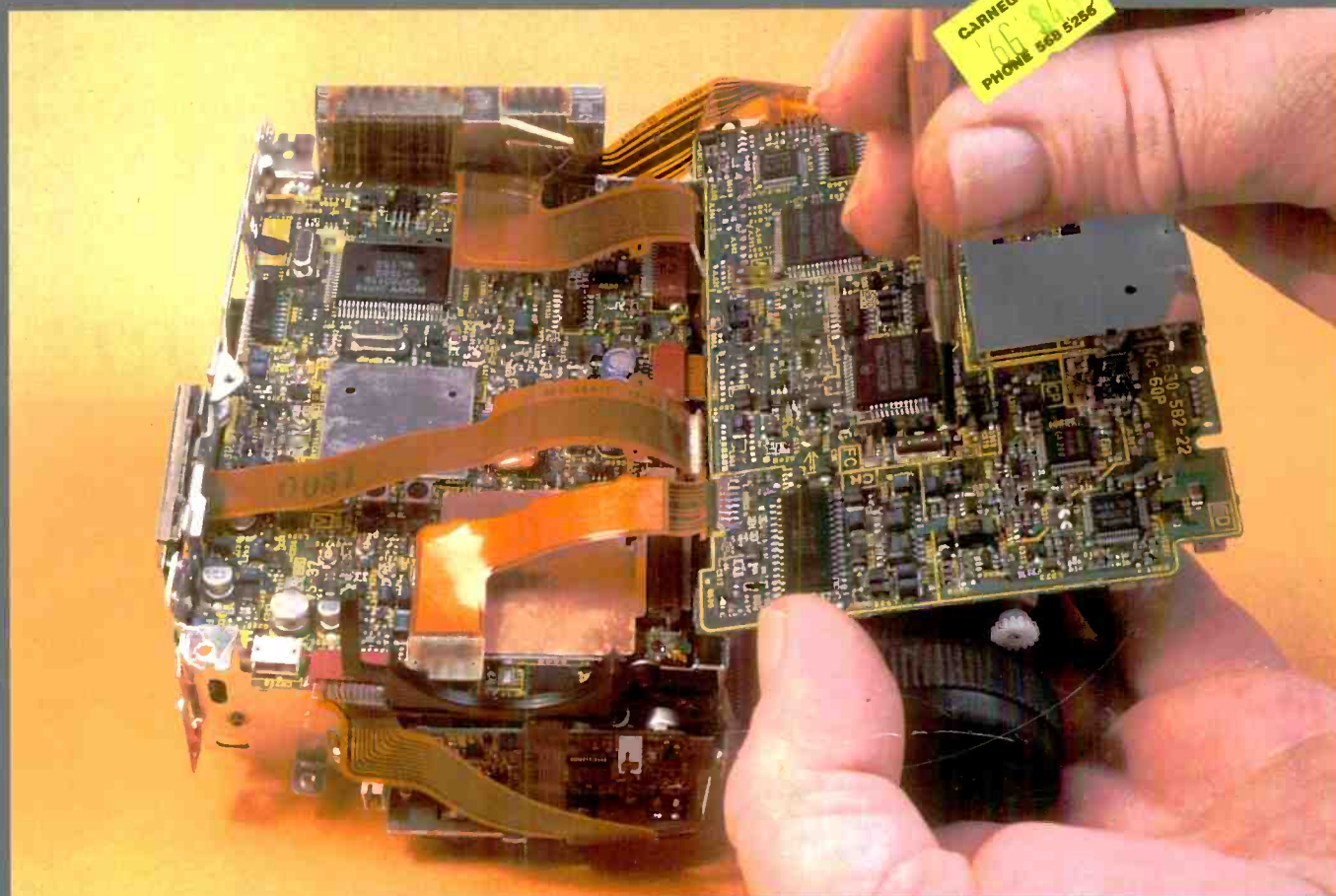


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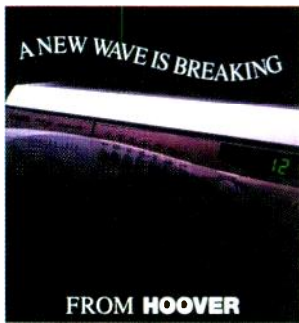
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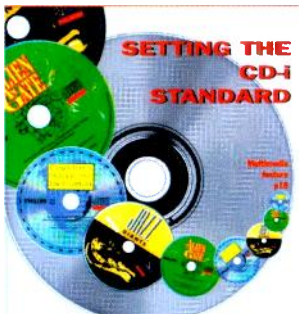
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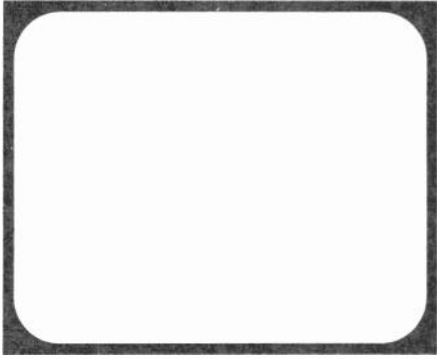
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BC107	8p	BD897	50p	S2800M	72p	DIODES	PCL84	60p	A73-8910	360p	LA4102	100p	SAAS020	350p	STK4793	800p	STR5041	350p	TD41013A	110p	TDA4280	320p
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BC109C	10p	BD977	40p	TP29	25p	Diodes	PLF200	110p	BA311	80p	LA4120	270p	SAAS040B	400p	STK4833	720p	STR58041	325p	TD41020	110p	TDA4290	170p
BC113	20p	BDX32	100p	TP29A	25p	BY127	8p	PL36	120p	BA313	100p	SAAS050	650p	STK4843	720p	STR58041	475p	TD41022	330p	TDA4400	175p	
BC114	20p	BDX65	60p	TP30	25p	BY127	8p	PL36	120p	BA333	80p	SAAB301	240p	STK4853	720p	STR6001	525p	TD41023	130p	TDA4421	300p	
BC143	20p	B0W23	55p	TP30C	25p	BY179	35p	PL59	180p	BA401	60p	LA4140	60p	STK4873	850p	STR80145	550p	TD41025	350p	TDA4426	170p	
BC147	8p	B0W24	55p	TP31A	22p	BY184	20p	PL504	120p	BA402	50p	LA4160	100p	STK4893	100p	STRD1076	450p	TD41028	-175p	TDA4427	200p	
BC148	8p	B0W53	50p	TP31C	22p	BY196	20p	PL508	20p	BA511	145p	LA4180	300p	STK4913	900p	STRD1806	400p	TD41029	200p	TDA4431	150p	
BC149	8p	B0W54	50p	TP32	22p	BY206	20p	PL513	24p	BA512	145p	LA4190	300p	STK4931	475p	STRD1516	400p	TD41035	110p	TDA4437	300p	
BC157	8p	B0Y92	100p	TP32A	21p	BY207	9p	PY81	100p	BA516	150p	LA4190	300p	STK5315	250p	STR7066	300p	TD41038	110p	TDA4439	220p	
BC158	8p	BF137	35p	TP32B	21p	BY210	22p	PY88	100p	BA521	100p	LA4192	140p	STK5322	500p	TA7054	900p	TD41044	110p	TDA4440	140p	
BC160	30p	BF167	30p	TP33	50p	BY225	120p	YF500A	190p	BA524	240p	LA4200	130p	STK5324	450p	TA7063	115p	TD41048	200p	TDA4442	240p	
BC171	10p	BF170	30p	TP33A	50p	BY227	120p	YF500A	190p	BA527	95p	LA4220	120p	STK5325	370p	TA7066	110p	TD41053	300p	TDA4445	200p	
BC172	10p	BF181	18p	TP34	50p	BY228	28p	LED's		BA527	95p	LA4220	120p	STK5325	370p	TA7066	110p	TD41053	300p	TDA4480	280p	
BC177	14p	BF183	20p	TP34C	60p	BY296	20p	3mm		BA532	100p	LA4260	230p	STK5332	180p	TA7089	300p	TD41060	140p	TDA4500	300p	
BC178	14p	BF195	7p	TP35C	65p	BY298	15p	Red		BA536	220p	LA4261	230p	STK5333	500p	TA7179	150p	TD41062	140p	TDA4501	300p	
BC181	14p	BF203	8p	TP36C	65p	BY299	15p	YE LOW		BA546	150p	LA4270	240p	STK5335	500p	TA7179	150p	TD41072	150p	TDA4501	300p	
BC182	7p	BF200	16p	TP41A	20p	BYX10	15p	GREEN		BA546	150p	LA4270	240p	STK5335	500p	TA7179	150p	TD41072	150p	TDA4501	300p	
BC182L	7p	BF225	30p	TP41C	22p	BYX55/350	30p	5mm		BA612	120p	LA4422	130p	STK5338	295p	TA7137	60p	TD41082	275p	TDA4501	300p	
BC183	7p	BF240	16p	TP42A	20p	BYX50/500	25p	RED		BA656	110p	LA4440	150p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC184	7p	BF254	15p	TP42C	20p	YX20/500	32p	YELLOW		BA658	350p	LA4440	150p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC184L	7p	BF255	12p	TP48	40p	OA90	10p	GREEN		BA685	400p	LA4460	150p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC212	7p	BF256	18p	TP50	60p	OA91	10p	RECTANG		BA1310	160p	LA4461	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC212L	7p	BF257	18p	TP51	60p	OA92	10p	LED's		BA1320	75p	LA4500	200p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC213	7p	BF258	18p	TP52	120p	OA202	10p	5mm x 2.5mm		BA1330	150p	LA4505	200p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC213L	7p	BF259	18p	TP53	120p	IN.914	20p	RED		BA1360	160p	LA4507	360p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC214	7p	BF262	25p	TP54	140p	IN.4001	3p	YELLOW		BA4403	220p	LA4508	200p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC214L	7p	BF263	25p	TP55	140p	IN.4002	3p	YELLOW		BA5101	350p	LA4510	100p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC217	7p	BF270	15p	TP60	65p	IN.4003	3p	GREEN		BA5204	200p	LA4520	100p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC238	7p	BF273	15p	TP107	65p	IN.4004	3p	LINEAR IC's		BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC239	7p	BF311	21p	TP110	40p	IN.4005	3p	AN203	210p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC300	20p	BF336	20p	TP111	40p	IN.4006	3p	AN203	210p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC301	20p	BF337	20p	TP112	40p	IN.4007	3p	AN203	210p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC302	20p	BF338	20p	TP115	40p	IN.4008	3p	AN214Q	170p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC303	20p	BF362	30p	TP116	40p	IN.4009	3p	AN228	280p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC304	25p	BF367	13p	TP117	40p	IN.5401	8p	AN240P	130p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC327	7p	BF403	25p	TP120	40p	IN.5402	8p	AN240P	130p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC328	7p	BF404	25p	TP121	40p	IN.5403	8p	AN259	250p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC337	7p	BF490	52p	TP122	40p	IN.5404	8p	AN262	140p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC338	7p	BF491	52p	TP123	40p	IN.5405	11p	AN271	230p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC441	28p	BFX20	99p	TP126	40p	IN.5406	12p	AN271	230p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC442	28p	BFX21	99p	TP127	40p	IN.5407	12p	AN301	310p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC443	28p	BFX22	99p	TP128	40p	IN.5408	12p	AN303	350p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
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BC447	28p	BFX26	99p	TP132	40p	IN.5412	12p	AN303	350p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC448	28p	BFX27	99p	TP133	40p	IN.5413	12p	AN303	350p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC449	28p	BFX28	99p	TP134	40p	IN.5414	12p	AN303	350p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC450	28p	BFX29	99p	TP135	40p	IN.5415	12p	AN303	350p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC451	28p	BFX30	99p	TP136	40p	IN.5416	12p	AN303	350p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
BC452	28p	BFX31	99p	TP137	40p	IN.5417	12p	AN303	350p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
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BC457	28p	BFX36	99p	TP142	40p	IN.5422	12p	AN303	350p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
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BC459	28p	BFX38	99p	TP144	40p	IN.5424	12p	AN303	350p	BA5402	180p	LA4550	120p	STK5339	400p	TA7140	100p	TD41083	95p	TDA4503	300p	
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UPC1373	85p	25A1059	100p	25C265	100p	25C1633	90p	25C2338	100p	25C2946	100p	25D792	100p	25D1413	75p	25D1414	75p	25K-205	200p	25K174	150p	8292	150p
UPC1373C	200p	25A1060	100p	25C266	100p	25C1634	90p	25C2339	100p	25C2947	100p	25D793	100p	25D1415	100p	25D1416	100p	25K-206	200p	25K175	150p	8293	150p
UPC1376	180p	25A1061	100p	25C267	100p	25C1635	90p	25C2340	100p	25C2948	100p	25D794	100p	25D1417	100p	25D1418	100p	25K-207	200p	25K176	150p	8294	150p
UPC1382	110p	25A1062	100p	25C268	100p	25C1636	90p	25C2341	100p	25C2949	100p	25D795	100p	25D1419	100p	25D1420	100p	25K-208	200p	25K177	150p	8295	150p
UPC1384	425p	25A1063	100p	25C269	100p	25C1637	90p	25C2342	100p	25C2950	100p	25D796	100p	25D1421	100p	25D1422	100p	25K-209	200p	25K178	150p	8296	150p
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UPC1389	120p	25A1065	100p	25C271	100p	25C1639	90p	25C2344	100p	25C2952	100p	25D798	100p	25D1425	100p	25D1426	100p	25K-211	200p	25K180	150p	8298	150p
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1402CA	650p	25A1104	140p	25C274	40p	25C1642	35p	25C2347	45p	25C2955	45p	25D801	30p	25D1431	200p	25D1432	200p	25K-214	40p	25K183	800p	745289	180p
UPC		25A1105	140p	25C275	40p	25C1643	35p	25C2348	45p	25C2956	45p	25D802	30p	25D1433	200p	25D1434	200p	25K-215	40p	25K184	800p	745290	180p
1420CA	450p	25A1106	160p	25C276	15p	25C1644	30p	25C2349	40p	25C2957	40p	25D803	20p	25D1435	150p	25D1436	150p	25K-216	40p	25K185	800p	745291	180p
UPC		25A1111	90p	25C277	15p	25C1645	35p	25C2350	45p	25C2958	45p	25D804	20p	25D1437	100p	25D1438	100p	25K-217	40p	25K186	800p	745292	180p
1421CA	650p	25A1112	150p	25C278	150p	25C1646	30p	25C2351	50p	25C2959	50p	25D805	170p	25D1439	170p	25D1440	170p	25K-218	50p	25K187	800p	745293	180p
UPC		25A1115	30p	25C279	110p	25C1647	1000p	25C2352	500p	25C2960	500p	25D806	140p	25D1441	140p	25D1442	140p	25K-219	50p	25K188	800p	745294	180p
1423CA	550p	25A1116	100p	25C280	110p	25C1648	1000p	25C2353	500p	25C2961	500p	25D807	140p	25D1443	140p	25D1444	140p	25K-220	50p	25K189	800p	745295	180p
UPC1470	200p	25A1124	60p	25C281	85p	25C1649	100p	25C2354	1000p	25C2962	1000p	25D808	140p	25D1445	140p	25D1446	140p	25K-221	50p	25K190	800p	745296	180p
UPC1504C	400p	25A1127	50p	25C282	85p	25C1650	100p	25C2355	1000p	25C2963	1000p	25D809	140p	25D1447	140p	25D1448	140p	25K-222	50p	25K191	800p	745297	180p
UPC1506C	400p	25A1133	120p	25C283	300p	25C1651	40p	25C2356	2500p	25C2964	2500p	25D810	140p	25D1449	140p	25D1450	140p	25K-223	50p	25K192	800p	745298	180p
UPC		25A1263	100p	25C284	300p	25C1652	40p	25C2357	1000p	25C2965	1000p	25D811	140p	25D1451	140p	25D1452	140p	25K-224	50p	25K193	800p	745299	180p
1514CA	200p	25A1142	100p	25C285	250p	25C1653	10p	25C2358	2500p	25C2966	2500p	25D812	140p	25D1453	140p	25D1454	140p	25K-225	50p	25K194	800p	745300	180p
UPC		25A1143	40p	25C286	20p	25C1654	70p	25C2359	35p	25C2967	35p	25D813	190p	25D1455	190p	25D1456	190p	25K-226	50p	25K195	800p	745301	180p
1515CA	250p	25A1145	40p	25C287	20p	25C1655	40p	25C2360	30p	25C2968	30p	25D814	190p	25D1457	190p	25D1458	190p	25K-227	50p	25K196	800p	745302	180p
UPC1520CA	250p	25A1146	40p	25C288	20p	25C1656	40p	25C2361	30p	25C2969	30p	25D815	190p	25D1459	190p	25D1460	190p	25K-228	50p	25K197	800p	745303	180p
UPC1536C	550p	25A1156	90p	25C289	100p	25C1657	40p	25C2362	30p	25C2970	30p	25D816	190p	25D1461	190p	25D1462	190p	25K-229	50p	25K198	800p	745304	180p
NZ423	100p	25A1162	30p	25C290	100p	25C1658	40p	25C2363	30p	25C2971	30p	25D817	190p	25D1463	190p	25D1464	190p	25K-230	50p	25K199	800p	745305	180p
NZ426	250p	25A1169	500p	25C291	275p	25C1659	40p	25C2364	30p	25C2972	30p	25D818	190p	25D1465	190p	25D1466	190p	25K-231	50p	25K200	800p	745306	180p
NZ427	560p	25A1176	30p	25C292	100p	25C1660	40p	25C2365	30p	25C2973	30p	25D819	190p	25D1467	190p	25D1468	190p	25K-232	50p	25K201	800p	745307	180p
NZ428	250p	25A1184	120p	25C293	100p	25C1661	40p	25C2366	30p	25C2974	30p	25D820	190p	25D1469	190p	25D1470	190p	25K-233	50p	25K202	800p	745308	180p
NZ429	560p	25A1186	120p	25C294	160p	25C1662	35p	25C2367	30p	25C2975	30p	25D821	190p	25D1471	190p	25D1472	190p	25K-234	50p	25K203	800p	745309	180p
NZ430	340p	25A1206	60p	25C295	40p	25C1663	85p	25C2368	30p	25C2976	30p	25D822	190p	25D1473	190p	25D1474	190p	25K-235	50p	25K204	800p	745310	180p
NZ438	510p	25A1208	70p	25C296	40p	25C1664	25p	25C2369	125p	25C2977	125p	25D823	190p	25D1475	190p	25D1476	190p	25K-236	50p	25K205	800p	745311	180p
NZ459	190p	25A1209	100p	25C297	225p	25C1665	40p	25C2370	110p	25C2978	110p	25D824	190p	25D1477	190p	25D1478	190p	25K-237	50p	25K206	800p	745312	180p
NZ460	560p	25A1211	75p	25C298	225p	25C1666	40p	25C2371	110p	25C2979	110p	25D825	190p	25D1479	190p	25D1480	190p	25K-238	50p	25K207	800p	745313	180p
NZ461	560p	25A1212	75p	25C299	225p	25C1667	40p	25C2372	110p	25C2980	110p	25D826	190p	25D1481	190p	25D1482	190p	25K-239	50p	25K208	800p	745314	180p
NZ462	560p	25A1213	75p	25C300	225p	25C1668	40p	25C2373	110p	25C2981	110p	25D827	190p	25D1483	190p	25D1484	190p	25K-240	50p	25K209	800p	745315	180p
NZ463	560p	25A1214	75p	25C301	225p	25C1669	40p	25C2374	110p	25C2982	110p	25D828	190p	25D1485	190p	25D1486	190p	25K-241	50p	25K210	800p	745316	180p
NZ464	560p	25A1215	75p	25C302	225p	25C1670	40p	25C2375	110p														

JUST ARRIVED

VIDEO HEADS

AKAI	
VSF600, VSF650	3800P
VP7100, VP7200, VP77	1500P
VS155, VS165	2600P
VS20, VS22, VS24, VS25, VS26, VS27, VS422, VS425, VS426, VS427, VSF10, VSP8, VSP9	1700P
VS240, VSP82, VS202	1500P
VS33	2600P
VSR9	1700P
AMSTRAD	
VCR8800, VCR8804, VCR9340	2400P
DD8900, DD8904, TVR4, VCR6200, VCR8600, VCR8602, VR8700	1300P
VCR8603, VCR8604, VCR8704, VCR8714	1350P
BAIRD	
VC14L	3000P
VHS82	7000P
BLAUPUNKT	
CR1000, CR1200, CR1500	4650P
CR1800	4100P
RTV321, RTV322	1700P
RTV330	2300P
RTV333	1000P
RTV33B	2800P
RTV348	2700P
RTV404, RTV414	3000P
RTV635	3000P
RTV640	3000P
RTV750, RTV800, RTV900	3500P
RTV810	4400P
RTV910	4500P
JVC	
HRD330, HRD337, HRD440, HRD637, HRD641, HRD660, HRFC100	2200P
JVC AND FERGUSON	
8902/8903/8909/8912/8922	1000P
8923/8925/8929/8935	650P
8931/8933	750P
FV43H, HRD860	3800P
VC141L, HRD190, HRD610	3050P
FV44L	2200P
BR1600, HRD142, HRD156, HRD152	1550P
BR6200	720P
HRD154, HRD217, HRD321, HRD350, HRD521, HRD522, HRD525, HRD527, HRD550	1700P
HRD580, HRD620, HRD650	2900P
FIDELITY	
VR900, VR910	1600P
FISHER	
FVHD140, FVHD40, FVHP1, FVHP10, FVHP20	1600P
FVHP40, FVHS10	1600P
FVHP200, FVHP210, FVHP300, FVHP310	2100P
FVHP500, FVHP5100, FVHP730, FVHP830	1200P
FVHP930	2500P
FUNAI	
E1100, VIP5000	1200P
VCR5840, VCR8007, VIP2500A, VIP3000A, VIP6000, VIP150	2200P
VCR4530, VCR6000, VCR6100	1600P
VCR8103, VCR600, VCR6100	1600P
VCR8103, VCR8107	2200P
VIP300A MKII	1900P
GEC	
V4005H	2000P
GOLDSTAR	
GHV1232, 1233, 1241, 1242, 1243, 1244, 1290, 1291, 1295, 1296, 1891, VCP4130, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316, 4320, 4321, 4326	1650P
GRUNDIG	
VS456	1700P
SE6110, SE9100, TVR4510, TVR5510, VS500, VS510, VS5180, VS6190, VS700, VS900	1800P
VS790, VS930, VS940	3800P
MVS660, SE6160, VERONA, VS660, VS6690	3500P
MVS710, MVS720, MVS910, SE9120, VS800, VSB10, VS910, VS920, SE7120, VS710, VS720	1800P
VS160, VS740	4400P
VS170	4600P
VS680	4600P
HINARI	
VCR34H, VTV200, VXL90	1850P
HITACHI	
VT15, VTP10, VTP30	1100P
VT16B, VT260, VT498	2700P
VT570, VT575, VT576, VT580, VT585, VT588	3400P
VT5600	1200P
VT60	1500P
VT660E	2600P
VT6700, VT6800	1200P
VTL30	2100P

VT522, VTM620, VTM622, VTM720, VTM722, VTM822	2000P
VTM725, VTM726, VTM72B	1600P
ITT	
VR3520, VR3701, VR3719, VR3720, VR3721, VR3759, VR9720	2000P
VR3730, VR3731, VR3749, VR3907, VR3908	2700P
VR3918, VR3919, VR3938	1600P
VR396B	7000P
VR3984	2300P
VR3958, VR4993	650P
VR4913, VRP3833	650P
LUXOR	
9245, 9251, 9254	1225P
9255, 9256	2150P
9270, 9271, 9273	1800P
9272, 928217	2700P
9252	2500P
928017, 928077, 928097, 929107, 929117	1700P
9253	2500P
9281	2700P
9284, 9295, VR3701, VR3721, VR3731, VR3761	2100P
MATSUI	
VX600	1100P
VX750	1500P
VX990	1600P
MITSUBISHI	
HSE12, HSE22, MX1	2400P
HS411EZ, HS411GZ	2900P
HS273	1700P
HSB10, HSB20, HSE10, HSE20, HSE21, HSE41	2200P
HSB11, HSB21	2200P
HSB30	2400P
HSE31, HSB31, HSE32	2800P
HSE50	3300P
NATIONAL	
NV8050, NV8051	2800P
AG1000, AG1050, NV260	1650P
AG6010, AG6015	2500P
AG6840	2400P
NV200	850P
NVD80	5000P
NVF65, NVH75	3400P
NVF51	4200P
NVG19	2300P
NVJ33, NVL21, NVJ30	1800P
NVJ35	3000P
NVM1, NVM3, NVM5	4200P
AG2100, AG2200	700P
NVF65	3200P
N.E.C.	
DX2000	3400P
DS6000	3500P
DX1000, DX1600, N9040, N9053, N9055	2000P
DX4000, N9610, DX3000	3200P
N9052, N9530	3400P
N9110, N9120, N914C	2700P
VCP1	1700P
PVC2300, PVC240, PVC740, PVC744, PVC760, PVC764	1600P
SAMSUNG	
VM1560, VN1561	2200P
SANYO	
VHR7900	3600P
SHARP	
VC585, VC685	2300P
VC90ET	3900P
VFH815	2800P
SONY	
SLV373UB	3000P
TOSHIBA	
V660	2350P
V880MS	2600P
V700G	3700P
V500G, V509G	2500P
V9680	2900P
V300G, V301, V305, V309G	2550P
V61, V63	1700P
V110, V120, V130, V140, V210, V220	1800P
TELEVISION ON/OFF MAINS SWITCHES	
Baur, Normende, Nova, Pioneer, Quelle, Saba, Salora, TEC, Thomson & Vega	375P
VIDEO MOTORS	
HITACHI	
VT11, VT14, VT15, VT16, VT17, VT19, VT35, VT39, VT57, VT88 (capstan motor)	3100P
BANG & OLUFSEN	
VHS65, VHS90 (capstan motor)	3100P

LOADING MOTOR UNITS

ITT	
VR3605, VR3905, VR3955, VR3985	1500P
VP2826, VR3906, V43926, VR3976	1250P
VP3946, VR3906, VR3948, VR3986, VR3995, VR6948	1500P
JVC	
HRD110, HRD111, HRD120, HRD121, HRD225	1500P
HRD140, HRD150, HRD157M, HRD158MS, HRD160, HRD250, HRD257MS, HRD566, HRP50	1250P
HRD455, HRD725, N895	1500P
SABA	
VR6005, VR6014, VR7004, VR7011, VR8011, VR8014	1500P
VR6006, VR6007, VR608, VR6009, VR6018, VR7007, VR7018, VR9006	1250P
VR6016, VR6038, VR7016	1500P
TELEFUNKEN	
VR1925, VR1930, VR1940, VR1950, VR925, VR930, VR940, VR950	1500P
A920, VR2920, VR12970, VR7921, VR7926, VR7931, VR7971, VR975	1250P
VR1970, VR1980, VR7970, VR7980, VR970, VR980	1500P
THOMSON	
V320, V321, V323, V326, V4200, V4300	1500P
V342, V343, V352, V353, V360, V4210, V4230, V4260	1250P
V364, V368, V4400, V6000	1500P
THORN-FERGUSON	
3V35, 3V36, 3V38, 3V39, 3V49, 8943, 8944	1500P
3V44, 3V45, 3V48, 3V54, 3V55, 3V57, 8947, 8947B, 8948	1250P
3V43, 9845	1500P
TOSHIBA	
V55, V57	1500P
V65, V66, V67	1250P
V61, V63	1500P
CASSETTE HOUSING	
AKAI	
VS35, VS53, VS55, VS66, VS75	2600P
FERGUSON	
FV31R	4300P
JVC & FERGUSON	
HRD515, HRD520, HRD527, HRD540, HRD550, HRD580, HRD600, HRD610, HRD620, HRD660, HRD670, HRD830, HRD840, HRD850, HRD860, HRD4050, HRD6600 & FV37H	2400P
IC TRANSISTORS	
M491BB1	500P
SAA5243PE	800P
TIP112H	50P
UPC1488H	150P
STR4090A	650P
IC AND TRANSISTORS	
BU506DF	120P
BUZ11	200P
BUZ80	200P
M494B1	700P
SAA5231	300P
SAA1293	550P
S2000A3	175P
S2000AF	175P
S2055A	175P
S2000AF	200P
S2530A	100P
TEA201BA	200P
UC3844	100P
UPC1185H2	400P
REMOTE CONTROLS	
AKAI	
RC-V10A	1000P
RCV37B	1000P
V25A	1000P
BUSH	
2020T, 2114T, 2321T, 2514T	1000P
2020, 2114, 2321, 2514	1000P
DECCA	
RC70	850P
FISHER	
RC905B	1000P
GRANADA/REDIFFUSION	
UNIVERSAL, 79500C, 986700	850P
SATELLITE	1000P
MK4 TEXT, 70115G, 70133G, 70357E	850P
MK4A TEXT, 70375C	850P
95288E	1000P
94490D	1000P

VIDEO SERVICE KITS

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

FERGUSON & JVC
3V4243
HRD455/HRD725
Contents
BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND
Order Code: SK37 £17.50

Economy Kit Contents
BELT SET, PINCH ROLLER, SUPPLY CLUTCH, TAKE UP CLUTCH
Order Code: SK38 £9.50

3V58/59/64/65
HRD170/180/210/230/300/320/370/400/430/530/700/750
HR55000
Contents
BELT SET, PINCH ROLLER, IDLER ARM, TENSION BAND
Order Code: SK44 £8.50

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

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

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

Economy Kit Contents
BELT SET, T.U. REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T.U. IDLER TYRE, T.U. CLUTCH
Order Code: SK34 £5.50

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

Economy Kit Contents
BELT SET, T.U. REEL TABLE TYRE, PINCH ROLLER, T.U. CLUTCH, T.U. IDLER TYRE, REEL IDLER TYRE
Order Code: SK36 £6.50

3V29/3V30
HR7200/7300/7350
Contents
BELT SET, T.U. REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T.U. CLUTCH, T.U. IDLER, TENSION BAND, VIDEO LAMP
Order Code: SK31 £11.50

Economy Kit Contents
BELT SET, T.U. REEL IDLER TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T.U. IDLER TYRE, T.U. CLUTCH
Order Code: SK32 £5.60

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

Economy Kit Contents
BELT SET, PINCH ROLLER
Order Code: SK40 £9.50

FISHER
FVHP905/906/907/908/910/911/916/918
Contents
BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND
Order Code: SK57 £13.00

Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK58 £5.00

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

Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK69 £3.60

HITACHI
VT11/VT33
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK08 £6.00

VT11/VT33
Contents
BELT SET, T.U. REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, FF/REW IDLER, CLUTCH PLATE, TENSION BAND
Order Code: SK45 £15.00

Economy Kit Contents
BELT SET, PINCH ROLLER, FF/REW IDLER TYRE, T.U. REEL TABLE TYRE, SUPPLY REEL TABLE TYRE
Order Code: SK46 £4.50

VIDEO SERVICE KITS (Cont.)

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

Economy Kit Contents
BELT SET, PINCH ROLLER, FF/REW IDLER
Order Code: SK50 £3.25

VT400/405/411/13/14/15/18/420/25/26/28/430/31/35/48/450/498/510/520/25/26/30/35/36/540/545/46/48/570/75/576/580/65/86
Contents
TIMING BELT, PINCH ROLLER, FF/REW ARM, CLUTCH BASE, TENSION BAND
Order Code: SK92 £11.50

VT100/101/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/VTL30
Contents
BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND
Order Code: SK15 £15.00

PANASONIC
NV2000/NV2010
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK83 £6.25

NV7000/NV7200/NV7800
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
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
BELT SET, PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP
Order Code: SK13 £9.50

Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE, PULLEY TYRE
Order Code: SK14 £4.50

NV7000/NV7200/NV7800
Contents
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND
Order Code: SK11 £10.00

Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE, CLUTCH TYRE
Order Code: SK12 £4.20

NV300/NV330/NV333/NV340/NV366
Contents
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND
Order Code: SK05 £8.00

Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE, PLAY IDLER TYRE
Order Code: SK16 £4.00

NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG16/NVG18/NVG30/NVG120/NVG130/NVG400/NVH65/PX/AC/AG1810/PK
Contents
LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER, TENSION BAND
Order Code: SK27 £9.50

Economy Kit Contents
LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TYRE
Order Code: SK28 £4.50

NV332
Contents
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW TYRE
Order Code: SK29 £13.00

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

NV230/250/259/280/430/450/460/470/650/810/890
AG1200/PK/AC1500/PK
Contents
BELT SET, PINCH ROLLER, IDLER, TENSION BAND
Order Code: SK23 £7.00

Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK24 £3.50

NV600/NV633
Contents
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND
Order Code: SK25 £13.00

Economy Kit Contents
BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE
Order Code: SK26 £6.50

NV730/NV770
Contents
SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND
Order Code: SK19 £7.00

Economy Kit Contents
SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER TYRE
Order Code: SK20 £4.30

NV370/NV380/480/630/780/830/850/AG2100/PK/AG2200/PK
Contents
BELT SET, PINCH ROLLER, IDLER, TENSION BAND
Order Code: SK21 £7.00

Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK22 £3.50

NV771/NV788
Contents
BELT SET, PINCH ROLLER, IDLER UNIT, TENSION BAND
Order Code: SK17 £7.50

Economy Kit Contents
BELT SET, PINCH ROLLER, IDLER TYRE
Order Code: SK18 £4.00

VIDEO SERVICE KITS (Cont.)

SHARP
VC331
Contents
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND, VIDEO LAMP
Order Code: SK47 £9.00

Economy Kit Contents
BELT SET, PINCH ROLLER, REEL IDLER TYRE
Order Code: SK48 £5.00

VC500/VC571/VC581/VC582/VC583/VC584/VC585
Contents
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND
Order Code: SK10 £9.50

Economy Kit Contents
BELT SET, PINCH ROLLER, REEL IDLER
Order Code: SK61 £6.50

VC781/VC781C/VC7322/VC785/VC796/VC793/VC800/VC810/VC812/VC814/VC816/VC818/VC820
Contents
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND
Order Code: SK14 £13.50

Economy Kit Contents
BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE
Order Code: SK65 £6.25

VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700
Contents
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND
Order Code: SK42 £13.50

Economy Kit Contents
BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE
Order Code: SK63 £6.25

THIS MONTH'S SPECIAL OFFERS

STH-461	£6.00	STK7563F	£8.00
STH-5332	£1.80	STK73410	£3.50
STH-5333	£5.50	TA8205AH	£2.50
STH-5422	£3.75	TA8210AH	£3.00
STH-5475	£3.50	TA8215H	£3.00
STH-7309	£3.50	TA8216H	£3.75
STH-7343	£4.00	TIPL791A	£0.80
STH-7353	£4.40		

SONY FLNCTION SWITCH (2 LEG)
SPECIAL PRICE £0.50

VEEG REEL MOTOR PU51381V £15.00
3v25, 3v30, 3v31, 3v32, 3v39, 882C, 89E1, 8941, 8942, HR7200, HR7300, HR7600, HR7E10, HR73E0, HR7655

HITACHI VIDEO HEAD £11.00
VT11, VT14, 16, 30, 33, 34, 330, 34C, E03, 640, 5030

MITSUBISHI VIDEO HEAD £16.00
HS300, 304, 320, 700

HS300, 308, 710 £18.00
HS300, 301, 302, 310 £17.00
HS337, 347 £17.00
HITACHI TRANSFORMER 2434274 £14.00
OUTPUT TV MODULE H6251 £5.50

PH LIPS

CASSETTE LIFT ASSEMBLY 6E120366 £11.00
DV185, 190, 28E, 471, 562, 761, VR6180, 6182, 6185, VR625, 630, 6291, 6293, 6362, 6367, 6393, VR6467, 6468, 7-20, 3561, 6673, 6760, 6761, 6870, 6970

PRESSURE ROLLER ASSEMBLY £4.50
DV185, DV190, DV286, DV486, DV471, DV582, DV571, DV618, VR6180, VR6182, VR6185, VR6185, VR6280, VR6291, VR6298, VR6362, VR6367, VR6390, VR6391, VR6393, VR6467, VR6468, VR6470, VR6561, VR6570, VR6581, VR6673, VR6675, VR6760, VR6761, VR6762, VR6870, VR6873, VR6875, VR6881, 63S87, 68S84, 7-684, 7288, 82S831

I.C. PROTECTOR

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

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IMPORTANT NOTICE

Attention all customers who purchased the WOODEN HANDLE SOLDERING IRONS, BRAND MITSUBISHI - MODEL MX-34 (30, 40 AND 60 WATTS) from us. Please DO NOT USE this tool. We would like you to return this item to us immediately and we will refund your money together with the postage. We apologise for any inconvenience caused.

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SONY FLYBACK TRANSFORMERS

Part No.	Model	Price
1-439-216-00	KV-8002E, 2010E, 2200E, 2015E, 1820E, 2010SE, KV-2012NE, 2016ME, 2015ME, 2010ME	£14.00
1-439-256-11	KV-2704EC, 2704UC, 2704ET, 2704EA, 2704E	£35.00
1-439-286-21	KV-2215UB, 2217UB, 2219EL, 2219FE, 2212EK, 2215ET	£30.50
1-439-289-21	KV-2705F, 2705FE, 2705UB, 2705E, 2706UB, 2720EC	£40.00
1-439-303-00	KV-2064EC, 20P51, 2082ME7, 2056EC, 2060SA, KV-2062E(ESP)	£27.00
1-439-311-00	KV-1440AEC, 1440AS MK2, CPS-14CD3, CPV-14CD2, KTX-1350VF, KTX-1430UB	£20.00
1-439-332-21	KV-2758, 2730EC, 2730FE, 2764EC, 2752UB, 2752F	£36.00
1-439-333-00	KV-1832EC, 1882UB, 1882F, 1882CH, 1882AEB, 1882AAM, KV-1882ME3, 1882HK, 1882AS, 16TR1, 882C(P), 1770R, KV-19H1TA, 19FE, 1705UB, 18G2, 1602M7, 1602GE, ADM-16B, KV-2082UB, 2086UB	£22.00

FLYBACK TRANSFORMERS

Manufacturer	Part No.	Price
FERGUSON	000-4208-001	£14.00
	000-4-208-002	£14.00
	000-4-225-002-0TG	£14.00
	000-4-247-001	£14.00
	000-4-247-001 HT1	£14.00
	060-3-093-001	£14.00
	(110) 06D-3-087-001	£14.00
	(110) 06D-3-084-001	£14.00
	06D-3-088-001	£14.00

Manufacturer	Part No.	Price
GRUNDIG	29201-019-05	£3.00
	29201-024-11	£14.00
	29201-024-04	£14.00

Manufacturer	Part No.	Price
PHILIPS	PS 140-17112	£14.00
	PS 140-10306	£11.50
	PS 140-10353	£15.50
	PS 140-10151	£15.00
	PS 140-10283	£15.00
	PS 140-10246	£13.00
	PS 140-10247	£14.00
	PS 140-10149	£12.00
	PS 140-10161	£9.00
	PS 140-17033	£10.00
	PS 140-17089	£10.00
	PS 140-10328	£14.00

Manufacturer	Part No.	Price
ITT	CVC20	£11.50
	CVC20	£11.50
	CVC30	£11.50

Manufacturer	Part No.	Price
HTACHI	2432981	£15.00
	2434274	£14.00
OUTPUT TV MODULE	HM6251 (REF 2370551)	£5.50
	HM6232	£3.00

IDLERS & PULLEYS REPLACEMENT

Manufacturer	Part No.	Price
AKAI	V51-1, V54-5, V515	FF-REW IDLER M1327773 £4.50
	V53, 5, 12, 56, 58, 59	T-UP IDLER BV327815 £6.00
	V51-2, V54-5, V515	FF-REW IDLER BV321979 £6.00
	V53, 6, 12, 59, 59	REEL IDLER M2366960J £11.00
	V9700	IDLER BV321979 £6.00
	V525, 125, 156, 156	IDLER ASSY M2366960J £11.00
	V516, 240, 244, 245, 247, 248, 250, 512, 515, 516	FF-REW IDLER BV327815 £6.00
	V522, 38, 105, 112, 115, 116, 205, 210	T-UP IDLER PU47752 £4.50
	V7710, V53900	REEL IDLER PU46381 £4.00
	V53900, V53900	UNLOADING IDLER PU46381 £4.00
	V7710, V53900	REW IDLER PU46380 £3.00
	V53900, V53900	REEL IDLER BV327815 £6.00
	V771, V510	IDLER BV36067 £5.00
	V788	REEL TABLE BR347731 £5.50
	V51, 3, 4, 9, 12	REEL TABLE ML373043 £13.00
	V523, 35, 37, 53, 55	CLUTCH ML373043 £13.00
	V566, 75, V5A77	CLUTCH ML373043 £13.00
	V59700	FF IDLER BV321761 £3.20
	V59700	REW IDLER W321762 £4.25

Manufacturer	Part No.	Price
AMSTRAD	VCR7000	IDLER 150280 £1.50
	VCR4500	CLUTCH 150873 £3.75
	VCR4600, VCR5200, VCR9000	CLUTCH 151284 £2.50
	VCR4500, VCR5200, VCR9000	GEAR HOLDER 151284 £2.50
	VCR4600	REF CLUTCH 151284 £2.50
	VCR6000, VCR6100	CLUTCH 153202 £3.00
	VCR4500, VCR9000	CLUTCH 153202 £3.00
	VCR4600, VCR4600	MOD KIT (TAPE CREASING) £4.50
	VCR4700	MOD KIT TAPE CREASING FOR AMSTRAD VCR4500, 4600, 4700 £3.00

Manufacturer	Part No.	Price
FERGUSON	3V00, 3V01, 3V16	T-UP IDLER PU47752 £4.50
	3V22, 3292, 8900, 8901, 8904, 8906	T-UP IDLER PU49280 £5.50
	3V16, 3V22	T-UP IDLER PU49280 £5.50
	8903, 8909, 8912, 8922	REEL IDLER PU48967 £2.50
	3V23, 3V29, 3V30	REEL IDLER PU48967 £2.50
	3V31, 3V32, 3V35, 8924, 8929, 8930, 8931, 8940, 8941, 8942	ROLLER ASSY PU48967 £2.50
	3V29, 3V30, 3V31	T-UP IDLER PU48967 £2.50
	3V32, 3V35, 3V36, 3V38, 3V39, 3V49, 8930, 8931, 8940, 8941, 8942	T-UP CLUTCH PU51380 £2.25
	3V32, 8930, 8931, 8940, 8941, 8942	REEL IDLER PU56374 £2.85
	3V35, 3V36, 3V38	T-UP CLUTCH PU56374 £2.85
	3V35, 3V36, 3V38	T-UP CLUTCH PU56374 £2.85
	3V38, 3V49, 8943, 8944	IDLER ARM PU58645 £2.25
	3V38, 3V39, 3V54	IDLER ARM PU58645 £2.25
	3V65, FV10, FV11, FV12, FV13, FV14, FV20, FV21, FV22, FV26, FV30, FV32, FV33, 8950, VC141L	CLUTCH ASSY PU58622 £11.50
	3V42, 3V43, 3V44, 3V45	CLUTCH ASSY PU57658 £11.50
	3V48, 3V53, 3V54, 3V55, 3V57, 8947, 8948	SUPPORT CLUTCH PU56043-1.4 £2.80
	3V42, 3V43, 3V44	T-UP CLUTCH PU56043-1.4 £2.80
	3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948	SUPPORT CLUTCH PU56043-1.5 £2.80
	3V00, 3V01, 3V16	LOADING IDLER PU43681 £4.00
	3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922	REW IDLER PU43608 £6.00
	3V16, 3V22, 8902	IDLER PU49281 £1.70
	8909, 8912, 8922	IDLER PU49283 £1.00
	3V16, 3V22, 8902	IDLER PU49283 £1.00
	8909, 8912, 8922	IDLER PU49283 £1.00

Manufacturer	Part No.	Price
RSHER	FVHP45, 520, 530	FF-REW PULLEY H638531 £1.00
	FVHP615, 618, 620	COMP. IDLER ASSY F143042040030 £3.30
	FVHP622, 710, 711, FVHP720, 721, 722, FVHP725, 730, 830	FF-REW PULLEY H638531 £1.00
	FVHP840, 905, 906	FF-REW PULLEY H638531 £1.00
	FVHP615, 618, 620	GEAR IDLER ASSY F1430430400900 £4.50
	FVHP622, 710, 711, FVHP720, 721, 722	FF-REW PULLEY H638531 £1.00
	FVHP725, 730, 830, FVHP840	FF-REW PULLEY H638531 £1.00
	FVHP615, 618, 620	REEL T-UP ASSY F1430410400900 £5.50
	FVHP622, 710, 711, FVHP720, 721, 722	FF-REW PULLEY H638531 £1.00
	FVHP905, 906, 906	GEAR IDLER ASSY F1430490402400 £4.00
	FVHP910, 911, 915, FVHP916, 918	FF-REW PULLEY H638531 £1.00
	FVHP975, 980, 990	IDLER F1430420400700 £4.50
	FVHP990	LOADING GEAR F1430420400700 £4.50
	FVHP905, 907, 5100	REEL DRIVE ROLER F1430410400900 £5.50
	FVHD40, 55, 140	REEL DRIVE ROLER F1430410400900 £5.50
	FVHP1, 10, 20	GEAR F1243051040200 £9.50
	FVHP975, 980, 990	CLUTCH F1243051040200 £9.50
	FVHP420, 520, 530	IDLER F1243051040200 £9.50
	FVHP420, 520, 530	TAKE UP IDLER F1243051040200 £9.50
	FVHP920, 710, 711, FVHP720, 721, 722	FF-REW PULLEY H638531 £1.00
	VBS3500	REEL DRIVE PULLEY £2.00
	VBS3500	IDLER £2.00
	VBS7000	REW IDLER £1.20

Manufacturer	Part No.	Price	
GOLDSTAR	GHV1221, 1232, 1240	CLUTCH GEAR 435038A £2.50	
	GHV1241, 1242, 1243	GHV1244, 1245, 1246, GHV1247, 1248, 8000, GHV8200, 8210, 8215, GHV951, VCP4100, 4130	CLUTCH GEAR £1.70
	GHV1221, 1232, 1240	IDLER £1.70	
	GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000, GHV8200, 8210, 8215, GHV951, VCP4100, 4130	CLUTCH GEAR £1.70	

Manufacturer	Part No.	Price
HINARI	VXL3, VXL20	REEL IDLER 40000009 £1.50
	VXL2	IDLER £1.50
	VXL4, VXL25	IDLER £2.75
	VXL4, VXL25	CLUTCH £2.75
	VXL4, VXL12, VXL25	LIMITER POST £1.30
	VXL30, VXL35, VTV300	CLUTCH GEAR £3.75
	VXL5, VXL6	GEAR HOLDER £3.50
	VXL7, VXL8, VXL9	CLUTCH GEAR £3.80

Manufacturer	Part No.	Price
HTACHI	VT11-33, VT63-64	CLUTCH ASSY 8879515 £7.50
	VT12, 17, 19, 38, 57, 88, 34, 35, 39, 52, 61, 62, 65, 85, 330, 640, VT105	CLUTCH ASSY 8886824 £7.50
	111, 113, 115, 118, 200	CLUTCH ASSY 8886972 £7.50
	125, 128, 130, 135, 138, 145, 150, 175, 225, 250, 255, 258, 280, VTL30	FF-REW IDLER 6413663 £2.80
	VT8000-8300, 7000	PLAY IDLER 6414221 £3.60
	VT8500-8700	FF-REW PULLEY 6383531 £0.80
	VT8000-8300, 7000	FF-REW PULLEY 6383531 £0.80
	VT8500-8700	FF-REW PULLEY 6383531 £0.80
	VT9300 9500, 8500	FF-REW IDLER 8681471 £3.30
	VT680, 6800, 9700, 9900	PLAY IDLER 8661482 £3.20
	VT9300-9500, 8500	PLAY IDLER 8661481 £3.20
	VT9300	IDLER 881505 £3.00
	VT9300-9500, 8500	IDLER 881505 £3.00
	VT9300-9500, 8500	FF-REW IDLER 8886971 £1.50
	VT11-33, VT63-64	FF-REW ARM 8886792 £2.75
	VT115, 118, 119, 120, 125, 128, 130, 135, 138, 145, 150	FF-REW ARM 8886792 £2.75
	VT175, 220, 225, 250, 255, 258, 260, VTL30	FF-REW ARM 8886792 £2.75
	VT400, 405, 410, 413	FF-REW ARM 8886792 £2.75
	VT414, 415, 418, 420, 425, 428, 430, 431, 435	FF-REW ARM 8886792 £2.75
	VT438, 450, 458, 510, 518, 520, 525, 526, 530, 535	FF-REW ARM 8886792 £2.75
	VT538, 540, 545, 546, 548, 570, 575, 576, 580, 585	FF-REW ARM 8886792 £2.75
	VT588, VTM625, 626, 630, 635, 636, 640, 645, 646, VTS80, 85	CLUTCH BASE 6886951 £3.25
	VT400, 405, 410, 413	CLUTCH BASE 6886951 £3.25
	VT414, 415, 418, 420, 425, 428, 430, 431, 435	CLUTCH BASE 6886951 £3.25
	VT438, 450, 458, 510, 518, 520, 525, 526, 530, 535	CLUTCH BASE 6886951 £3.25
	VT538, 540, 545, 546, 548, 570, 575, 576, 580, 585	CLUTCH BASE 6886951 £3.25
	VT588, VTM625, 626, 630, 635, 636, 640, 645, 646, VTS80, 85	CLUTCH BASE 6886951 £3.25
	VT3000	T-UP IDLER (LARGE) 6861505 £5.00
	VT3000	REW IDLER 6861505 £5.00
	VT680, 6800, 9700	F5-BRAKE 6861505 £5.00
	VT9700, 9900	F5-BRAKE 6861505 £5.00

Manufacturer	Part No.	Price
HTACHI TV	OUTPUT MODULE HM 6251	£5.50
	OUTPUT MODULE HM 6232	£5.50
JVC	HR330, 3660, 4100	T-UP IDLER SML PU49280 £5.50
	HR7200, 7600, 7650	T-UP CLUTCH PU53462A £2.25
	HR7655, 7300, 7350, 7610	REEL IDLER PU48967 £2.50
	HR7200, 7600, 7650	ROLLER ASSY PU49042A £4.00
	HR7600, 7610, 7650, 7655, 7700	ROLLER ASSY PU49042A £4.00
	HR7600, 7610, 7650	ROLLER ASSY PU49042A £4.00
	HR7655, 7700	T-UP IDLER LRG PU47752 £4.50
	HR3300, 3660, 4100	T-UP IDLER PU51402A £1.25
	HR7200, 7600, 7650	T-UP IDLER PU51402A £1.25
	HR7665, HRD110, HRD111, HR7300, 7350, 7610, HRD120-121, 225	T-UP CLUTCH PU55373 £2.00
	HRD225, HRD111	T-UP CLUTCH PU55373 £2.00
	HRD110, HRD120-121, 225	IDLER ARM PU55734-3.8 £2.85
	HRD225, HRD111	IDLER ARM PU55734-3.8 £2.85
	HRD170, 180, 210, 230	IDLER ARM PU58465 £2.25
	HRD220, 370, 400, 430, 470, 530, 700, 750, 950, 3000	IDLER ARM PU58465 £2.25
	HR5600, HR55500	CLUTCH MECH PU55882 £13.50
	HRD456, HRD725	CLUTCH MECH PU55822 £11.50
	HRD140, 150, 157, 158	CLUTCH MECH PU57658 £11.50
	HRD180, 250, 257, 455, 565, 566, 755, HRP50	REW IDLER PU46380 £6.00
	HR3300, HRP50	REW IDLER PU46380 £6.00
	HR3660, HR4100	TAKE UP CLUTCH PU56043-1.4 £2.80
	HRD140, 150, 157, 158	TAKE UP CLUTCH PU56043-1.4 £2.80
	HRD180, 250, 257, 455, 565, 566, 755, HRP50	TAKE UP CLUTCH PU56044-1.5 £2.80
	HRD140, 150, 157, 158	TAKE UP

REMOTE CONTROLS

GRUNDIG

TP160E	1050P
TP200, TP300	1000P
TP400	850P
TP590-600	1050P
TP390, TP610	1050P
TP621	1050P
TP630, TP650	1000P
TP660	1050P
TP661	1050P

HITACHI

CLE800-CLE830	900P
A617402/655602	1000P
A512120/230	1000P
A514790	1000P
A5088470	1000P
A518612	1000P
SCL002	1000P
C2096	1000P
A511940	1000P
655602H	1000P

ITT

IFB13, 14, 15	900P
FS4	850P
RG305	900P
RG306	900P
FS9/1-10/1	900P
VS5 RUK	900P
VS4-1	900P
MULTICONTROL (17C20)	1000P

KORTING

18279, 18396, 18460, 18521 SE	1000P
40540 VTS	1000P

LOEWE

DC11	1000P
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MATSUI

010270601	1000P
VX770	1000P

METZ

JAVA COLOR (6890)	1000P
COLOR (7156)	1000P
JAVA (7180)	1000P

MITSUBISHI

939P/03607, 939P/03609	900P
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NOKIA

SATELLITE	1000P
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NORDMENDE

TC2336	1050P
CMC1, TC3519	1050P

OCEANIC

390C9500	1000P
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ORION

RC53	1000P
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PANASONIC

EUR51200	900P
TC2200	900P
VSQ0357/NV730	1050P
TNQ1621	1000P

PHILCO

CARVEL, CONCORDE, MERCURY	1000P
TELESTAR	1000P
TC10	1000P

PHILIPS

RC5002, 5154	900P
KT3 NON TEXT	900P
69117032	1050P
69117194	1050P
RC5991 UNIV	850P
RC3B	900P
KT3 TEXT	900P
RC5352	900P
RC5375	900P
RC5 STANDARD	900P
RC5901	900P
RC5903	900P

SABA

T6772	1000P
TC319-320	1050P
TC356	1050P
TC358	1050P
TC360	1000P
TC365	1000P

SALORA

SERIES L	1000P
86173	1000P

SANYO

RC218, RC222, RC228, RC238	900P
JXGE	1000P
JXDE	1000P
VHR2300	1000P
RC628	1000P

SHARP

G0121CESA, 123CESA, 204, 251	900P
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SIEMENS

FC616	1000P
FC631	1000P
FC742	1000P

SONY

RM604, RM605, RM606	900P
32 CHANNEL	900P
RM613	900P
RM632, RM636	900P

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TX10 STEREO TEXT	850P
TX9-90-100	850P
3V55, FV11	1050P
TX100 FASTTEXT	900P
TX100 STEREO FASTTEXT	900P
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CT9117	1000P
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Replaces Philips Part No's: 138-10229. 2.4V - 90mAh	240P

REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES

Replaces Ferguson Part No: 00E6-067-001. 1.2V	
Used on: TX10	150P
Replaces Ferguson Part No's: 00E6-066-001. 2.4V	
Used on: 3V35, 3V56, 3V58, 3V65	280P

LINE OUTPUT TRANSFORMERS

Description	Price	Order Code
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ORION 3714002	1500P	LOT02
FIDELITY ZX300	1500P	LOT03
FE TX100 90 DEG	1500P	LOT04
SABA 490007182	1500P	LOT05
FE TX90 WHITE	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
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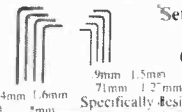
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Specifically designed for video maintenance

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

CERAMIC PLUG TOP

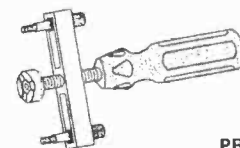
3A	FUSE33	100P
5A	FUSE34	100P
13A	FUSE35	100P

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10uf at 250v.....	35
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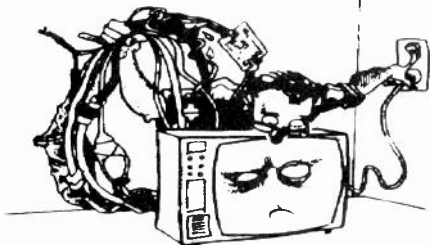
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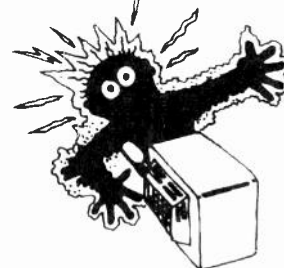
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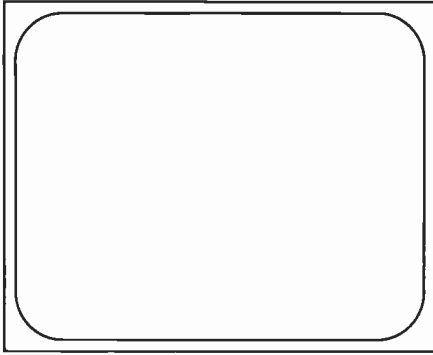
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TELEVISION

What Next?

Two Christmases have now gone by with virtually none of the seasonal improvement in sales we had previously come to expect in the radio trade. Is there to be no end to the protracted standstill in the consumer electronics field? The fact that the Clydesdale Group, which employs 1,500 people in 135 stores in Scotland and England, has just called in the receivers underlines the tough conditions at present. Even camcorder sales, which had looked like a bright spot in the generally gloomy scene, have turned down. There's much talk about multimedia equipment such as CD-i providing fresh business opportunities, but it's unlikely to do much for us in the immediate future. Some things, such as the TV set and the VCR, can be regarded as virtually indispensable today. But the number of such mass-appeal items is strictly limited. The public is never for example going to take to walking around with a palmcorder permanently at the ready. The camcorder is inherently a niche market, though a substantial one. Will people take to interactive TV/video technology in a big way? The general consensus seems to be that we shall have to wait for more interesting software to become available before the potential can be assessed.

One part of the electronics/entertainment market that has been spectacularly successful over the last couple of years has been the video game. In 1992 sales of home video games equipment and cartridges worldwide amounted to some \$14bn: in 1993 they exceeded \$16bn. If you've been selling Nintendo and Sega products you should have been doing all right. But it seems that even this current success story has passed its peak, for the time being anyway. Nintendo is now forecasting a drop in sales during the current year and reports flat conditions in its main market, the USA.

There's an inherent weakness in the video games market. Seventy five per cent of all video games are bought by male youths aged eight to eighteen. So the market is subject to the fickle tastes of the young. There is nevertheless considerable potential, because the technology is there to drive the market. For a start the quality of the product can be considerably enhanced by a move from cartridges to CD-ROMs as the storage medium. This will provide improved displays and enable more complex programs to be created. It's interesting that sales of multimedia PCs equipped with CD-ROM drives are already booming in the USA – over 20m such units are expected to be sold over the next three years.

Another thing that could boost the video games market is the advent of low-cost virtual-reality systems. As George Cole reports on a later page, both Nintendo and Sega announced at the recent Las Vegas Consumer Electronics Show that they are working on this. It seems that we could expect virtual-reality games at around £175 within the next couple of years. This is mind-boggling when you consider that until comparatively recently a virtual-reality games system would cost around £25,000. There would presumably be severe limits to the display and potential at such a low price, but Sega mentions full colour, stereo surround sound and head-tracking. It remains to be seen whether such systems will be glorified toys or something more substantial. A US firm, Aura Systems, has just announced a further prospect: its Interactor body vest promises to mimic feeling in addition to providing vision and sound. The idea is that you put on a body harness that's connected to a games console, television set or stereo unit which triggers a magnetic actuator. This produces body-pulsing vibrations: in effect the body becomes a loudspeaker cone. A volume adjuster is provided to set the average intensity of the effect. When used with a computer game the wearer gets buffeted as he hits or is hit by his opponent. Interactor is due to be launched in the USA shortly at under \$90. It sounds more like a gimmick than the Feelies forecast by Aldous Huxley in *Brave New World* back in 1932 – but we may be getting there!

The Interactor is unlikely to set the High Street afire. And the video phone seems to be something of a damp squib. Satellite system sales have been flat for some time, suggesting that some sort of market saturation point has been reached for the time being. VOD via the phone looks like a good medium-term prospect for improved business. The modem required should be available at a price that will be easy on people's pockets. How the marketing will be done remains to be seen.

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

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COVER PHOTO

This month's cover photograph shows the internal arrangements in the Sony TR55 camcorder. See article on pages 326-7.



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The Panasonic Alpha 3 Chassis

Part 1

Ray Meadows

In a previous article (January) we took a brief look at the various chassis that have been produced at Panasonic's Cardiff plant. One of the most interesting is the Alpha 3, which was introduced at the end of 1989 for use in top-of-the-range receivers. Models fitted with it include the TX25A2, TX28A2, TX33A2, TX25W2, TX25W2A (with Astra tuner) and TX28W2. The basic difference between the A and W models is in the cabinet design: the W2 sets have conventional loudspeaker arrangements while the A2 models have Panasonic's 'dome' speakers – these are sealed units that are wrapped around the inside of the cabinet, producing a 'tight', quality sound from very slim apertures. The A2s also have a third AV input which is at the front. All these models are fitted with Philips Blackline invar-mask tubes, with a scan-velocity modulation coil. Later variants of some models have alternative Philips tubes with black matrixing and a few cost-saving circuit changes: the model numbers are suffixed X.

New features introduced with the Alpha 3 chassis included black-level expansion. This is a circuit that stretches the contrast curve in dark areas of the picture so that a greater amount of detail can be seen. The Sony CX20125 chip is used for this purpose: it adjusts the luminance gamma-correction curve. Thanks to the use of a new Matsushita microcomputer chip which has a built-in graphics generator, the on-screen displays are more extensive than with the Alpha 2 chassis. Previous chassis had used the teletext graphics generator for this purpose.

To help the service engineer a self-test mode is included. This is activated by pressing the remote off-timer and on-board volume down buttons simultaneously. Numbers that represent different check-sum figures then appear on the screen: they can be compared with the values quoted in the service manual as an aid to locating chip and bus faults.

One Alpha 3 model was produced in Japan: the TX37A2G has a Mitsubishi tube, 100Hz scanning and an Astra tuner. It is substantially more complex than its UK-made cousins.

The Alpha 3 is more modular than its predecessor. This makes production, testing and the introduction of model variants and options easier. It also makes servicing easier. Disadvantages are increased panel area and thus material cost. There are also rather a lot of interconnecting leads. This doesn't detract from the performance, which is excellent – some European AV review magazines still use the 37in. model as their reference large-screen set as it is said to give the best picture quality available.

Panel Arrangement

Fig. 1 shows the chassis arrangement. The various panels are listed in Table 1. D and E are the main panels. Panels F, X and BS are options fitted on some models only. There are minor differences between the arrangements with A2 and W2 models.

Panels D and E are held in a rigid plastic frame to form the base of the chassis. They are joined together by two small snap-down connectors and an earth lead. These items are physically attached to panel E. As all the power and deflection functions are carried out on panel D it's useful to be able, for servicing, to separate this from the rest of the set. So subpanels B, C and H plug into panel E. Subpanel EV is very small and is usually soldered into panel E.

Dismantling the Set

Panel C can be removed simply by releasing a metal supporting bracket. Removal of panels B and H is more difficult, the method of fixing being less obvious. To remove these panels it's necessary to release a large clip that holds them down at the front of the chassis. Although this

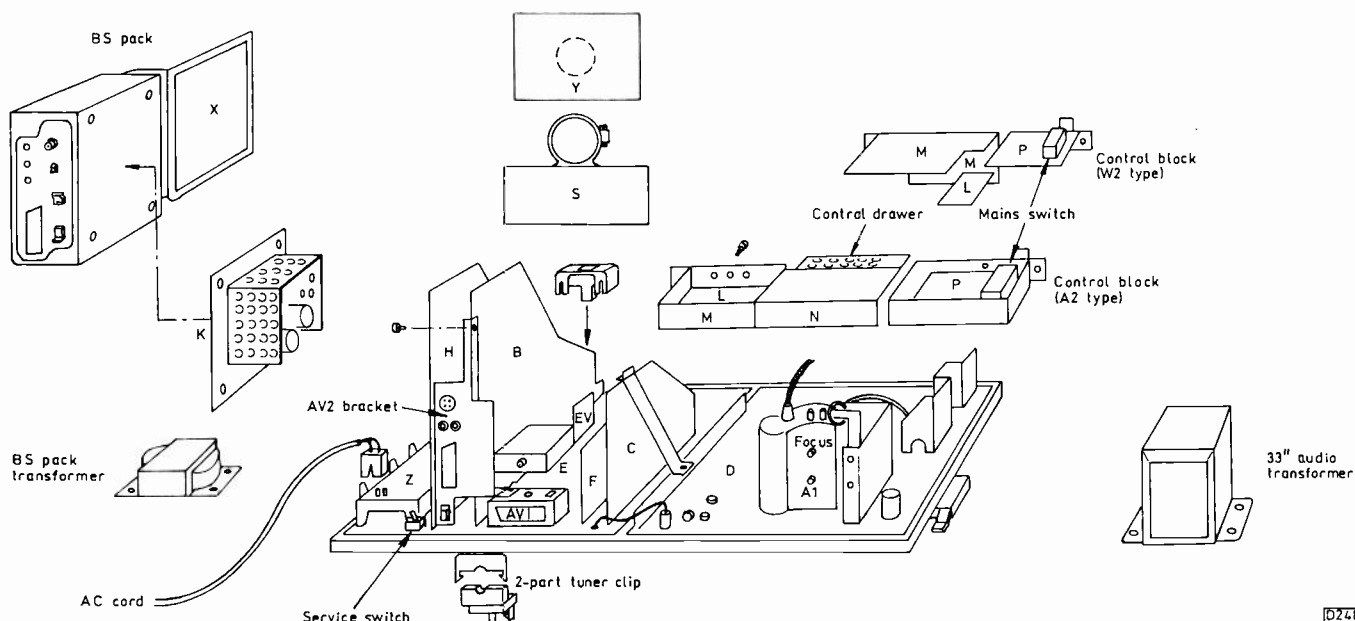


Fig. 1: Alpha 3 chassis layout, showing all the options.

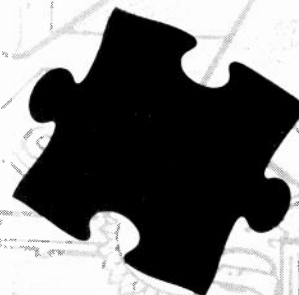
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being accessible through a cutout in the back cover. The audio power amplifier (panel K) that normally lives on the bracket now rides shotgun style on the sat pack.

The audio power transformer for the TX33A2's updated specification is fitted to the cabinet base below the left dome speaker. Panel K contains the remaining power supply components and a more powerful amplifier with a double heatsink.

Because of the numerous differences I won't deal here with the 37in. model.

The Power Supply

The mains supply enters the set at panel Z, which is mounted on an isolated plastic frame above panel E. It holds the mains fuse and the first of the mains filters. The supply then passes via a thick blue and white cable to panel P, which has the mains switch and the second filter, at the front of the set. The reason for having the filters on two panels is improved FTZ (the German input and influx immunity test) performance. Power from panel P reaches the electronics on panel D at connector D1. The mains supply feeds to auxiliary transformers, i.e. those for the satellite pack and audio power amplifiers, are separately fused on panel P which is responsible for distribution.

Fig. 2 shows the live side of the chopper power supply circuit on panel D. The mains input at connector D1 is fed to the degaussing circuit, the standby transformer T1291 and the mains bridge rectifier D825. Degaussing coil plug D3 is the same size and shape as D1 and can be confused with it when the chassis is reassembled: the degaussing coil lead is red and black however. The mains bridge rectifier's reservoir capacitor is C827: D828 absorbs excessive voltage spikes while R822, a low-value, fusible resistor on the earthy side of the bridge, provides surge current limiting.

The 325V d.c. supply developed across C827 is fed to the primary winding of the chopper transformer T825 at P1, the other end of the winding being connected to the collector of the 2SC4557 chopper transistor Q821. Bias for Q821 is provided by R824, R825 (the start-up resistors) and R829, which ensure that the transistor starts to conduct as soon as power is applied. Q821 forms the active element in a blocking oscillator circuit, with feedback to its base from winding F1-B1 on the transformer.

Chopper Action

When Q821 switches on, current flows in the chopper transformer's primary winding P1-P2. As a result a smaller current flows, by induction, in the pulse windings F1-B1 and F1-F2. The feedback from winding F1-B1 via C835 and R828 to the base of Q821 is positive, and as a result Q821 is rapidly driven to saturation. When Q821 reaches saturation point there is no longer any voltage change across the primary winding and the output from the feedback winding falls to zero, i.e. there is no positive feedback. Thus Q821 switches off. C825 acquires a negative charge when Q821 saturates: this charge holds Q821 in the cut-off state, leaking away via R828 and R829. The voltage at Q821's base eventually becomes positive again, at which point it switches on. D830 acts as a clamp to prevent excessive negative voltages appearing at Q821's base.

As any Alpha 3 owner knows, with an e.h.t. voltage of almost 30kV these sets produce a lively switch-on thump. Q822 and its associated components reduce the surge to prevent power supply damage. The output from winding F1-F2 on the transformer is rectified by D826, with C838 as its reservoir capacitor, to provide a d.c. supply for the

optocoupler D834 and base bias for Q821. While this supply is rising at first switch on, the change in voltage is coupled by C843 via R845 and D837 to the base of Q822. As a result Q822 conducts, and in turn Q827 switches on, reducing Q821's base bias. Thus the time taken for Q821 to saturate is increased, slowing down the chopper circuit's action. Q822 is protected from damage by negative spikes at switch off by D837 and D835.

To minimise on-screen and radiated r.f. interference it's desirable to run the chopper circuit in synchronism with the line output stage. For this purpose flyback pulses picked up by a single, isolated overwinding on the line output transformer are applied to terminals D19 and D20 of the power supply. The pulses are fed via R830 and D831 to the base of Q821 to ensure that its operating frequency is locked to that of the line output stage.

Voltage regulation is based on sampling the 150V h.t. supply produced by the chopper circuit. Fig. 3 shows the arrangement used. Sampling is carried out, via zener diode D842, at pin 1 of the SE140N error detector chip IC826. This chip's output, at pin 2, is used to control the conduction of the LED in the optocoupler D834. The phototransistor section of this device drives Q823 (Fig. 2), which sets the d.c. conditions at the base of Q821 and hence the discharge time for C835. Thus Q821's precise switch-on time varies with any change in the h.t. voltage.

Circuit Shutdown

Standby switching is carried out by Q825. When this transistor is switched on Q823 is also permanently on, shorting to chassis Q821's base. The chopper power supply is thus shut down. We'll cover this in more detail when we consider the remote control system in a later instalment.

If there's an excessive load on the power supply Q821 will conduct more heavily than under normal conditions. This situation is monitored by R831 in Q821's emitter circuit. Should the voltage developed across R831 rise to the point where Q822 begins to conduct, Q827 will be brought

Table 1: Panel arrangement

Panel	Circuitry
D	Power supply, line and field output, EW correction.
E	Video processing, system control, AV1.
C	Audio terminals, tone and ambience.
B	Tuner, i.f. section, Nicam decoder.
H	Teletext, AV2, S-VHS.
EV	Luminance buffer.
K	Audio power amplifier.
L	Headphones and (A2 models only) AV3.
M	Control panel (two-section with W2 models).
N	Control panel (A2 models only).
P	Mains switch and filter.
S	Scan-velocity modulation.
Y	Tube base with RGB amplifiers.
Z	Mains filter.
F	Comb filter (export Model 33A2C only).
X	Satellite receiver power panel.
BS	Broadcast satellite pack (25W2A and 33A2G only).

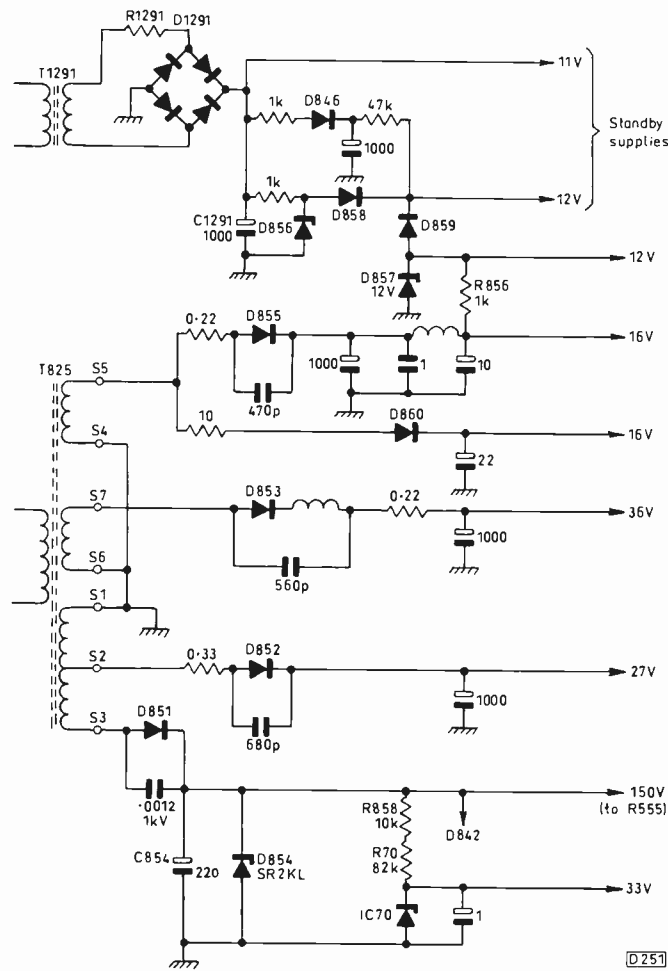


Fig. 4 (left): The circuitry on the secondary side of the chopper and standby transformers.

into action as previously described. If the condition persists, the power supply shuts down.

Secondary Side

Fig. 4 shows the circuitry connected to the secondary side of the chopper and standby supply transformers T825 and T1291. A total of seven supplies are derived from T825 and two from T1291.

Over-voltage protection is provided by D854. If the voltage regulation carried out by IC826 and its associated components should fail and the 150V h.t. voltage rises excessively D854 will conduct, placing a heavy load on the chopper circuit whose excess-current trip will come into operation.

The main 150V h.t. line is used to supply the line output stage and part of the scan velocity-modulator circuit. It also, via R858, R70 and IC70, produces the 33V tuning supply.

The other supplies are used as follows. The 36V line powers the audio amplifiers (except for 33in. models which have a separate linear supply) while the 27V line supplies the field output and line driver stages and part of the scan velocity-modulator circuit. There are two 16V lines. One low-power output provides switch-off spot suppression on panel Y. The other higher-current output is used to provide 12V and 5V supplies on panels E and B. This line also feeds the 12V zener diode D857, via R856. When the set is operating this output is tied to the 12V standby line via D859. The 11V supply produced by the standby circuit goes, via a 5V regulator, to the remote control circuit on panel M.

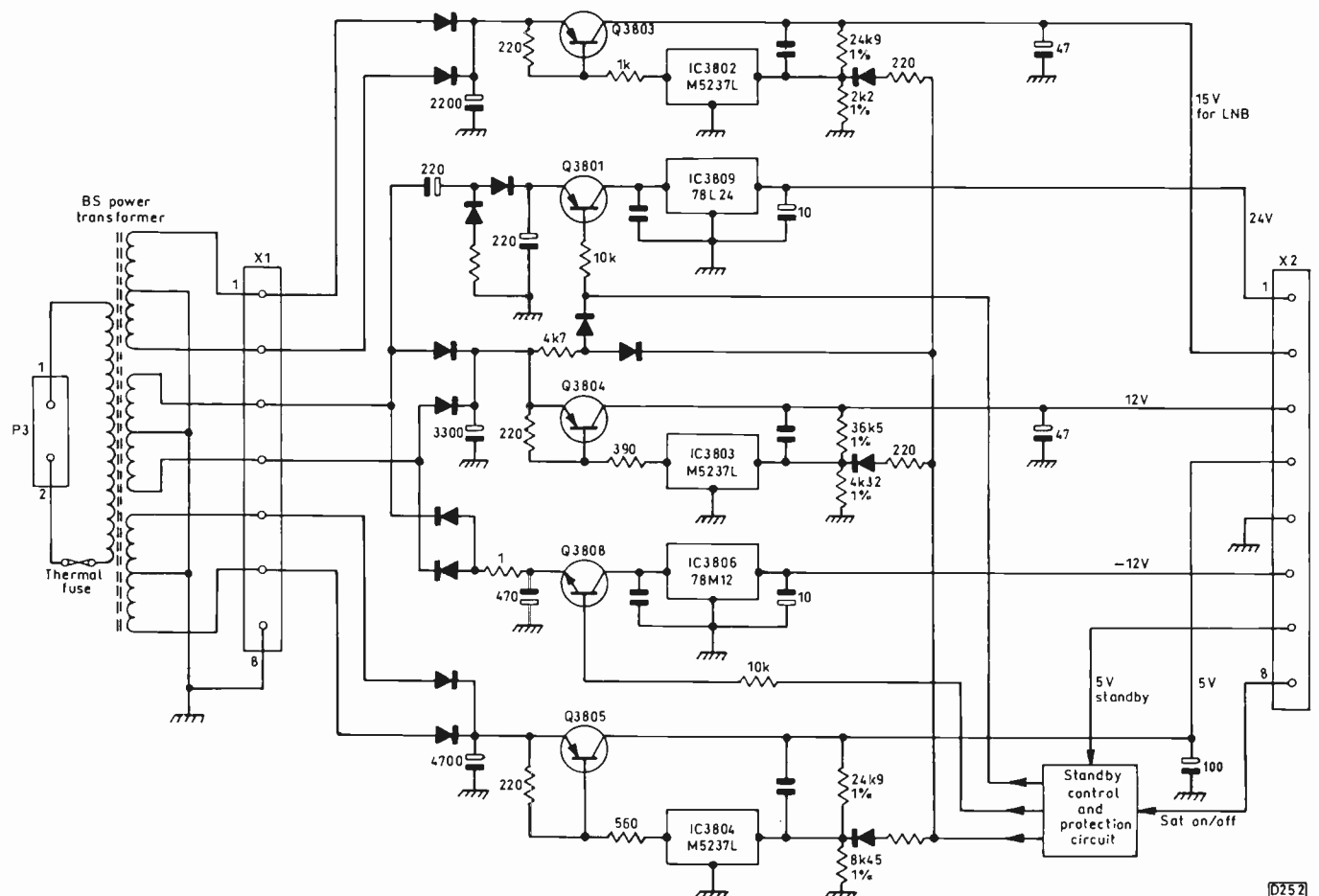


Fig. 5: The satellite pack power supply circuit.

Many of the lines have fusible series resistors to prevent excessive current flows. It's not uncommon for R555 in the 150V feed to the line output stage to fail for no apparent reason, though a check on the line output stage should always be carried out before replacing it. Those who have tussled with R555 will recognise the dead set symptom with a faint dying buzz from the power supply. Operation of the excess-current trip produces a more satisfying 'skwee' sound. R451 in the field output stage sometimes bites the dust. The result is field collapse, but you can't see this because of the operation of the beam-limiter circuit. Thus the set produces sound and e.h.t. but no picture.

Satellite Pack Power Supply

The satellite pack power supply (panel X), used in Models TX25W2A and TX37A2G only, is shown in Fig. 5. The mains transformer has three centre-tapped secondary windings which are used to produce five separate supplies at 15V, 24V, 12V, -12V and 5V. So that the satellite pack remains in operation for recording purposes these supplies are all present when the set is in the standby mode. In this condition there should be an output from the green LED next to the red standby LED. If it isn't, check that the satellite button inside the control door is depressed. A standby control signal appears at pin 8 of connector X2. It's used to

shut down the 24V, 12V, -12V and 5V supplies. The 15V line, which powers the LNB, remains on continuously. There is however a mechanical switch that can be used to turn off the LNB supply. It's in the satellite pack and is useful as shorted LNB leads have been known to blow the thermal fuse in the power transformer, which is an expensive item.

While the 24V and -12V supplies are regulated by conventional linear voltage regulator chips, the remaining supplies have M5237L auto voltage regulators (AVRs) that drive current-boosting transistors. The output from an AVR is set by the voltage applied to its input pin (3): to obtain the required outputs voltage dividers using close-tolerance (1%) resistors are used.

Audio Power Transformer

Models TX33A2 and TX37A2G have a cabinet-mounted transformer that drives a simple full-wave bridge rectifier circuit to produce an unregulated 36V supply for the audio amplifier on panel K.

Next Time

In Part 2 we'll return to the main chassis to look at the signals circuitry on panels B and H.

HELP WANTED

Wanted: One or two Philips 26in. G11 sets with teletext in moderate condition. H.E. Chamberlain, 68 Valley View, St. Keyne, Nr. Liskeard, Cornwall PL14 4QJ.

Wanted: Service manual/circuit for the Nicam decoder made by Audio-Visual Technical Support, or has anyone this company's address? A. Patel, 42 Dorchester Way, Kenton, Middx HA3 9RF. 081 743 8000, ext. 62227.

Wanted: For Polytechnic students' project, circuit diagram and any other technical information on the Ferguson SRB1 satellite receiver. A.R. Kumsinda, c/o Malawi Industrial Research and Technology Development Centre, PO Box 357, Blantyre, Malawi.

Wanted: Circuit diagram for the Baird Model 8243 TV receiver. D. Maciver, 46 Newhaven Main Street, Newhaven, Edinburgh EH6 4TD. 031 551 1616.

Wanted: Back issues of *Television*, November 1987-present (vols. 38-43). Also Sony mini system amplifier Model TA-H300 in working or repairable condition. Garry Griffiths, 167 Middlemarch Road, Coventry CV6 3GJ. 0203 595 144.

Wanted: Mains power transformer (part no. 37523) for a Gould OS1100 dual-trace oscilloscope. R. Hughes, Glandy, Dinas Cross, Newport, Pembro SA42 0XP. 034 86 255.

Wanted: L.T. transformer (part no. TLP8282W, circuit ref. T1002) for the Panasonic TC481. Maybe other CTV models use this transformer? Roger Burchett, 12 Ormonde Road, Hythe, Kent CT21 6DN. 0303 267 969.

Wanted: Service manuals for the following. JVC U-Matic CR6060 and CR6000 VCRs. JVC tuner/timer TU20E. National TC293NSP multistandard colour receiver/monitor.

Funai/Technicolor 212B VCR - video cassettes also required for this. T. Martini, 6 Levant House, Mile End Road, London E1 4RB. 071 790 6807.

Wanted: Working power supply panel SS9002A or SS9009A for JVC AV20ME - or any help in locating a source. D. Granger, White Lodge, Sheephatch Lane, Tilford, Surrey GU10 2AQ. 0252 782 692.

Wanted: Upper cylinder or complete drum assembly for a Philips VR6460. Malcolm Lambert, 1 Dundale Farm Cottages, Dundle Lane, Bells Yew Green, Kent TN3 9AQ. 0892 824 657.

Wanted: Has anyone any ideas about or information on a CD player laser strength tester - they are very expensive here. L. Hanran, 15 Wright Street, Townsville, 4811, Queensland, Australia.

Wanted: LOPT for the Huanyu Model 37C-2 and information on how to erase the memory in the electronic lock on the Grundig TVR4500. A. Fisher, Complex TV Services, 133 High Street, Princess End, Tipton, West Midlands DY4 9JE. 021 557 6636.

Wanted: Source of parts for the Huanyu 37C-3 or is there an Hitachi equivalent? A. Clark, 21 Herdman, Greenleys, Milton Keynes MK12 6AD. 0908 312 000.

Editorial note: We have received a number of queries about spares for Huanyu sets. If anyone has any information we would be pleased to pass this on.

Wanted: Circuit diagram for the 9V, 1A regulated power supply from car 12V battery input for the Sony Betamax camera. H. Hughes, 51 Standard View, Ynyshir, Rhondda, Glam. CF39 0HR. 0443 685 044.

Wanted: U.H.F. tuner for the Sony Model KV1310UB. E.W. Ingarfill, 44 Pitts Lane, Earley, Reading RG6 1BU. 0734 265 357.

Teletopics

INTERACTIVE TV SYSTEMS

It seems that the US computer software company Oracle Corporation has taken a lead in developing the software required for interactive TV (I-TV) services, including video-on-demand (VOD) and home shopping and banking. British Telecom is to use Oracle software in its forthcoming VOD trials, starting this spring, prior to the planned launch of the service next year. In the USA Oracle is offering I-TV services in conjunction with Bell Atlantic. According to Oracle, the annual subscription with an I-TV system serving a million households would be about £50 including the decoder/modem box.

Bell Atlantic is thinking of offering off-air as well as cable I-TV: it's planned as part of the world's first commercial I-TV operation, adding the prospect of mobile VOD. A trial involving over three hundred Bell Atlantic employees living in Washington DC is to start this month.

UK cable operator Diamond Cable plans to offer off-air pay-per-view TV in its Nottingham franchise area. The company is negotiating with the Department of Trade and Industry for a trial licence to provide such a service.

CABLE EXPANSION

According to the Cable Television Association UK cable operators plan to invest £1.2bn this year to reach a further 1.6m homes. They expect to add a further 2m homes in 1995, bringing the total number of households with access to modern cable systems to 6.6m. Success in providing telecommunications in addition to TV services has given a boost to cable TV, increasing the willingness of investment institutions to provide funds. It's expected that the number of people employed in the cable TV industry will rise from around 10,000 to some 16,000 by the end of the year.

SATELLITE TV

Pace's MSS1000 PAL/VideoCrypt IRD with Dolby Pro Logic sound and ability to receive the Astra 1D satellite channels has now been released. Suggested price is £399. It was first shown at the 1993 Cable and Satellite Show last April. Other new releases from Pace are Models PRD800 Plus, PRD900 Plus and MSS500. The main differences between these latter models relate to the number of channels that can be stored and the number of scart sockets provided. Both the MSS500 (at £299) and the MSS1000 have two VideoCrypt smart card slots in the front panel.

Pace has been very successful in providing service back-up for its products, in particular with its publication *Service Matters*. Two issues have been published to date: they include very clear guidance on dealing with faults and information on various general matters. Copies can be obtained free of charge by bona fide dealers and repair shops by application to Pace Micro Technology Ltd., Victoria Road, Saltaire, Shipley, W. Yorkshire BD18 3LF (0274 532 000). The company also has a technical support hotline: 0274 537 122.

British Sky Broadcasting has made a first payment to its shareholders, totalling £50m. Some £1.6bn has been invested in the service to date.

Bad luck for Eutelsat with the failure of the Ariane V63 launch: Eutelsat II F5 was part of the load.

MULTIMEDIA ETC

Nimbus Information Systems has established an MPEG-1 compression service that can transfer up to 75 minutes of full-motion video (FMV) on to a disc. The material has to be provided on D1 digital tape. It can be recorded in Video CD, CD-i, CD-ROM or CD-ROM-XA form and is returned to the client on a CD-R disc with audio that can be multiplexed or separated.

Commodore has launched, at £200, an MPEG-1 FMV module for the Amiga CD32 computer games system. It allows an Amiga CD32 machine to play Video CD titles – Commodore plans to launch a series of music video titles.

Sales of the Apple MessagePad personal digital assistant (see *Television* November 1993, page 54), which was introduced last September, have been disappointing. To date some 75,000 have been sold – the initial launch sales figure was 50,000. Though a sales fall off following the initial launch is to be expected, there are doubts about the commercial value of the technology in its present form. There have apparently been problems with the handwriting recognition software.

VIDEO

A system called Commercial-Free has been developed by a US inventor to provide automatic elimination of advertisements when programmes are being recorded. It analyses the content of the incoming video and audio signals to determine when commercials begin and end – the low-signal modulation and sound energy in the transmissions are monitored. An add-on unit using the Commercial-Free technology is to be made available in the USA next month: VCRs with the technology built in should be available in 1995, but there are no plans to date for an international version.

Korean manufacturer GoldStar expects to sell 100,000 Video CD players this year at a price of around £500 each: a feature film disc costs about £17 in Korea, where demand for karaoke CD machines has created a substantial market for the system.

Kong Wah Holdings, Hong Kong, has produced the world's first widescreen LCD TV receiver. The 40in., 16:9 display has three colour LCDs mounted side-by-side. Depth of the set is just 14in. It is to go into full production later this year.

TRADE NEWS

The latest BREMA figures, for the third quarter of 1993, show flat trading conditions. Deliveries of TV sets and VCRs were slightly higher than in the equivalent quarter of 1992, but there was a significant decline (20 per cent) in camcorder deliveries. It seems that most of what growth there was came from the lower end of the market.

Serviscope has been bought by the white goods servicing company National Homecare. It will operate as Homecare Serviscope, with its headquarters at Darlaston, West Midlands. All present Homecare and Serviscope centres are to be retained, but in future some may handle both brown and white goods.

Valve and Tube Supplies, Unit 2A, Rink Road Industrial Estate, Ryde, Isle of Wight PO33 2LT (0983 811 386, fax 0983 564 708) has acquired the valve stock of the former Vintage Wireless Company of Bristol.

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Servicing the Sony TR55

Keith T. Keeton

The Sony TR55 palmcorder was released in 1989, when it was remarkable for being the first full-function machine to break through the 1kg barrier. With battery and tape it weighs 990g; the camcorder itself tips the scales at 790g. Several things contribute to weight and bulk reduction: the use of a mini-sized (26.7mm) head drum with omega tape wrap; the FL mechanism, with which the tape-threading process starts with cassette loading; incorporating the head-drive motor into the drum assembly; and a high degree of miniaturisation of the electronics, double-sided SMD boards being used throughout. Power consumption is 5.2W (record mode) from an NP55 type 6V battery.

Despite its minuscule size the TR55 has a full specification. There are two-speed operation, a flying erase head, title superimposition, an 0.5in. CCD image sensor with 6:1 zoom ratio, mono f.m. sound, a monochrome electronic viewfinder, insert- and search-editing, TTL autofocusing, six shutter speeds and a switchable full-auto mode. The original recommended retail price was just under £1,000.

Servicing Aspects

The TR55 has proved to be a reliable device: as with all camcorders, faults are commonly caused by accidental physical damage and can thus be unpredictable and sometimes expensive. As shown in Fig. 1, the electronics are laid out on thirteen PCBs – some of them are four-layer types. The largest and most complex PCB assemblies are VS37 for video processing, servo and system control, and VC60 which houses the camera, autofocus and colour encoder electronics. An 8-bit, 80-pin microcontroller chip with 352Kbytes of internal memory provides system control via a serial bus line. Three further microcontrollers are used for autofocusing, the set-up data and display/data-strobe purposes.

Before any attempt is made to repair or adjust equipment like this it's essential to have the service manuals. The main one (part no. 9-972-846-11) runs to 310 pages: there's a separate one (part no. 9-972-705-11) that covers the deck (FL/Q mechanism).

Four years' experience of servicing these camcorders has

enabled us to compile the fault guide listed below. Some entries refer to the remote commander, which is a servicing jig that plugs into the camcorder's three-pole minijack remote control socket. It provides an LCD digital readout indicating various conditions and fault modes as well as providing a means of adjusting the EVRs (electronic variable resistors) in the camera block. The data is passed, in 8-bit serial form, via the LANC bus to the camera-block microcontroller chip for storage in a non-volatile memory. A DA converter turns the stored data into control voltages for the encoder, white balance, iris, focus and zoom functions.

Fault Guide

(1) E-E picture shows titler all the time: colour changes with titler selection. Cause is a dry-joint at Q256 on board VC60.

(2) White E-E picture, even with iris closed. Y signal o.k. at pin 40 of IC301 but output at pin 22 at raised level. IC301 (type CXA1072R) or C323 (1µF tantalum capacitor) may need to be replaced. These items are on board VC60.

(3) Video fades to monochrome. Noisy, smeared E-E and record pictures, playback o.k. Caused by lack of PG pulses at pin 17 of the CCD image sensor because of broken track. Link between pin 17 and JL004 (board CD14).

(4) No E-E colour, playback o.k. If oscillator X141 is running, check for a dry-joint at pin 1 of IC502. If oscillator is not running replace crystal X141. These items are on board VC60.

(5) No E-E picture – iris shut. Playback o.k. No output at pin 19 of DT74 and no CCD signal at pin 32. Caused by a dry-joint at pin 14 of connector CN301. Items on board CD14.

(6) No E-E picture, black screen, LCD display incorrect. Microcomputer chip was not running correctly because

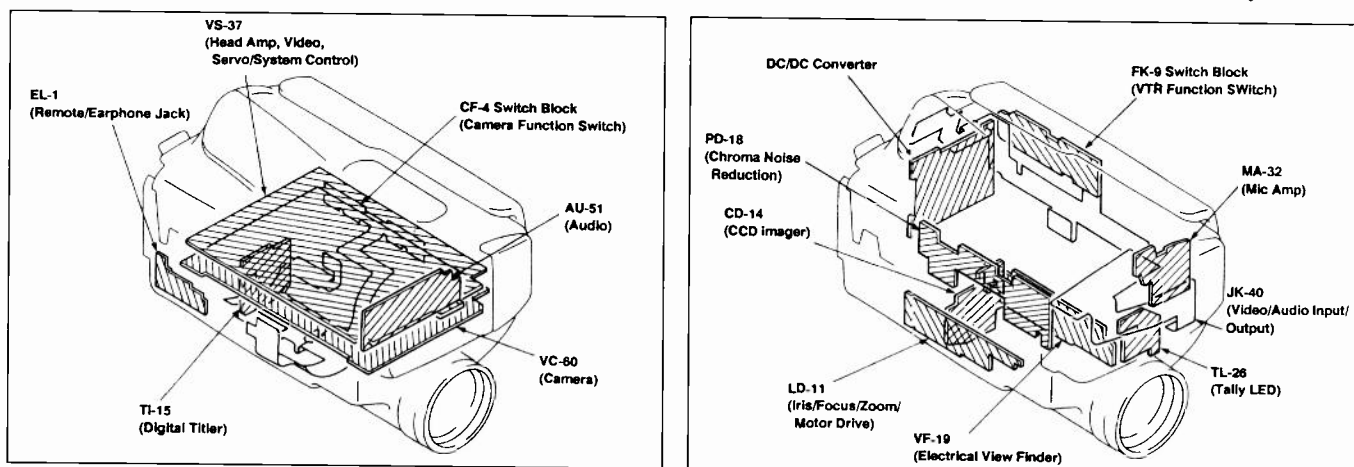


Fig. 1: Location of the various PCBs inside the Sony TR55 palmcorder.

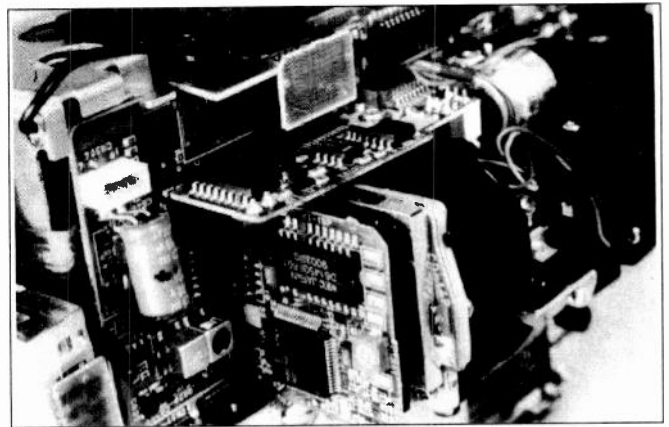
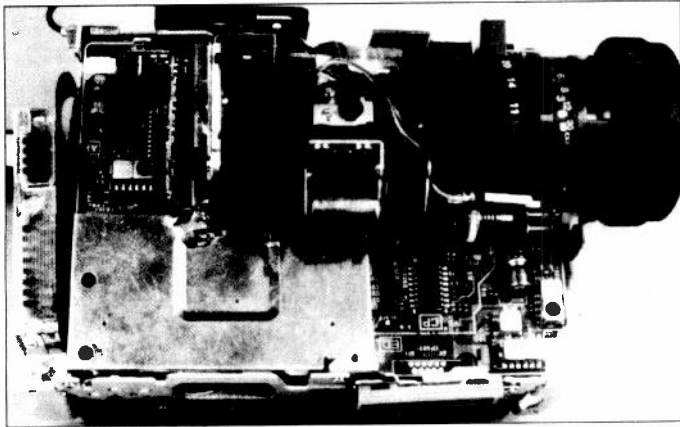


Fig. 2: Internal views of the Sony TR55.

incorrectly inserted lithium battery locked it up. Remove battery, reset by powering up the camcorder, then replace the battery.

(7) No E-E picture, black screen. Date can be set up. Playback o.k. CN301/CN302 on board CD14 loose. Reconnect tightly.

(8) No E-E picture, black screen, playback o.k. Remote commander shows line but fault not caused by EVR misadjustment. IC561, type UPD7503GFJ363B8, on board VC60 may be faulty (replace). If the fault is due to corrosion near IC561 board VC60 (part no. A7061851A) will have to be replaced.

(9) No E-E picture, black screen with thick white flickering lines. Oscillator X101 on board VC60 not running. Replace crystal X101.

(10) No E-E picture, playback o.k. L403 on board VC60 open-circuit.

(11) No E-E picture, black screen, playback o.k. Iris doesn't open because of loss of power. Dry-joints at IC613 on board VC60. Resolder.

(12) No zoom and no autofocus. E-E and playback pictures o.k. Circuit protector PS701 on board LD11 has developed high resistance. Replace PS701, type ICP N10.

(13) Failure to record, playback o.k. Dry-joint at W303, connector for flexi-link, on board VC60. Resolder.

(14) Over-exposed E-E picture, playback o.k. Hybrid i.c. DT74 on board VC60 faulty. Replace chip.

(15) E-E display shows missing pixel. CCD is faulty (board CD14). Replace CCD, type ICX027BK2. Note that replacement CCD sensors don't need the spot-drop compensating ROM IC003 on board DT74; remove and discard it.

(16) Failure to record colour, playback o.k. Caused by dry-joints on board VC60 near C503/504/505/506/512/513. Resolder in this area.

(17) Failure to record colour, E-E and playback o.k. Various causes have been experienced. Check whether L222 on board VS37 is open-circuit: replace/resolder as necessary. If chroma is present at pin 49 of IC203 on board VS37 but there's no chroma at pin 47 replace this chip, type CXA1200. If the signal is o.k. at pin 6 of IC502 on board

VC60 but there's no chroma at pin 2 and no oscillation at pin 8, L502 (220 μ H) is probably open-circuit or dry-jointed. Replace/resolder as necessary. If the signal is o.k. at pin 6 of IC502 but there's no signal at pin 2, resolder or replace bandpass filter FL501.

(18) Recordings produce a noisy picture. E-E and playback of prerecorded tapes o.k. The 5.85938MHz oscillator on board VS37 is drifting. Replace the crystal, X501.

(19) Caution light on loading. Remote commander shows fault status 04. Capstan motor is jammed. Release/replace motor, type DCV21A.

(20) Caution light on when loading tape, machine works o.k. otherwise. Replace IC503, type CX20115A, on board VS37.

(21) Caution light on, mechanism jammed because of a bent base plate. Replace base plate, part no. 372823101, and slider, part no. A7040153A.

(22) Caution light on, no eject. Plate on loading motor loose. Reposition.

(23) Caution light on, no rewind. Arm assembly gets caught under the supply reel. Replace base assembly 222, part no. X37279283.

(24) Caution light on. Take-up spool doesn't take up tape. Replace spool, part no. X37279521.

(25) Noisy mechanism. Noise is from head drum. Replace complete drum unit, part no. A7048214A.

(26) Playback, record, fast forward or rewind operate for a few seconds only then the caution light comes on. LS flexi-connector FP115 faulty. Replace flexi, part no. A7061238A.

(27) Noise bars on playback pictures, worse in SP mode. Head rotating too fast. Replace IC601, type CXP80116, on board VS37.

(28) Playback picture rolls. Black lines at the bottom of the screen. Tracking is incorrect and can't be adjusted. Replace faulty drum, part no. A7048214A.

(29) Playback picture unstable. R.F. f.m. envelope at TP207 fluctuates (not because of tape path fault). Replace IC601, type CXP80116, on board VS37.

TV Fault Finding

Reports from Philip Blundell, AMIEIE, Brian Storm, Terry Lamoon, Mike Pritchard, Eugene Trundle, Chris Avis, Edward Joyce, Keith Evans, Michael Dranfield and John Edwards

Philips 2A Chassis

If you encounter one of these sets where the BUT11 chopper transistor has gone short-circuit collector-to-base don't omit to check whether L5687, which is in series with its base, is open-circuit. The power supply will run when this coil is open-circuit but there will be no regulation. So with a dummy load the 140V line will rise to an excessive level.

P.B.

Toshiba 145E7B

Sound was o.k. but there was just a blank raster. Most of the voltages around the TDA3565 colour decoder chip were correct but the voltage at the brightness control pin (9) was higher than the normal 2.3V. A new TDA3565 was required.

P.B.

Grundig P37-142 (CUC51A Chassis)

This set produced a channel display but there was no sound or raster. At switch on the line oscillator (in the TDA2595 chip) produced an output for a second then stopped – the chip was sensing a fault on the protection line (pin 10 of the deflection module). A long search to find the cause seemed likely, then I noticed drops of water near the line output transistor. Because of a spill there was water beneath the line output transformer, the leakage triggering the over-voltage protection circuit. A happy half hour removing components in the line output stage and drying beneath them restored normal operation.

P.B.

Grundig GSC100 Chassis

If the e.h.t. is excessive, check whether Di508 is open-circuit.

P.B.

Panasonic TX28X1 (Alpha 4 Chassis)

There was a height problem with this set. The field scan was normal when the set was first switched on, but after about half an hour it would begin to jitter then the height would slowly increase until it was at least twice the normal size. Checks around IC501 and the ramp generator brought me to C402 which had a definite leak. It wasn't a small, yellow ceramic capacitor but a normally reliable Mylar type – a nice chocolate brown colour.

B.S.

Panasonic TX21M2T (Z4 Chassis)

This set was totally dead because the 270k Ω start-up resistor in the power supply was open-circuit.

B.S.

Panasonic TXC74 (Alpha 1 Chassis)

This set was brought to us because the line output transistor Q551 kept blowing. The one fitted had indeed been damaged, with quite a heavy leak between its collector and emitter. We fitted a replacement then left the set running on the soak-test bench. After about an hour the width came in slightly, but when the set was approached the fault cleared for another hour! This behaviour repeated itself for most of the rest of the day. Fearing for the life of Q551, we checked

the line drives and output stages carefully for dry-joints. Sure enough there were some rather obvious dry-joints at the secondary winding connections of the line driver transformer T531. Resoldering these restored Q551's life expectancy.

B.S.

Panasonic TX29A3 (Euro 1 Chassis)

This set worked for a while then the screen would slowly become brighter and brighter until there was just a white raster. The on-screen graphics were still present when any control was operated however. These new digital sets can be difficult to work on, especially with an intermittent fault like this one. So we resorted to guesswork. The DPU2553 deflection processor chip eventually turned out to be the culprit.

B.S.

Matsui 1422

A whistle came from the power supply area. Easy I thought, must be the transformer. A little pressure on the transformer with my screwdriver stopped the whistle but, just as I was about to remove it, I noticed a small 4,700pF, 1kV capacitor with a split in it next to the transformer. This capacitor (C613) normally shuts the set down when it splits, but on this occasion it decided to oscillate instead. Still, cheaper than a replacement transformer.

T.L.

Matsui 1455

This set caused its owner some distress. When she switched it to standby it remained on and when she switched it on from standby there was an overbright, pulsating display. A quick check on the h.t. feed to the line output stage showed that it was not being shut down when standby was requested. I traced back to the standby switching circuit and found that Q605 was short-circuit. Replacing this cured the problem, to the relief of the customer.

T.L.

Sony K VX25

Several of these sets have been brought to us with the complaint that they go dead intermittently. The cause of the trouble is dry-joints on Q608, which is mounted on the long heatsink down the centre of the PCB.

M.P.

Tatung 180 Chassis

Three of these sets came in after a storm with thunder and lightning. They all had the same fault symptoms – no sound and vision, with the LED lit – and in each case the cause was the SAB3035 chip IC1001 on the front panel. Roll on the next storm!

M.P.

Hinari TVA1

We've had several faults on the rather inaccessible front panel in this model. The most common one is loss of memory. This is cured by replacing the M58655P chip. The other main problem is drifting because of a faulty 33V stabiliser.

M.P.

Sony KV2212UB

Two or three of these venerable sets that have come our way have had a propensity to suddenly go off searching along the u.h.f. bands like lost souls in the wilderness. It's a habit that is guaranteed to raise viewers' blood pressure. The cause is leakage between the contacts of the search keyswitches. Replacement is the only cure. E.T.

Sanyo CBP2145 etc (E2 Chassis)

Complete loss of signals with these sets is often caused by failure of choke L391, which supplies 5V to the u.h.f. tuner. It goes open-circuit, but we've known the break to heal itself as the set warms up, adding a bit of interest to the diagnosis. E.T.

Philips 10CX1120

There was very erratic field scanning – sometimes cramping across the centre of the screen, occasionally complete field collapse. The culprit turned out to be C582, a ceramic capacitor that's connected to pin 20 of the TDA1770 field timebase chip – another habitual 10nF offender. C.A.

Philips System 4 Chassis

The problem with this set was intermittent sound muting. It could be instigated by moving the wiring loom between the front panel and the main chassis, but dry-joints and faulty plug/socket connections weren't responsible. The unusual cause was the on/off switch, whose momentary standby contacts were shorting erratically. C.A.

Ferguson TX10 Chassis

This set stopped tripping when the scan coils plug was disconnected, i.e. the supply to the line output stage was removed. The output transistor was o.k.: the fault was in the line output transformer T721. It's easy to miss this item as the e.h.t. is produced by the chopper transformer. C.A.

Philips KT4/K40 Chassis

We've recently encountered an EW problem with two of these sets, with the classic corset-shaped picture – and evidence of considerable efforts to clear the fault. In both cases the cause was the innocuous little choke L5170 in the EW modulator circuit. If the correct replacement produces a picture with slightly convex sides a small series resistor, of around 120Ω, will straighten it. C.A.

ITT/Nokia CP3128 (Core 2 90° Chassis)

This set came in dead with a nice open-circuit mains switch. Fitting the expensive replacement restored the set to life, with the remote control functions appearing to operate correctly. I finally shut the set off with the remote standby button. Next day the owner was back with the complaint that "it still won't switch on". In fact the on/off switch would turn it on and the standby button would turn it off. But I'd failed to notice that the set's standby LED indicator went out quickly in standby, with the set unresponsive to the remote turn-on command. The standby supply is derived from the mains bridge rectifier's output via thermistor R701 and the 2.7kΩ resistor R655, which feeds the 11V zener diode D702. This diode was leaky, reducing the supply to less than 5V. A replacement finished the job properly. C.A.

Philips G90AE Chassis

The fault with one of these sets was reduced height with top foldover. I eventually found that R3508 had risen in value from 24kΩ to 70kΩ. E.J.

Sony KVM2131U

There was no sound adjustment though the on-screen graphics indicated that volume up/down was working. A check showed that the volume adjustment voltage at pin 2 of IC001 was going up and down when asked but the voltage at pin 7 of the TDA1013A audio chip IC201 remained permanently at 6V. The cause of this was a leaky diode (D201, type 1SS133) in the a.f. mute line. E.J.

Philips CP110 Chassis

The power supply is often destroyed when one of these sets is left in standby. There's a modification to overcome the problem. If it hasn't already been done, change C2661 from 1,500μF to 2,200μF and remove C2657 (if fitted – see page 574, June 1993). Then replace the faulty parts – usually the bridge rectifier diodes, the BUT11AF and BC337 transistors in the chopper circuit, the TEA1039 chopper control chip and the fuse.

After doing all this I put one of these sets on soak test. Horror of horrors, it went dead again after a few minutes. It turned out that the two resistors in the chopper transistor's base circuit, R3658 (120Ω) and R3659 (100Ω), had gone high in value. Replacing them, also the BUT11AF transistor and the TEA1039 chip, got the set working again – for what I hope will be a long time. E.J.

Grundig CUC70 Chassis

If the problem is line tearing, check or change C501 (1,000μF, 25V) which is down by the line output transformer. E.J.

Philips CP110 Chassis

One of these sets was dead with F1 showing in the display. This indicates that the 12V supply is missing. In fact however the power supply was in the standby mode. The microcontroller chip had told it to start, but because transistor 7739 in the standby circuit had a base-emitter leak the power supply didn't start up. E.J.

Sony K VX2552 (AE-1C Chassis)

There was no picture, just a blank raster. The cause of the fault was traced to the DTA144EK surface-mounted transistor Q305 on colour decoder board B. E.J.

Samsung CI3312Z

This set wouldn't tune though the on-screen display indicated that the tuning was o.k. A check showed that the tuning voltage at pin VT of the tuner was zero. Tracing this back brought me to the integrating transistor RQ01 which was without a supply at its collector because its 10kΩ load resistor RR05 was open-circuit. E.J.

Philips Anubis A Chassis

This very new-looking set appeared on the bench recently, equipped with yet another even smaller chassis. The

reported fault was "dead – blows the mains fuse". Attention was immediately turned to the now obligatory BUT11AF chopper transistor which was short-circuit. We suspected that there might be something more sinister and a quick call to the friendly man at Philips revealed that a service kit has been issued to deal with the problem. Reference no. is SBC7021, part no. 4822 310 20491. Fitting this restored normal operation. **K.E.**

Salora L Chassis

A loud, crackling noise from the speaker was accompanied by a picture that collapsed horizontally and vertically. It didn't take us too long to find that there were dry-joints on C511, C512 and C507 in the line output stage. **K.E.**

Mitsubishi CT2223B

Field bounce is a problem we don't encounter very often these days. It brought back memories of certain monochrome sets long since gone. Electrolytic capacitors being the favourite suspect for this sort of thing, we were not surprised to find that the field scan coupling capacitors C412 and C413 were not up to specification. We've also had failure of these 330 μ F capacitors cause field collapse. **K.E.**

Toshiba 215T8B

This set failed to respond to commands either from the remote control unit or its own front panel control pad. A visual check of the main PCB revealed evidence of arcing at the scan coil connector. As a result of this the two system control chips QA01 and QF04 had perished. Repair to the PCB header and the replacement of these two rather expensive chips put matters right. **K.E.**

Sanyo CPT7135

The power supply appeared to trip out as soon as the set was switched on. When a 100W bulb was connected across the 145V rail's reservoir capacitor C331 the set started up and ran, happily lighting the bulb and operating the set at the same time. Further checks showed that C321 (10 μ F) was open-circuit, a replacement restoring normal operation. **M.Dr.**

Samsung CI5013T

There was no teletext sync, intermittent top expansion of the teletext or alternatively the text would disappear, leaving only the page number slowly rolling down the screen. You are not likely to come across this intermittent fault as it occurs only in the mix mode. A very simple modification is all that's required but Samsung won't recognise it as they say they haven't come across the problem. I can supply details if you send a stamped, addressed envelope to me at 62 Fairfield Road, Buxton, Derbyshire SK17 7DW. **M.Dr.**

Ferguson ICC5 Chassis

The complaint was that the output from the right-hand speaker cut out intermittently. When we removed the back we found that there were two huge dry-joints on the right-hand speaker socket. After resoldering these the set was returned to the customer, only to come back next day with the same complaint. The cause of the fault took some time to locate, because the symptom occurred only momentarily. There turned out to be a dry-joint on the front-mounted headphone socket. **M.Dr.**

Philips 2A Chassis

After soldering some dry-joints to cure an intermittently dead set we were faced with excessive width, the width control having no effect. We found that the -26V supply to the width control was missing as the 15 Ω safety resistor R3602 was open-circuit. This was in turn because of a solder splash that shorted C2602 to chassis. **M.Dr.**

Panasonic TX28A1 (Alpha 2W Chassis)

There was audio trouble with this 28in. monster: no sound for the first half hour after switching on. We'd not seen one of these sets before and didn't have the manual, so we had to play this one by ear! A slight buzz from the speaker confirmed that the amplifier was working, and no signal at the scart socket suggested that the cause of the fault lay near the intercarrier sound chip. Some likely chips were heated and cooled to no avail. Then quite by accident some freezer caught IC1204, a three-pin 5V regulator. Its output remained the same when it was heated and cooled, but a scope revealed that an enormous amount of 100Hz ripple was present at its output when freezer was sprayed in its direction. IC1204 is fed from a small mains transformer and bridge rectifier whose 1,000 μ F, 16V reservoir capacitor C1206, which is behind IC1204, had dried up. A replacement cured the fault. When we obtained a circuit diagram we discovered that a muting circuit is linked to the output from IC1204. **M.Dr.**

Decca/Tatung 165 Chassis

For a dead set that's stuck in standby with the power supply running check whether R803 and R809, both 82k Ω , are open-circuit. These two power supply resistors provide, in conjunction with a 15V zener diode, a -15V supply to the on/off switch's momentary contacts. To avoid comebacks replace both resistors. **M.Dr.**

Hitachi CPT2246 (NP83CQ Chassis)

The sound was normal but the picture looked as though it was made up of tiny black or white squares depending on picture content, with no shade difference between black and white. Thus a face would appear brilliant white or blacked out while a white shirt would appear brilliant white with the surrounding items either black or brilliant white – most strange! More by luck than judgement we discovered that the TDA3561A colour decoder chip IC501 was the culprit. **J.E.**

Philips CP90 Chassis

We've had a couple of these sets in recently. The first was suffering from field collapse because R3623 (8.2 Ω) was open-circuit. This surge-limiter resistor is in the 163V line output stage derived supply. It's used by the RGB output stages and also provides base bias for the upper field output transistor.

The second set displayed a picture that lacked contrast because preset R3944 (5k Ω) was broken. **J.E.**

Toshiba 255R7B

This set was dead. Just before the set had shut down the picture had collapsed to a line down the centre of the screen, i.e. loss of line scan. Investigation showed that pin 27 of plug 570 was severely dry-jointed while the 2SD1432 line output transistor Q404 was short-circuit. **J.E.**

At the Las Vegas CES

George Cole

The Winter Consumer Electronics Show (CES) opened in Las Vegas in January. In the past the show concentrated on audio and video products: this time many multimedia and computer games systems were on display.

CD-i and Video CD

The Philips Compact Disc Interactive (CD-i) system was on show in the games pavilion this year, along with Sega, Nintendo, Commodore and Atari products. Originally Philips presented CD-i as primarily a home reference/education system, but the emphasis now is on games and video software. John Hawkins, president of Philips Interactive Media Distribution and Systems, announced that over 300,000 CD-i decks have been sold world wide: the company expects sales to reach a million by the end of the year. Philips plans to launch more CD-i hardware later in the year, including a carousel player. CD-i players are cheaper in the USA, the lowest price model costing around \$400/£260. The digital video cartridge that enables CD-i decks to play MPEG-1 standard full-motion video (FMV) titles is priced at \$250/£170. Philips has also developed for CD-i a video control system called Edison. It has a VCR-type control panel and provides seven playback speeds.

GoldStar showed a CD-i deck, Model GDI12, with a built-in FMV cartridge. It plays CD-i, Video CD, Photo CD, CD+G (CD plus graphics) and audio CD discs and will cost around \$650/£435 when launched in the USA later this year. Its dimensions are 430 x 90 x 380mm (w x h x d), weight being 5.8kg.

Lots of CD-i video titles were on show. The picture quality of the MPEG-1 video is very impressive – many titles look better than VHS. As MPEG encoding improves, picture quality should approach that of S-VHS. Philips has also signed a thirty-movie agreement with MGM and United Artists.

CES provided the first glimpse of dedicated Video CD decks that play audio CDs and discs with MPEG-1 video. This conforms with the White Book standard agreed by Philips, JVC, Sony and Matsushita. Panasonic showed a portable machine with a 4in. LCD screen while Technics had a five-disc Video CD changer and a mini Video CD system. Samsung's DVC500RK is a five-disc machine while Model DV530KV plays almost every type of optical disc including audio CD, Video CD, CD+G, CD-V (CD Video, an obsolete format though some titles are still around) and Laser Disc. Fisher had on show a 24-disc Video CD changer. The GoldStar range included two Video machines: Model GVD100 plays audio and Video CDs; the Video CD autochanger holds up to 150 discs. It will also be possible to play Video CDs via a personal computer, and Sigma Designs launched a CD-ROM upgrade kit that also plays CD-i video titles. No price details were available.

Philips pointed out that there's a slight mismatch between the Green Book standard (for CD-i) and the White Book standard (for Video CD): the size of the CD-i video frame is slightly narrower than that with Video CD. As a result, when a CD-i deck equipped with an FMV cartridge plays a Video CD there's a slight overlap and a narrow line is seen at the sides of the screen. This shows up with only some TV sets, but Philips is introducing correction in its

next generation of FMV cartridges for release in February.

Philips also revealed that contrary to what had previously been assumed there will be two Video CD versions, a 525-line one for NTSC countries and a 625-line one for PAL areas. It was originally thought that, being a digital medium, Video CD would not be affected by the standards complications with analogue video discs and tapes. But Philips showed that when a 525-line disc is played by a European player you get a letterbox effect, while a 625-line disc played by an NTSC machine gives vertical stretching (faces look long and thin for example). The movie companies have insisted that there should be two types of Video CD discs so that their stars look their best. The companies also want to keep the present PAL/NTSC licensing arrangements, and to stagger the release of video titles – most appear on video in the USA six months before they reach Europe. In practice however the letterbox effect seen when using a European machine is unlikely to deter anyone wanting to watch imported video titles. The movie companies have also insisted that CD-i decks include an anti-copy system to stop users copying Video CDs on to VHS. A number of systems are currently being evaluated by Philips.

Other Multimedia Systems

CD-i's rival format 3DO was out in force. The system is based on an Interactive Multiplayer that has a 32-bit ARM (Advanced RISC Machine) processor – CD-i uses a Motorola 68000 16-bit processor. Panasonic launched the first 3DO machine, Model REAL FZ-1, last autumn in the USA at \$700/£460. Sales figures to date haven't been released, but it's thought that around 10,000-20,000 units have been sold. Sanyo and AT&T plan to launch 3DO machines later this year.

AT&T will introduce two models, one with a built-in modem that allows users to talk and play games simultaneously over the phone – parents will love this one! A PAL 3DO player has been developed by Panasonic which plans a May European launch for the system. Panasonic also plans to launch an MPEG-1 decoder that's compatible with the White Book standard. A player with a prototype MPEG decoder was present on the 3DO stand – it was literally a PCB that stuck out of the side of the machine. The pictures looked poor, though Panasonic also showed a machine running MPEG video which looked much better.

JVC showed its X'EYE system, which is based on the WonderMega format that was launched in Japan several years ago. X'EYE plays audio CD, CD+G Karaoke, Electronic Book CD-ROMs (with an optional ROM cartridge) and Sega cartridge and CD-ROM games. The player uses two Motorola 68000 processors and a Z80 graphics processor. There are r.f. and composite video outputs, also audio phono outputs. X'EYE goes on sale in the USA in April at \$500/£330.

Pioneer has launched its LaserActive format in the USA: it stores an hour of analogue video and 500Mbytes of data on each side of a 12in. disc. LaserActive hardware includes Model CLDA100 which can play audio CD, CD+G, CD-V, Laser Disc and LaserActive discs. Users can also buy games packs for Sega CD-ROM and cartridge games, LaserKaraoke titles and NEC DuoSoft discs and games cartridges. The

CLDA100 has a five-disc CD tray, an 8-bit digital field memory for special effects and a 425-line horizontal resolution. Price is \$970/£650. The optional games packs cost from \$350/£230 to \$600/£400. Pioneer also demonstrated 3-D LaserActive software which uses the Nuoptix system, with glasses that have light and dark lenses.

Sega showed its Genesis CDX multimedia CD-ROM entertainment system which plays Sega CDs and cartridges in conjunction with a TV set and can also play audio CDs and CD+G discs. CDX requires mains power for games, but two AA batteries can be used to play audio CDs. The unit uses two Motorola 68000 processors, a Z80 graphics chip and has a single-speed CD-ROM drive. Dimensions are 19 x 4 x 13.5cm (w x h x d), weight about 0.5kg. Future machines will have a built-in LCD screen for playing games on the move, though battery power will have to be improved for this.

Computer Games

Sega is to launch a home virtual reality games system in the USA later this year. It will consist of a helmet that plugs into a Genesis (Mega Drive) console. The helmet has a full-colour display, stereo surround sound and a head tracking system. It will cost under \$250/£166.

Nintendo is developing with Silicon Graphics a 64-bit games system called Project Reality. A prototype system which has photo-realistic graphics was demonstrated by Silicon Graphics. The product will be available in arcades at the end of the year: domestic systems costing less than \$250/£166 are to go on sale next year. Meanwhile Nintendo has launched an updated version of its SFX RISC chip called Super FX2. It's essentially a software technology that improves the chip's performance and almost doubles its operating speed.

Atari mounted a large display of its 64-bit Jaguar games system, which sells for \$250/£166 in the USA. The player



Panasonic's 14in. Flat Vision TV set with its beam-indexing/LCD display is less than 4in. deep.

has five processors, including an Atari 64-bit graphics processor, a 32-bit digital sound processor for CD and stereo sound, an Object processor for video effects, a Blitter Graphics Accelerator for copying and manipulating images and a 16-bit processor for secondary processing. An add-on CD-ROM drive that's compatible with Video CDs is planned.

Comodore showed its Amiga CD32 system which uses a 32-bit processor and sells for \$400/£266. The company has just launched an MPEG video decoder for the system in the UK.

TV

Panasonic showed its Flat Vision active beam-matrixing set that combines CRT and LCD technology – the 14in. set is less than 4in. deep. Its display in effect consists of 10,000 mini-screens. The set is to go on sale in the USA next year. No price details were announced. Sharp had on show two 16:9 widescreen sets (Models 30W1000 and 34W1000) with a built-in stereo decoder, on-screen menus and a closed caption decoder – this system allows text subtitles to be buried in the video signal, being seen only when a suitable decoder is used. There were no price details. Video Technologies International showed a 40in. 16:9 LCD projection set that was just 14in. deep.

Japanese companies haven't given up the Hi-Vision HDTV system. Several units were on display. Pioneer for example showed a Hi-Vision disc player and a projection monitor (Model numbers HLD1000 and SDP50HD2 respectively). Although the picture quality was impressive an analogue HDTV system is unlikely to find many backers these days and the equipment is very expensive – the player around \$6,500/£4,300 and the projector around \$18,000/£12,000.

DirecTV, the Hughes digital satellite TV system that has a 150-channel capability, begins operations in the USA in April with two DBS satellites. DBS-1 carries 60 channels and DBS-2 80-90 channels. The two satellites are co-located at 101°W. Most of the programmes will be pay-per-view sports events and movies: payments can be debited automatically by credit card or paid for monthly. Hardware consists of a Digital Satellite System – an 18in. dish and receiver, with remote control – manufactured by Thomson and sold under its RCA brand name. DirecTV uses a smart card conditional access system developed by News Datacom. Cost of the home system is around \$700/£466. Hughes says that the system offers CD-quality audio and near Laser Disc picture quality.

Video

Pioneer had on show a video disc recorder, Model VDRV1000, which records on 12in. magneto-optical discs. Recording time is 32 minutes per side. The machine is designed for professional use, costing around \$40,000/£27,000. Each disc costs some \$1,200/£800 – it's hardly a domestic system!

Panasonic's L XK750 is an auto-reverse Karaoke Laser Disc machine that incorporates a timebase corrector and has an S-video output. It plays audio CDs, CDV discs and Laser Discs. Price is \$1,000/£667.

Gemstar, which developed the VideoPlus timer system (known as VCR Plus in the USA), announced several new products. VCR Plus with CallSet makes it possible to set up a VCR Plus handset via the telephone. The user calls a free-fone number and enters information such as the VCR model number and the date and time. A signal is then sent to the

VCR Plus unit which is automatically set up. Let's hope that the idea catches on for other consumer electronic equipment such as VCRs. Cost of the handset is \$60/£40. The VCR Plus Control Tower is a combined universal remote/VCR Plus handset that can control up to four pieces of equipment, for example a TV set, a VCR and a cable TV box. Price is \$80/£53. IndexPlus is an automatic videotape indexing system. The VCR provides an on-screen menu, from which viewers can make their selections, listing all taped programmes. This feature will arrive later in the year.

Audio

Technics introduced the SATX1000, a THX receiver for home cinema enthusiasts – THX is the standard set by LucasFilm for high-quality Dolby Surround Sound systems. Denon has obtained a licence to produce Dolby Surround Digital (DSD) equipment. The DSD format provides six discrete channels, known as 5.1 left, centre, right, two surrounds and sub-woofer, and uses Dolby's AC-3 compression system with bit rates of 320kbits, 384kbits and 640kbits. Pioneer demonstrated a Laser Disc system with DSD.

Sony introduced a number of second generation MiniMisc machines that are smaller and lighter than previous models. The MZR2 is a recorder which weighs around 300g with battery while the MDS501 is a home deck. Sharp also showed a portable MiniDisc recorder, Model MD11, that weighs around 300g. It's powered by a rechargeable lithium battery which provides a recording time of about two hours. No price details were announced.

Technics showed a DCC home recorder, Model RSDC8, which is to be launched in June at \$600/£400. The company also announced a mini hi-fi system with a DCC player: the SCCH919D has a three-disc CD player, a graphic equaliser and a tuner. It will be launched in April but no price details were provided.

Miscellaneous

Videosnap showed a low-cost (\$700/£467) video printer that produces Polaroid prints.

Casio's AV100 is a portable AV system that includes a 2.5in. colour LCD screen, a clock/timer and calendar. Price is \$350/£233. Casio also showed a wrist-watch controller, Model CMD30B, that can be used to control a VCR or cable TV box. VCR controls include fast forward, rewind, play, stop and channel selection. Price is \$80/£53.

There were devices to control children's viewing habits. The Telecommander is an add-on box that enables parents to ration the amount of time that children spend watching TV: once a child has used up the time allocated by a parent the TV set switches off. Parents can also block specific channels or time slots. TV-Kid is designed to ensure that children don't sit too close to the TV set: the parents specify a minimum viewing distance and if the child sits too close an alarm sounds.

TV Graffiti is a system that enables the user to draw cartoons on the TV screen. The cartoons, which include thought bubbles, can be selected from a library of 150 pre-drawn images or drawn freehand. The pictures can be saved on tape.

Prize for the daftest video feature must go to Sharp who proudly showed a new tape loading system. The user pushes the cassette into the tape slot part way then settles back in his seat and presses a button on the remote control unit to complete the loading. Sharp claim that VCR users will find this very convenient!

Next Month in TELEVISION

TV/VIDEO SPARES GUIDE

Free with the April issue of *Television*, an updated version of our much valued Spares Guide which lists brands, spares departments and suppliers.

SOLDERING AND DESOLDERING SMDs

In order to pack more electronics into ever smaller spaces, also to simplify manufacturing, increasing use is being made of surface-mounted components. This presents quite a problem to the servicing trade, since such devices are more difficult to remove and replace than components with conventional leads. There are several techniques, and quite a lot of equipment has been introduced to assist with the problem. Steve Beeching provides a practical guide to techniques and the equipment available.

TUNING AND MEMORY SYSTEMS

The next instalment in Eugene Trundle's series describes the various channel tuning methods currently in use, including voltage- and frequency-synthesis arrangements. You'll have no doubt as to what does what in these systems after reading it.

TOSHIBA FAULT KNOW-HOW

More advice from Toshiba on fault-finding and recommended repair procedures.

THE PANASONIC ALPHA 3 CHASSIS

April's instalment deals with the circuitry on Panels B and H, i.e. the signals sections. The full specification of the chassis means that there is considerable processing and switching in these areas.

CURING AUDIO TAPE DAMAGE PROBLEMS

One thing that's guaranteed to cause user distress is damage to valued audio cassettes. There are various causes and steps to take. Geoff Davies describes the servicing procedures required.

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Test Report: Workshop Manager Plus

David Botto

One job that's particularly disliked by service engineers is dealing with the mountains of paperwork that every service department seems to generate. A new software program from Wessex Microtech, called Workshop Manager Plus, enables you to use the power of your PC to do the job easily, quickly and accurately.

The program was written by Bruce Johnston and Tony Morris, who are experienced TV/video/computer service engineers. Two years of hard work went into writing and testing it. Unlike some of the software I've tested this program works properly – I've not encountered any bugs. An effective telephone helpline is available when you've registered your copy of Workshop Manager Plus, but you're unlikely to need it as the program is so easy to use.

You don't need a mouse: selection of whatever function is required is easily and quickly done via the keyboard, usually with a single keystroke. If the display remains the same for more than ten minutes the built-in screen-saver blanks out the screen, protecting your monitor: touch any key and the display immediately reappears in its last used form.

Installation

The Workshop Manager Plus program is normally supplied on two 3.5in. high-density 1.44Mbyte discs that are packed with highly-compressed files (it's also available on 5.25in. discs). It takes about three minutes to load, the fifty eight files requiring just over 3Mbytes of your hard disc space. The installation program automatically inserts a 'start-up' batch file in your root directory.

Getting Started

Starting the program is easy: you type WM then press the return key. This brings up the opening menu. You have a choice of six headings: workshop manager; static files; reports; utilities; contracts; and quit system. When one of these has been chosen, another menu appears. Selecting one of these gives access to a series of screens, one after another, as you enter information.

They are coloured a restful grey that's easy on the eyes. Lettering is in white and gold, with blue highlighting that shows the chosen selection.

To enter a new repair job you first highlight 'Workshop Manager', using the keyboard up/down arrows, or type letter W then touch return. This brings up a new menu. You begin by typing the customer's name, address, work and home phone numbers and a customer reference code into the customer file – you can also type in any relevant information, e.g. 'customer only home mornings', 'maximum repair cost not to exceed £60', etc. These comments are not printed, but remember that the customer may see what's on the screen.

On the screen that follows you enter under Type whether the repair is to a colour TV set, a VCR, a computer, etc., also the model and serial number. The next available job number is selected and inserted automatically. You simply follow the straightforward on-screen instructions as you move from screen to screen.

With most screens additional help can be obtained by pressing the F1 function key. A 'pop-up' list then appears. An extremely useful 'locator' function finds lists of customers, jobs, part lists and insurance company details automatically – in fact almost any information that you might require. The locator function also finds and displays a built-in database of components and trade prices: these can be inserted into the job card directly (this database is supplied by JJ Components). Other databases can be added.

Another screen page, the Job Card, records the name of the engineer who did the repair and the part number(s) of the components fitted or required or a description of them and the quantity needed. When a faulty component has been located its circuit reference number is entered. The database then comes into action, selecting the right part number and giving its trade price. Prices can be updated as necessary.

Iris Codes

An outstanding feature is the program's use of Iris (integrated repair information system) codes. This is something I've not seen with other workshop program software. The Iris code uses three groups of letters to provide a section, a defect and a repair code, indicating exactly what was wrong with and what had to be done to a TV set, VCR, computer or other piece of electronic equipment in for repair. Here's how it works.

When you complete the item page you enter a question mark under the subheading PCB/Sect. The section code table then appears on the screen, listing all the sections of the piece of equipment concerned. If the fault was in the power supply for example you select 'PSU' from the section code table. Let's assume that a short-circuit component had to be replaced. Under the defect code subheading a short-circuit is represented by the letter Q, while under the repair code subheading letter A means that a replacement was required. Thus the complete Iris code for the repair is 'PSU Q A'.

These codes were originally devised by Sony to eliminate stacks of paper work. When Sony receives reports from dealers and engineers the Iris codes can be used to show recurrent failures, enabling action to be taken to provide cures for stock faults.

Say you had an elusive fault that took hours to sort out a couple of years previously. Now you have the same set with the same fault but can't recall what caused it. Check the Iris code in your Workshop Manager Plus history file and you'll have all the information you need.

The System in Operation

Workshop Manager Plus works out the time cost, the total labour charge and the cost of the materials required: it then totals everything up and adds VAT (the VAT rate can be changed). Bills, estimates and orders can be produced, saved on disc and printed out.

Commands in the Job File section enable you to edit or delete job details and print them, also invoices and job cards. Press key F1 and a pop-up help screen will appear: this facility is available right through the program. There's provision for entering trade repairs. Information can be backed up on floppy discs: it's recommended that three

separate discs, popularly known as the father, son and grandfather, are used to save important files – then if one disc is corrupted you can refer to one of the other two.

The reports section of the program enables you to do a number of things. You can print mailing labels without having to type in the address, which is taken from the customer file automatically. You can list all jobs between any two selected job reference numbers, make an audit report by date between any two dates, keep a check on work in progress and see which invoices have been paid. This last facility is particularly useful: in a busy service department it's all too easy to overlook a bill that hasn't been paid. Warranty/guarantee reports can be selected and printed. Trade repair, dealer reports and invoices can be analysed and checked.

The utilities section enables data to be backed up on floppy discs. Should the mains power fail while the system

is being used open files might be locked or held: the file scanner option enables these files to be recovered easily.

Conclusion

The manual supplied with Workshop Manager Plus is comprehensive, easy to read and easy to understand. Study it carefully and you'll have no difficulty in mastering the program.

Workshop Manager Plus costs £199 plus VAT, which would soon be recovered in a busy service department. You need to try it to appreciate fully the program's power and flexibility. It's available from Wessex Microtech, 3 Ladymead, Ilminster, Somerset – telephone number 0460 55 166. My thanks to Bruce Jonston for lending me the software and supplying technical information. See advertisement in February issue of *Television*.

Test Case 375

When Resident Workshop Sage first joined Test-Case Repairs Ltd. just twenty one years ago he was the proud father of a new baby girl, Susy Sage. During the subsequent years she, and other small Sages, have been supported by Sage's prowess at the bench. Her dependence on him is by no means finished! For her eighteenth birthday Sage bought her a beautiful 25in. Toshiba TV set. Now here she was, praising Dad's diagnostic abilities to the skies before dropping into the conversation the fact that said wonder Toshiba set had developed a fault. It just happened to be in the boyfriend's car outside.

Sage had no time to deal with it himself, as he was knee-deep in VCR repairs and urgent rental jobs. So it found its way to Sherlock's bench where the fault was discovered to be tuning drift. As the set warmed up it drifted down band to the point where it displayed flashes of a broadcast several channels below the one at which it started. It's a 256T9B, but you won't necessarily need the service manual to make sense of this one – the same thing could happen to any TV set that has a varicap tuner and an integrator to produce the tuning voltage from a variable mark-space ratio squarewave provided by the control chip. The squarewave output from the tuning chip is fed to a switching transistor which charges a three-stage RC integrating network from the 33V stabilised line.

The first suspect was the two-legged, μ PC547J 33V stabiliser chip. In went a replacement, but this made no difference at all. Sherlock then decided to monitor the voltage at the tuner's tuning voltage input pin, but found that the tuning went way off the moment the Avo 8's prod touched the pin: it must have been loading down the circuit. The tuner itself could have been the culprit of course, but there was nothing quite like it in the stores – it had fifteen pins and incorporated the i.f. amplifier, demodulator and all! Sherlock devised a way of testing it however: he used an elaborate and expensive bench power supply that he borrowed from Sage to feed the tuning voltage pin. The power supply had a digital readout of voltage (up to 15V) and current (up to 4A), so it should be able to do this little job – and did. At 12.27V it tuned the set to the local BBC-1 transmission and held it there all afternoon, without any drift. So the tuner seemed to be all right, which was a relief.

Sherlock next considered the circuit that produces the tuning voltage. The three integrating capacitors looked o.k. and measured o.k., but substitutes were fitted as a check.

The set still drifted as it warmed up. The associated resistors were then checked: they measured correctly and held their values when temperature cycled using a hairdryer and a can of freezer spray. On then to the switching transistor, its collector load resistor and an electrolytic that decouples the 33V line. These items were tested by measuring them and, in the case of the transistor, by fitting a substitute. None of this led to the cause of the fault. What was left? The mighty 64-pin M37100MB-583S control chip.

Knowing that he would have to foot the bill, Sage now took an interest. The upshot of this was that a replacement chip wasn't ordered, or needed. Sage's bank balance nevertheless took a battering, and Suzy had to wait a week to get her set back. Although Sherlock's diagnostic efforts seemed foolproof, there was something that he'd overlooked. What was it, and which item was responsible for the fault? For the answer turn to page 359.

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Modern TV Receiver Techniques

Part 15: Teletext-2

Eugene Trundle

Last month we got as far as seeing how a page of teletext is selected and stored in memory in the form of 960 7-bit words, each of which represents a character or graphic building block or alternatively indicates an 'attribute' that governs the way in which the words/graphics are to be displayed on the screen. The position in which each data block is stored in the memory determines where it will appear in the text display. Once the data for a page has been stored in memory it can be read out at any rate and as many times as required. But before we look at RAM readout and the generation of characters and graphics we need to look at the structure of the text display and the way in which it is formed in an ordinary 625-line, 50-field picture.

Data Displays

We've seen that a text page consists of 24 rows, each of which contains 40 characters or spaces. A TV field consists of 312.5 lines, of which 287.5 (say 288) are used for picture information. Each character row consists of ten horizontal scan lines. Thus 24 rows occupy 240 lines. This allows 24 blank lines above and below the active rows.

Now consider the horizontal aspect. Each line scan period is 64µsec, of which about 50µsec produces a visible picture display, the rest being given over to slight overscan, blanking and synchronisation. Each of the forty characters in each text row has a 1µsec time slot, leaving a 5µsec margin at each side of the display. The characters are made up from dots, each character being six dots wide. For six dots per 1µsec slot, the dot clock frequency comes out at 6MHz. To get a steady character display on the screen this 6MHz dot clock must be synchronised to the line scanning. This is done by locking a 6MHz crystal oscillator at 384 times the line frequency ($15,625\text{Hz} \times 384 = 6\text{MHz}$) by means of a times 384 divider and a phase-locked loop. The relevant bit of the decoder was shown at the top left-hand side of the block diagram in last month's instalment (Fig. 6, page 266). The need to synchronise the character generator to the off-air transmission becomes obvious when you consider the superimposition of text on pictures for subtitles and newflashes.

Memory Readout

Plainly memory readout must be governed by the display (dot) clock. The data is read straight from the memory to the screen, using a 'look-up table' to determine the characters etc. to be displayed, i.e. the character/graphics generating circuits compare the data from the memory with the stored codes to find out what is to be shown on the screen.

During the field blanking interval the clock divider (see Fig. 6 last month) receives its input from the data clock (6.9375MHz). This governs writing into the memory. As soon as the active picture period begins (line 23 or 336, even or odd fields respectively), the clock divider's input is taken from the dot/display clock, which is suppressed for the first 24 lines to give the blank border at the top of the screen. At the start of the visible part of each subsequent line the clock starts to run after 5µsec generating, via the

divider, address data to extract in the correct sequence seven-bit data words from the memory (RAM). At this time the RAM is switched to read instead of write. The data words emerge in parallel form at 1µsec intervals, the forty that make up each row of text being read out in 40µsec. After this the display clock is again suppressed, preventing further readout from the RAM. Five microseconds into the next visible line scan the display clock starts up again to begin another 40-word, 40µsec, 40-character readout cycle.

Because each displayed character is ten scanning lines deep the same data is read out of the RAM ten times, after which the row address is incremented to read out the data for the next row of the text display. The parallel data outputs from the RAM go to the character/graphics generators, whose job is to convert them to the appropriate serial data streams required by the RGB amplifiers to produce the appropriate dots on the screen.

The Character Generator

Basically the character generator consists of a ROM (Read-Only Memory) in which the characters/graphics that can be displayed are stored in a look-up table. During each memory read the character code addresses a ROM location which contains the pattern of ones and zeros that form the required video waveform. The ROM contains at least 96 symbols, any of which can be selected by means of the 7-bit ASCII code – see Fig. 2 last month.

Fig. 1 shows how a character is built up within the 6-dot by 10-line rectangle it occupies. To provide a space between successive displayed rows, the top line is unused. The last dot column is also unused, providing a gap between adjacent characters. The bottom two lines are reserved for the tails of lower-case letters such as p, j and g. Thus an upper-case (capital) letter occupies a rectangle consisting of 5 x 7 dots – the letter K is shown here as an example.

Fig. 2 gives an idea of how the character generator circuit works. The ROM section receives 7-bit parallel data from

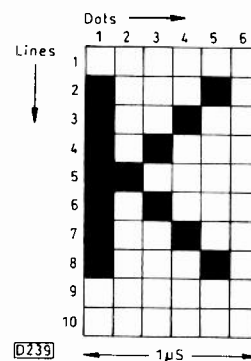


Fig. 1: Make-up of a teletext character. Lines 1-10 are successive scanning lines in a single field while each dot has a duration of 167nsec.

the RAM. During the first RAM readout the corresponding ROM readout is 000000 etc. to provide a blank spacing line on the screen. On the next line, 64µsec later, the data from the RAM produces, successively, the tops of all the

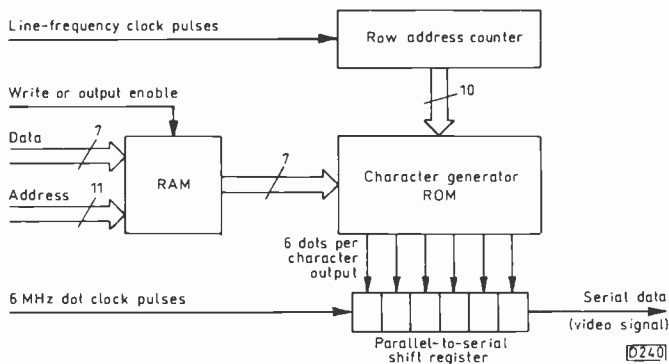


Fig. 2: Operation of the character generator section of the decoder.

characters in the row: in the example shown in Fig. 3, a display consisting of the word ape, the ROM readout will be 0010000000000000. On the next line the same data output from the RAM produces from the ROM the second line of the characters, here 0101000000000000. The third line scan, and the third repeat of the RAM readout, produces ROM output row three, which in this case is 1000101110001100. This process continues for all forty characters in the displayed row, the train of binary code emerging from the ROM on each line consisting of 240 bits rather than the eighteen given in our 'ape' example.

The row address counter shown in Fig. 2 thus has to clock the 6-bit display data out of the character generator ROM at 1usec intervals. Each 6-bit word is fed into a shift register that converts it to serial form: the 6MHz display/dot clock controls the readout from the shift register. The serial data thus generated is passed through three gates (not shown), one each for R, G and B, on its way out of the teletext decoder to get the colours right. The gates are controlled by the attribute codes shown in the top halves of columns 0 and 1 in the code table (Fig. 2 last month).

Character Rounding

The characters we have considered so far (Figs. 1 and 3) have a rather jagged appearance where they are curved: this is particularly apparent with diagonal lines. The situation is aggravated by the fact that what we have considered so far relates to the lines in a single field scan. As the data from the ROM is the same on both odd and even fields, the display of a diagonal is as shown in Fig. 4(b). It can be smoothed out by arranging that the character generator inserts half dots before and after the basic ones, as required on alternate fields. In effect this doubles each character's dot resolution in both the horizontal and vertical directions. Thus characters based on a 7 x 5 dot matrix are displayed with a 14 x 10 dot resolution.

This character rounding arrangement relies on the use of interlaced scanning. As mentioned in Part 8 (page 872,

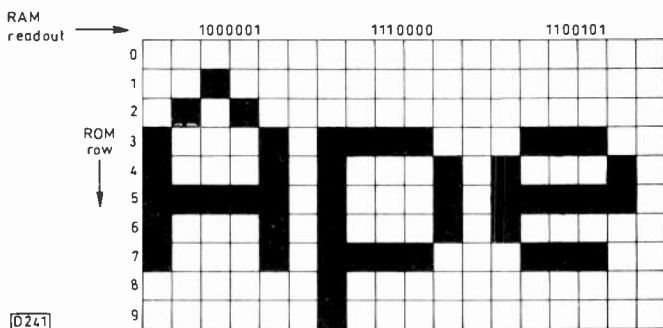


Fig. 3: Example of the build up of a single word displayed on the screen.

October 1993), interlacing gives rise to interline flicker at the horizontal edges of characters and graphics. The flicker can be removed by using non-interlaced (288-line) scanning in the text mode. The choice is thus between coarse diagonals and edge flicker, though interlacing must be used with subtitles and newflashes because these are inserted into the picture display. Modern decoder chips can be switched, by the control system, between the two display modes as required. Some have a smaller dot matrix (9 x 10, 12 x 10) to improve the character resolution.

Graphics and Effects

Graphics – the ones shown in the 'a' columns in Fig. 2 last month – are much easier to generate than alphanumeric characters, requiring only a few logic gates in the generator circuits. Two graphics modes are possible for each code number, contiguous which is used for large areas and separated which is used for finer detail. In the contiguous mode the graphics blocks occupy the whole of the 10 x 6 dot matrix shown in Fig. 1. Thus large areas of interrupted

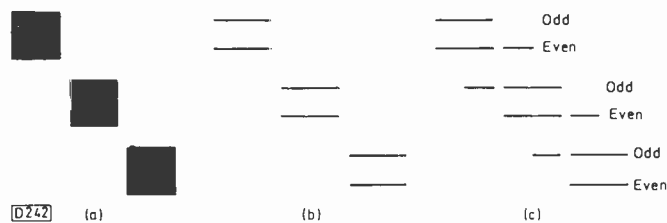


Fig. 4: Character rounding. (a) Data in the ROM. (b) Resulting display without rounding. (c) Rounding by means of the addition of half dots, alternating between 'before' and 'after' on successive fields.

colour are produced on the screen. In the separated mode the blocks have spaces around them. Letters and numbers larger than those that can be produced by the character generator are built up using graphics blocks – as are coarse pictures, maps and diagrams.

The 'effects' are also generated at the back end of the teletext decoder. Gates provide the flash and conceal features, controlled by an internal bistable circuit and the viewer respectively. Subtitle, newflash and clock-insertion boxes are generated by the picture-blanking section of the decoder, shown on the right-hand side in Fig. 6 last month. In the superimposition mode the contrast of the TV picture is, for greater legibility, reduced by a pull-down command to the appropriate control pin of the RGB chip.

Decoder Arrangements

The first teletext decoders contained over a hundred chips, being built up from general-purpose logic chips and such memory devices as were at the time available. Not unrepresentative of this approach was the DIY teletext decoder project published in these pages back in 1977. Current decoders use LSI devices, greatly reducing the number of chips required. In the widely-used Philips design shown in Fig. 5 there are just two decoding chips plus a memory chip (RAM) with a storage capacity of 2K x 8 bits (or 8K x 8 bits for Fastext operation). The dedicated micro-controller chip is an optional extra; indeed the current trend is towards control by the TV set's central microcomputer chip since this reduces costs.

The analogue signal processing is carried out in the SAA5231 VIP (Video Input Processor) chip which operates

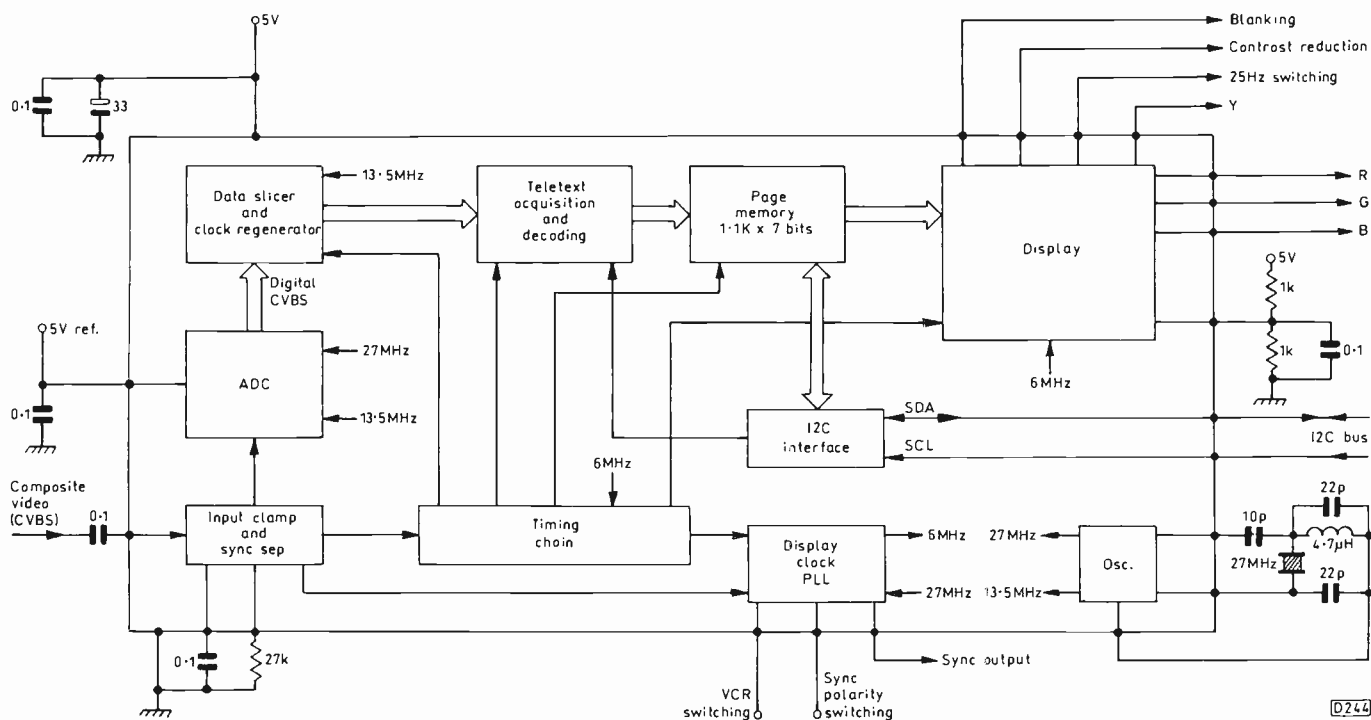


Fig. 6: Single-chip teletext decoder incorporating a one-page memory.

data in a dynamic RAM, shown here as having a storage capacity of 256K x 8 bits and thus able to store over 200 pages. When the user requests one of them the BMC generates the necessary addresses, switches the DRAM to read and feeds the data to the CCT chip where it's dealt with in exactly the same way as previously described.

A further development by Philips incorporates the BMC feature in the same pack as the VIP, decoder and character generator. This chip, type SAA5247, is identical to the SAA5244 except for the inclusion of DRAM interfacing circuitry. It can be connected to up to 1M x 4 bits of memory to store a maximum of 512 pages: a 256K x 4-bit store can hold 128 pages for display. When a page request is made the DRAM is rapidly scanned in the full-field mode: time is saved by restricting the search to the memory area assigned to the relevant magazine and page header information. To ensure that the most up-to-date page is displayed the memory is scanned in reverse order, i.e. from the most recently stored page to the oldest one. When the required page is found the memory is searched forward to read the data out to the one-page memory within the SAA5247 chip.

Teletext Developments

With the advent of satellite transmissions that can cover a dozen or more countries and the acceptance of the UK-designed teletext system as a de facto world standard (it's now been adopted by over 35 countries), the language requirements have become greater. This has led to the development of character generators that hold up to 192 characters, the extra ones being selected by the control bits in the header row (C12-14 in Fig. 3 last month) and by packet 26 which determines the supplementary character that overwrites the basic one at any particular point in a row and column.

It's also possible by similar means to subtitle programmes in many languages simultaneously, the desired translation being selected by the viewer for insertion in the picture. For text pages where two languages may be required simultaneously, e.g. some for educational purposes, there are chips with dual-ROM character generators capable

of producing two alphabets. Switching between one and the other during a single row of the display is achieved by using a control character to shift the readout from one alphabet to the other, in a similar manner to selecting alphanumeric or graphic characters.

OSD Functions

When suitable software is incorporated in the control system the teletext ROM can be used to generate on-screen menus and captions for such purposes as programme/channel number readout, analogue control setting displays and viewer-programmed status titles.

Text Programming of VCRs

The excellent VideoPlus VCR programming system is simple to operate and has become very popular with both manufacturers and users. It has one or two drawbacks however. It can't cope with regional programme variations in places where alternative transmissions are available and codes for all possible programmes may not be available to the user. More importantly, it can't take into account changes in programme scheduling or unexpected programme overruns. Programme Delivery Control (PDC) overcomes these problems and provides more features than

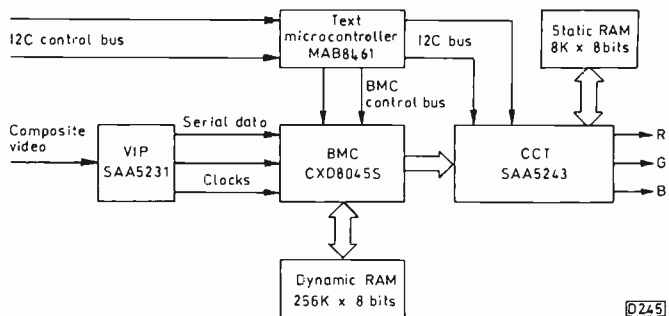


Fig. 7: Storing more pages: the BMC chip co-ordinates data transfer between the VIP and CCT chips and the DRAM.

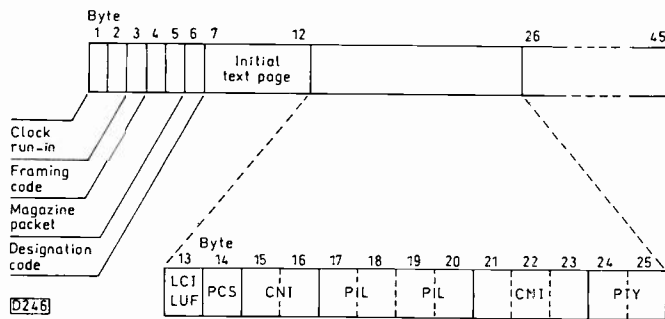


Fig. 8: Structure of the teletext 8/30 packet that carries PDC programme identification and timing data. The abbreviations used are as follows: LCI label channel identification; LUF label update flag; CNI country/network identification; PIL programme identification label; PTY programme type.

a simple time plus channel setting system.

PDC data is carried in packet 8/30 of the teletext signal. Its unique address code ensures that it and no other data is processed by the PDC dataline decoder incorporated in several currently-available VCRs. Fig. 8 shows the contents of packet 8/30, which is transmitted once per second amongst all the other teletext data but not, of course, displayed on the screen apart from (optionally) bytes 26-45 that contain a twenty-character programme title for display as a status message. The packet starts with the same preamble as all text lines: PDC data occupies bytes 13-25 (52 bits), carrying information on programme type, the broadcaster and start/stop times, the latter being conveyed by the PIL data and modified if necessary by that in the LUF section. Hamming coding is used to protect the data, as with the header row 0 discussed last month.

Fig. 9, from a current Toshiba design, shows how simple

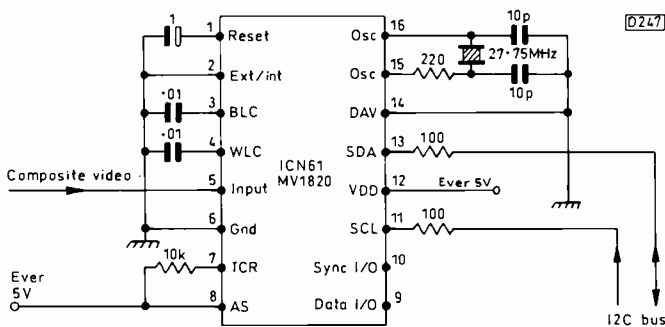


Fig. 9: Connections to the MV1820 PDC processor chip. The output from the 27.75MHz crystal oscillator is divided down in the same way as in Fig. 6. Some of the facilities provided by this chip are not used here.

the PDC decoder system is to implement (the internal workings of the MV1820 chip are quite complex however). Composite video enters ICN61 at pin 5 where it goes to a processing circuit similar to that in the VIP chip previously discussed. When the packet 8/30 ident label arrives the rest of the chip comes to life to compare the user's preset recording instructions, which are held in one register of an internal comparator, with the data in the packet. On detection of a coincidence between the two a record command is sent down the I2C data line to the system control microcomputer chip which starts the recording – and later stops it, again under PDC control.

The user can enter timer data in four ways: by normal keyboard programming; by VideoPlus coding; by bar-code

scanning; or, where a complete text decoder with display facility is incorporated, by a cursor that can be moved up and down a teletext programme schedule page. However it's entered the information is converted to a data packet which is fed to the chip via the I2C line and then stored. Automatic recording is assured. In the event of failure of the PDC data for whatever reason the VCR returns to its normal timer mode.

The PDC system has many advantages over simpler programming systems: it can be used to pause or terminate recording at any time during the programme; to record programmes of the same type (e.g. soaps, news, Open University broadcasts) over a four-week period; to record certain sections within a programme (e.g. all the swimming events in Olympic Games coverage); and it can cope with a change of channel in the scheduling of the required programme. It's a pity that in the UK only Channel Four has implemented PDC, and that there are at present no plans to extend the technique to the other networks.

Viewdata

Unlike teletext, Viewdata is a two-way interactive communication system that relies on a telephone line link between the user and the database. It has a much slower data rate – 1,200 (receive)/75 (send) bits per second – but a much faster access time since there is no need to wait for the requested information while the computer and character generator provide a virtually instantaneous response.

Viewdata uses the same 40 character x 24 row display format and the same ASCII coding for alphanumerics and graphics as the teletext signal, so the same character generator can be used. The control codes are quite different however, with columns 0 and 1 given over to cursor (simulates letter-printing head) instructions which thus do the job of the row-address data in the teletext signal. The display control characters are moved to extra columns 4b and 5b, created by changing bit 7 in the data word from 1 to 0 – compare with Fig. 2 last month.

A technique called shift coding is used to switch the character generator between teletext and Viewdata operation. When any of the Viewdata control characters in the extra columns 4b or 5b are to be sent they are preceded by a special 'escape' control character that makes the decoder invert bit 7 of the next data word. This in effect converts the Viewdata control character to a teletext control character for storage in the RAM: when it's read by the character generator section it appears, and is treated, just like teletext code.

Two other major differences between the Viewdata and teletext formats are the fact that the latter uses even parity in the eighth bit of the byte and that each byte has a start and stop bit consisting of one and zero respectively. These things affect the processing prior to the page memory and are irrelevant to Viewdata operation: for Viewdata use all that's required is to feed 7-bit Viewdata characters into the teletext page memory and provide a suitable display clock to synchronise the memory readout with the timebase scanning. For details of the Viewdata transmission modulation system and interfacing with the telephone line, see Roy Baines' article in the June 1991 issue of *Television* (page 566).

Next Month

This instalment has shown more than any of the others the need for a comprehensive control system. Next month we'll start on this subject by taking a look at tuning control techniques.

JVC GRAX55

This camcorder wouldn't play or record and there was no fast forward or rewind operation. E01 and E02 were displayed in the viewfinder. The problem lay in the drive to the loading motor: the 'sensor PCB cable' on the underside of the mechanism was open-circuit where the loading motor cable plugs in. Replacing this sensor PCB cable got the camera up and running again.. **G.S.**

Finlux CR4700

There were lines on the playback picture and recordings and the machine damaged tapes. The fault was caused by the fact that the cassette holder didn't sit down far enough. A new cassette holder cured the problems. **G.S.**

JVC GRSX9

The camera section failed to produce a picture because the iris jammed shut from cold. As the iris is not available separately you have to replace the 'optical block assembly' to cure the problem. **G.S.**

Sanyo VMD3P

We've had two of these camcorders with foldover on the right-hand side of the picture produced by the viewfinder. In both cases the fault was cured by replacing C9911 (10 μ F, 16V), the line drive coupling capacitor in the didy little horizontal scan stage. **E.T.**

Sony V90

We've had the following faults with this model:

- (1) Intermittent rewind. Cause was a dry-joint at IC001.
- (2) No fast forward/rewind/playback/record. The capstan wasn't being powered because the flexi connector FP53 was faulty. Part no. A7060693A.
- (3) No playback colour or sound was caused by absence of a 5V supply because transistor Q952 was faulty.
- (4) We've had a couple with this fault, the symptom being playback picture shake. The cause was the fact that the supply reel didn't turn smoothly because of a missing washer (part no. 370144101) beneath it. Where does it go to?!

Note that when the camcorder is dismantled there will be no playback sound or colour if CN501 is not connected to W953. **K.T.K.**

Sony CCDF330

Faulty playback colour was the complaint, and it certainly was! Flashes of colour were visible amongst a jumble of wavy lines. A check along the chroma playback signal path brought me to IC363 (jog chroma processing) where something very nasty appeared to be happening. The signal

waveforms were distorted and the HD pulses at pin 10 were missing. I came to the conclusion that the chip had to be faulty but decided to check its supply at pin 1 before ordering a replacement. It was fortunate that I did because there was appreciable ripple. The culprit turned out to be the decoupling capacitor C455 (0.01 μ F) which was completely open-circuit. **D.C.W.**

Sony F Range with U and U' Mechanisms

I've recently had three of these machines with similar problems. During the loading process either guide pole base can hesitate or jam at a particular point in the sequence, the result being anything from a mere click from the mechanism to a caution situation with no functions available to the user. In each case the cause was a slight deformation of the main chassis in the area of the guide slots. I was able to overcome the problem in each case by dismantling the deck mechanism and carrying out careful realignment. **D.C.W.**

Ferguson FC07

The cause of no autofocus or zoom operation was the fact that the 10 Ω safety resistor R81 had gone open-circuit. It's in a supply that goes to autofocus and zoom drives on the AF PCB. **D.C.W.**

Sanyo VMD6P

Although a tape could be loaded successfully no functions were then available and 'cassette' flashed in the viewfinder. Checks showed that all the deck sensors were functioning correctly while mode-switch information was being received correctly by the syscon chip. When eject was selected unloading took place correctly – or did it? Wasn't the capstan motor revolving a little too fast? Yes, it was! As no capstan FG signals reached the syscon chip it thought there wasn't a tape present. The motor itself was the cause of the problem, a replacement providing a complete cure. **D.C.W.**

Canon A10E

The grip strap on early versions of this model often becomes detached from the rear-end mountings. It's secured by two screws that hold it to the right-hand side case. What happens is that the internal moulded screw securing point breaks away from the case. A replacement we obtained from Canon shows the later method of securing the grip. Moulded securing points and screws are no longer used. Instead, a short length of steel rod is linked through the holes previously occupied by the screws. This is glued to the inside of the case. So it's not necessary to obtain a new case to repair a detached strap – merely a short steel rod and some glue! **D.C.W.**

Amstrad VMC100

A dead machine was rescued by replacement of CP401 and CP402 (main board) and Q402. **D.C.W.**

CD Player Repairs

Les Austin

All good soaps begin with a prologue. So for that matter do the bad soaps. Here goes!

The phone rang. It was John, asking to speak to Master (our workshop foreman). Since Master was on holiday I took the call. John, a one-man TV business and an old friend, was surprised to hear my voice.

"Hello Les. I didn't know you worked there."

"Oh yes" I replied. Then, my chest swelling with pride, "I do the CD players for them."

"Gosh" said John, obviously impressed. "Better you than me, mate. I never seem to have much luck with them."

I carefully omitted to mention that I don't seem to have much luck with them either. It then struck me that most of my other engineer friends say the same sort of thing, and I began to wonder why. Maybe we're all a bit dim.

John regained my attention with the obvious question "why have you been brought down to this?" I began to tell him the awful details and if you, dear readers, are patient I'll reveal all to you as well. But just a little at a time. . . For now, to business.

Cost of Lasers

In a letter not long since S.R. Hogue mentioned the high cost of laser units and pointed out that because of this very few customers have the repair carried out. He referred to Sony laser units, at about £50 trade price. But was he right? Well I'm sure that some of them, especially the more integrated ones, command this sort of price. But not all of them do.

There are many different makes of CD player on the market. A high proportion of them use a Sony laser unit. The one most commonly found is the KSS150, which has now been superseded by the KSS210. It's a direct and unambiguous replacement. Now clearly Sony UK isn't interested in supplying parts for Goodmans, Hitachi, Aiwa and so on players. But if you have a Sony account, or know someone who does, then why not get the units direct from Sony?

About eighteen months ago I needed a KSS150 for a Sony player. I took a quick look in the manual and placed an order by Viewdata. Shortly afterwards a KSS210 arrived together with an invoice for approximately £17 plus VAT. Later, when I had a batch of non-Sony machines with faulty lasers, I ordered ten more. A few weeks later I needed another KSS150, this time for a different Sony player. Again reach for the manual, copy out the part number, give it to Master and ask him to order two – a spare is always handy, and doesn't cost much. Two weeks later I was somewhat embarrassed when Master handed me two lasers and an invoice for £76 plus VAT.

Did Sony think they were for Ferguson machines maybe? Were they trying to teach us a lesson? When I rechecked the part numbers I found that I'd not ordered the same ones. It seems that £17 brings you a KSS210 made in Japan, while for £38 you can have a KSS210 made in Singapore. I ordered two more using the earlier part number and tried to return the £38 ones for credit, but Sony didn't want to know.

The moral of this is that if you want a KSS150 or a KSS210, order part no. 8.848.137.11 – and check the price first. Since that time, as a result of currency value changes, the prices have gone up. The last one I had cost £24 plus VAT.

It's not just Sony. When I asked Chas. Hyde the cost of a laser for the Sanyo CP200 the figure I was given was £90 plus VAT. No, the customer didn't want us to go ahead with that repair.

Sometimes the customer will accept a high quotation. If he has paid a lot for a very superior player (Technics perhaps) he expects a costly repair. He's not likely to be disappointed. The other occasion when there's a good chance of your quotation being accepted is when the CD is part of a midi system that may well have cost £400 to £700. This can also apply where the CD player is a separate unit but is matched to other equipment or is perhaps remotely controlled by the same handset.

S.R. Hogue reminded us that Philips' Rafoc units are very reason-

ably priced. I think that the last one I had, for a Technics player, was around £28. The same CDM4/19 from Panasonic/Technics was about £50. You'll hardly need me to tell you who I ordered it from. While on the subject of Philips, have you seen the service information on setting up the CDM2 Rafoc? To check the alignment of the lens you place a glass disc above it and view the reflection of a striplight on the lens. Well if £28 seems to be a fair price for a laser unit, what do you think of £150 for a glass disc?

Hitachi doesn't believe in giving anything away. I recently had a ghetto blaster that needed a new laser in for repair. As it was an under-guarantee repair the cost of £80 for a KSS210 was not a problem – Hitachi would end up paying the bill. But the company can't expect to sell many of these units in any other circumstances. Why £80? Hitachi obviously doesn't think we can change a laser without a bit of help, so you can get the laser only as a complete mechanism assembly. Things wouldn't have been too bad if the mechanism had been in stock, but we would have to wait for the ship to come from Japan. At least the correct part did eventually arrive: it doesn't always happen.

Test Equipment

You require test equipment for CD player servicing of course. The most obvious requirement is an oscilloscope. But what sort? You won't get much help from service manuals. The one for the Samsung SCM6500 suggests a 100MHz type. The manual for the Sanyo CP10 says both a 100MHz scope and a storage scope. During a Kenwood seminar I attended a 60MHz type was suggested, but it was agreed that one with a narrower bandwidth would be o.k. Incidentally Kenwood has a very fine range of scopes and I gather that discounts are possible. In his series on CD Player Servicing Joe Cieszynski said that he was happy with his 35MHz Cossor CDU150. For the past couple of years I've generally used a Telequipment D67, which has a 25MHz bandwidth.

What sort of signals do we need the scope to see? The highest component of the r.f. signal is at 1.44MHz. The focus and tracking waveforms are at only a few kHz. There will be a microcontroller clock, say at 4MHz, and a crystal for the digital processor, often about 9 or 18MHz. This suggests that a 20MHz scope would

be satisfactory. It wouldn't be able to display the 67MHz clock signal in the digital section of the Pioneer PD7030, but we'd use our frequency counter for that, wouldn't we?

I rarely use a second trace, but it would be unwise to limit yourself to a single-trace model. Y-amp sensitivity should be 10mV/div or better, but you will not need the full bandwidth. So 100mV/div with a times ten gain switch would be o.k. (don't confuse this with a times ten attenuation switch in the probe). Timebase speed needs to be at least 500nsec/div: any slower and you'll not easily see the crossovers in the r.f. waveform. Triggering needs to be stable at all timebase speeds: both 'auto' and 'normal' ('triggered' and 'level set') are required for easy tracking-balance adjustments.

Finally pay attention to the scope's acceleration voltage. A monoaccelerator tube operating with an e.h.t. voltage of 1-2kV is of not much use: quality scopes always employ high-voltage post-deflection acceleration. For example the Telequipment D67, which has a bandwidth of 25MHz, has a total acceleration voltage of 10kV. The figures for the Telequipment D75/D83 are 50MHz and 15kV, and for the Hewlett-Packard 182C 100MHz and 22kV.

A storage scope? The last time I used mine was to show Tea Brew Tim, the trainee engineer, how different circuits give different microcontroller reset waveform shapes. You don't need a storage scope just to confirm the presence of such waveforms! No, I don't think you need a storage scope.

In conclusion this time a couple of fault reports.

Sharp DX110

'Faulty' said the note that accompanied this ageing player. Switch on, load a disc, see it read the TOC, press play and listen to the nice music. For a few seconds, then hear the nasty skipping followed by silence from the audio stages and squeaks from the mechanism. Our video man, who once worked for Sharp, said "sled motors are suspect with these machines". Another clue was the squeaking noises, not unlike those produced by a well-known player that always seems to have a faulty sled motor. The r.f. signal seemed to provide confirmation. So I checked the motor with my analogue meter. This showed that there was

nothing amiss, but I went ahead and ordered a manual and sled motor from WVE. The sled motor arrived, but no manual. Needless to say fitting it made no difference. Time to speak to the nice man at Sharp.

"No lad" he said in his lovely Mancunian way, "sled motors in the DX110 don't fail. It's probably the chip." He also said he'd send me a photocopy of the circuit diagram and the set-up instructions. With the circuit to hand at least I'd have an idea about which chip was which.

Careful inspection of the PCB revealed some suspect joints, but attention to them with the big Weller gun made no difference. Try freezer on the r.f. chip. Bingo! It was now possible, with regular doses of freezer, to hear Dvorak without nasty skipping. One of our suppliers had a replacement LA9100 chip for £5. Another satisfied customer, and one unwanted second-hand sled motor labelled and put on the shelf.

There are two lessons to be learnt from this. First, just as not every Pioneer CD player has a faulty disc motor, so not every Sharp player has a faulty sled motor. Secondly if your Sharp expert doesn't call you 'lad' in Mancunian, ignore what he says!

Pioneer PD4050

This one stood accused of skipping. It seemed all right to me at first attempt, so I phoned the customer. He'd bought it from Comet new and had sent it back to them three times previously, but it had never worked satisfactorily. It stood unused for about two years, then his son had said he would like to use it. The skipping was neither severe nor regular, but made it impossible to enjoy good music.

I put it back on test. Sure enough it did skip. A check showed that the r.f. waveform was 3V peak-to-peak, which is far too high. I assume that the Comet man had wound it up a bit 'for good luck'. After resetting it to the correct level (1.5V p-p) I went through the full setting-up procedure, including the tangential and diffraction adjustments. It then seemed to be o.k., so I returned it to the customer.

A week later it was back. The accompanying note agreed that it was better, but it was still not satisfactory. A Vivaldi disc was enclosed. Unusually, the disc was spotless and unscratched, but yes there was occasional loss of audio. Connect the scope to the r.f. test point then watch and listen. There it was, a brief

dropout of both the sound and the r.f. signal. The eye pattern provided no explanation, so I didn't change the disc motor (this is, anyway, one of the models where the disc motor isn't the first suspect). Perhaps a new laser unit is required? This was a tempting option, but I wasn't convinced. Time to ring the nice man at Pioneer.

In view of what I'd already done, he couldn't suggest anything else. Probably a new laser would be the next move. Earlier versions of this model use type PWY1008, which is not considered to be so reliable, but this one had the later PWY1009. Before ordering another one I decided to look in my own little black book. What's this then? A note says "for skipping problems add C2 and C4, both 33pF, to pins 10 and 11 of the CXA1081S r.f. chip". These are the input pins for the E and F photodiodes. Quickly fit them. Now I remember: about eighteen months previously another nice man at Pioneer had told me this. On that occasion however the capacitors had already been fitted.

Switch on: perfect Vivaldi. I played it for a couple of days before returning the player and disc to the customer.

One question remains: why didn't the nice man at Panasonic tell me about the capacitors this time? But let me be honest. This is one fault that I could never have put right without the manufacturer's help. It's a good job that I put the note in my little black book.

Goodmans GCD300

The display lit and the tray opened and shut but nothing else worked. The disc didn't rotate. According to the customer a great deal of smoke had come from the ventilation holes and a hissing could be heard (not from the speakers) just before the machine stopped working. When we removed the top cover we saw that an electrolytic capacitor, C609 (2,200µF, 16V), had disintegrated and left debris inside the machine. It's the smoothing capacitor for the -12V supply. There's a similar capacitor, C608, for the 12V supply. C609 had failed because it had been connected the wrong way round - both capacitors had been inserted into the PCB as if the two supplies were positive. Replacing C609 cured the problem. I've not come across this before but there could, I suppose, be a batch of faulty machines.

Mike Leach

ECONOMIC DEVICES 32 TEMPLE STREET, WOLVERHAMPTON, WV2 4AN

15/80H	3.83	25C1398	0.80	2SD468C	0.00	BR105B	0.24	BD190	0.31	BF959	0.18	BYW56	0.46	M192B1	1.86	SG613	18.79	TA7176P	1.30	TD1190Z	4.08	TEA1009	1.61
15/85R	3.84	25C1413A	1.30	2SD476	0.97	BC107B	0.20	BD201	0.40	BF960	0.27	BYX55600	0.20	M21C	1.85	SGSF344	6.62	TA7193AP	3.36	TD1200	0.91	TEA1014	1.87
17052	3.85	25C1509	0.51	2SD525	1.27	BC108	0.15	BD203	0.46	BF966	0.61	CA1310E	0.78	M293	14.63	SKE4F104	0.97	TA7193P	7.09	TD1210	0.91	TEA1039	2.15
17053	2.38	25C1520	0.54	2SD551	5.81	BC109A	0.16	BD232	0.28	BF970	0.30	CA309A	3.06	M490	15.30	SKE4F210	0.87	TA7205AP	1.51	TD1412	0.77	TEA218A	1.49
17088	2.38	25C1573	0.26	2SD613	0.63	BC109B	0.15	BD237	0.25	BF973	0.35	CD4001	0.14	M491	7.94	SKE5F310	1.68	TA7207P	1.68	TD1506	4.59	TEA2164	2.68
17089	3.39	25C1573Q	0.26	2SD636	0.14	BC117	0.13	BD237	0.30	BF981	0.44	CD4011	0.21	M50115AP	3.24	SL1430	1.41	TA7210P	1.50	TD1510	2.54	TEA2165	6.26
17127	1.77	25C1675	0.09	2SD637	0.12	BC139	0.33	BD238	0.11	BF990	0.61	CD4013	0.34	M51102L	1.77	SL1431	1.70	TA7214P	3.74	TD1512	3.17	TEA2166	0.55
1N4001	0.04	25C1685	0.17	2SD667	0.26	BC140	0.21	BD239	0.29	BF990A	0.77	CD4016	0.14	M51231P	2.03	SL1432	2.10	TA7217AP	1.27	TD1515A	2.54	TEA2166M	0.75
1N4002	0.07	25C1740	0.12	2SD669	0.63	BC141	0.34	BD241	0.41	BF991	0.43	CD4021	0.43	M51393AP	4.64	SL471	1.70	TA7222	1.24	TD1516G	3.56	TEA2167	0.59
1N4003	0.05	25C1741	0.17	2SD669A	0.63	BC147A	0.06	BD243	0.39	BF996	0.53	CD4052	0.29	M51515L	2.01	SL490	2.31	TA7222AP	1.27	TD1518Q	3.32	TEA2168	0.52
1N4004	0.07	25C1815	0.14	2SD716	1.46	BC148	0.12	BD243A	0.43	BF992A	0.48	CD4053	0.20	M51521L	0.54	SN29764AN	1.99	TA7227P	2.29	TD15190	2.81	TEA2169	0.36
1N4005	0.06	25C1826	0.72	2SD718	1.45	BC148A	0.06	BD243C	0.44	BF995	0.55	CD4066	0.30	M5218L	0.48	SN7474N	0.98	TA7230P	1.60	TD1701	4.86	TEA2170	0.00
1N4006	0.06	25C1827	1.00	2SD734	0.24	BC148B	0.04	BD244A	0.34	BFY50	0.34	CD4069	0.17	M5231L	0.55	SN76013ND	7.38	TA7233P	1.95	TD1870	3.77	TEA2171H	0.58
1N4007	0.06	25C1845	0.20	2SD762	1.51	BC149	0.04	BD244C	0.42	BFY51	0.34	CD4070	0.21	M53216P	1.48	SN76227N	1.07	TA7240P	2.46	TD1904	1.21	TEA2172	0.57
1N4148	0.04	25C1846	0.51	2SD774	0.36	BC149C	0.04	BD245C	0.72	BR100	0.17	BR100	0.17	BR100	0.17	BR100	0.17	BR100	0.17	BR100	0.17	BR100	0.17
1N4448	0.06	25C1923	0.13	2SD877	0.36	BC157	0.13	BD246C	0.71	BR101	0.98	CR30M	2.62	M54544L	1.87	SN76705AN	1.70	TA7250	4.03	TD1908A	1.14	TEA2173	0.48
1N5061	0.38	25C1942	0.34	2SD877E	0.36	BC157	0.13	BD246C	0.71	BR101	0.98	CR30M	2.62	M54544L	1.87	SN76705AN	1.70	TA7250	4.03	TD1908A	1.14	TEA2173	0.48
1N5402	0.12	25C1959	0.33	2SD881	0.90	BC159	0.06	BD247A	0.56	BR103	0.53	CRD2AM	2.17	M54548L	3.29	SN76705AN	1.70	TA7250	4.03	TD1908A	1.14	TEA2173	0.48
1N5404	0.13	25C1969	2.46	2SD881	1.34	BC161	0.27	BD317	0.87	BR303	1.22	CV12E	2.70	M54648L	6.62	ST441C	2.80	TA7270P	1.73	TD2002	0.85	TEA2175	0.83
1N5406	0.12	25C1983	1.78	2SD885	0.94	BC166	0.42	BD318	1.10	BR444	1.02	CX109	7.05	M54648L	6.62	ST441C	2.80	TA7270P	1.73	TD2002	0.85	TEA2175	0.83
1N5408	0.12	25C2001	0.14	2SD870	3.28	BC171B	0.14	BD380	0.34	BRV56	0.43	DTA124E	0.13	M54898AP	20.45	STK0029	5.88	TA7271P	1.76	TD2004	1.27	TEA2176	0.30
1N914	0.04	25C2073	0.51	2SD871	5.08	BC178	0.11	BD434	0.38	BT120	1.28	ER1400	2.15	M5730P	2.38	STK0040	7.40	TA7274P	2.72	TD2006	1.06	TEA2177	0.46
1S1555	0.22	25C2078	0.77	2SD880	0.48	BC182L	0.06	BD435	0.34	BT129	3.26	HA11235	1.95	M583731	2.29	STK0059	9.75	TA7280	2.11	TD2009	2.29	TEA2178	0.17
1S2076	0.29	25C2141	1.48	2SD882	4.23	BC184	0.09	BD437	0.32	BT136600	1.14	HA11244	3.83	M583732	2.88	STK025	9.61	TA7299	2.34	TD2020	3.72	TEA2179	0.32
2N2219A	0.27	25C2166	1.27	2SD898	4.23	BC184	0.09	BD437	0.32	BT151500R	1.10	HA11244	1.21	M583732	2.88	STK042	6.90	TA7313AP	0.82	TD2030H	0.61	TEA2180	0.30
2N2222	0.22	25C2168	0.85	2SD904	5.95	BC184C	0.04	BD438	0.31	BT151800	1.15	HA11423	2.02	M583732	2.88	STK062	8.88	TA7317P	0.93	TD2030V	1.05	TEA2181	0.44
2N2905	0.21	25C2236	0.25	2SD973	0.38	BC184LC	0.10	BD441	0.34	BK205	1.07	HA11440	2.92	M583732	2.88	STK131	7.79	TA7325P	0.45	TD2031	2.53	TEA2182	0.39
2N2926G	0.37	25C2271	0.22	74L500	0.21	BC204	0.14	BD442	0.29	BU208A	1.16	HA11663	3.43	M583732	2.88	STK141	9.31	TA7343AP	0.72	TD2032	1.68	TEA2183	0.38
2N3053	0.36	25C2274	0.22	7805	0.28	BC207B	0.23	BD442	0.14	BU208D	1.53	HA11713	1.24	M583732	2.88	STK142	8.21	TA7343AP	0.72	TD2033	1.68	TEA2184	0.38
2N3054	0.98	25C2274K	0.22	7808	0.30	BC212B	0.06	BD529	0.97	BU326A	1.36	HA11741	6.77	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2034	3.76	TEA2185	0.92
2N3055	0.77	25C2314	0.33	7812	0.30	BC213	0.11	BD530	0.43	BU406	0.68	HA11745	5.10	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2035	0.88	TEA2186	0.80
2N3442	1.00	25C2335	1.43	7815	0.30	BC213	0.11	BD530	0.43	BU406D	1.02	HA13001	6.77	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2036	0.88	TEA2187	0.80
2N3702	0.11	25C2458	0.12	7818	0.41	BC214L	0.09	BD536	0.48	BU407	0.53	HA13108	3.56	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2037	0.88	TEA2188	0.80
2N3704	0.14	25C2482	0.34	7905	0.34	BC237	0.10	BD675	0.30	BU407D	0.97	HA13118	1.87	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2038	0.88	TEA2189	0.80
2N3773	1.27	25C2547E	0.24	7912	0.43	BC237B	0.05	BD677	0.32	BU426A	0.96	HA13119	2.03	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2039	0.88	TEA2190	0.80
2N3819	0.34	25C2565	0.86	AA119	0.36	BC238	0.11	BD707	0.51	BU426E	2.13	HA13403	4.66	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2040	0.88	TEA2191	0.80
2N3904	0.11	25C2570A	0.29	AA143	0.13	BC238B	0.05	BD839	0.51	BU500	1.32	HA1377	2.42	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2041	0.88	TEA2192	0.80
2N4444	3.22	25C2577	1.06	AC127	0.11	BC239	0.04	BD901	0.51	BU508A	0.95	HA1388	2.63	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2042	0.88	TEA2193	0.80
2N6292	0.62	25C2581	3.45	AC141K	0.46	BC252B	0.07	BD902	0.51	BU508AF	1.27	HA1389	2.52	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2043	0.88	TEA2194	0.80
2SA1015	0.10	25C2632	0.43	AC176K	0.30	BC300	0.48	BD911	0.65	BU508D	1.27	HA1392	1.61	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2044	0.88	TEA2195	0.80
2SA1016	0.17	25C2655	0.25	AC187	0.16	BC301	0.28	BD912	0.65	BU508DF	1.87	HA1397	2.63	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2045	0.88	TEA2196	0.80
2SA1020	0.43	25C2671	0.68	AC187K	0.33	BC302	0.36	BDV65B	1.16	BU508V	1.43	HA1399	2.33	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2046	0.88	TEA2197	0.80
2SA1021	0.43	25C2688	0.60	AC188	0.36	BC303	0.22	BDW84C	1.28	BU526	1.43	HA1452	4.86	M583732	2.88	STK162M	9.51	TA7358P	0.88	TD2047	0.88	TEA2198	0.80
2SA1095	7.44	25C2785	0.12	AC188K	0.82	BC307	0.06	BDW93C	0.59	BU536	1.60	HM6232	10.36	M6550	2.50	STK325	5.92	IAG626	6.67	TD2060	3.08	TEA2199	11.24
2SA1102	2.54	25C2791	5.44	AD149	0.52	BC307A	0.06	BDW94C	0.46	BU608	1.44	HM6251	9.52	MPSA42	0.23	STK5326	6.20	TBA120	0.93	TD2611A	0.64	TEA2200	1.78
2SA1143	0.17	25C3150	1.44	AD161	1.02	BC307B	0.06	BDX32	1.70	BU705	1.61	HM7103	14.07	MPSA56	0.12	STK5331	3.02	TBA120AS	0.50	TD2611AQ	2.03	TEA2201	0.94

SPECIAL OFFERS - ENDS 30/04/94 OR WHILE STOCKS LAST

BU208A x 5	3.99	TDA 3654 x 2	2.50
BU 426A x 5	3.75	TDA 4601 x 2	2.55
BU 508A x 5	3.60	STR 54041 x 2	6.00
BU 508AF x 5	5.00	STANDARD VIDEO SENSOR LAMP x10	2.50
BUT 11AF x 5	3.25	STANDARD VIDEO SENSOR LAMP	2.50
TV FAULT FINDING GUIDE	9.99	PLUG x 10	4.00
VIDEO FAULT FINDING GUIDE	9.99	V7IE ETC. BELT KIT x5	5.50
SATELLITE FAULT FINDING GUIDE	14.95	3V29 ETC. BELT KIT x 5	4.50
CO AXIAL AERIAL PLUGS x 25	3.75	3V35/6 ETC. BELT KIT x 5	4.25

2SA1175	0.25	25C3153	2.37	AD162	0.96	BC308	0.06	BDY20	2.13	BU806	0.82	ICH281	0.26	MPSA39	0.09	STK5332	2.74	TBA120S	0.89	TDA2652	14.32	UPC1181H	6.88
2SA1186	3.73	25C3156	4.22	AF124	0.77	BC308A	0.09	BF115	0.41	BU806A	0.80	KA2101	0.83	MR854	0.14	STK5333	4.28	TBA120T	0.51	TDA2653A	3.26	UPC1182H	5.95
2SA1208	0.34	25C3182	3.25	AF127	0.59	BC308C	0.06	BF179	0.31	BU807													

Updated Television Index and Directory

Peter Marlow, B.Sc., C.Eng.

An updated version of the *Television Index and Directory* disc is now available – version 2. In addition to incorporating information on Volume 43 of *Television* several improvements have been introduced. There are now over 5,000 references to TV, VCR and CD player fault reports, articles, leaders, letters and features covering six years of *Television* magazine, from 1988 to 1993 – Volumes 38 to 43. The Index includes an advertisers list, an updated TV/VCR spares guide and a directory of trade and professional organisations. As before, the *Television Index and Directory* disc will work with any IBM or compatible PC with a hard disc drive. A full description of the 'soft' index was published in the May 1993 issue of *Television*.

New Features

Apart from the Volume 43 (1993) data, there are new sections on camcorder and satellite TV faults and an international TV standards list. But the biggest improvement is the inclusion of fault descriptions. For each fault there is now a brief description – over 3,000 of them. A typical fault page now looks like Fig. 1. The number /1, /2 etc. to the right of the model or chassis number shows that there are references to that particular chassis on more than one page. To help provide easy access, the hash symbol (#) at the end of each fault reference refers to the number of the fault on the page – there can be more than one fault relating to a particular model on the same page. The tab key moves a highlight bar through the references to act as a marker.

A number of minor software improvements have added features to the search and mark functions.

Another proposed innovation is the *Fault Report Disc*. Later this year we expect to issue a Fault Report Disc for Volume 43: this will have on it the full text of all the TV Fault Reports, VCR Clinic, Camcorner and CD Player Case-book items and the satellite TV faults published during November 1992-October 1993. Access to the data on this disc will be via the new version of the *Television Index and Directory* – it cannot be accessed in any other way.

On receipt of the *Fault Report Disc* a simple installation procedure will put the fault report data on to your computer's hard disc drive. Access to the data is simple: go to the Index and choose a fault report section. Select a model/chassis then choose the required fault reference using the tab key or a mouse. Next press the enter key. From the example shown in Fig. 1 you will get the fault report display shown in Fig. 2.

You can browse through the page using the ↑ or ↓ key or the page up and down keys. The numbers at the bottom right-hand corner (see Fig. 2) indicate the line number from the top of the page, in this case line 61 of 158. Press F10 or Esc, or click the mouse over the small square at the top left corner, to return to the *Index*.

If the Volume 43 *Fault Report Disc* is well received discs will be made available for earlier volumes.

Availability

Version 2 of the *Television Index and Directory* is available at £30 from Video Interface Products Limited, 1 Vineries Close, Cheltenham, Gloucestershire GL53 0NU. Alternatively those with version 1 discs can have them

TV Fault Reports		R
Ferguson MM02 Monitor		
Ferguson SAP1 satellite receiver		
Ferguson SRA1 satellite receiver		
Ferguson SRA1S		
Ferguson SRB1 (BSB receiver)		
Ferguson SRV1 satellite TV receiver		
Ferguson SRV1/Pace SR9000 IRD		
Ferguson TX10 chassis	/1	
Ferguson TX10 chassis	/2	
Ferguson TX10 chassis	/3	
Ferguson TX10 chassis	/4	
Ferguson TX10 chassis PC1560 panel		
Ferguson TX10 chassis (Teletext)		
Ferguson TX10 chassis 1560/61 panel		
Ferguson TX100 (100 deg) chassis		
Ferguson TX100 chassis	/1	
Ferguson TX100 chassis	/2	
Ferguson TX100 chassis	/3	
Ferguson TX100 chassis	/4	
Ferguson TX100 chassis (Teletext)		
FERGUSON TX10 CHASSIS		/4
Half inch black line across picture		
November 1992, p35 #6		
Fizzing noise & lines across screen		
February 1993, p282 #7		
Shattered mains fuse.		
February 1993, p282 #12		
Field bounce at switch-on.		
April 1993, p438 #7		

F1-Help F2-Search F3-Memo F4-Edit F5-Other F10-Exit TAB 134/1024

Fig. 1: Typical fault report page in the index.

#7 Ferguson TX10 Chassis

The complaint was of a "fizzing noise and lines across the screen". In fact the focus unit was arcing. A replacement cured the fizzing but there was still no line sync and the hold control had no effect. Replacing the TDA2576A time-base generator chip IC741 restored normal operation. J.E.

#8 Philips 2A Chassis

Very occasionally this set would shut down and the power supply would whine. A slight tap on the PCB in the line output stage area would bring the fault on. Close examination showed that the tuning capacitor C2609 was dry-jointed. Resoldering this and several suspect joints in the same area cured the fault. J.E.

#9 Ferguson TX98 Chassis

This set was dead with 17V at the input to the TDA8138

↑ PgUp PgDn Home End F10 or ESC to exit 61/158

Fig. 2: Typical display with the proposed Fault Report Disc.

upgraded for £12 – quote the Version 1 disc serial number when sending in the order.

The proposed Volume 43 Fault Report Disc would cost £15. Note that the Television Index and Directory disc Version 2 is required for access.

Hard copy (paper) indexes for Volume 43 are now avail-

able from the same source at £3.50 each.

Make cheques payable to Video Interface Products Limited, not Television, and please don't omit to mention the disc format required, i.e. 5-25 or 3-5in. Prices include VAT and UK postage: add an extra £1 postage for overseas EC orders or £5 for non-EC overseas orders.

<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <tr> <th>ICS</th> <th>25A748</th> <th>0.85</th> <th>25D2340</th> <th>0.45</th> <th>5TK461</th> <th>6.00</th> </tr> <tr> <td>4.188</td> <td>0.20</td> <td>25A777</td> <td>0.35</td> <td>25D325</td> <td>0.35</td> <td>5TK1050</td> <td>7.75</td> </tr> <tr> <td>AD151</td> <td>0.50</td> <td>25A841</td> <td>0.40</td> <td>25D355</td> <td>0.45</td> <td>5TK2029</td> <td>4.75</td> </tr> <tr> <td>AD162</td> <td>0.50</td> <td>25A893</td> <td>0.50</td> <td>25D400</td> <td>0.18</td> <td>5TK3042</td> <td>4.20</td> </tr> <tr> <td>BC108</td> <td>0.07</td> <td>25A1011</td> <td>1.35</td> <td>25D467</td> <td>0.15</td> <td>5TK3042 2</td> <td>4.75</td> </tr> <tr> <td>BC141</td> <td>0.30</td> <td>25A1102</td> <td>1.50</td> <td>25D525</td> <td>0.60</td> <td>5TK4191.5</td> <td>18.50</td> </tr> <tr> <td>BC142</td> <td>0.70</td> <td>25A1123</td> <td>0.49</td> <td>25D600</td> <td>0.40</td> <td>5TK5325</td> <td>4.45</td> </tr> <tr> <td>BC307</td> <td>0.08</td> <td>25A1175</td> <td>0.40</td> <td>25D612</td> <td>0.80</td> <td>5TK5332</td> <td>1.80</td> </tr> <tr> <td>BC337</td> <td>0.07</td> <td>25A1282</td> <td>0.80</td> <td>25D636</td> <td>0.10</td> <td>5TK5333</td> <td>2.40</td> </tr> <tr> <td>BC546</td> <td>0.07</td> <td>25A1307</td> <td>1.50</td> <td>25D716</td> <td>0.95</td> <td>5TK5422</td> <td>4.70</td> </tr> <tr> <td>BD131</td> <td>0.30</td> <td>25B370</td> <td>0.40</td> <td>25D725</td> <td>3.50</td> <td>5TK5476</td> <td>2.00</td> </tr> <tr> <td>BD132</td> <td>0.30</td> <td>25B574</td> <td>0.65</td> <td>25D824</td> <td>0.07</td> <td>5TK7348</td> <td>3.15</td> </tr> <tr> <td>BD243</td> <td>0.38</td> <td>25B541</td> <td>1.90</td> <td>25D856</td> <td>0.55</td> <td>5TK73410</td> <td>4.00</td> </tr> <tr> <td>BD246</td> <td>0.65</td> <td>25B546</td> <td>0.55</td> <td>25D1136</td> <td>0.50</td> <td>5TA401</td> <td>3.50</td> </tr> <tr> <td>BDX33</td> <td>0.50</td> <td>25B618</td> <td>3.05</td> <td>25D1273</td> <td>0.70</td> <td>5TA411</td> <td>3.80</td> </tr> <tr> <td>BDX34</td> <td>0.50</td> <td>25B641</td> <td>0.11</td> <td>25D1275</td> <td>0.58</td> <td>5TA441</td> <td>2.50</td> </tr> <tr> <td>BF197</td> <td>0.20</td> <td>25B649</td> <td>0.38</td> <td>25D1278</td> <td>0.58</td> <td>5TR441</td> <td>4.75</td> </tr> <tr> <td>BF239</td> <td>0.70</td> <td>25D717</td> <td>0.52</td> <td>25D1398</td> <td>1.40</td> <td>5TR451</td> <td>10.95</td> </tr> <tr> <td>BF494</td> <td>0.16</td> <td>25B651</td> <td>1.50</td> <td>25D1426</td> <td>2.05</td> <td>5TR5412</td> <td>4.40</td> </tr> <tr> <td>BF681</td> <td>0.30</td> <td>25B1015</td> <td>0.60</td> <td>25D1441</td> <td>3.50</td> <td>5TR41090</td> <td>5.90</td> </tr> <tr> <td>BFY51</td> <td>0.80</td> <td>25B1016</td> <td>1.10</td> <td>AN31R</td> <td>4.40</td> <td>5TR50103</td> <td>2.65</td> </tr> <tr> <td>BFY90</td> <td>2.00</td> <td>25C372</td> <td>0.70</td> <td>AN5011</td> <td>3.50</td> <td>5TR59041</td> <td>6.40</td> </tr> <tr> <td>BU124</td> <td>1.35</td> <td>25C458</td> <td>0.68</td> <td>AN5512</td> <td>1.35</td> <td>TA7157</td> <td>1.20</td> </tr> <tr> <td>BU180</td> <td>1.90</td> <td>25C681</td> <td>3.20</td> <td>AN5521</td> <td>1.35</td> <td>TA7270</td> <td>2.00</td> </tr> <tr> <td>BU206</td> <td>0.85</td> <td>25C741</td> <td>3.00</td> <td>AN6367</td> <td>3.90</td> <td>TA7280</td> <td>2.75</td> </tr> <tr> <td>BU208</td> <td>0.68</td> <td>25C867</td> <td>3.00</td> <td>AN6373</td> <td>2.75</td> <td>TA7504</td> <td>2.35</td> </tr> <tr> <td>BU208A</td> <td>0.70</td> <td>25C841</td> <td>0.12</td> <td>AN7115</td> <td>1.40</td> <td>TA8205</td> <td>2.90</td> </tr> <tr> <td>BU208A</td> <td>0.90</td> <td>25C998</td> <td>3.05</td> <td>BA31R</td> <td>1.75</td> <td>TA8207</td> <td>1.65</td> </tr> <tr> <td>BU325A</td> <td>1.10</td> <td>25C1008</td> <td>0.70</td> <td>BA658</td> <td>3.60</td> <td>TA8210</td> <td>3.50</td> </tr> <tr> <td>BU407</td> <td>0.65</td> <td>25C1103</td> <td>0.50</td> <td>BA1330</td> <td>1.50</td> <td>TA8214</td> <td>3.40</td> </tr> <tr> <td>BU409</td> <td>1.10</td> <td>25C1123</td> <td>0.45</td> <td>BA5466</td> <td>2.50</td> <td>TA8215</td> <td>3.00</td> </tr> <tr> <td>BU426</td> <td>1.50</td> <td>25C1222</td> <td>0.11</td> <td>BA6219</td> <td>1.20</td> <td>UPC574</td> <td>0.50</td> </tr> <tr> <td>BU508A</td> <td>0.85</td> <td>25C1327</td> <td>0.78</td> <td>HA1156</td> <td>1.35</td> <td>UPC1029</td> <td>2.00</td> </tr> <tr> <td>BU508B</td> <td>1.35</td> <td>25C1382</td> <td>0.30</td> <td>HA1377</td> <td>1.40</td> <td>UPC1032</td> <td>0.50</td> </tr> <tr> <td>BU508D</td> <td>1.10</td> <td>25C1429</td> <td>0.55</td> <td>HA1277</td> <td>1.50</td> <td>UPC1185</td> <td>0.80</td> </tr> <tr> <td>BU536</td> <td>1.05</td> <td>25C1447</td> <td>0.80</td> <td>HA2101</td> <td>1.00</td> <td>UPC1230</td> <td>1.50</td> </tr> <tr> <td>BU626</td> <td>1.45</td> <td>25C1514</td> <td>0.42</td> <td>LA1263</td> <td>1.00</td> <td>UPC1363</td> <td>1.80</td> </tr> <tr> <td>BU508AF</td> <td>1.20</td> <td>25C1559</td> <td>0.55</td> <td>LA1352</td> <td>1.45</td> <td>UPC1378</td> <td>1.90</td> </tr> <tr> <td>BU508DF</td> <td>1.35</td> <td>25C1674</td> <td>0.15</td> <td>LA1450</td> <td>2.05</td> <td>UPC1394</td> <td>1.50</td> </tr> <tr> <td>BU111A</td> <td>0.70</td> <td>25C1767</td> <td>0.36</td> <td>LA1482</td> <td>1.65</td> <td>UPC4556</td> <td>0.50</td> </tr> <tr> <td>BU111AF</td> <td>0.85</td> <td>25C1815</td> <td>0.12</td> <td>LA4290</td> <td>1.30</td> <td></td> <td></td> </tr> <tr> <td>BU112A</td> <td>0.85</td> <td>25C1852</td> <td>0.80</td> <td>LA4449</td> <td>1.18</td> <td></td> <td></td> </tr> <tr> <td>BU112AF</td> <td>1.10</td> <td>25C1914</td> <td>0.15</td> <td>LA4460</td> <td>1.30</td> <td></td> <td></td> </tr> <tr> <td>BU156A</td> <td>0.80</td> <td>25C1983</td> <td>0.90</td> <td>LA4700</td> <td>4.40</td> <td></td> <td></td> </tr> <tr> <td>TP30C</td> <td>0.25</td> <td>25C2002</td> <td>0.22</td> <td>LA6324</td> <td>1.90</td> <td></td> <td></td> </tr> <tr> <td>TP31A</td> <td>0.25</td> <td>25C2027</td> <td>2.20</td> <td>LM318</td> <td>1.15</td> <td></td> <td></td> </tr> <tr> <td>TP32B</td> <td>0.30</td> <td>25C2076</td> <td>1.10</td> <td>LM723</td> <td>0.45</td> <td></td> <td></td> </tr> <tr> <td>TP41A</td> <td>0.30</td> <td>25C2236</td> <td>0.25</td> <td>LM818</td> <td>2.25</td> <td></td> <td></td> </tr> <tr> <td>TP47</td> <td>0.45</td> <td>25C2278</td> <td>1.00</td> <td>LM8402</td> <td>5.25</td> <td></td> <td></td> </tr> <tr> <td>TP110</td> <td>0.85</td> <td>25C2347</td> <td>0.18</td> <td>MS1439</td> <td>1.40</td> <td></td> <td></td> </tr> <tr> <td>TP112</td> <td>0.85</td> <td>25C2500</td> <td>0.28</td> <td>MS220L</td> <td>1.75</td> <td></td> <td></td> </tr> <tr> <td>TP142</td> <td>0.90</td> <td>25C2575</td> <td>1.25</td> <td>MS1172</td> <td>2.60</td> <td></td> <td></td> </tr> <tr> <td>TP1791</td> <td>1.30</td> <td>25C2603</td> <td>0.12</td> <td>MS8484</td> <td>4.50</td> <td></td> <td></td> </tr> <tr> <td>TP1955</td> <td>0.50</td> <td>25C2668</td> <td>0.10</td> <td>MB3731</td> <td>2.80</td> <td></td> <td></td> </tr> <tr> <td>MIE340</td> <td>0.25</td> <td>25C2688</td> <td>0.30</td> <td>MB3742</td> <td>2.45</td> <td></td> <td></td> </tr> <tr> <td>MIE521</td> <td>0.35</td> <td>25C2838</td> <td>3.00</td> <td>MB3756</td> <td>2.20</td> <td></td> <td></td> </tr> <tr> <td>2N2222</td> <td>0.20</td> <td>25C2979</td> <td>2.00</td> <td>MC1327</td> <td>0.65</td> <td></td> <td></td> </tr> <tr> <td>2N2035</td> <td>1.10</td> <td>25C3182</td> <td>1.50</td> <td>MC1426</td> <td>2.30</td> <td></td> <td></td> </tr> <tr> <td>2N3773</td> <td>1.50</td> <td>25C3262</td> <td>3.50</td> <td>MC14493</td> <td>6.50</td> <td></td> <td></td> </tr> <tr> <td>2N6130</td> <td>0.40</td> <td>25C3345</td> <td>1.00</td> <td>SA1293A</td> <td>4.85</td> <td></td> <td></td> </tr> <tr> <td>2N4350</td> <td>0.60</td> <td>25C3506</td> <td>3.40</td> <td>SA1293-2</td> <td>5.15</td> <td></td> <td></td> </tr> <tr> <td>2SA606</td> <td>2.85</td> <td>25C3883</td> <td>2.80</td> <td>SA1293-3</td> <td>5.15</td> <td></td> <td></td> </tr> <tr> <td>2SA679</td> <td>1.95</td> <td>25C4242</td> <td>1.40</td> <td>SA45010</td> <td>4.95</td> <td></td> <td></td> </tr> <tr> <td>2SA722</td> <td>0.62</td> <td>25D198</td> <td>1.60</td> <td>SA45243PE</td> <td>7.15</td> <td></td> <td></td> </tr> </table>	ICS	25A748	0.85	25D2340	0.45	5TK461	6.00	4.188	0.20	25A777	0.35	25D325	0.35	5TK1050	7.75	AD151	0.50	25A841	0.40	25D355	0.45	5TK2029	4.75	AD162	0.50	25A893	0.50	25D400	0.18	5TK3042	4.20	BC108	0.07	25A1011	1.35	25D467	0.15	5TK3042 2	4.75	BC141	0.30	25A1102	1.50	25D525	0.60	5TK4191.5	18.50	BC142	0.70	25A1123	0.49	25D600	0.40	5TK5325	4.45	BC307	0.08	25A1175	0.40	25D612	0.80	5TK5332	1.80	BC337	0.07	25A1282	0.80	25D636	0.10	5TK5333	2.40	BC546	0.07	25A1307	1.50	25D716	0.95	5TK5422	4.70	BD131	0.30	25B370	0.40	25D725	3.50	5TK5476	2.00	BD132	0.30	25B574	0.65	25D824	0.07	5TK7348	3.15	BD243	0.38	25B541	1.90	25D856	0.55	5TK73410	4.00	BD246	0.65	25B546	0.55	25D1136	0.50	5TA401	3.50	BDX33	0.50	25B618	3.05	25D1273	0.70	5TA411	3.80	BDX34	0.50	25B641	0.11	25D1275	0.58	5TA441	2.50	BF197	0.20	25B649	0.38	25D1278	0.58	5TR441	4.75	BF239	0.70	25D717	0.52	25D1398	1.40	5TR451	10.95	BF494	0.16	25B651	1.50	25D1426	2.05	5TR5412	4.40	BF681	0.30	25B1015	0.60	25D1441	3.50	5TR41090	5.90	BFY51	0.80	25B1016	1.10	AN31R	4.40	5TR50103	2.65	BFY90	2.00	25C372	0.70	AN5011	3.50	5TR59041	6.40	BU124	1.35	25C458	0.68	AN5512	1.35	TA7157	1.20	BU180	1.90	25C681	3.20	AN5521	1.35	TA7270	2.00	BU206	0.85	25C741	3.00	AN6367	3.90	TA7280	2.75	BU208	0.68	25C867	3.00	AN6373	2.75	TA7504	2.35	BU208A	0.70	25C841	0.12	AN7115	1.40	TA8205	2.90	BU208A	0.90	25C998	3.05	BA31R	1.75	TA8207	1.65	BU325A	1.10	25C1008	0.70	BA658	3.60	TA8210	3.50	BU407	0.65	25C1103	0.50	BA1330	1.50	TA8214	3.40	BU409	1.10	25C1123	0.45	BA5466	2.50	TA8215	3.00	BU426	1.50	25C1222	0.11	BA6219	1.20	UPC574	0.50	BU508A	0.85	25C1327	0.78	HA1156	1.35	UPC1029	2.00	BU508B	1.35	25C1382	0.30	HA1377	1.40	UPC1032	0.50	BU508D	1.10	25C1429	0.55	HA1277	1.50	UPC1185	0.80	BU536	1.05	25C1447	0.80	HA2101	1.00	UPC1230	1.50	BU626	1.45	25C1514	0.42	LA1263	1.00	UPC1363	1.80	BU508AF	1.20	25C1559	0.55	LA1352	1.45	UPC1378	1.90	BU508DF	1.35	25C1674	0.15	LA1450	2.05	UPC1394	1.50	BU111A	0.70	25C1767	0.36	LA1482	1.65	UPC4556	0.50	BU111AF	0.85	25C1815	0.12	LA4290	1.30			BU112A	0.85	25C1852	0.80	LA4449	1.18			BU112AF	1.10	25C1914	0.15	LA4460	1.30			BU156A	0.80	25C1983	0.90	LA4700	4.40			TP30C	0.25	25C2002	0.22	LA6324	1.90			TP31A	0.25	25C2027	2.20	LM318	1.15			TP32B	0.30	25C2076	1.10	LM723	0.45			TP41A	0.30	25C2236	0.25	LM818	2.25			TP47	0.45	25C2278	1.00	LM8402	5.25			TP110	0.85	25C2347	0.18	MS1439	1.40			TP112	0.85	25C2500	0.28	MS220L	1.75			TP142	0.90	25C2575	1.25	MS1172	2.60			TP1791	1.30	25C2603	0.12	MS8484	4.50			TP1955	0.50	25C2668	0.10	MB3731	2.80			MIE340	0.25	25C2688	0.30	MB3742	2.45			MIE521	0.35	25C2838	3.00	MB3756	2.20			2N2222	0.20	25C2979	2.00	MC1327	0.65			2N2035	1.10	25C3182	1.50	MC1426	2.30			2N3773	1.50	25C3262	3.50	MC14493	6.50			2N6130	0.40	25C3345	1.00	SA1293A	4.85			2N4350	0.60	25C3506	3.40	SA1293-2	5.15			2SA606	2.85	25C3883	2.80	SA1293-3	5.15			2SA679	1.95	25C4242	1.40	SA45010	4.95			2SA722	0.62	25D198	1.60	SA45243PE	7.15			<h2 style="text-align: center;">HOT – HOT OFFERS</h2> <h3 style="text-align: center;">Ends 15/3/94</h3> <p style="text-align: center;">Subject to stock availability</p> <p style="text-align: center;">(First come first served basis. Limited stock)</p> <p style="text-align: center;">Amstrad Mod Kit, only £2.99 each</p> <p style="text-align: center;">Hitachi VTII Pinch Roller 3 P/c only at £6.00 piece</p> <p style="text-align: center;">Panasonic Line Output Transformer</p> <p style="text-align: center;">Pt No. TLF14521F/TLF14567F, only at £24.00</p> <p style="text-align: center;">TDA 2600 5 P/c only £6.25</p> <p style="text-align: center;">BU 508A Phillips 10 P/c only at £7.00</p> <p style="text-align: center;">Phillips 1.2 Volt Back-up Battery, 3 P/c only at £3.00</p>	<p style="text-align: center;">NEW – NEW – NEW</p> <p style="text-align: center;">How long time is money, if your workshop is computerised then ask for FREE evaluation disc with your next order on:</p> <p style="text-align: center;">“WORKSHOP MANAGER PLUS”</p> <p style="text-align: center;">Only available from us. Ask for 1994 full catalogue</p>
ICS	25A748	0.85	25D2340	0.45	5TK461	6.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
4.188	0.20	25A777	0.35	25D325	0.35	5TK1050	7.75																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
AD151	0.50	25A841	0.40	25D355	0.45	5TK2029	4.75																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
AD162	0.50	25A893	0.50	25D400	0.18	5TK3042	4.20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BC108	0.07	25A1011	1.35	25D467	0.15	5TK3042 2	4.75																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BC141	0.30	25A1102	1.50	25D525	0.60	5TK4191.5	18.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BC142	0.70	25A1123	0.49	25D600	0.40	5TK5325	4.45																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BC307	0.08	25A1175	0.40	25D612	0.80	5TK5332	1.80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BC337	0.07	25A1282	0.80	25D636	0.10	5TK5333	2.40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BC546	0.07	25A1307	1.50	25D716	0.95	5TK5422	4.70																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BD131	0.30	25B370	0.40	25D725	3.50	5TK5476	2.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BD132	0.30	25B574	0.65	25D824	0.07	5TK7348	3.15																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BD243	0.38	25B541	1.90	25D856	0.55	5TK73410	4.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BD246	0.65	25B546	0.55	25D1136	0.50	5TA401	3.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BDX33	0.50	25B618	3.05	25D1273	0.70	5TA411	3.80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BDX34	0.50	25B641	0.11	25D1275	0.58	5TA441	2.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BF197	0.20	25B649	0.38	25D1278	0.58	5TR441	4.75																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BF239	0.70	25D717	0.52	25D1398	1.40	5TR451	10.95																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BF494	0.16	25B651	1.50	25D1426	2.05	5TR5412	4.40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BF681	0.30	25B1015	0.60	25D1441	3.50	5TR41090	5.90																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BFY51	0.80	25B1016	1.10	AN31R	4.40	5TR50103	2.65																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BFY90	2.00	25C372	0.70	AN5011	3.50	5TR59041	6.40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU124	1.35	25C458	0.68	AN5512	1.35	TA7157	1.20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU180	1.90	25C681	3.20	AN5521	1.35	TA7270	2.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU206	0.85	25C741	3.00	AN6367	3.90	TA7280	2.75																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU208	0.68	25C867	3.00	AN6373	2.75	TA7504	2.35																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU208A	0.70	25C841	0.12	AN7115	1.40	TA8205	2.90																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU208A	0.90	25C998	3.05	BA31R	1.75	TA8207	1.65																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU325A	1.10	25C1008	0.70	BA658	3.60	TA8210	3.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU407	0.65	25C1103	0.50	BA1330	1.50	TA8214	3.40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU409	1.10	25C1123	0.45	BA5466	2.50	TA8215	3.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU426	1.50	25C1222	0.11	BA6219	1.20	UPC574	0.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU508A	0.85	25C1327	0.78	HA1156	1.35	UPC1029	2.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU508B	1.35	25C1382	0.30	HA1377	1.40	UPC1032	0.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU508D	1.10	25C1429	0.55	HA1277	1.50	UPC1185	0.80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU536	1.05	25C1447	0.80	HA2101	1.00	UPC1230	1.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU626	1.45	25C1514	0.42	LA1263	1.00	UPC1363	1.80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU508AF	1.20	25C1559	0.55	LA1352	1.45	UPC1378	1.90																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU508DF	1.35	25C1674	0.15	LA1450	2.05	UPC1394	1.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU111A	0.70	25C1767	0.36	LA1482	1.65	UPC4556	0.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
BU111AF	0.85	25C1815	0.12	LA4290	1.30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
BU112A	0.85	25C1852	0.80	LA4449	1.18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
BU112AF	1.10	25C1914	0.15	LA4460	1.30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
BU156A	0.80	25C1983	0.90	LA4700	4.40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP30C	0.25	25C2002	0.22	LA6324	1.90																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP31A	0.25	25C2027	2.20	LM318	1.15																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP32B	0.30	25C2076	1.10	LM723	0.45																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP41A	0.30	25C2236	0.25	LM818	2.25																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP47	0.45	25C2278	1.00	LM8402	5.25																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP110	0.85	25C2347	0.18	MS1439	1.40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP112	0.85	25C2500	0.28	MS220L	1.75																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP142	0.90	25C2575	1.25	MS1172	2.60																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP1791	1.30	25C2603	0.12	MS8484	4.50																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
TP1955	0.50	25C2668	0.10	MB3731	2.80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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2N2222	0.20	25C2979	2.00	MC1327	0.65																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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VCR Clinic

*Reports from Philip Blundell, AMIEE
Chris Watton, Nick Beer, Brian Storm,
John C. Priest, John Hepworth, F. A. Sumar,
Ed Rowland and John Coombes*

Hitachi VTM620E

If the cassette lift doesn't work check that the capstan motor is free to rotate easily – in this model the capstan motor operates the lift. A stiff motor can be cured by dismantling it and cleaning the capstan spindle bearing. **P.B.**

Grundig 2 X 4 Super

This old-timer had a servo fault – there were tracking bars in play and still frame. Module swapping proved that the cause of the fault was on the DTF board. Comparison checks with a working board then soon showed that the signal at pin 1 of IC2630 was missing. A new MC14066 chip in position IC2605 brought the signal back; the still-frame picture was now o.k. but there were still tracking bars in the play mode. There was a lot of ripple on the waveform at pin 7 of IC2710 because the sampling gate in IC2708 was leaky. It's another MC14066 – good job I had two of them on the shelf! **P.B.**

Panasonic NVG500

If the power supply is dead replace the 10 μ F electrolytic capacitor C15. **P.B.**

Ferguson FV67HV

Suspect a faulty loading motor if cassette loading/unloading is slow. Good motors usually have a current consumption of about 30mA with a 6V test supply and the belt removed: I've had faulty motors that take 2A! **P.B.**

General VGX520/Panasonic NV430

There was a slight hum bar in the E-E mode and a stronger hum bar with colour reversal in it in the playback mode. Electrolytics C1002 (4.7 μ F, 40V) and C1003 (47 μ F, 40V) in the power supply section were the cause. As the panel is difficult to get at, replace both capacitors – either can cause this fault, and it would be annoying to have to take the panel out again. **C.W.**

Toshiba V211

Playback of a test tape produced a good picture but there was a cyclic wow, about every four seconds, when the tape speed varied. This was a simple one: cleaning the control head cured the fault, but why was there no picture disturbance when control was lost? **C.W.**

Ferguson 3V55

The problem was that this machine would stop in play. Watching the tape counter in the fast-wind mode led me to the reel sensor – the counter worked in fits and starts instead of providing a steady count. As cleaning the underside of the reel disc and the faces of the opto device made no difference, a new sensor was fitted. But the fault was still present. A scope check on the sensor's output showed that it was intermittent: so a new reel disc was tried. The results were no better. The cause of the trouble was actually down to me: when I first removed the reel disc to clean it one of the height setting

washers had been lost. Thus when the disc was refitted it was too close to the sensor. Matters were put right when a new washer was fitted beneath the reel disc. So the cause of all the trouble had been a dirty reel disc, but carelessness had resulted in lost time. I should be shot at dawn! **C.W.**

Panasonic NVG21B/25B

The following power supply fault is becoming quite common in these machines. Symptoms vary, but there are usually striations and interference on the E-E and playback vision, and the drum servo can be disturbed. The cause is excessive ripple on the unregulated 8V input to the multi-regulator chip, caused by C1023 (1,000 μ F, 10V, 105°C) going low in value or open-circuit. Check the 6V supply which will usually be on the low side. Note that the physical size of this capacitor is critical, being a high-temperature type. **N.B.**

Panasonic NVF55

In the E-E mode this machine produced a blank, grey raster, with no VU meter display on the display tube. The M66006FP chip IC1701 enables the VU display and switches the AV1 and AV2 circuits: fitting a replacement cured the fault. **B.S.**

Panasonic NVSD40

This machine would accept a tape then keep it: lapsing into sullen silence, it would power down then after a few minutes the power supply would cut out. The machine was brought back to life when I connected a battery to the loading motor to extract the tape. Checks in the loading motor drive circuit showed that the BA6219B chip IC6501 was badly overheating – presumably it was making the power supply cut out. Fitting a replacement cured the fault. **B.S.**

Mitsubishi HSB12 etc

The following problem can occur with most Mitsubishi VCRs in the HSB11/21/31 and HSB12/27/32 series and later. The symptoms are that the machine will accept a tape and lace up but won't play, won't wind properly, damages tapes and the tape counter doesn't work.

Insert a cassette and watch the action of the guides during lace-up. Then eject the tape and observe the at-rest position of arm TU-G (C-033) which is sometimes referred to as the half-load arm. You'll see that it has been prevented from going all the way back by arm TENS-REG-T (C-031) which has moved too far to its left. It should not move behind arm TU-G but should stay to the right of it. The consequence of this is that when a cassette is loaded arm TU-G is outside the cassette and as a result can't carry a loop of tape towards the capstan and pinch roller during lace-up. Thus when play is selected the tape doesn't move and during wind the counter cannot operate as the tape isn't held against the audio/control head.

As with most machines which incorporate a real-time counter, indexing and jog/shuttle/reverse play functions

there are several guides and tension arms that are not found in more basic models. In this design arm TU-G has to carry the tape through the gap between the capstan and the pinch roller during the lace-up so that it passes across the face of the audio/control head during both forward and reverse play. Arm TENS-REG-T operates as a reverse back-tension arm during reverse play and search. It also has, at its pivot end, a small brake arm that bears on the take-up reel turntable. If this brake's friction pad becomes dislodged, arm TENS-REG-T can move an extra five degrees or so to the left. This in turn means that when arm TU-G moves back during the unlacing process it's obstructed by arm TENS-REG-T and comes to rest outside the front edge of the cassette, producing the symptoms mentioned above when the next cassette is inserted.

If the missing brake pad is still inside the machine it can be refitted using a touch of Evostick. Otherwise, replace the complete arm assembly, part no. 591B551010. Note that there are two tension springs at the pivot end of the arm – omit one of them at your peril! **J.C.P.**

Toshiba V309

The complaint was that this machine would neither eject or play a tape – there was one in it. It would try to rewind. The timing of the loading gear was a mile out. After setting it up the machine worked correctly. A week later it came back with the same fault however. This happened again after a further week. A new loading motor assembly finally cured the problem. **J.H.**

Toshiba V93

I've had a few of these machines that would play but had no clock display. This means that the tuning doesn't work either. The cause of the fault is the d.c.-d.c. converter unit, which develops an internal short. As a result its circuit protector goes open-circuit. **J.H.**

Baird 8940/JVC HR7350

There was no rewind or fast forward operation. Checks showed that CP2 on the mechacon panel was open-circuit. So I changed IC12 (10VT05) for good measure. After this the machine functioned perfectly. This is my favourite VCR. **J.H.**

Hinari VXL5

This problem will probably be experienced with any VCR that uses the same deck, for example the Amstrad VCR4600. The machine worked perfectly with some tapes, but with others the recorded sound was very low. After much searching, soldering and component checking I soldered all the connections on the audio/control head. This provided a complete cure. **J.H.**

Hitachi VT9500

Apart from clock operation there were no functions. After checking the supplies on the rectifier PCB and finding that they were as given in the manual we next checked the voltage at the syscon chip's supply pin 21. The reading here was 0V instead of 10V. This supply is obtained from the 12V regulator chip IC903, the feed being via two 1SS133 diodes, D904 and D905. When they were checked we found that D904 was open-circuit while D905 was leaky. After fitting new diodes the machine worked normally. **F.A.S.**

Matsui VX735/Saisho VR3300

When the machine had been working for about two hours the capstan would start to stop for about a second at regular intervals. Application of freezer to the control chip on the capstan motor subpanel would restore normal operation for a short period, implying that the i.c. was faulty. Unfortunately it's not available as a separate item, so a complete motor assembly is required. **E.R.**

Philips VR6520/Panasonic NV370

This machine was dead with no display; the function LED lit continuously though dimly. The cause of the fault was absence of the 5V supply because R1001 (0.39Ω) had gone open-circuit for no apparent reason. It's shown as R1 on the PCB, which is a bit confusing if you are not familiar with this model. Sometimes failure of the 3.9V zener diode D1002 can be the cause of R1001's demise. On this occasion however simple resistor replacement restored normal operation. **E.R.**

Akai VS5

There was no colour in either the playback or the record mode. As the machine was getting on it years repair might not have been economic if we'd had to spend time on fault finding. We'd come across the fault in the past however and as we note such things in the relevant manual we were able to restore the colour by going straight to C60 (0.01μF) and replacing it. The capacitor had become leaky. **E.R.**

Sharp VC583H

The fault, which was very intermittent at first, was no playback/record/E-E picture. Its cause was traced to dry-joints at plug/socket CC on the video/chroma PCB. Resoldering restored normal operation. **J.C.**

JVC HRD750EK

Poor recorded sound can be a problem with this model. It's usually accompanied by a slight crackle. In one case recently the cause turned out to be a worn audio/control head, but in some cases the tape path guides are incorrectly set. The result is a low f.m. and/or audio waveform. **J.C.**

JVC HRD225/Ferguson 3V36

If the machine won't accept a tape, check whether the supply spool rotates for a short time. If it does, check the l.t. supply to IC204. Should this be missing circuit protector CP1 (F15) is probably open-circuit. If it doesn't, check the voltage at pin 37 of IC201: this should be in the low state without a tape in the cassette housing. If it isn't low, check the up/down detector switches by replacement. **J.C.**

Hitachi VT410

We found that slow rewind and fast forward with one of these machines was being caused by a power supply fault: the 12V output from IC851 (STK5372) was low. **J.C.**

Sharp VC583H

Incorrect or no functions can be caused by a faulty mode switch. But check whether it might be misaligned because of a jammed tape, causing cog jumping. **J.C.**

Long-distance Television

Roger Bunney

1993 was not a good year for DX-TV reception: there were few instances of double-hop Sporadic E signals, no worthwhile F2 reception occurred while tropospheric activity was minimal. December was no exception, with little to report apart from an SpE opening on the 21st when strong TVE (Spanish) ch. E2 and E3 and ARD (German) ch. E2 signals were received in the late afternoon and evening. A mid-winter SpE opening often occurs: this must have been it! The Geminids meteor shower produced numerous signal bursts in Band I in the middle of the month – Simon Hamer observed bright meteorites zipping across the sky on the 13th, the peak day.

With the current decline in sunspot activity as we approach the minimum point in the cycle it's likely that SpE activity will increase. The next season is now three months away: keep a close look out during mid-late April as an early opening is often a sign of a good main season to come. But those equipped with even the simplest dish system can turn to a menu of test cards and news feeds on any day of the year! The next section is for the growing band of sat-zappers. . .

Satellite Sightings

The intention of this new section is not to provide an extensive log of all the things seen but a quick review of the unusual and interesting sightings over the last few weeks. These can range from a special football OB, live news from a world hotspot to a new channel opening or perhaps the location-studio horse-racing circuit from Salisbury course. We would welcome relevant news and photographs from readers: please include details of the receiving set-up since this can enable other enthusiasts to assess and compare results. Quite good results can be achieved using the simplest type of receiver and a smallish dish. I still use two manually-tuned receivers as my main set-up and find that weak signal reception with my elderly Echosphere SR1000 is better than with a standard Monterey 20.

The festive season is reflected in news feed contents, and greetings cards are often presented by the news-feed originators. The staff at the main Dutch switching centre went over the top this year with a series of four computer-generated greetings captions that successively wiped down the screen.

Political unrest is always present of course. On the afternoon of the 30th there were parallel news feeds from JTV Amman and the Capital Studios, Jerusalem via Eutelsat II F3 at 7°E concerning a West Bank bomb blast. The usual news shots were carried – smoke, shattered property, bodies etc. Unlike many of their overseas equivalents, UK broadcasters are very careful about what they show and tend to edit out anything considered to be unsuitable. Satellite zappers who view news broadcasts from other European sources will find that the most grisly pictures are often shown.

Perhaps my own favourite sighting over Christmas was of the Church service in the Lebanon linked back to Ireland on the 25th via Eutelsat II F1 at 13°E (at 11.67GHz horizontal). The service with the Irish UN contingent was held in a tent, Armstrong Satellite providing the link facilities with help from RTE and a Beirut OB unit.

Both John Locker (Wirral) and Andrew Sykes (W. Yorkshire) report a hot DX sighting, eastbound NBC feeds at 10.968GHz vertical, now confirmed as via Intelsat 506 at 50°W. The signal level compares with EBU Sarajevo via Intelsat 603 at 34.5°W, i.e. not too strong!

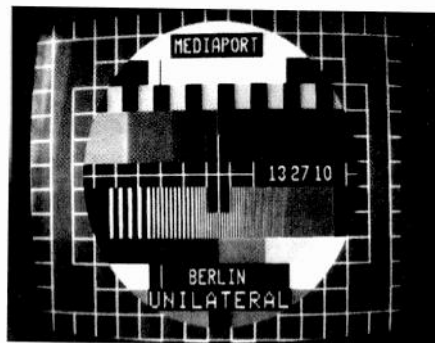
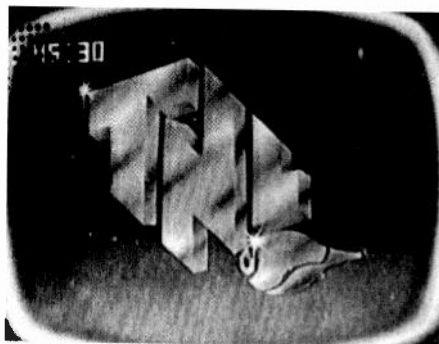
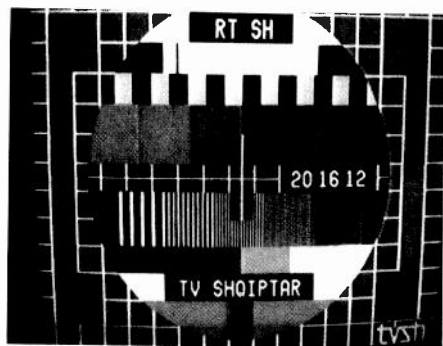
Berry Habekotte's dish is mounted atop the 12m high block of flats in which he lives in Holland. After very high winds during mid-December Berry found that there were no Astra signals. On reaching the roof to investigate, his worst fears were not confirmed: all that had happened was that the dish assembly had turned slightly. Resetting restored the signals.

Keith Marriott (Notts) is using one of the recently released (to clear at £100 each) Discus Elipse receivers with a 1.6m dish and an Echosphere triple-band LNB. The accompanying photo received from him shows Reuters Moscow via Intelsat K at 21.5°W, a typical news feed source – one of many that can be seen during the day and evenings from across the Clarke Belt.

Well that's the sort of thing we intend to feature in this section: much relies on you to keep us posted on what you find is happening up there in the sky. All comments are welcome.

News Items

Germany: According to the BDXC there are rumours that the ARD-I network may close at the end of 1995 because of



Left: The PM5534 test pattern as used by RTSH (Albania). Photograph from John Locker. Centre: The Telshan Network (Sri Lanka) identification logo (TNL), used on chs. E3, E4 and E21. Photograph from Bandula Gunasekera. Right: Another variation on the PM5534 theme. This satellite news feed, from Moscow via Intelsat K at 21.5°W, was photographed by Keith Marriott.

its poor financial performance now that there is growing competition from stations such as RTL.

Poland: The main Warsaw transmitter at the Palace of Culture has been overhauled after being in operation for some 38 years. The National Broadcasting Council has awarded the franchise to run the first nation-wide commercial network to a consortium called Polsat.

Kenya: The radio and TV network is being expanded with grant aid from Japan. New TV stations are to be built at Kisii, Webuye and Nakuru, with a new studio complex at Ngong. When the expansion is complete TV coverage will extend to 60 per cent of the population, radio coverage to 95 per cent.

Lithuania: 177kW e.r.p. transmitters at Vilnius transmit Ostankino on ch. R2 and Lietuvos Televizja on ch. R4.

UK: To avoid loss of sound signal synchronisation when the vision signal is passed through video processing equipment with frame stores etc. the BBC is testing auto-audio-sync in its network distribution system. The technique used is to insert a data signal during the video blanking period so that the delay at the end of the video processing chain can be determined: an appropriate audio delay is then introduced.

Satellite News

Orbit Communications, a programme company based in Rome, is to provide several encrypted direct-to-home channels for broadcasts to the Middle East, using digital compression to the MPEG standard. Transmissions from a dedicated satellite should begin later this year, and up to twenty channels may be available within three years. The company is backed by Saudi commercial interests and the Royal Family. Al-Mustaqbal TV, which is beamed across the Arab world from Arabsat 1D at 20°E (at 3.796GHz), is now on air. London-based MBC plans to expand its services to the same region, using digital compression with encryption – MBC-1 will remain in the clear, with MBC-2/3/4 scrambled. Arabic Radio and TV, another Rome-based service, is to start transmissions shortly via Arabsat 1D using, unusually, encrypted D2-MAC.

Failure of the Ariane V63 rocket led to loss of the Eutelsat II F5 and Turksat 1A satellites.

Eutelsat I F1, now at 48°E, is giving more DX potential from central Asia.

A new Indian channel, Jain Sat Television, is being transmitted at 3.875GHz via the Russian Gorizont satellite at 103°E.

Changes are being implemented by Intelsat: instead of the slot at 63°E there are to be two slots at 62 and 64°E: 512 will move to 21.5°W when the new 702 satellite is positioned at 1°W, with 502 moving to 40.5°W.

Maxat is constructing a third teleport at the BBC's Brookmans Park site, with up to eleven dishes. The site was chosen after a DTI ruling that prevents any more uplinking within the M25 area to minimise interference to cross-city terrestrial microwave services.

Updated satellite information can be obtained from Design Technology Ltd. using its Datastream Information Networking system in conjunction with a PC/modem installation. The 24-hour service has daily EMail and on-line news updating. Access in the UK is on 0891 516 526 at 48p per minute standard or 36p per minute cheap rate.

TV-DXing for Beginners – 4

This final part provides clarification on a few points. We'll consider first ways of mounting aerials.

NEW PRODUCTS




Kansai TVR51K 21" Multi-system Colour TV

Aerial Techniques brings you two new products to complement our already extensive range.

- "Personal Preference" memory function – (Volume, Colour, Brightness, Contrast and Hue)
- 5-System PAL: B/G, PAL-D/K, PAL-1, SECAM B/G, SECAM D/K and NTSC 3.58/4.43
- Infrared Remote Control
- 90 Preset Channels
- Automatic Tuning
- On Screen Display – Volume, Colour, Brightness, Contrast, Hue and Channel
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Alloy scaffolding can be used to build a garden mast. Bang a twin putlock section several feet into the ground, with perhaps 3-4ft projecting above. Bolt a 20-30ft scaffold pole to the lowest point of the putlock, using a hinge/swivel scaffold clamp, then raise the pole with aerials, bolting the mast securely to the upper putlock when vertical. This is an easy and cheap approach to a garden-mounted system. Guying is advised where the mast is 30ft or more high.

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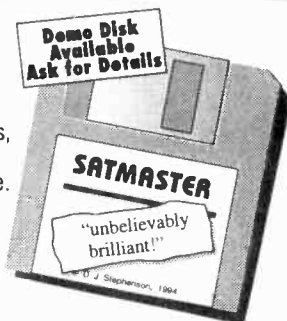
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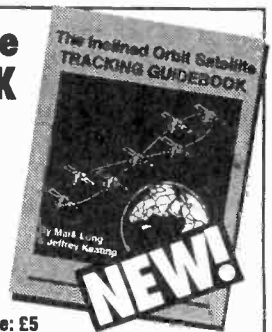
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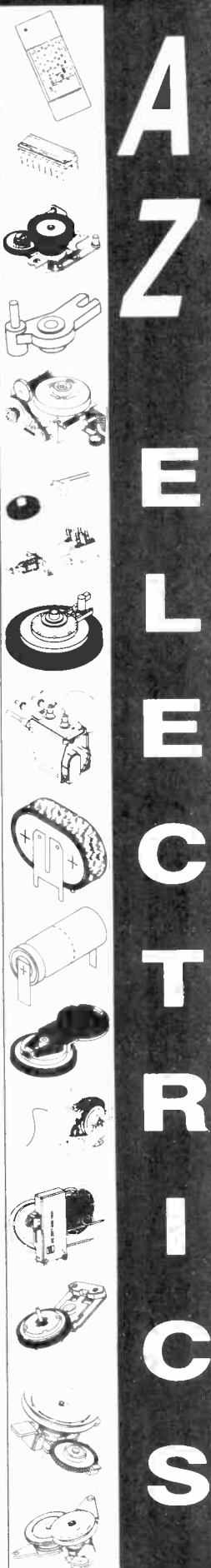
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AN253P	BA4416	£2.40	18225	£0.80	MS1515L	£3.00	SA6040L	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47O	£0.20
AN253P	BA4417	£2.40	18225	£0.80	MS1515L	£3.00	SA6040M	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47P	£0.20
AN253P	BA4418	£2.40	18225	£0.80	MS1515L	£3.00	SA6040N	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47Q	£0.20
AN253P	BA4419	£2.40	18225	£0.80	MS1515L	£3.00	SA6040O	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47R	£0.20
AN253P	BA4420	£2.40	18225	£0.80	MS1515L	£3.00	SA6040P	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47S	£0.20
AN253P	BA4421	£2.40	18225	£0.80	MS1515L	£3.00	SA6040Q	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47T	£0.20
AN253P	BA4422	£2.40	18225	£0.80	MS1515L	£3.00	SA6040R	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47U	£0.20
AN253P	BA4423	£2.40	18225	£0.80	MS1515L	£3.00	SA6040S	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47V	£0.20
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AN253P	BA4425	£2.40	18225	£0.80	MS1515L	£3.00	SA6040U	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47X	£0.20
AN253P	BA4426	£2.40	18225	£0.80	MS1515L	£3.00	SA6040V	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47Y	£0.20
AN253P	BA4427	£2.40	18225	£0.80	MS1515L	£3.00	SA6040W	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47Z	£0.20
AN253P	BA4428	£2.40	18225	£0.80	MS1515L	£3.00	SA6040X	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47AA	£0.20
AN253P	BA4429	£2.40	18225	£0.80	MS1515L	£3.00	SA6040Y	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47AB	£0.20
AN253P	BA4430	£2.40	18225	£0.80	MS1515L	£3.00	SA6040Z	£3.50	SN7672	£5.00	TA7650	£3.00	TA2030H	£2.00	TEA2101P	£5.00	TSC2622	£2.00	BC2150	£0.07	TP47AC	£0.20



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PHONE
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the UK a booklet that describes aerial systems for DX-TV reception.

R.F. interference is a problem you'll almost certainly encounter. Many devices such as kids' walkie-talkies, automatic garage door systems, baby alarms, pagers, remote door bells (some with intercoms), cordless phones etc. operate at frequencies around 49MHz, making it impossible to receive ch. R1 video (at 49.75MHz). The wide i.f. band-pass characteristic of most TV receivers may also cause problems with adjacent channels such as E2 (48.25MHz video). Use of a notch filter tuned to 49MHz should clear ch. E2 but will lose most of the ch. R1 video. Some imported 49MHz devices operate outside the allocated frequency, at powers far in excess of the permitted maximum, using mains wiring as an aerial. The authorities seem to pay little attention to this. The 50MHz amateur radio band has caused few problems for TV-DXers: unless you live next to G8XXX this potential source of interference can be disregarded. Interference from ignition, thermostats, hospital equipment etc. can usually be sorted out easily once the source has been located.

The main problems in Band III come from the newly-established PMR (mobile communications and networking) systems. Again, notch filtering can help.

With the use of f.m., harmonic radiation in Bands I and III from CB operators is rare. Unfortunately the occasional CB operator uses an illegal a.m. (US) rig which can produce severe harmonic problems, particularly when used with a 'burner' (a linear amplifier to boost the output power). The DTI is always interested in learning about illegal operators, particularly if their locations can be disclosed. Bandpass

filtering inserted at the aerial input (before any amplification) will usually reduce or eliminate interference from out-of-broadcast sources such as taxi services etc.

There are usually few interference problems in the u.h.f. bands, especially since the removal of ch. E35 airport radar systems to higher frequencies. To my knowledge cellphone systems have caused no problems with u.h.f. TV reception, though I have heard of i.f. breakthrough with a domestic satellite system via the download.

What does cause problems is the use of a wideband, high-gain head amplifier that raises signal levels both within and outside the TV broadcast bands. Such an amplifier will lift police (450MHz), amateur TV (435MHz) and the signals from TV transmitters to levels that cause tuner overloading. The result is cross-modulation and a general mess that cannot be sorted out. Most modern TV tuners use bipolar transistors, have a wideband input and a limited dynamic range. They are thus unable to deal with excessively high inputs. The answer is to use a low-gain, low-noise head amplifier and high-quality, low-loss u.h.f. cable. This combination will lift weak signals sufficiently to overcome cable losses while maintaining an optimum signal-to-noise performance.

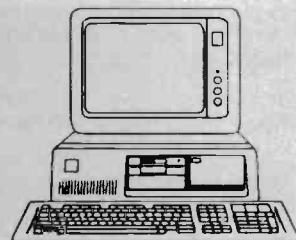
As a final word of advice, I advocate the use of separate aerial cable runs for each band. The idea of the outputs from all the aerials being diplexed and fed via a single wideband amplifier and cable is attractive but will almost certainly result in problems.

If readers have queries about DX-TV reception, interference etc., I'll try to sort them out if they write in with a stamped, addressed envelope.

TELEVISION INDEX & DIRECTORY

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

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Reprints of articles from *TELEVISION* back to 1986 are also available: ordering information is provided with the index, or can be obtained from the address below. Hard copy indexes of *TELEVISION* are available for volumes 38 to 43 at £3.50 each.

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Auto Grey-scale Faults

Steve Beeching, T.Eng.

A problem with a Grundig television receiver led me to think about the practical aspects of dealing with faults that arise with automatic grey-scale correction circuits. For good grey-scale rendition the three guns in a colour tube should all have the same emission characteristics. This means that they should have the same cut-off points and track the signal level together between black and peak white. The cut-off points (black level) can be matched by adjusting a standing bias voltage under no-signal conditions. Peak white matching can be achieved by adjusting the gains of the tube drive stages. When correctly set up all three guns should track the grey-scale throughout the contrast range. As guns age however their emission changes. The low level of the grey scale will then start to tint. To provide automatic compensation for cut-off level variation a negative feedback system is now widely used. It enables low-level matching to be maintained over the life of a tube. Some more recent systems provide automatic correction of the black and peak white levels: the one we'll describe here is the widely used version that corrects the black level only.

Circuit Operation

The basic principle is to measure each gun's beam current at black level in sequence. This is done once per field. Since black level represents zero beam current the sampling has to be done at very slightly above black level: pulses are added to the video waveforms for this purpose.

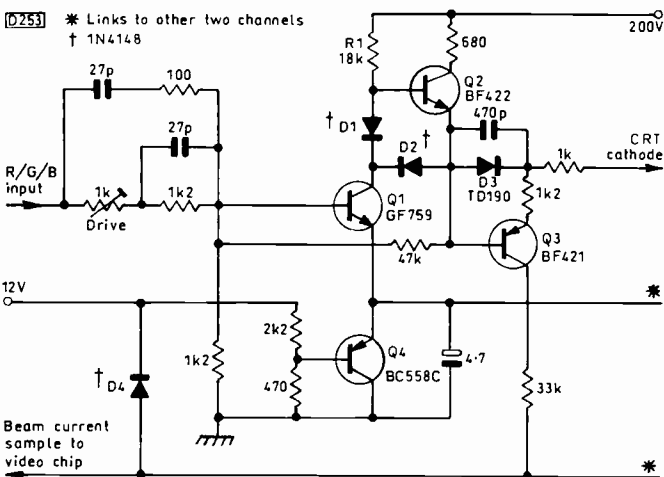


Fig. 1: Class AB video output stage circuit with a current-sampling transistor (Q3).

The samples are fed back to the colour decoder or processor chip, depending on which chip set is used in the chassis, where they are used to establish clamp voltages that set the d.c. level of the drive signals. Obviously this has to be done at a time when there is no video signal present. Use is thus made of the field blanking period, the sampling being done on lines 22, 23 and 24 or 334, 335 and 336 depending on whether the field is an even or odd one. The three sampling pulses are issued in the order red, blue and green. There's a common return path to the video chip, and a clamp diode

may be incorporated here to protect the chip in the event of a failure in one of the output stages.

Fig. 1 shows a typical R/G/B output stage used with automatic grey-scale correction of the type under discussion - this particular design is employed in several Grundig chassis. The video input, R, G or B, is fed to the GF759 voltage amplifier transistor Q1 via a 1kΩ preset that's adjusted for peak white balance. The BF422 emitter-follower transistor Q2 is present to improve the performance when there is a white-to-black transition, i.e. when Q1 is suddenly cut off and its collector voltage rises. Otherwise the load (mainly tube) capacitance would have to charge via the relatively large-value load resistor R1.

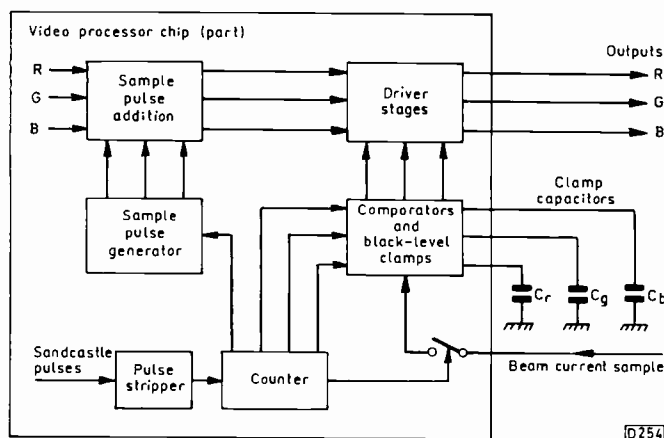


Fig. 2: Block diagram showing a typical video processing chip automatic grey-scale correction system.

This would introduce a delay, the result being a poor transient response, i.e. a smeary display, when white turns to black - something that's particularly relevant with text displays. When the transition is from black to white, Q1 turns on hard to provide a rapid discharge path via D2. The BC558C transistor Q4 provides a constant-current bias source for all three RGB output transistors: a resistor would introduce too great a voltage drop, limiting the output voltage range.

Beam current is measured by the BF421 transistor Q3 which comes on whenever Q1 is conductive, with D3 providing bias. The beam current path is thus via Q4, Q1, D2 and Q3. There is continuous beam current monitoring, Q3 producing a signal at its collector throughout the field scan: it doesn't turn on just to sample the black-level pulses, as some write-ups suggest. But, because of a switch within the associated chip (see Fig. 2), only the sample pulses affect the black-level clamping. This switch is closed only when the sample pulses are present. The clamp reservoir capacitors Cr, Cg and Cb are charged in sequence when the sample pulses occur, establishing the correct black level, the charge being refreshed once per field.

Fig. 3 shows the grey-scale sampling waveforms for each gun. The upper waveform is a composite pulse since the three sampling pulses are combined at the collectors of the

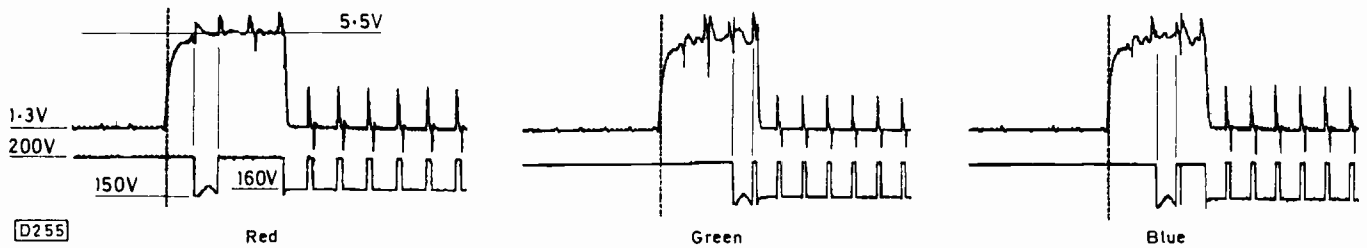


Fig. 3: Current-sampling pulse waveforms, R, G and B respectively.

sampling transistors (Q3 and its equivalents in the other two channels), being separated by the switching at the feedback end of the chain. The composite pulse has a d.c. level of 1.3V and a nominal amplitude of 5.5V. The lower waveforms are the drive signals applied to the tube's cathodes. The black-level sample pulses sit at about 160V, the level between 160V and 200V providing line blanking.

Fault Conditions

If a serious fault occurs in one of the output stages the video chip may shut off all its outputs. In this event check the collector voltages at the GF759 transistors. You may get a reading of 200V or 4.5V in the event of a fault condition. Both the GF759 and the BF422 transistor in the faulty channel will have to be checked – substitution is the quickest test. A problem with one of the BF421 transistors is not so

easy to assess. A faulty transistor will often appear to be o.k. when a meter check on its junctions is carried out. Substitution is the best approach – preferably all three at once.

Leakage in one of the TD190 diodes is a common cause of poor grey-scale performance. It will result in incorrect beam current measurement, affecting the d.c. or black level of the relevant output from the video chip. This may turn the gun affected up a bit, the black-level tint providing a clue as to which output stage is faulty. More than one of these diodes may be leaky: thus a yellowy/greenish low-level display would suggest that the diodes in the red and green output stages are leaky.

When a diode has become leaky it may be correct to suspect higher than normal tube flashover activity in the relevant channel – or channels where more than one diode is defective. In this event a quick tube drive repair would not be in order.

Letters

CHRISTMAS THANKS

It was teatime on Friday the 24th of December and a milestone in my working career. I'd just completed a full day of field servicing – fourteen jobs, all completed, and no customer left without a working TV set and/or video recorder over the holiday. I was polite and cheerful, affable even, and made return visits to three of the jobs with urgent spares or to double check a possibly intermittent fault.

But in over forty years in the trade it was the first time that I've worked a busy Christmas Eve without a single customer offering a tip. The only drink I was offered was a cup of tea. I was abused by two customers for leaving them until "the last minute" – in one case this was at 11.30 a.m. In several cases I had difficulty getting to the faulty set because of children or revellers. I'm not really concerned about tips as such, but some indication of appreciation that an effort has been made to turn up, and that participation in the festivities was thus delayed, would not have gone amiss. Am I alone in thinking that the attitude of the public is deteriorating rapidly? Come back Scrooge, all is forgiven!

John C. Priest,
Blackpool, Lancs.

TATUNG TVR6111/AMSTRAD VCR9410

In the February VCR Clinic Eugene Trundle mentioned a modification to cure intermittent failure to rewind or wind fast forwards with the Tatung TVR6111/Amstrad VCR9410 etc. Here in Mauritius we have the Casio VX4000/Funai VIP2000 etc. that use the same deck. In the stop mode, plastic lever 1 (see Fig. 1) comes to rest by the metal post, where the rubber damper is fitted. If this damper is worn

out, plastic lever 1 rests just a little bit behind its correct location (more to the left, closer to the metal post), thus making it impossible for the trigger lever to flip back into

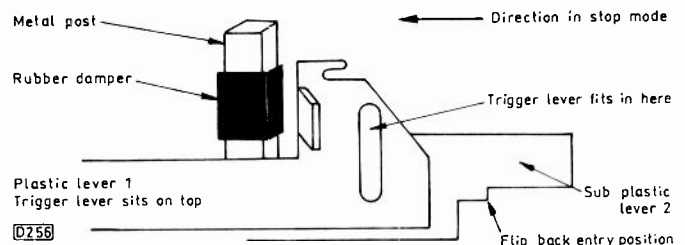


Fig. 1: Position of the rubber damper that causes the intermittent rewind/fast forward fault.

position. As a result you get the fault condition mentioned above. The correct cure is to replace the rubber damper. If it's not available a plastic sleeve (e.g. e.h.t. cable sleeve) cut to length will do nicely.

Ben Hosseinally,
Mauritius.

TV CABINETS

I received for repair a 20in. ITT colour set fitted with the Monoprint A/NN chassis. The customer's friend who brought it along said that it had been accidentally knocked off the coffee table on to the carpet (faceplate down). This had pushed the controls inwards and away from the front moulding. Could I put matters right?

After removing the rear cover expecting to find all kinds of damage, I was much relieved to discover that the plastic moulding that secures the main PCB to the base of the wooden cabinet (top, bottom and both sides) had come away: it was only stapled. More damage could be seen after removing the main PCB and plastic retainer. The front moulding beneath the tube flare had come adrift – yet more

staples. So out came the tube. After removing the offending staples then drilling, screwing and glueing, everything was sound and solid. But if you ask me this is crazy: what's the sense of bolting a 20in. c.r.t. to a plastic moulding then stapling this to a piece of chipboard? If this is considered to be structurally sound then I'm a Dutchman. It could lead to real fireworks.

*M.K. Hayter,
Birmingham.*

EDUCATIONAL PROJECT

There's been much public debate about youth problems. One solution would be more technical education, but young people don't by and large seem to be interested. One thing that does take their fancy however is video. It would be nice to be able to build a camera as an educational project, but it seems that parts with which to experiment just aren't available cheaply – things like CCDs and their accessories. It must be possible to produce something to feed into a VHS machine for under £200, or under £100 if existing lenses can be used. May I use your columns to appeal for experimental material with which to make a child-proof video camera, using rock-bottom price lenses, for the youth programme I'm trying to establish here in Cambridge?

*Fred Allen, B.Sc., M.Sc.,
Cambridge Exploratorium,
13 Shelley Road, CB3 0BP.*

HEATSINK COMPOUND

Power chips and transistors are usually fixed to a heatsink using a compound of some type (oxide, silicon grease etc.). It has a tendency to dry out over a period of say five-ten years, the result being a substance like Tippex. This is of course less efficient, so the power device runs hotter leading to failure. Perhaps this is the reason for the high failure rate of STR and STK devices. I now clean off the old material and remake the joint whenever I consider this to be necessary.

Recently I had a twelve-year old Sony KV1820 TV set that operated intermittently (whether on or at switch on). The cause of the problem was dried out heatsink compound. I've also repaired a computer monitor with an STK-type regulator in the same way. Field and line output devices can also be affected.

*A.J. Crush,
Dover, Kent.*

HAMEG SCOPE REPAIRS

If my recent experience is anything to go by Hameg was rather unfairly criticised in your November issue (Letters, page 24). The problem was that my HM605 scope refused to produce a display, a burning smell becoming apparent after a few minutes. With the help of the excellent manual that comes with it I was quickly able to isolate the cause of the problem to an open-circuit BD237 flyback transformer switching transistor (T608). It had failed because the e.h.t. multiplier was short-circuit. When I phoned Hameg to ask about a replacement multiplier I had a long conversation with John Heredia, who couldn't have been more helpful. He seemed to be totally familiar with the instrument, confirmed my diagnosis of the cause of the fault and advised me in some detail about another fault in the over-scan circuit. As a result I soon traced the cause to the TL820CN chip IC502.

John Heredia was able to look up the price of the parts I

required and the only slight problem is that Hameg insists on clearing cheques before parts are despatched or repairs are returned. This is apparently because of unfortunate experiences in the past.

*Dave Mackrill,
St. Leonards-on-Sea, East Sussex.*

SERIES VOLTAGE REGULATORS

The series voltage regulator circuit shown in Eugene Trundle's article (January 1994, page 168) has been proved by many technicians to be unsatisfactory. I believe that the source of the trouble with the circuit lies in the biasing. Unregulated voltage should be fed to the collector rather than the emitter of a series pass transistor, and there should be no need for a parallel resistor. Details of a trouble-free regulator circuit were provided by J. LeJeune in the May 1992 issue (page 484).

*K.J. Treeby,
Plymouth, Devon.*

PUBLICATIONS

A second edition of the *Satellite Repair Manual* has been published by Eurosat Distribution (Midlands) Ltd., Unit 4, Bentley Lane Industrial Park, Bentley Lane, Walsall, West Midlands, WS2 8TL (0922 39 299, fax 0922 39 398) at £14.95 by mail order. To make it more convenient to handle the new edition has been reduced to A5 size, but it has grown in volume with much additional material mostly based on practical experience. Well worth while for anyone active in this field.

Savoy Hill Publications, Warrens View, Wrington Hill, Wrington, Bristol BS18 7PR (0934 863 491), proprietor V. Osborne, claims to hold the world's largest collection of technical information – manuals, service sheets etc. – on vintage radio/TV/electronics and electrical equipment. Copies can be supplied to order. Phone/write for details.

LCD PRODUCTION

Philips has started production of sample monochrome LCDs using a new process, thin-film diode plus reset (TFD+R). An advantage is low cost, three-four masks being required instead of the six-eight needed to produce TFT (thin-film transistor) panels. Better yield also helps to reduce cost: there are four display control diodes per pixel, representing a considerable built-in redundancy. Each panel has twelve chips mounted on the glass to control the display. Initial panels are of 9.5in. size, but the technology has the potential to be used for panels of up to 20in. (diagonal dimension) – according to Philips 16in. is expected to be the maximum for TFT panels. Colour versions of the panel are said to be "a year away". The thin-film diodes act as switches, controlling the capacitance that determines pixel brightness: the new reset drive scheme eliminates residual non-uniformity.

Hitachi is to invest \$280m in a new plant at Mobara, Japan for the production of full-colour TFT LCDs. Production of monochrome LCDs is being transferred to Taiwan. The new plant is due to begin panel manufacture in October: when fully operational, output will rise to 40,000 panels a month. Hitachi hopes for a yield of close to sixty per cent. Initially production will be devoted mainly to 9.4in. panels for notebook computers. As a result of simpler processing the number of masks required will be reduced from the present seven to five.

Help Wanted

Wanted: Circuit diagram for the Wolsey Starlet Astra satellite receiver. D.J. Long, 697 Halifax Road, Hartshead Moor-side, Cleckheaton, West Yorks BD19 5QT. 0274 877 211.

Wanted: 570HB22 tube for the Sony Model KV2204UB; remote control unit for the Sony KV2204UB; tuner/i.f. panel for the National Panasonic Model TC361GM. Mike Skipper, 18 Exeter Close, Tonbridge, Kent TN10 4NS. 0732 353 588 (evenings).

Wanted: NW2521AS or equivalent chip for the Network Model NWC1410R. V. Jeremy, 7 Tai Penyard, Penyard, Merthyr Tydfil, Mid Glamorgan CF47 0LP.

Wanted: Circuit diagram (or copy) and any other information on the Hyundai HCM1421B colour monitor. Jess Alderman, Outspan, Quethiock, Liskeard, Cornwall PL14 3SQ.

Wanted: ML922 remote control receiver chip. K. Jenkins, 4 Woodgrove Road, Henbury, Bristol BS10 7RE. 0272 505 836 (evenings).

Wanted: Good secondhand or surplus LOPT and remote control unit for the Panasonic Model TC2031 (U4 chassis). T. Thirsk, 15 Daisy Way, High Lane, Stockport, Cheshire SK6 8EF.

Wanted: Details for increasing the number of channels available with the Uniden UST8008 satellite receiver. Peter Clarke, 28 Wentworth Gate, Linton Park, Wetherby, W. Yorkshire LS22 6XD. 0937 582 828.

Wanted: Display panel PCB for the Fisher FVHP907 VCR and front flap/cover for the Hitachi CPT2246 TV receiver. K. Cargill, 1 Stradowen Drive, Strathfoyle, Londonderry BT47 1XN.

Wanted: Handbook (or photocopy) for the Salora 5902/Nokia 1200 satellite receiver. R. Baker, 17 Chapel Lane, Upwey, Weymouth, Dorset DT3 5NA. 0305 208 815.

Wanted: Front panel (not PCB) for the Akai VS112EK VCR, or complete machine if necessary. C.J. Waterman,

Hill House, 2 High Street, Blackboys, Uckfield, E. Sussex TN22 5JS. 0825 890 448.

Wanted: Cassette housing with damper and lid for the Triumph VR9500. T.J. Steel, 185 Charter Road, Chippenham, Wilts SN15 2RF.

Wanted: Mains transformer for the Gould OS255 scope. Call/fax Lawrie Milner on 0388 526 368 (Old Rectory House, 38 Front Street, Stanhope, Co. Durham DL13 2UE.

Wanted: 115V 5A regulator chip for the Sharp SP2 Mk 2 chassis. R. Lane, 29 Hawthorn Crescent, Durham DH1 1ED. 091 384 3843.

Wanted: Any information – circuit diagram, service manual, operating instructions or articles – for Radar Model 202 c.r.t. tester/rejuvenator. Andy Andrews, 61 Dawlish Crescent, Wyke Regis, Weymouth DT4 9JW. 0305 777 747.

Wanted: Has anyone details of how the Rediffusion transistor, which uses the same signals panel as the Rediffusion/Doric Mk 4 chassis, be modified for DX and/or amateur band reception? Also on using the the VM6101 teletext board with the Mk 4 chassis? G. Woods, 5 Mere Green, Walton, Liverpool L4 5XL.

Wanted: Good home for a *Television* colour portable with 22in. tube in G8 cabinet, also spare power and line output transformers, PCBs and relevant copies of *Television*. J.R. Wall, 9 Furlong Mews, Ringwood, Hants BH24 1HF.

Wanted: Does anyone know of a source of Sonata CTV spares? Also of fault/service guides for home computers, e.g. Commodore 64, Amiga 5/600, Amstrad etc. C.J. Davies, 52 The Close, Johnston, Haverfordwest, Dyfed, N. Wales SA62 3QQ. 0437 890 561.

Wanted: Can anyone supply details of how to make a BBC Model B computer with Acorn teletext adaptor produce hard copy on a printer? At present the program is of the terminate and stay resident type: it behaves just like a teletext TV set. D. Benyon, Marshland View, St. Annes Hill, Bude, Cornwall EX23 0LT. 0288 353 373.

Wanted: Pin connection details for the eight-pin DIN socket on an Hitachi VKC500E video camera. Ken Partington, 14 Napier Road, Monton, Eccles M30 8AG. 061 789 2088.

Answer to Test Case

375

– see page 335 –

The cause of tuning drift can be difficult to track down, especially when it's spasmodic. But at least the Toshiba set's fault was consistent: the tuning drifted down as the set warmed up. Tuning is set by the bias applied to the varicap diodes in the tuner: the bias voltage must be held very steady for correct tuning to be maintained, though the a.f.c. circuit will compensate for any very slight drift.

There seemed to be little doubt that the symptom was being caused by a downwards tuning voltage drift (as the bias decreases the effective capacitance of the diodes increases, thus tuning to a lower frequency). Had Sherlock used a digital (high-impedance) voltmeter to check the bias

voltage he would not have loaded down its source and would have been able to see the 2V or so fall that occurred as the detuning took place. If he had gone on, as Sage subsequently did, to switch his Avo 8 to its 50 μ A range and connect it in series with the supply to the tuning voltage pin (Toshiba refers to this supply as BT) he would have seen the current rise after a few minutes from virtually zero to a random but significant level. So there was electrical leakage within the tuner assembly, sufficient to load down (as the Avo 8 had done) the relatively high impedance (because of the series integrating resistors) tuning voltage supply. The tuner had worked perfectly when fed from the low-impedance and closely-stabilised output from the bench power supply, whose digital current meter was too 'coarse' to register the tiny current drain caused by the leakage inside the tuner.

Sage had to fork out for a new tuner assembly, and efforts to pass it off as a twenty first birthday present didn't go down at all well. . .

What a Life!

Donald Bullock

Now that we're Bullock and Sons I'm able to slip out of the workshop now and again. In fact I sometimes slip as far as Spain for a week or two where we have, amongst other things, a Sony audio stacking system. Of late the CD section, a CDPM30, had been disinclined to accept discs. The drawer would come out all right and take the disc in, but the disc would either come straight back out again or the machine would refuse to play it, the visual display faltering and then finally sticking.

I removed the lid, was disappointed by the rather flimsy plastic construction, then studied the loading action. Because the loading belt slipped, the machine didn't complete the cycle. As I'd no spares I ordered a new one. What to do in the meantime? With Snoddies in mind I grabbed a saucepan and boiled the belt for fifteen minutes. This did the trick and I was able to play Paris After Dark, a new CD of old, romantic pre-war French songs: they've been remastered to give truly amazing reproduction. This has rekindled my interest in the means employed by such experts as John R.T. Davies, the well-known ex-Temperance Seven man and wizard of the art of cleaning up old 78s. I've dropped him a line.

Broadcasts Available

I brought a Pace PRD800 satellite receiver and a 1m dish over and, using a satellite finder from Panasonic, installed them. The results are surprisingly good, despite the fact that we're at the edge of the footprint. But as one who was brought up on the BBC style of presentation I find Sky's general standards unacceptable. As a result we watch very little television. Two terrestrial Spanish channels are available, one at u.h.f. and the other at one end of Band I – with horizontal polarisation, making receiving aerial systems very cumbersome. A little time spent away from Britain makes a chap very appreciative of our with-it country.

One bonus with Sky Television however is the fact that some UK radio programmes, including the BBC's World Service and Radio 4, are interleaved with the Sky Gold channel. Reception is excellent. I'd earlier spent a great deal of time and trouble erecting a high, outdoor long-wave aerial system. But my efforts weren't completely wasted: we now receive some very pleasant, melodious snatches of radio that seem to come from France.

Uninterruptible Power Supply

Since I'm an inveterate scribbler another necessity here is an uninterruptible power supply (see test report in the January issue) for use with my wordprocessors. Necessity

because there's often at least one power cut a day here, without any warning.

An ICC5 Ferguson

It seems that I can't escape from my TV reputation. Miguel called the other day and declared "I think you are clever television mechanic".

"Not me, Miguel" I replied, "I'm just here for the sun."

Anyway the upshot was that I ended up looking at his Ferguson 59P7 television receiver – it's fitted with the ICC5 chassis. The set was dead and a quick check showed that the two 1Ω surge-limiter resistors RP01 and RP02 had both burnt out. Moving over to the nearby mains bridge rectifier I found that one section was short-circuit. Just in case it had been a victim rather than the criminal I checked the 150μF, 385V reservoir capacitor CP03. It's as well that I did, because it was dead short.

I sent Miguel down into the village for one of the spares I didn't have, and a bit later we had the set working merrily.

"I tell everyone how clever you are on television" said Miguel. "That'll bring you lots of pesetas!"

"You tell nobody" I said, "televisions make me loco."

"I'm a secret" smiled Miguel.

Tropical Tom's Bush

Everyone here likes Tropical Tom. Portly, loud and open, he's kindness itself. But he's also very short tempered. He arrived from his holiday home frantically shaking a Bush 2714 portable colour set (11AK03 chassis).

"One chance!" he bawled at it as he approached our door, "one final chance and no more. Next time down the well!"

When I plugged the set in it refused to go into standby. I've had this before, so I replaced thermistor TH802 in the start-up circuit. The set then sprang to life and I left it soak testing. An hour later there was a power cut. When power was restored the set would only groan and flicker.

I suspected the microcontroller chip IC1004 but didn't have one. So I checked some of its more obvious d.c. voltages and ended up at the cathodes of D804 and D805, the 1.t. rectifier diodes on the secondary side of the chopper transformer T802. There was barely any voltage here though there was plenty of pulsed a.c. at their anodes. I checked their back-to-front ratios in circuit. They were excellent. Then I took them both out and checked them again. Still good! While they were out I checked the higher-voltage lines which were o.k., then their reservoir capacitors which were also o.k. So I soldered the two diodes back into circuit and tried again. The set worked a treat.

I could only conclude that the diodes had been dry-jointed. It seemed worth examining the rest of the chopper power supply with a magnifying glass. As several joints had a hairline running around them I resoldered the lot. With luck the set won't end up down the well!

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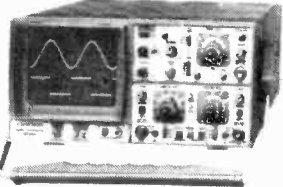
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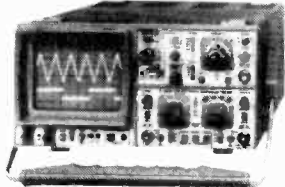
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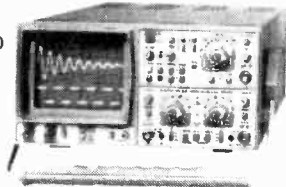


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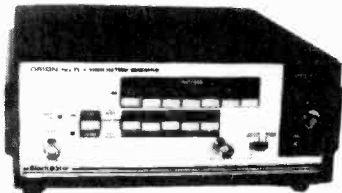
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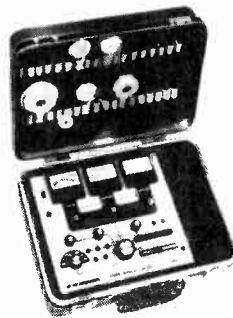
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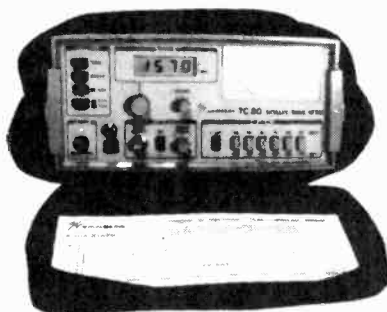


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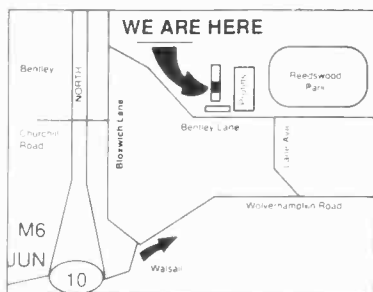
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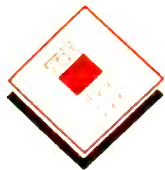
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MAG7 thereafter £1 a metre (ie 20m is £22) REF: MAG1 Max length
250m

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MONO VGA MONITOR Made by Amstrad, refurbished £49
REF: MAG49

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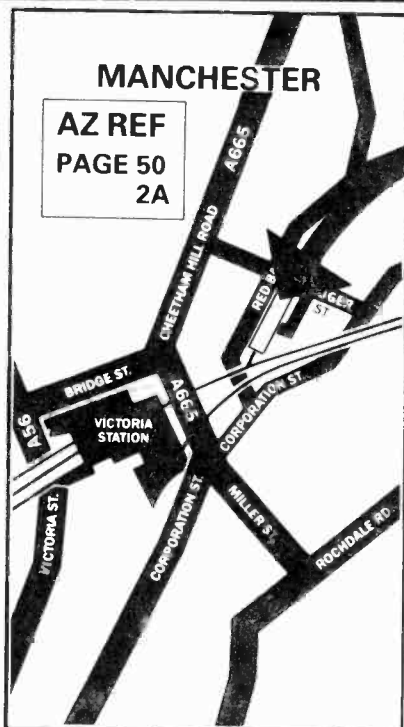
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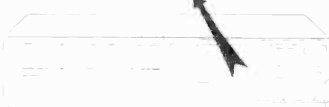
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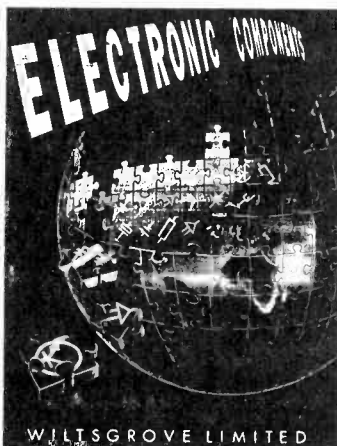
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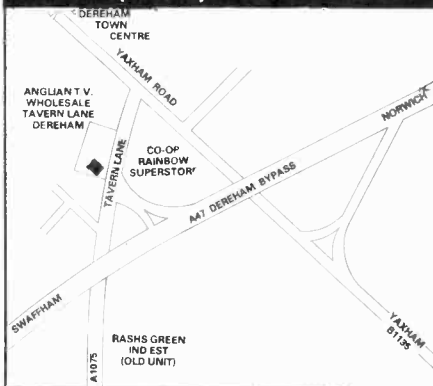
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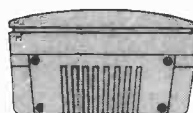
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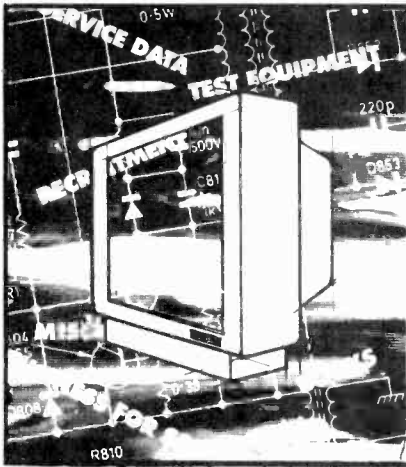
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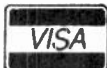
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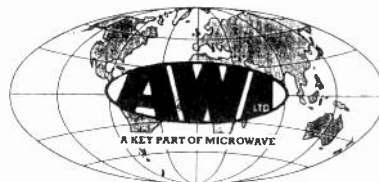
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TX100 REMOTE PANEL No.56413IC M293B/and SAA5012 £10 etc		144MHz Changed Over Relay Aerial 50p 6251 FRAME O/P THICK FILM HITACHI GEC £9.00 THICK FILM HITACHI HM9205A £4.00		PHILIPS UNIVERSAL BATTERY TESTER SBC 1695 £5.00 BATTERY CONVERTER FOR THORN FERGUSON TX85 £8.00 ONE I.C. K35 Decoder £10.00 PHILIPS Deck Calculator £7.00		TX100 SWITCH MODE TRANS 5157/48 £5 AND 001/4252001 (06)3082001		STEREO SOLAR RADIO VHF AND MW £10.00 1000V AC 1000V DC I.C. PHILIPS ME ITR ANALOG ITR					
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