. These networks reduce the signal amplitudes by about 6dB, which in the case of the S chroma signal means that a burst signal amplitude of 150mV is presented to the chroma stages.

The video input (CVBS or S luminance) is fed to the base of the emitter-follower/buffer transistor TX17, which is a.c. coupled to the following amplifier stage TX03-TX05 via CX19. Because of this a.c. coupling, d.c. restoration is provided by DX01, CX20, RX43 and RX44 at the input to the amplifier, whose output is buffered by TX05. RX50/RX51 attenuate the output, which is fed via TX11 to pin 2 of the switching chip IX01. TX11's emitter load is RX82, which is connected to pin 3 of the chip. The use of an amplifier prior to the switching improves the signal cross-talk performance. The output from this switch is passed via TX09 to the colour decoder chip IC01, to the sync separator in IV01 and to the teletext panel (Fig. 1 last month was simplified in this respect).

A simpler arrangement is used for the S chroma input, which is fed via buffer transistor TX10 to pin 15 of IX01. The output is via TX08 to IC01.

Signal selection depends on a comparison (by the switch decoder) between the voltage levels at pins 9 and 10 of IX01. Pin 9 is held high via RX84. Pin 10 receives the selection request from the microcontroller chip IR01 (also pin 10) via TX14. When TX14 is switched on, the AV1 input is selected. This change is also sent to the AV/tuner switch in the i.f. module via TX18.

The CVBS signal from the tuner is a.c. coupled via CX22 to the base of TX07, with d.c. restoration by DX03 etc. to suit the input requirement of IX01 and the Cenelec standard requirement at scart socket AV1. The input to IX01 is via TX16 (whose load resistor is again RX82); to the AV1 socket it's via TX06.

The RGB inputs at socket AV1, also the fast blanking input (pin 16), are attenuated then passed directly to IV01 for selection and processing. The scart switching input (pin 8) is also attenuated and is then fed to pin 28 of the micro-controller chip IR01 for status detection. The three possible voltage levels at pin 8 of AV1 indicate the following: 0-2·4V TV function; 3·6-7·4V 16:9 aspect ratio; 8·6-12V 4:3 aspect ratio.

Dual-scart Arrangement

Fig. 2 shows the circuit differences when a second scart socket, AV2, is incorporated. The AV2 circuitry is much simpler than that for socket AV1. The CVBS/S-luminance input is fed to pin 1 of IX01 via TX13 while the S-chroma input is fed to pin 12 via TX12. Stereo audio inputs from all three socket arrangements (AV1, AV2 and front panel) are routed to the audio processor board where input selection is carried out under the control of IR01 via the I2C bus. The switching signal at pin 8 of socket AV2 is attenuated then fed to pin 29 of IR01 for format and scart switching selection. There is audio loop-through from the AV1 connector or front panel sockets via the audio processor board, and video loop through from the junction of TX05's emitter and RX50 via RX49 to pin 19 of socket AV2.

Signal selection switching is a bit more complicated as pin 9 of IX01 may be either high or low. With pins 9 and 10 both high the tuner CVBS signal appears at pin 3 and pin 13 is taken to chassis. With pin 9 low and pin 10 high the AV1 CVBS/S-luminance input appears at pin 3 while the AV1 S-chroma input appears at pin 13. With pins 9 and pin 10 both low pins 3 and 13 are both taken to chassis. With pin 9 high and pin 10 low the AV2 video/luminance input appears at pin 3 and the AV2 chroma input at pin 13.

Audio Signal Processing

The audio processing arrangements in the ICC9 chassis are completely new. The circuitry has been designed for multi-standard operation, and has been further modified for Nicam sound. Fig. 3 shows the basic arrangement. The

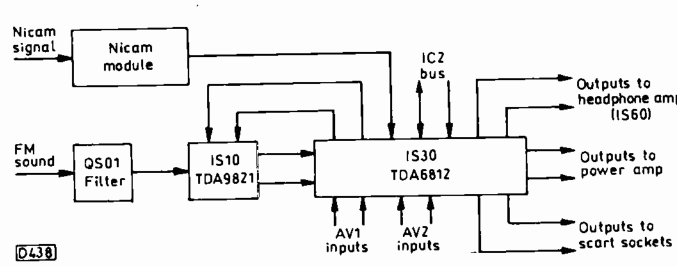

Fig. 3: Block diagram of the audio processing arrangement.

TDA9821 chip IS10 demodulates the standard f.m. mono sound signal (only one half is used with mono only and Nicam receivers, the other half being used with dual f.m. sound carrier systems). This process is alignment free.

With both f.m. and Nicam sound the next circuit block consists of the TDA6812 audio processor chip IS30. The audio signals are here subjected to tone control and quasi-stereo conditioning. After this the main audio signal is sent to the mother board for power amplification. A Motorola

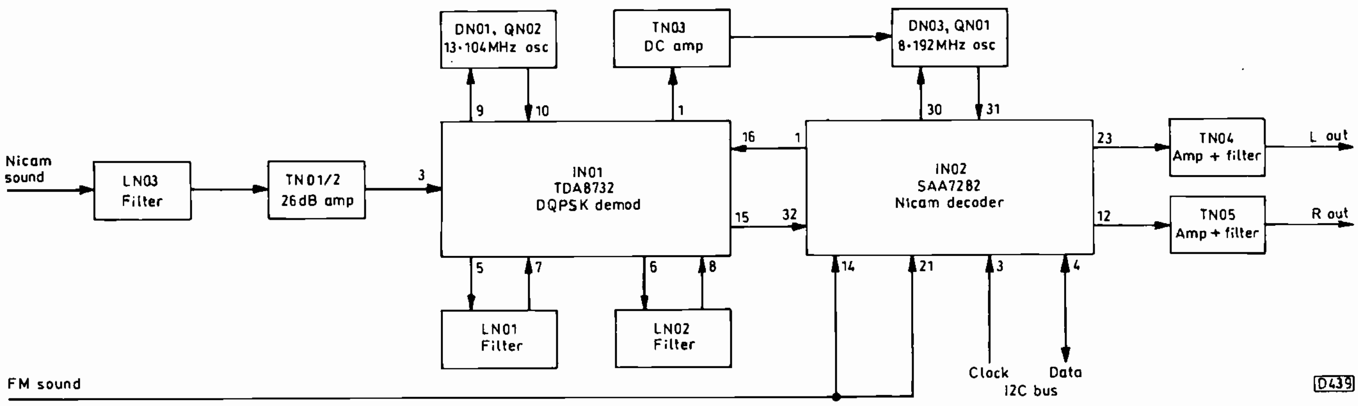

Fig. 4: Block diagram of the Nicam module.

MC33076P1 chip (IS60) provides amplification for the headphone outputs.

Nicam Decoder

Fig. 4 shows the Nicam module in block diagram form. It's designed as a plug-in addition to the audio processor board.

The 6·552MHz Nicam signal from i.f. module type IF2145 is filtered, amplified and then fed to the TDA8732 dual quadrature phase-shift key detector (DQPSK) chip IN01. This is followed by the SAA7282 Nicam decoder chip IN02 whose output is filtered and amplified then passed to the audio signal module for further processing.

There are two phase-locked loop crystal oscillators, both with varicap diode control. The 13·104MHz oscillator (QN02, DN01) is used for carrier regeneration while the 8·192MHz oscillator (QN01, DN03) is the bit-rate clock. Filtering in the two channels is provided by LN01/02.

IN02 informs the microcontroller chip IR01 about the state of the Nicam signal so that the decoder status can be displayed on the screen. At receiver power up a default value for the maximum acceptable bit error rate is sent to the module. If this rate is exceeded because the quality of the Nicam signal is poor, the module tells IR01 which can then switch to the f.m. sound signal. A minimum value is also noted so that if the Nicam signal quality improves the microcontroller chip can be asked to switch back to Nicam. The value difference between these two conditions is such that switching does not oscillate between the two.

Audio Processing

Fig. 3 showed the basic audio processing configuration. The TDA9821 dual-PLL f.m. demodulator is a multi-standard device with standard selection carried out by inter-communication between this chip and the following TDA6812 audio processor chip. As this feature is not required in the UK it's engineered out.

The supplies to both chips are stabilised by series regulator transistors with zener diode control.

The TDA6812 chip is also a multi-standard device designed to meet the requirements of international markets. Various sections intended for use with the German f.m. stereo sound system are simply ignored in UK sets. The following notes outline the functions of this chip:

I2C bus connection: Pin 34 is the data and pin 33 the clock input from pins 1 and 2 of the microcontroller chip IR01. The bus controls audio signal input selection; volume, balance, bass and treble control; audio 'dimension'; and headphone volume.

Adjustment amplifier: This provides design flexibility so that different demodulator chips can be used. With i.c.s that have an output signal level of 250mV, such as the TDA9820, a compensatory gain can be introduced to increase the level by 6dB to 500mV, the nominal scart output level.

Input switching: Selects either TV f.m. mono at pin 1, Nicam stereo at pins 11 and 12; AV1 scart stereo at pins 7 and 8; or AV2 scart stereo at pins 9 and 10.

Headphone volume control: Adjustable in 32 steps of 2dB, giving a range of 64dB.

Main pre-volume and quasi-stereo: Following signal selection this section can provide a quasi-stereo effect, which is switchable, with a mono input signal. The trick used – it was employed as far back as some versions of the TX10 chassis – is to introduce a 180° phase shift in one channel at around 1kHz.

Bass control: This is adjustable in steps of 3dB over a range of +15dB to –12dB.

Basewidth (alternatively known as stereo-wide): When activated this feature expands the basewidth for stereo reproduction by introducing frequency-dependent crosstalk in opposite phase at frequencies below the bass control cut-off frequency.

Volume control: Independently adjustable for right and left signals. The range at the speakers is 70dB, adjustable in 67 1·25dB steps.

Treble control: Adjustable over a range of ±12dB in steps of 3dB.

The main L and R audio outputs from the chip appear at pins 22 and 21 respectively. The outputs to the headphone amplifier chip IS60 are at pins 30 and 31. This device is a dual wideband operational amplifier which is powered from the ±20V rails.

The Microcontroller Chip

Fig. 5 shows the microcontroller arrangement, with some of the peripheral circuitry. The ST9093 microcontroller chip IR01 has 32Kbytes of ROM and 640 bytes of

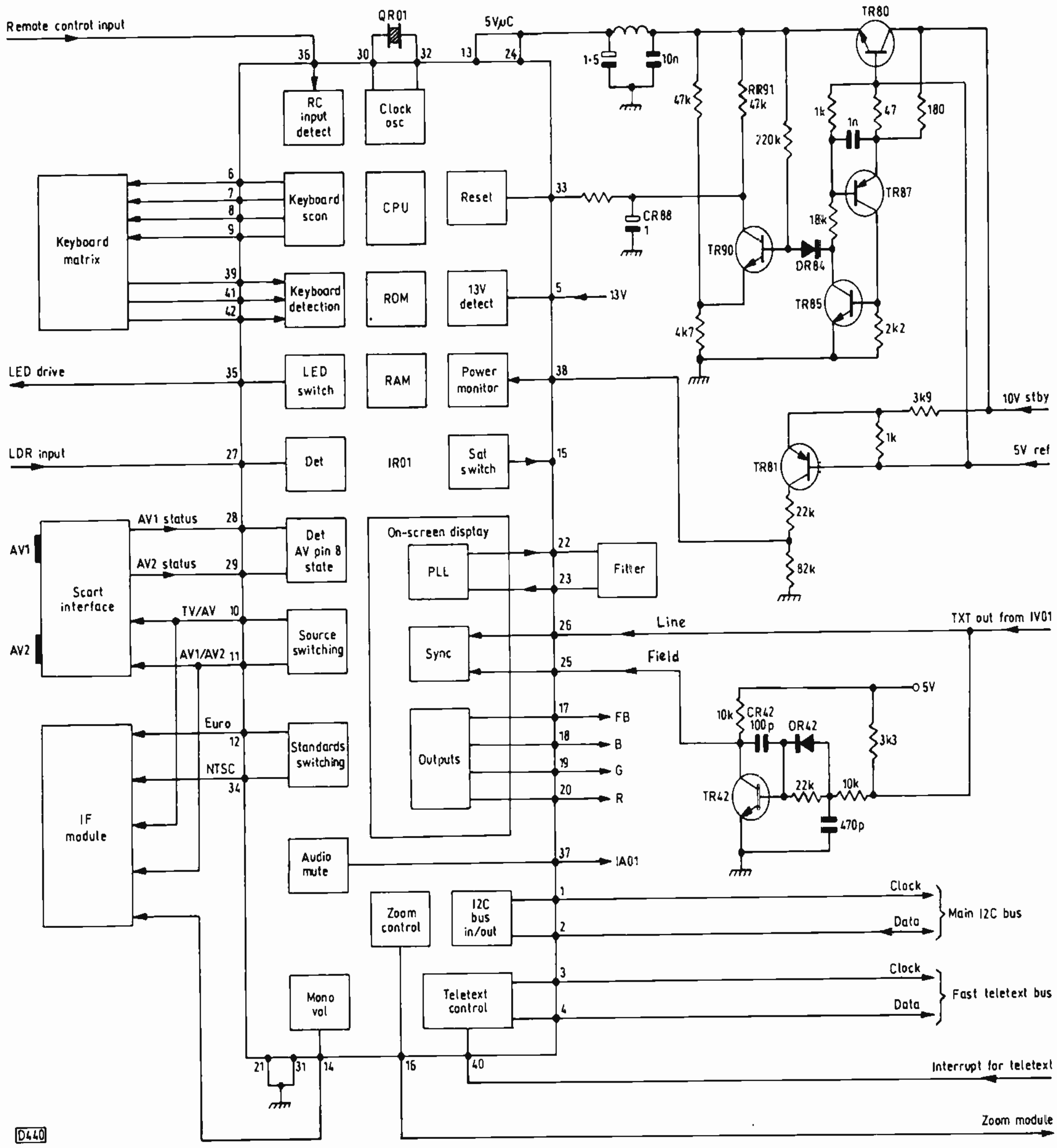

Fig. 5: Illustrating the main aspects of the microcontroller chip's operation.

RAM built in. The crystal oscillator runs at 22MHz: divided by two this gives a clock frequency of 11MHz. Orders are sent to IR01 either via the remote control line or via the on-board keyboard, which has a 4 x 3 matrix with ten key input combinations. IR01 controls the chassis via 23 input/output communication lines and two serial I2C bus lines.

Two pins read pin 8 information from the AV1 and AV2 scart sockets. One pin accepts an input from an LDR (a light-dependent resistor that senses the ambient light level, its output being used to provide automatic contrast adjustment to suit). The chip generates on-screen displays consisting of up to eight lines of 32 characters each, in eight colours.

One other chip, a non-volatile 512-byte EEPROM (IR02), is used in the control section of the chassis. It stores all the service data, user and factory-defined variables and the tuning programme information.

We'll now look at the various control circuit functions.

Power-on sequence: When the set is first switched on the power supply will start to generate the 10V standby voltage. As this voltage rises, the 5V ref. voltage becomes available at pin 21 of IV01. This is fed to the base of TR80, which produces a regulated 5VμC supply for IR01. TR81 switches on, generating the power monitor input signal at pin 38 of IR01. When pin 38 goes high, IR01 knows that power on has been initiated and its oscillator circuit starts. A reset signal is then required to complete IR01's initialisation procedure. This is generated externally by a circuit which will be described later (see pin 33 below). Once IR01's initialisation has been completed the red standby LED comes on. Data is then sent to IV01 via the main I2C bus, using the values stored in IR02, and the set is fully on.

Power-off sequence: The power monitor circuit in effect continuously monitors the 10V standby supply. When this circuit detects a fall in the 10V standby voltage, IR01 receives an indication that the power has been switched off. All data currently held IR01 is then stored in IR02, via the I2C bus, before the 10V standby supply voltage falls below a workable level.

Pins 1 and 2, main I2C bus: This links IR01 with the tuner, the audio circuit, the EEPROM, the multi-function chip IV01 and the two colour decoding/processing chips IC01/2. Normal operating speed is 50kHz.

Pins 3 and 4, fast I2C bus: This links IR01 to the teletext decoder chip, operating at the faster rate of 750kHz.

Pin 5, 13V detection input: The 13V supply produced in the line output stage is reduced to CMOS level by a potential divider network and fed to pin 5 of IR01. This level is checked by IR01: once a high is detected, an initialisation routine for the other I2C controlled chips is started.

Pins 6-9 keyboard output, pins 39/41/42 keyboard interrupt input: IR01 normally keeps its keyboard output pins low. The input pins are linked to the 5VµC supply via pull-up resistors. When a keyboard button is depressed, one of the input pins goes low. IR01 then scans all the keyboard lines to identify the key pressed and put into effect the requested operation.

Pin 10, tuner/AV switching output; pin 11, AV1/AV2 switching output: These pins select different signal sources. When pins 10 and 11 are both low the CVBS signal from the tuner is selected. When pin 10 is low and pin 11 is high external CVBS is selected. When pin 10 is high and pin 11 low the AV1 input is selected. When pins 10 and 11 are both high the AV2 input is selected.

Pin 12, standard switching output: This is fed to transistor TR22 which acts as an inverter. Low = standard B/G, DKK or I; high = standard L or PALplus. The output from TR22 is fed to the i.f. module.

Pins 13 and 24: IR01's supply pins. The 5VµC supply is derived from the 10V standby supply via the series regulator transistor TR80, whose base is controlled by the 5V ref. supply generated within IV01 (output at pin 21).

Pin 14, mono volume: This pin produces a pulse-width modulated (PWM) volume control output for mono sound sets. The range is 32 steps, each step width being 1msec. TR55 and the associated components convert the PWM to an analogue voltage.

In stereo sets this pin is used to control an additional degaussing circuit for tubes with screen sizes in excess of 33in.

Pin 15, satellite standby: Used only when a satellite tuner is incorporated.

Pin 16, zoom function output: This pin produces a PWM output to control zoom operation when a zoom module is incorporated. Low = normal TV scan size; pulsed = 25 per cent increase in scan size; high = 33 per cent increase in scan size.

Pin 17, OSD fast blanking: A 5V pulse is present here while the on-screen display is active. A potential divider reduces the level to 1·5V which is fed to IV01.

Pins 18, 19, 20: OSD RGB outputs, at 5V p-p. Reduced to 600mV p-p by potential dividers before application to IV01.

Pins 21 and 31: Chassis connections.

Pins 22 and 23: OSD PLL and filter connections.

Pins 25 and 26, H and V sync inputs respectively: The source of these inputs is the TXT OUT output at pin 30 of IV01. It consists of line and field sync pulses. Pin 26 requires field sync pulses only: the circuitry around TR42 suppresses the line sync pulses.

Pin 27, LDR detector: Used to monitor the output from an ambient light detector when fitted. The contrast level is adjusted accordingly.

Pins 28 and 29, scart socket AV1 and scart socket AV2 respectively pin 8 level detection: The inputs from the scart sockets are reduced by potential dividers. At IR01 0-0·9V = TV, 1·5V-2·9V = AV 16:9; 3·4V-4·8V = AV 4:3.

Pins 30 and 32, oscillator: Connected to the external crystal QR01 which runs at 22MHz. The internal clock frequency is 11MHz. In the halt mode, with the oscillator stopped, pin 30 goes high with pin 33 low. To leave this condition a reset pulse must be applied to pin 33.

Pin 33, reset input: The reset pulse goes low and must have a duration of at least 10msec. It's generated by the circuitry around TR90 and the Schmitt trigger TR85/87. After switch on IV01 produces the 5V ref. supply at pin 21 and TR80 produces the 5VµC supply for IR01. TR90 will be biased on, holding pin 33 at around 0·5V. When the voltage at the base of TR87 rises above 0·6V it will switch on, in turn switching on TR85. The two transistors latch on, with TR85 shorting out the base of TR90 via DR84. TR90 is thus switched off, the voltage at pin 33 rising at a rate determined by the time-constant of CR88 and RR91.

Pin 34, NTSC switching: Operates in the same manner as pin 12. Is used only in sets fitted with a special NTSC i.f. module.

Pin 35, LED switching: Used to control the red/green standby/on LED. Also used in the child-lock mode to blink the standby LED. When the TV set is on pin 35 is low and the LED shines green. In the standby mode pin 35 is high and the LED shines red. In the child-lock mode pin 35 is pulsed and the LED blinks red.

Pin 36, remote-control input: This pin has a Schmitt-trigger interrupt input to guarantee rapid IR command identification.

Pin 37, audio mute output: This pin is high in the mute condition. Mute is activated on viewer request, during channel change, when there is no 'valid signal', and in the standby mode.

Pin 38, power monitor input: The operations associated with this pin were described in the sections on the power-on and power-off sequences earlier. With the 10V standby supply falling at power off, IR01 feeds into the EEPROM via the main I2C bus information on the system status and the last volume control setting. Once the data has been saved the halt mode is entered.

Pin 40, text information interrupt: The teletext decoder uses this pin to tell IR01 that the requested page is ready to be displayed. The pin then goes low.

Next Month

In Part 3 we'll look at the video signal processing and the timebases and provide some notes on fault-finding.

Workshop Health

Pete Roberts

No one can deny that servicing consumer electronic goods can sometimes be a hiding to nowhere. Customers nowadays expect instant service at minimal cost, and are only too ready to run snivelling to the nearest solicitor should their equipment go wrong again, even when the new fault is totally unrelated to the previous one or is caused by their own stupidity. Is it any wonder that the trade is in the Premier Division for heart attacks and nervous breakdowns?

A factor which doesn't help is the working conditions that many engineers have to endure during their whole working day. I've had the misfortune to work in some dingy, depressing dives – one in particular had toadstools growing from the walls! While there's little that can be done about the moaning customers, a few simple measures can lift the workshop lads' spirits, health and productivity.

Lighting

The first and possibly the most important factor to take into account is lighting. Lack of daylight, especially during the winter months with their grey skies and short days, has for some years been known to give rise to a state of clinical depression in suscepible people: there's a name for it, Seasonally Affected Disorder, with the very appropriate acronym SAD.

SAD is not a psychological condition that's "all in the mind", something "to snap out of". It's caused by biochemical changes whose origin can be traced to the fact that we humans are a subtropical species not really cut out for the drab, grey environment which is our lot in the UK for much of the year. SAD is in fact an acute manifestation of a hibernating instinct that affects us all to some extent as the nights draw in. Severe cases warrant proper medical treatment with drugs. Changes in the amounts of two neurotransmitters present in the brain, serotonin and melatonin, lead to SAD. It's known that these chemical changes are triggered by changes in the ambient light level perceived by the eyes.

A person who is depressed for any reason is not a good worker: his concentration, attention span and social skills are all impaired. Depression is also thought to lower the effectiveness of the immune system, leaving the victim even more vulnerable to all the colds, flu and worse that our glorious climate can throw at us.

The simple fact is that artificial lighting is not a satisfactory substitute for daylight. Those who work all the time with artificial light will have experienced the gloom of a 'fully lit' workshop after having been outside on a sunny day. The human eye has the capacity to adapt itself to a vast range of ambient light intensity. Use of a simple photographic exposure meter will demonstrate just how dim an artificially lit workshop actually is.

The average amount of heat and light radiation that reaches the ground in the UK, known as the 'insolation', is about 1kW per square meter. To simulate that light intensity in the workshop would require something like eight 300W bathroom heat/light lamps over the average workbench! Not a practical proposition to say the least. So the first task is to get as much daylight as possible into the workshop.

As bright sunshine can be a hindrance in a TV workshop, the windows should be north facing or curtains could be provided for use when needed. Direct sunlight can on the other hand be a help in audio or white goods workshops, where workbenches would be best sited under south facing windows. As the working day outlasts daylight hours in winter we still have to consider the workshop's artificial lighting, which needs to be as bright as possible. First however a note about security.

Security

The main problem nowadays with windows is the security risk, especially where the workshop is situated at ground level behind the premises. If you are setting up a new workshop it may be better to site it upstairs, though this may mean lugging heavy sets up and down stairs with the accompanying risk of back injury – can't win, can we? To prevent undesirables seeing in 'to case the joint', ground-level windows can be glazed with the wire-reinforced, dimpled glass much loved by the makers of council house front doors. Or you could consider using Makrolon plastic glazing, which is next to impossible to break and would deter vandals and casual thieves. Bear in mind however that any plastic glazing is vulnerable to a determined individual with a thermic lance!

Some kind of secondary security will be needed. This could be anything from wire mesh or steel bars to perhaps wrought iron with interesting scrolly bits. You could even use the same kind of roller shutters that probably adorn the front of your shop. Your local Police Crime Prevention Officer will be glad to provide advice free of charge. And don't forget that you'll need some sort of glass breakage detector on each window, including any skylights, connected to your security system.

Artificial Lighting

The bog-standard fluorescent lighting we're all used to is not the best for close work. Conventional fluorescent tubes flicker at twice the mains frequency and, as the tubes wear. the hot cathodes at each end lose their emission – usually at different rates. As a result the tube acts as a crude rectifier, passing more current one way than the other. This 'half waving' produces that annoying 50Hz flicker. Though the 100Hz flicker of a tube that's working normally is not particularly noticeable, it can still lead to eyestrain, headaches and tiredness.

For bench lighting you could use standard incandescent light bulbs or even halogen lamps, though at 300W or 500W the latter are costly to run and hot to work under. Better still would be one or two of the new compact fluorescent lamps that use h.f. electronic ballasts. These are basically switching regulators that run at several tens of kHz. Thus their use eradicates flicker. H.F. ballasts to run standard-size fluorescent tubes are also available, but they are a bit pricey. RS lists them in the lighting section of catalogue 1; Farnell lists special electronic ballasts for the Thorn 2D range of compact fluorescent lamps. Bear in mind that h.f. ballasts can cause interference to LW and MW radio reception in their vicinity. The colour temperature (warm or daylight) of fluorescent tubes is a matter of preference, but try to keep them all the same.

If your premises have a three-phase supply, any overall flicker will be effectively eliminated by installing the main lighting in multiples of three fittings, each connected to a different phase. This technique is standard in industrial units, as it prevents the strobe effect that has the dangerous ability to apparently freeze rotating machinery. Incidentally three-phase supplies should not be present anywhere on the workbench, as there is 415V between any two phases: all non-isolated sockets and those on immediately adjacent benches must be fed from the same phase. Otherwise anyone leaning over from his bench to the next while accidentally touching live gear could end up on the wrong side of a 415V crack.

Heating and Ventilation

Ventilation isn't a problem during the summer: just open the windows and doors and breath in deeply all that lovely fresh car exhaust gas! In winter the problem is to get all the fag smoke and soldering fumes out while keeping expensive heat in. So ventilation is vital! The recent death of Roy Castle underlined the risks of even secondary smoking, and asthma due to soldering fumes is a recognised industrial disease. Line output transformer and other component burn-ups also release highly toxic fumes. For example burning PVC forms hydrogen chloride while burning polyurethane forms hydrogen cyanide. Most fumes from burning plastics are garnished with some tasty dioxins for good measure.

Even without any poisonous fumes, an ill-ventilated workshop will become stuffy, smelly and unpleasant, considerably increasing the risk of airborne infection passing from one person to another. Lack of ventilation also leads to dampness, which is not only unhealthy but can encourage mildew, wet- and dry-rot and other fungi to attack the building's fabric – we're back to those toadstools growing on the walls! More importantly, fungal spores aggravate and can cause asthma, bronchitis and other severe respiratory complaints.

Where natural ventilation is difficult to arrange, or during cold weather, a Vent Axia extraction fan will probably do the trick – mount it above the bench of the most recalcitrant smoker.

Air Ionisation

A problem that's particularly associated with TV and AV workshops is the wrong sort of ionisation. The air molecules present are generally not electrically neutral. The atoms of which they are composed can be either negatively ionised (carrying extra electrons) or positively ionised (carrying too few electrons). Air ionisation has been proved to affect human health and wellbeing – amongst other things it influences brain serotonin levels.

Negative ions are the good guys, while positive ions are decidedly anti-social. A net surplus of them in the air will leave you feeling under the weather: literally so, as the tired, headachy feeling associated with thundery weather is known to be mostly caused by strong positive air ionisation.

There's a lack of negative ions in polluted air: TV sets, with their 25kV tube final anode voltage, are excellent positive ion generators. Any corona discharge at this voltage also produces ozone and nitrous oxides, which are most definitely not good for you.

The cure is simple: install one or two ionisers. These devices are basically high-voltage generators that run at typically –7kV. This potential has been found to give efficient ionisation with negligible production of ozone. To eliminate any shock hazard the high voltage is at a very high impedance. It's applied to several sharply-pointed electrodes which ionise by corona discharge. The ionised air is strongly repelled by the electrodes, forming an 'electric wind' that disperses the ions efficiently.

In addition to having a significant 'feel good' effect, negative ionisation clears the air of spores, dust, bacteria, smoke and fumes. Air ionisers are cheap to run, costing typically a penny or so a week. As they should be run continuously it's probably better to buy a ready-made model that conforms to BS415 rather then try to knock one up from odd bits and pieces. Most of the airborne garbage ends up on and around the ioniser, so dust it regularly to ensure maximum efficiency – this goes for domestic ionisers as well.

If you really feel like pushing out the boat you could buy one of the so-called 'air processors'. These draw room air through a series of filters, removing particles and ionising the filtered air before returning it. But remember that conditioning your workshop air is no substitute for adequate ventilation, as normal respiration produces carbon dioxide and removes oxygen – which need to be removed and replaced respectively.

Research

None of the above is quackery or old-wives' tales! Much research was carried out during the Seventies to discover the cause of the so-called 'sick-building syndrome'. Staff who worked in certain office blocks, shopping malls (which were new at the time) and factory buildings would be off-colour, listless and prone to taking time off for sickness.

The numbers involved, together with their wide social distribution, ruled out malingering as the cause, and firms located in 'sick buildings' tended to have a high staff turnover. It was found that the major causes of the problem were lack of natural light and stale, recirculated conditioned air, especially when it was tainted with traces of chemical fumes escaping from plastic building materials.

In Conclusion

Whether you are self-employed, an employee or a company service manager you should find that the suggestions outlined in this article will help to establish a better working atmosphere (literally!) in the workshop. It's worth repeating that happy engineers are productive engineers, and that you could end up with less stress, sickness and absenteeism. Let's face it: there's enough nastiness from the front of the counter without having to put up with ill-feeling out back as well.

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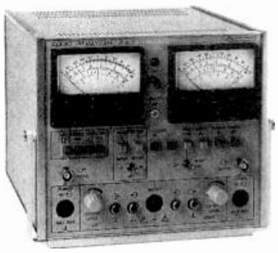
Audio - Video - Television - Satellite TV - Telecomunications

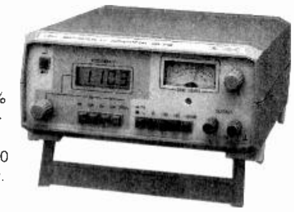
The manufacturer who cares about quality & features rather than being lowest in price !



Audio Analyser
Model AA-930

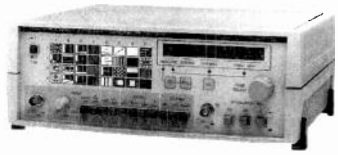
Multi-function meter. Measures distorsion, wow & flutter, stereo power, signal levels in & out; generates audio test signals. Features include large clearly marked analogue meters. Performs the work of many individual instruments. £ 490

Low Distortion Low Frequency Generator
Model GB-212



20 Hz to 200 kHz, harmonic distortion 0.02 % maximum over audio band. Frequency counter resolution ashigh as 0.1 Hz. 600 ohms impedance. Output level attenuation range 60 dB, with analogue meter for settng accuracy. Excellent output level flatness. £ 219

Television Pattern Generator
Model GV-698/11

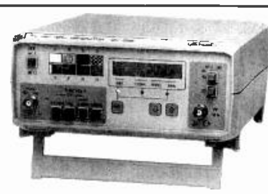


32 patterns, 32 internal memories. PAL/NTSC/SECAM standards, with I, B, G, H, M, M, N, D & K, NICAM, teletext all in one instrument.
Optional on screen logotype. (Other pattern generators available from £ 210). £ 1428

Functions Generators
Models GF-230 & GF-232

Two versions available: 0.1 z to 1 MHz and 0.2 Hz to 2 MHz. Producing sine, triangular and square waveforms, with variable symmetry. Excellent performance. £ 153 & £ 206

Television Pattern Generator
Model GV-298

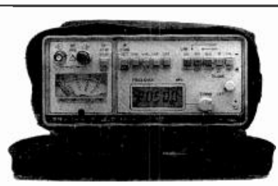


Compact high performance generator, RF and video outputs. Frequency range same as GV-698/11, 37 to 865 MHz. Circle pattern included. £ 433

CRT Rejuvenator
Model TA-903

Similar to TA-901, but has three meters to monitor cathode current. Special technique allows repeated rejuvenation of CRT. Supplied in attache style case, for easy field and workshop use. £ 498

TV & Satellite Level Meter
Model MC-360



Ideal instrument for the professional installer of FM/TV aerials and satellite TV dishes. Covers 48 to 856 MHz and 950 to 2050 MHz. Lighweight, compact and rechargeable battery operated. £ 654

CRT Rejuvenator
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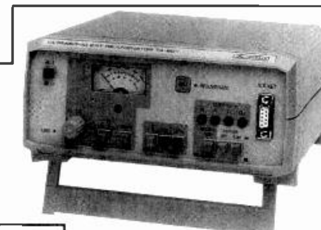
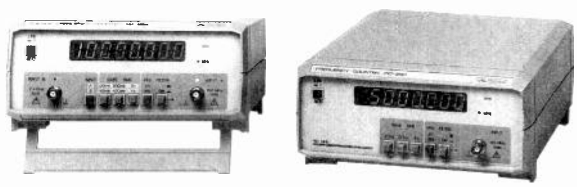


An essential tool for every TV workshop. Promax have made many thousancs. Supplied complete with a set of base adaptors. £ 235



Frequency counters
Models FD-250 & FD-252

FD-250 covers 20 Hz to 160 MHz and FD-252 covers same plus, 100 MHz to 2.4 GHz. Large L.E.D. display. Wide performance at low cost. £ 153 & £ 206

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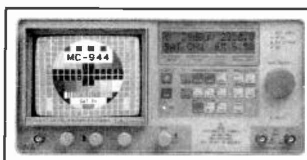
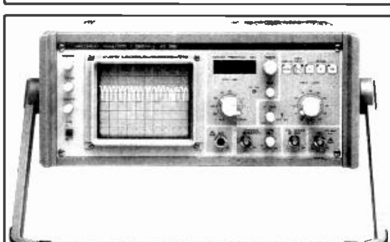
Built-in demodulator for easy station ident, and audible tone foreasy positioning. This meter is light in weight, but has outstanding technical features.'
£ 354



TV & Satellite Level Meter
Model MC-944

This meter has everything for the top flight instaler of aerials, dishes, CCTV, MATV, SMATV and others systems. Features include TV monitor, spectrum analyser, sync pulse, teletext, printer output, 99 memories, tuneable audio subcarriers, etc. Full autocorrection for superb, unequalled accuracy!. RS-232 as standard. £ 1895



R.F. Spectrum Analyser
Model AE-566

1 to 1000 MHz, with 950 MHz to 1750 MHz option. Built-in tracking generator. Offers spanwidths from 1 MHz to 1000 MHz. Includes normalizer. This analyser is ideal for production and educational applications, as well as R+D. £ 2800

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HOW LOW ARE YOUR FLOPPIES? 3.5" (1.44) unbranded. We have sold 100,000+ so ok! Pack of 50 £24.99 ref DEC16

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5mw LASER POINTER. Supplied in kit form, complete with power adjuster, 1-5mw, and beam divergence adjuster. Runs on 2 AAA batteries. Produces thin red beam ideal for levels, gun sights, experiments etc. Cheapest in the UK! just £39.95 ref DEC49

SHOP WOBBLERS! Small assemblies designed to take D size batteries and 'wobble' cardboard model signs about in shop windows! £3 99 Ref SEP4P2.

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STEREO MICROSCOPE 155X195MM, up to 600mm high, so items up to 10" will fit under lense. Rack and pinion focusing, 6 interchangeable rotating object lenses, interchangeable eye pieces, +scaled eyepiece for accurate measuring etc. Powerful low voltage illumination system with green filter and variable intensity, 100mm black/white + ground glass stage plate, 70mm swivel mirror, adjustable eyepieces (both focus and width). Magnification range 4.6-100.8, field of view 39-2.4mm). Price is £299 for complete setup. Ref 95/300.

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COMPUTER RS232 TERMINALS. (LIBERTY) Excellent quality modem units,(like wyse 50,s) 2xRS232, 20 function keys, 50 thro to 38,400 baud, menu driven port, screen, cursor, and keyboard setup menus (18 menu's). £29 REF NOV4.

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Minature adjustable timers, 4 pole c/o output 3A 240v,

HY1230S, 12vDC adjustable from 0-30 secs. £9.99
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PC PAL VGA TO TV CONVERTER Converts a colour TV into a basic VGA screen. Complete with built in psu, lead and s/ware. £49 95. Ideal for laptops or a cheap upgrade.

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ASTEC SWITCHED MODE PSU BM41012 Gives +5 @ 3.75A, +12@1.5A, -12@.4A. 230/110, cased, BM41012 £5.99 ref AUG6P3.

TORRODIAL TX 30-0-30 480VA, Perfect for Mosfet amplifiers etc. 120mm dia 55mm thick. £18.99 ref APR19.

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MILITARY SPEC GEIGER COUNTERS Unused anstraightfrom Her majesty's forces. £50 ref MAG 50P3.

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OUTDOOR SOLAR PATH LIGHT Captures sunlight during the day and automatically switches on a built in lamp at dusk. Complete with sealed lead acid battery etc £19.99 ref MAR20P1.

ALARM VERSION Of above unit comes with built in alarm and pir to deter intruders. Good value at just £24.99 ref MAR25P4.

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MICRODRIVE STRIPPER Small cased tape drives ideal for stripping, lots of useful goodies including a smart case, and lots of components. £2 each ref JUN2P3.

SOLAR POWER LAB SPECIAL You get TWO 6"x6" 6v 130mA solar cells, 4 LED's, wire, buzzer, switch plus 1 relay or motor. Superb value kit just £5.99 REF: MAG6P8

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300DPI A4 DTP MONITOR Brand new but shop soiled so hence bargain price! TTL/ECL inputs, 15" landscape, 1200x1664 pixel complete with circuit diag to help you interface with your projects JUST £14.99. REF JUN15P2.

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

SWITCHED MODE PSU ex equip, 60w +5v @5A, -5v@.5A, +12v@2A,-12v@.5A 120/220v cased 245x88x55mm IEC input socket £6.99 REF MAG7P1

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

PLUG IN ACORN PSU 19v AC 14w , £2.99 REF MAG3P10

POWER SUPPLY fully cased with mains and o/p leads 17v DC 900mA output. Bargain price £5.99 ref MAG6P9

ACORN ARCHIMEDES PSU +5v @ 4.4A. on/off sw uncased, selectable mains input, 145x100x45mm £7 REF MAG7P2

GEIGER COUNTER KIT Low cost professional twin tube, complete with PCB and components. Now only £19 REF AUG19.

9v DC POWER SUPPLY Standard plug in type 150ma 9v DC with lead and DC power plug. price for two is £2.99 ref AUG3P4.

AA NICAD PACK encapsulated pack of 8 AA nicad batteries (tagged) ex equip, 55x32x32mm. £3 a pack. REF MAG3P11

13.8V 1.9A psu cased with leads. Just £9.99 REF MAG10P3

PPC MODEM CARDS. These are high spec plug in cards made for the Amstrad laptop computers. 2400 baud dial up unit complete with leads. Clearance price is £5 REF: **MAG5P1**

INFRA RED REMOTE CONTROLLERS Originally made for hi spec satellite equipment but perfect for all sorts of remote control projects. Our clearance price is just £2 REF: **MAG2**

200 WATT INVERTER Converts 10-15v DC into either 110v or 240v AC. Fully cased 115x36x156mm, complete with heavy duty power lead, cigar plug, AC outlet socket. Auto overload shutdown, auto short circuit shut down, auto input over voltage shutdown, auto input under voltage shut down (with audible alarm), auto temp control, unit shuts down if overheated and sounds audible alarm Fused reversed polarity protected. output frequency within 2%, voltage within 10%. A extremely well built unit at an excellent price. Just £64.99 ref AUG65.

UNIVERSAL SPEED CONTROLLER KIT Designed by us for the C5 motor but ok for any 12v motor up to 30A Complete with PCB etc. A heat sink may be required. £17.00 REF: **MAG17**

MAINSCABLE Precut black 2 core 2 metre lengths ideal for repairs, projects etc. 50 metres for £1.99 ref AUG2P7.

COMPUTER COMMUNICATIONS PACK Kit contains 100m of 6 core cable, 100 cable clips, 2 line drivers with RS232 interfaces and all connectors etc. Ideal low cost method of communicating between PC's over a long distance. Complete kit £8.99.

MINI CYCLOPS PIR 52x62x40mm runs on PP3 battery complete with shrill sounder. Cheap protection at only £5.99 ref MAR6P4.

ELECTRIC MOTOR KIT Comprehensive educational kit includes all you need to build an electric motor. £9.99 ref MAR10P4.

VIDEO SENDER UNIT. Transmits both audio and video signals from either a video camera, video recorder, TV or Computer etc to any standard TV set in a 100' range! (tune TV to a spare channel) 12v DC op. Price is £15 REF: **MAG15** 12v psu is £5 extra REF: **MAG5P2**

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LOW COST WALKIE TALKIES Pair of battery operated units with a range of about 200'. Ideal for garden use or as an educational toy. Price is £8 a pair REF: **MAG 8P1** 2 x PP3 req'd.

***MINATURE RADIO TRANSCEIVERS** A pair of walkie talkies with a range of up to 2km in open country. Units measure 22x52x155mm. Including cases and earp'ces. 2xPP3 req'd. £30.00 pr. REF: **MAG30**

COMPOSITE VIDEO KIT. Converts composite video into separate H sync, V sync, and video. 12v DC. £8.00 REF: **MAG8P2.**

LQ3500 PRINTER ASSEMBLIES Made by Amstrad they are entire mechanical printer assemblies including printhead, stepper motors etc etc In fact everything bar the case and electronics, a good stripper! £5 REF: **MAG5P3** or 2 for £8 REF: **MAG8P3**

LED PACK of 100 standard red 5m leds £5 REF **MAG5P4**

UNIVERSAL PC POWER SUPPLY complete with flyleads, switch, fan etc. Two types available 150w at £15 REF:MAG15P2 (23x23x23mm) and 200w at £20 REF: MAG20P3 (23x23x23mm)

***FM TRANSMITTER** housed in a standard working 13A adapter!! the bug runs directly off the mains so lasts forever! why pay £700? or price is £26 REF: MAG26 Transmits to any FM radio.

***FM BUG KIT** New design with PCB embedded coil for extra stability. Works to any FM radio. 9v battery req'd. £5 REF: MAG5P5

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TALKING COINBOX STRIPPER originally made to retail at £79 each, these units are designed to convert an ordinary phone into a payphone. The units have the locks missing and sometimes broken hinges. However they can be adapted for their original use or used for something else?? Price is just £3 REF: **MAG3P1**

TOP QUALITY SPEAKERS Made for HI FI televisions these are 10 watt 4R Jap made 4" round with large shielded magnets. Good quality. £2 each REF: **MAG2P4** or 4 for £6 REF: **MAG6P2**

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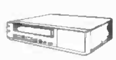

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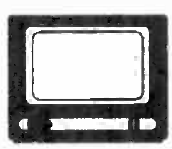

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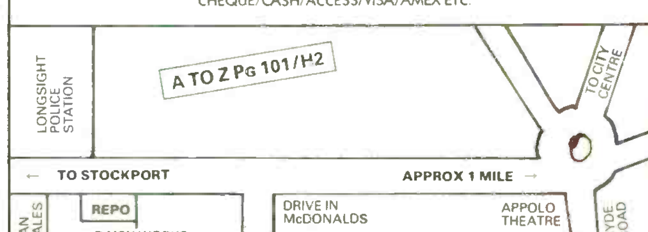

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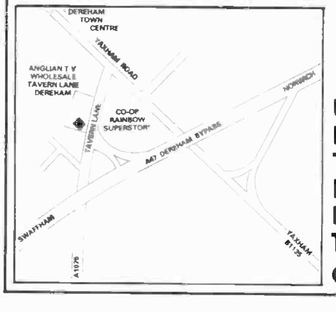

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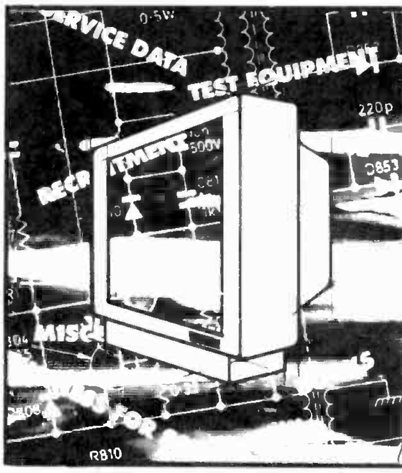

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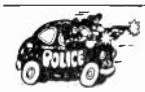

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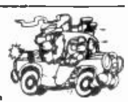

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12v DC and 24v DC power supply
regulated £2.00

Philips
Text Decoder K40 £8.00

ICC5 Tube Base on panel
ICC5 Decoder panel each £5.00

KT3/k30 T/Text Hand Set £8.00
KT3K30 Full Remote £15.00
Pye & Philips handset
KT3-K30 chassis
No. RC5150-RC5176-RC5071-RC5177
Special Price £13.00
RC4001 KT3 and Teletex £12.00
TX10 Hand Set Text £12.50
TX9 with Text £12.50
TX9 & TX10 button print £1.00
TX10 Focus Pots £4.00

Mains Stand By Switch with Coil £1.00

Nicam Boards
Texas Instruments MkII £15.00

Toshiba Nicam Board £6.00

Ferguson Nicam Board £15.00

Text-Type
Replace Hand Set for Philips KT3-K30,
K4 etc £6.00

Thorn Handsets
9000-9600-TX9-TX10-TX100
Text and Non Text £10.00

Philips RC5171 (Handset) £8.00

Sanyo Magnatron
Type 2M218H £10.00

1992 to 1993 Mod.
Orion Video Hand Set with LCD £5

Samsung & Orion Video decks with
heads £16.00
TV & Video hand set £2.00
Orion TV and video hand set £2.00

B.Sky.B VHF to IF Block Converter £1.00

10 Panels Ferguson
Mixed from TX9 to ICC5 £20.00

TV Aerial Ring Type 40p

TX100 Remote Hand Sets £6.00

ITT-Nokia Tuner IF
RF-IF-Module 5829 02 58 £6.00

SEL-ITT HF-Module 2
UK 5828-04-10 £6.00

Amstrad-Double Decker Switch Mode
POWER SUPPLY £5.00

Amstrad-Long Chassis
and short Chassis
Power supply £4.00
Models 1991/1992

BU 208A, BU 508A, BU 508D,
BU 508AF, BU 508DF, £1.00 each
BU 801 60p
2SD 1398 £1.00

2SD 1428 £1.00
2SD 1556 £1.00
2SD 1844 £1.00

TDA 2600 £1.50

TX90 Mains Transformer £10.00

TDA 3560 £2.00
TDA 3654 90p
TDA 3653AQ £1.00
TDA 3562A £1.00

STR 4211 £6.00
STR 6020 £6.00
STR 6602D £4.00

01 M4-412-001-RU1
8 Way Pre sets for TX10-TX100 £3.00

Philips Handsets
RC 5353
RC5300 £8.00
RC 5176 each
RC5177

Philips 36832 2A LOPT £15.00

2433274 LOPT £12.00

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U/V Tripler £4.00

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FERGUSON Hand sets
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IK2000 £5.00
IK7000 £5.00
SRD 2 £1.00
SRD 3 £1.00
T780 £2.00
SRD 4 £1.00

TX85 – TX8 Ferguson £10

PANASONIC TV Video Handset
1993 models with door-
3 types £7.00 each

ORION Hand set
LCD Video Easy Programmer £10.00
RC18 £3.00

PHILIPS
U/V Handset TV/VCR/TXT
Remote RC 5903 £12.00

ORION Hand set
Video RC44 £3.00
Video RC07 £3.00
LCD

PANASONIC-TV Original
Handsets for models:
TC1632, TC1642, TC2232
TX2034, TX2044, TX2200
TX2234, TX2244, TX2300
TX2636, TX3300, RC201
replaces TNQ1411/2
£8.00 each

TOSHIBA Hand sets
CT 9511 £5.00

CT 9234 Hand sets
CT 9455
CT 2233
CT 938
CT 9268A
CT 9384
CT 9194
CT 9296
CT 9186
CT 9187A
£3.00 each

AMSTRAD Long Chassis
Display Panel 1992/1993 £4.00

Amstrad Tuner UE33-B01 £3.00

TX10 Focus Units 6 for £10.00

Conversion Kit ITT Teletext £8.00

Burglar Alarm Siren 12 Volt 50p

Amstrad 6000 Head with
motor LP £10.00
Good Lower Drum £3.00

HITACHI sets etc
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STR6020 £6.00
S2000AF line o.p. £1.00
2SC940 £1.00
BU105/04 80p
BU108 £1.00
BU124 50p
BU126 80p
BU180a 65p
BU204 60p
BU205 75p
BU206 £1.00
BU207 £1.00
BU208 80p
BU208A £1.50
BU208D 90p
BU222 £1.00
BU326 £1.00
BU407 60p
BU508A 90p
BU508AF £1.00
BU508D 80p
BU705 £1.00
BU806A £1.00
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BYW95 10p
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BUK445/600 £2.00
BUK454/600 £2.00
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TDA3048 £3.00
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TDA3190 £1.00
TDA3301 £3.00
TDA3505 £3.00
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TDA3561 £3.00
TDA3560 £4.00

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TDA3566 £3.50
TDA3564 £4.00
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TDA3591 £1.00
TDA3592A £3.00
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BYV96D 10p
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BYW29/50 15p
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2SD716 £1.00
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2SD789 30p
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2SD1266 £1.00
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2SD1556 £1.00
2SD1576 £1.00
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For use with Ferguson Video Star S-VHS
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RF-IF Module 5829-01-05
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950 to 1750 NOKIA Sat-Tuner
£4 each

KIT FOR NOKIA ITT SETS
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LH 5164D – IC's
On Text Panel
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FERGUSON LOWER DRUM PDM2024F
£20 each

MATSUI – ORION – SASHIO Video hand set
L.C.D. 1992-1993 models £5 each
and RC07 and RC44 £2

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4K – 1.5K, 2.5K, 10K £5 each

PANASONIC Hand Set TNQ 8E 0442
PANASONIC Hand Set TNQ 1E 1411
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