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TELEVISION

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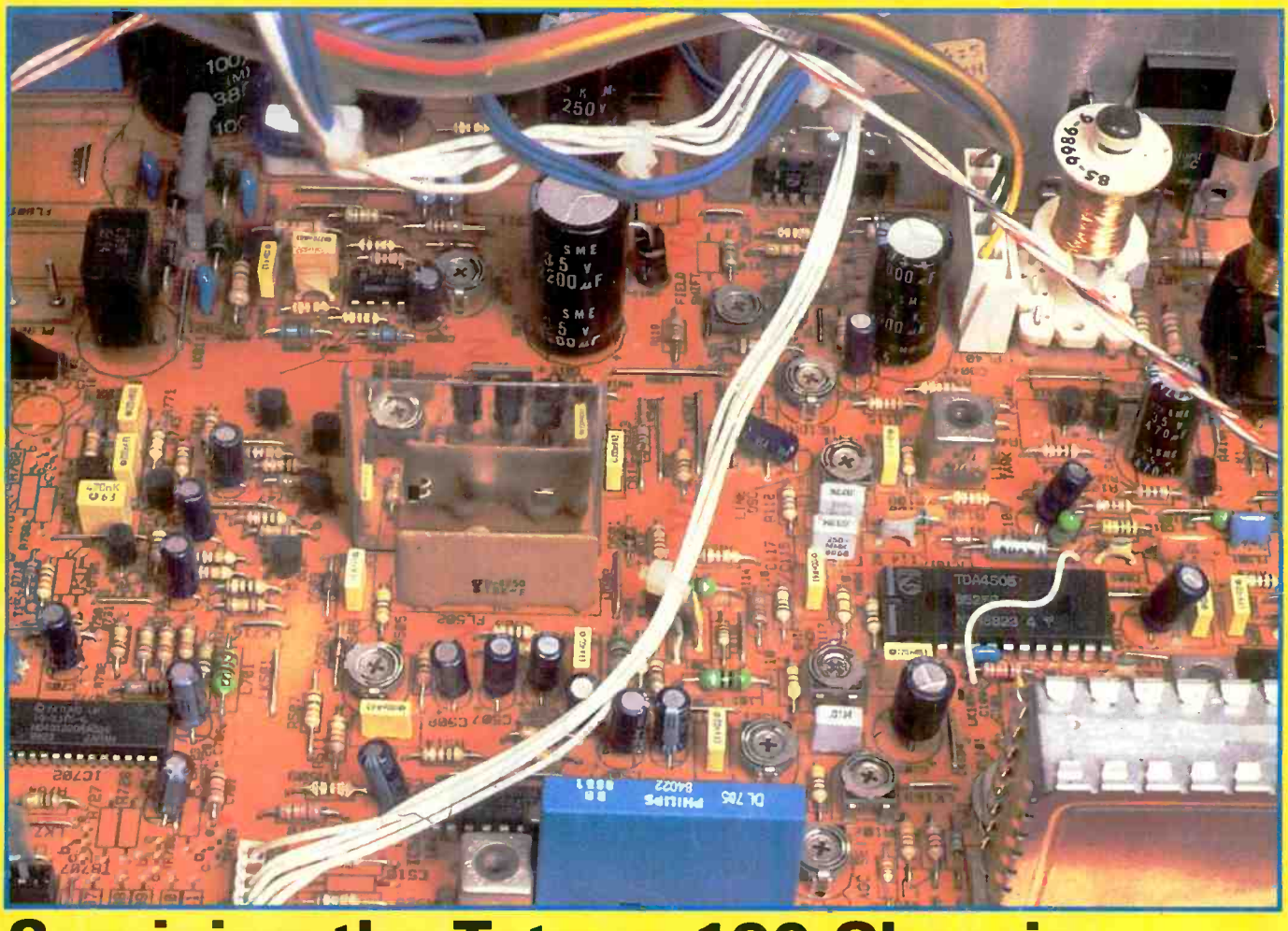

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FEBRUARY 1993

Vol. 43, No.4 Issue 508

On sale January 20th

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BC107	8p
BC108	8p
BC109	8p
BC109C	10p
BC140	20p
BC141	20p
BC142	20p
BC143	20p
BC147	8p
BC148	8p
BC149	8p
BC157	8p
BC159	8p
BC160	30p
BC171	10p
BC172	10p
BC177	14p
BC178	14p
BC179	14p
BC182	7p
BC182L	7p
BC183	7p
BC183L	7p
BC184	7p
BC184L	7p
BC212	7p
BC212L	7p
BC213	7p
BC213L	7p
BC214	7p
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BC237	7p
BC238	7p
BC239	7p
BC300	20p
BC301	20p
BC302	20p
BC303	20p
BC304	25p
BC327	7p
BC328	7p
BC337	7p
BC338	7p
BC441	28p
BC446	8p
BC449	15p
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BC478	18p
BC516	22p
BC537	25p
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BC547	8p
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BC558	8p
BC559	8p
BC560	8p
BC637	20p
BC638	20p
BC639	20p
BC640	20p
BCY70	16p
BCY71	16p
BCY72	16p
BD115	30p
BD124P	50p
BD131	25p
BD132	25p
BD133	50p
BD135	20p
BD136	20p
BD137	20p
BD138	20p
BD139	20p
BD140	20p
BD144	90p
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BD166	30p
BD175	30p
BD177	30p
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BD643	50p
BD645	50p
BD647	50p
BD649	50p
BD675	40p
BD676	40p
BD677	38p
BD678	40p
BD679	40p
BD680	40p
BD681	45p
BD682	45p
BD705	50p
BD707	50p
BD709	50p
BD711	50p
BD736	50p
BD826	50p

BD828	50p
BD897	50p
BD899	50p
BD901	50p
BD977	50p
BDX32	100p
BDX33	60p
BDX65	80p
BDW23	55p
BDW24	55p
BDW93	50p
BDW94	50p
BDY92	100p
BF137	35p
BF167	30p
BF180	16p
BF181	18p
BF183	20p
BF195	7p
BF199	8p
BF200	16p
BF225	30p
BF240	16p
BF245	25p
BF254	15p
BF255	12p
BF256	18p
BF257	18p
BF258	18p
BF259	18p
BF262	25p
BF263	25p
BF270	18p
BF273	15p
BF311	21p
BF336	20p
BF337	20p
BF338	20p
BF362	30p
BF367	13p
BF371	17p
BFR40	25p
BFR90	52p
BFR91	99p
BFT43	30p
BFX29	20p
BFX84	20p
BFX85	20p
BFX87	15p
BFX88	15p
BFX89	60p
BFY17	30p
BFY18	40p
BFY50	14p
BFY51	14p
BFY52	14p
BFY56	25p
BFY64	25p
BFY90	45p
BLY48	85p
BR100	14p
BR103	37p
BR303	85p
BRY49	38p
BSS74	33p
BSX20	15p
BSX26	18p
BT100A	70p
BT106	180p
BT109	90p
BT119	100p
BT146	99p
BT151	58p
BTY79	140p
BU100A	110p
BU104	80p
BU105	80p
BU108	100p
BU109	80p
BU110	110p
BU111	140p
BU124	60p
BU126	65p
BU180	150p
BU184	100p
BU204	75p
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BU208AT	90p
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BU209	140p
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BU226	190p
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BU325	55p
BU326	75p
BU406	70p
BU406D	85p
BU407	55p
BU407D	80p
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BU408D	85p
BU409	95p
BU426A	70p
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BU508D	80p
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BU922	130p
BU930	130p
BUT11AF	70p
BUT12	80p
BUT56A	150p
BUX80	180p
BUX84	50p
BUX85	50p
BU69A	200p
BUY71	300p
BUZ71	75p
C106D	28p
MJ1000	200p
MJ1001	200p
MJ10012	300p
MJ15001	325p
MJ15002	300p
MJ15003	325p
MJ15004	370p
MJ2501	110p
MJ2955	55p
MJ3000	115p
MJ3001	115p
MJE29A	30p
MJE30A	30p
MJE340	25p
MJE350	80p
MJE520	30p
OC28	350p
OC29	250p
OC35	350p
OC36	250p
OC45	50p
OC72	50p
OC200	180p

R2008B	100p
R2010B	100p
S2800D	52p
S2800M	72p
T2800D	52p
T2800M	72p
TIP29	15p
TIP29A	22p
TIP29C	25p
TIP30	25p
TIP30C	30p
TIP31A	22p
TIP31C	30p
TIP32	24p
TIP32A	21p
TIP32C	28p
TIP33	50p
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TIP34	50p
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TIP35C	65p
TIP36C	65p
TIP41A	20p
TIP41C	22p
TIP42A	20p
TIP42C	22p
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TIP48	40p
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TIP122	47p
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TIP131	30p
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TIP142	90p
TIP145	65p
TIP146	90p
TIP147	100p
TIP150	90p
TIP151	90p
TIP2955	42p
TIP3054	45p
TIP3055	42p
TIS44	40p
TIS61	15p
TIS90	15p
TIS91	18p
TIS93	20p
VK1010	88p
VN10KM	60p
VN66AF	100p
VN88AF	115p
ZTX107	11p
ZTX108	11p
ZTX109	12p
ZTX212	27p
ZTX300	13p
ZTX301	16p
ZTX302	16p
ZTX303	24p
ZTX304	17p
ZTX320	29p
ZTX500	13p
ZTX501	13p
ZTX502	18p
ZTX503	18p
ZTX504	25p
ZTX550	24p
2N696	26p
2N697	22p
2N698	40p
2N706	22p
2N708	22p
2N914	28p
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2N1131	28p
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2N1711	24p
2N1893	30p
2N2102	50p
2N2218A	24p
2N2219	24p
2N2221	23p
2N2222	23p
2N2369	15p
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2N2905	20p
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2N2907	18p
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2N3053	18p
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2N3055	38p
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2N3440	58p
2N3442	85p
2N3585	120p
2N3702	9p
2N3703	9p
2N3704	9p
2N3705	9p
2N3706	9p
2N3707	9p
2N3708	9p
2N3710	12p
2N3711	12p
2N3771	85p
2N3772	90p
2N3773	100p
2N3799	18p
2N3819	29p
2N3866	68p
2N3903	11p
2N3904	11p
2N3905	11p
2N3906	11p
2N4031	25p
2N4036	25p
2N4062	12p
2N4064	100p
2N4401	12p
2N4403	12p
2N4443	76p
2N5061	20p
2N5088	20p
2N5192	50p
2N5241	500p
2N5245	45p
2N5294	30p
2N5296	30p
2N5366	25p
2N5401	12p
2N5448	12p
2N5496	80p
2N6107	40p
2N6292	40p

2N6385	120p
2N6403	160p
3N143	65p

DIODES

Rectifier Diodes

BY127	8p
BY133	8p
BY164	40p
BY179	35p
BY184	32p
BY196	20p
BY206	11p
BY207	11p
BY210	22p
BY225	120p
BY227	19p
BY228	28p
BY296	20p
BY298	23p
BY299	22p
BYX10	15p
BYX55350	30p
BYX55600	25p
BYX70500	32p
OA47	10p
OA90	10p
OA91	10p
OA200	10p
OA202	10p
IN 914	2p
IN 4001	3p
IN 4002	3p
IN 4003	3p
IN 4004	3p
IN 4005	3p
IN 4006	3p
IN 4007	4p
IN 4148	2p
IN 5400	9p
IN 5401	8p
IN 5402	8p
IN 5403	8p
IN 5404	8p
IN 5405	11p
IN 5406	12p
IN 5407	12p
IN 5408	12p
RGP15	15p
RGP30	16p
SKE4F206	60p
SKE4F208	80p
SKE4F210	100p
SR2M	60p

I.C SOCKETS

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

ZENERS

400 MW BZY88 RANGE 2V7 to 39V	5p
1.3W BZX61 RANGE 2V7 to 39V	9p

CRYSTALS

Freq in MHz

1.0	260p
2.4576	180p
3.276	115p
4.0	110p
4.194	130p
4.43	95p
5.0	130p
6.0	115p
10.0	140p
11.0	250p
12.0	120p
14.756	200p
15.0	160p
18.0	130p
18.432	130p
24.0	250p
48.0	160p

VOLTAGE REGULATORS

7805	25p
7806	25p
7808	25p
7812	25p
7815	25p
7818	25p
7824	25p
7905	25p
7906	30p
7908	30p
7912	30p
7915	30p
7918	30p
7924	30p
78L05	24p
78L08	24p
78L12	24p
78L15	24p
78L18	24p
78L24	24p
79L05	35p
79L08	35p
79L12	35p
79L15	35p
7818KC	100p
7824KC	100p
LM309K	100p
LM317K	200p
LM317T	100p
LM323K	350p
LM723	35p
78H08KC	800p
78H12KC	700p
79HGKC	800p

VALVES

DAF96	100p
DY87	80p
EB91	50p
EBF80	60p
EBF89	60p
ECC84	80p
ECH83	100p
ECH84	90p
ECL80	65p
ECL82	80p
ECL84	100p
ECL85	80p
EF85	80p
EF183	75p
EF184	85p
EL34	300p
EL95	85p
EL500	100p

EY86	70p
EY87	70p
EY88	80p
PC97	100p
PCC85	60p
PCF80	100p
PCF801	110p
PCF802	80p
PCF806	115p
PCH200	100p
PCL81	65p
PCL82	80p
PCL84	60p
PCL85	80p
PCL805	80p
PFL200	110p
PL36	120p
PL83	60p
PL84	80p
PL95	180p
PL504	120p
PL508	200p
PL519	430p
PY81	100p
PY88	100p
PY500A	190p

LED's

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

RECTANG. LED's

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

LINEAR IC's

AN203	210p
AN210	165p
AN214Q	170p
AN228	280p
AN240P	130p
AN252	150p
AN259	250p
AN262	140p
AN271	230p
AN274	250p
AN301	330p
AN303	250p
AN304	360p
AN315	210p
AN316	350p
AN360	100p
AN362	140p
AN366	150p
AN610	160p
AN612	160p
AN3312	350p
AN3320K	800p
AN3331K	900p
AN3792	400p
AN3794	450p
AN3795	500p
AN3821	800p
AN3821K	600p
AN3822K	700p
AN3830K	800p
AN3990K	300p
AN3991K	400p
AN5010	450p
AN5011	400p
AN5015	350p
AN5020	200p
AN5025	250p
AN5030	550p
AN5033	400p
AN5034	500p
AN5111	550p
AN5132	250p
AN5135	600p
AN5138	450p
AN5150	600p
AN5151	600p
AN5215	100p
AN5250	150p
AN5256	150p
AN5260	350p
AN5262	175p
AN5265	150p
AN5352	600p
AN5355	450p
AN5410	375p
AN5411	450p
AN5421	150p
AN5429	420p
AN5431	300p
AN5440	400p
AN5510	400p
AN5512	250p
AN5515	200p
AN5520	550p
AN5521	250p
AN5612	400p
AN5613	200p
AN5615	300p
AN5620	330p
AN5622	350p
AN5625	400p
AN5712	350p
AN5722	140p
AN5730	160p
AN5732	160p
AN5753	170p
AN5763	450p
AN5790	300p
AN5791	350p
AN5836	450p
AN5862	300p
AN6135	150p
AN6238	400p
AN6247	200p
AN6270	400p
AN6300	600p
AN6306	550p
AN6307	250p
AN6320	300p
AN6328	400p
AN6332	390p
AN6337	420p
AN6341	250p
AN6344	440p
AN6350	610p
AN6359	500p
AN6360	320p
AN6362	480p
AN6371	470p
AN6387	560p
AN6811	130p
AN6884	240p
AN7105	210p
AN7110	130p
AN7114	150p
AN7115	150p
AN7116	90p
AN7120	130p
AN7130	110p
AN7140	450p

AN7145	195p
AN7146	210p
AN7154	180p
AN7156	240p
AN7168	260p
AN7178	270p
AN7222	180p
AN7254	150p
AN7256	250p
AN7310	90p
AN7311	90p
AN7410	250p
AY3 1015	290p
AY3-1270	800p
AY3-1350	450p
AY3-8910	360p
AY3-8912	400p
BA301	65p
BA311	80p
BA313	60p
BA333	100p
BA340	150p
BA401	60p
BA402	60p
BA511	160p
BA514	160p
BA516	150p
BA521	160p
BA524	240p
BA526	180p
BA527	95p
BA532	140p
BA534	290p
BA536	180p
BA546	180p
BA612	160p
BA656	150p
BA658	380p
BA684	400p
BA685	400p
BA1310	160p
BA1320	110p
BA1330	160p
BA1360	160p
BA4403	220p
BA5101	400p
BA5102	220p
BA5204	200p
BA5402	180p
BA5406	180p
BA5408	180p
BA6104	250p
BA6208	250p
BA6209	260p
BA6304	120p
BA6305	140p
BA6410	220p
BA6411	250p
BA6993	150p
BA7001	150p
BA7004	200p
BA7007	200p
BA7021	180p
BA7022	350p
BA7751LS	150p
BA7752	250p
BA7755	150p
BA7767AS	200p
CX108	950p
CX134A	950p
CX136	600p
CX139	1450p
CX139A	750p
CX141	750p
CX143	800p
CX143A	1250p
CX145	725p
CX150B	325p
CX158	825p
CX175	325p
CX186	750p
CX187	825p
CX804A	775p
CX832	825p
CX867	575p
CX868	525p
CX877	300p
HA1125	150p
HA1137W	135p
HA1197	150p
HA1199	145p
HA1319	240p
HA1338	300p
HA1339A	350p
HA1377	160p
HA1388	320p
HA1389	210p
HA1392	200p
HA1394	280p
HA1397	250p
HA1398	240p
HA11219	280p
HA11221	180p
HA11225	150p
HA11235	145p
HA11251	240p
HA11423	210p
HA11724	800p
HA12002	300p
HA12003	250p
HA12005	320p
HA12017	130p
HA13001	170p
HA13002	250p
HA13006	400p
HA13007	400p
HA13108	350p
HA13412	600p
HA13432	400p
HA17524	250p
HA17805	100p
ICL7106	650p
ICL7611	90p
ICL7660	240p
ICM7555	60p
ICM75556	80p
KA2101	100p
KA2102	150p
KA2130	150p
KA2206	150p
KA2209	125p
KA2210	230p
KA2212	80p
KA2213	130p
KA2214	150p
KA2261	100p
KA2263	100p
KA2264	100p
KA2284	100p
KA2401	150p
KA2412	350p
KA2912	125p
KA2914A	300p
LA1130	240p
LA1150	150p
LA1185	150p
LA1201	75p
LA1210	140p
LA1222	80p
LA1230	130p
LA1231	210p
LA1364	200p
LA1365	120p
LA1368	220p
LA1385	170p
LA1460	220p

LA2000	150p
LA2101	270p
LA2200	190p
LA3160	120p
LA3201	80p
LA3210	65p
LA3220	100p
LA3300	140p
LA3301	110p
LA3350	110p
LA3361	100p
LA3375	300p
LA4030	180p
LA4031	140p
LA4032	140p
LA4051	160p
LA4100	85p
LA4101	80p
LA4102	100p
LA4110	120p
LA4112	120p
LA4120	270p
LA4125	200p
LA4126	240p
LA4137	180p
LA4140	60p
LA4160	100p
LA4180	300p
LA4182	180p
LA4190	300p
LA4192	140p
LA4200	130p
LA4201	120p
LA4220	120p
LA4260	230p
LA4261	300p
LA4270	300p
LA4420	140p
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LA4430	130p
LA4440	230p
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LA4461	130p
LA4500	200p
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LA4507	360p
LA4508	260p
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LC7137	450p
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LF357	70p
LF398	300p
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LM311	35p
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LM358	45p
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LM3911	160p
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M58484	500p
M58655P	400p
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M51518	200p
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MB3714	270p
MB3715	250p
MB3722	280p
MB3730	160p
MB3731	300p
MB3756	230p
MB3759	200p
MB8719	360p
MC1455	45p
MC1458	30p
MC1488	50p
MC1489	50p
MC1496	65p
MC3302	70p
MC3401	45p
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STK770	750p
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STK3062	600p
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STK3083	550p
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STK3152II	990p
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STK4162	650p
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STK4181	820p

STK4182II	800p
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STK4192	800p
STK4231II	990p
STK4272	720p
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STK4793	1100p
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TC5081AP	180p
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TC9122P	430p
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TC9134	750p
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TC9152	425p
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TC9156	300p
TC9163	375p
TC9164	400p
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TC9176P	500p
TCA740	130p
TCA940	100p
TCEP100	100p

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TD62382	200p
TD62506	200p
TD62705	250p
TD6304AP	300p
TD6306P	350p
TD6350P	200p
TD6359P	300p
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TDA3591	450p

LINEAR IC's – Cont.

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TDA3654	150p
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TDA7220	150p
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TDA8196	150p
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TDA9503	200p
TDA9513	350p
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TL082	46p
TL083	55p
TL084	70p
ULN2002	70p
ULN2003	69p
ULN2068	270p
ULN2804	170p
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UPC554	130p
UPC555	60p
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UPC571	220p
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UPC576	200p
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UPC1028	90p
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UPC1032	60p
UPC1158H	70p
UPC1177H	250p
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UPC1252H	220p
UPC1263	230p
UPC1270H	250p
UPC1274V	250p
UPC1277	240p
UPC1278	240p
UPC1288V	230p
UPC1298V	320p
UPC1318	300p
UPC1335V	320p
UPC1350	115p
UPC1352	400p
UPC1358H	250p

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8904 8923 8924 8925 8929 8935 8941 8943 8944 £6.50
8909 8912 £8.00
8930 8931 8933 8940 £8.00
8947 £23.00
8945 £20.00
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VRP25 £10.00
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VR30A 30B 30E 40A £33.50

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VHSAN3 £8.00
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VHFS1 FS2 £13.00
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VHSVH4 VHW1 XH1 YH2 £16.00
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4935 4943 4963 4985 4993 TR4833 4935 4985 4993 £6.50
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VR3975 VR3912 £20.00
VR3986 £15.75
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VR3917

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FV31 £22.00
FV37 £38.00

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RTV330 454 520 530 535 560 660 670 RTV720 730 740 800 810 900 910 920 £2.50

DECCA
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VRH8495DK (Pressure Roller Assembly) £6.25

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ITT
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ORION
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Pressure Roller Assembly
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SANYO
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SHARP
VC381 VC386 VC2300 VC3300 VC7300 VC7700 VC8300 VC9100 VC9300 VC9500 VC9700 VC200 VC2300 VC3300 VC384 VC385 VC388 VC390 VC393 VC6000 VC6200 VC7750 VC800 £2.50

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VC573 VC584 VC5W20E VCA1031 £2 50
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VC781 VC785 VC787 VC793 VCT72
VC600 VC682 VC684 VC693 VC699
VC700 VC772 VC7810 VC782 VC782
VC7282MK2 VC783 VC786 VC800
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VX617 VX618 VX626 VX627 VX629 £2.50
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VB8220 VB971 VB8225 VI730 VI770
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VX972 £2 50

SIEMEN
FM350 FM352 FM355 £2 50
FM361 FM362 FM363 FM364 £2 50
FM391 FM392 FM394 FM461
FM462 FM464 FM468 FM561 £2 50

SONY
SLC5 SLC6 SLC7 SL3000 SL8000
SL8[illegible] SL8200 SL8600 SL36 SL37
SLJ10 SLT6ME SLT7ME £2.50
SLC9 SLC20 SLC24 SLC30 SLC33
SLC44 SLHF100 SLF1 SLF11 SLF25
SLF30 SLF60 SLF100 SL200 SLF60PS
SLF90E SLHF150 SLHF850 SLK88
SLK95 SLT[illegible]ME SLT30ME SLT50ME £2 50
BMC100 BMC200 BMC500 £2.50
SLV201 SLV202 SLV301 SLV302
SLV401 SLV402 SLV801 SLV802 £2 50

TOSHIBA
DV80 DV90 DV96 DV97 [illegible]
V202 V205 V207 V30[illegible] V309 V500
V509 V55 V57 V61 V64 V65 V66
V67 V700 V71 V73 V74 V75 V77
V81 V83 V85 V86 V93 V94 £2 50
V547 V[illegible]80 £2.50
V91 V961 Pressure Roller Assembly £6 25

VCR BELT KITS

AKAI
VP7100 VS9300 VS9500 VS9700
VS9800 £1.30
VS1 VS2 VS4 VS5 VS11 VS15
VS5[illegible] VP88 V56 V58 V59 £1 00
VS10 £0 65

AIWA
AV[illegible] £1.25
AV[illegible] £1 40
G700 £1.60
G900 £1 80

ALBA
VCR3000X VCR4000 £1 30

AMSTRAD
TVR123 VCR4600 VCR4700 VCR5[illegible] £1.60
VCR7000 £0 80
VCR6000 VCR6100 £1 80

AUTHENTIC
N85[illegible] £1.20

DECCA
[illegible] £1.20
VR[illegible] £0.80

FERGUSON
[illegible] 3V16 3V22 8900
8901 [illegible] 8904 8906 8909
8912 89[illegible] £1.35
3V23 89[illegible] 8924 8929 £0 65
3V29 3V30 8930 8931 89[illegible] £0 90
3V31 3V32 8941 894[illegible] £0 85
3V35 3V36 3V38 3V39 3V4[illegible]
8943 8944 £0.70
3V42 3V43 3V44 3V45 3V48
3V53 3V54 3V55 57 8945 8947 8948 £0.65
3V58 3V59 3V64 3V6[illegible] 8950 8951
FV10 FV11 FV12 FV13 FV14 FV2[illegible]
FV21 FV22 FV26 FV30 FV32 FV33 £1 05

FIDELITY
HQS200 VCR600 VCR610 £1.80
VCP100 £1.60
VTR1000 £1.00

FISHER
VBS7[illegible] £2.45
VBS900 £1.20
FVHP520 FVHP530 FVHP420 £0.60
FVHP615 FVHP618 FVHP620 FVHP622
FVHP710 FVHP711 FVHP715 FVHP716
FVHP720 FVHP721 FVHP72[illegible] FVHP72[illegible]
FVHP730 FVHP830 FVHP840 £1.00
FVHP905 FVHP906 FVHP907 FVHP908
FVHP910 FVHP911 FVHP915 FVHP916
FVHP918 FVHP5000 FVHP5005
FVHP5050 FVHP5075 FVHP5100 £1 00
VBR330 VBS7500 VBS7600 VBS9000 £1 00
VBS3500 £0 75

FUJITSU
HS760 VX71[illegible] VX720D £1.60

FUNAI
V1 V25 VCR4600 VCR4800 VCR5200
VCR5400 VCR5600 VCR6600 £2 10
VCR4530 VCR5840 VCR5843
VCR6800 VCR680 £1.80
VIP3000 VIP5000 £1 60

GEC
[illegible] £1.50
[illegible] £1.00

GOLDSTAR
GHV1231 GHV1232 GHV1241
GHV1242 GHV1243 GHV1244
GHV1245 GHV1246 GHV1248 GHV5[illegible]
GHV8000 GHV8210 GHV8215
VCP4100 VCP4130 £0.80
GHV1290 GHV1291 GHV1295
GHV1296 VCP4200 VCP4300 VCP4301
VCP4305 VCP4306 VCP4310 VCP4311
VCP4315 VCP4330 VCP4331 VCP433[illegible]
VCP433[illegible] VCP4000 £1.20
GHV1247 GHV8[illegible] £1.50

GRUNDIG
MVS400 MVS440 VS400 VS410
VS440 VS450 VS460 £0.55

HINARI
VXL[illegible] £0 80
VXL7 VXL8 VXL9 £1.80
VXL4 VXL35 £0 70
VXL5 VXL6 £1 60
VXL[illegible] VXL3[illegible] £0 90

HITACHI
VT11 VT14 VT17 VT19 VT33 VT34
VT35 VT38 VT39 VT88 VT165 VT330 £1.00
VT5000 VT5500 £1 20
VT7000 VT8000 VT8500 £0.60
VT680 VT6500 VT6800 VT9300
VT9500 VT9700 VT9900 £0.50
VT52, VT61, T62, T63, VT64, VT65,
VT85, VT86, VT640 £1.50
VT3000 £1 50
VT100 VT110 VT111 VT113 VT115
VT118 VT120 VT125 VT128 VT13[illegible]
VT138 VT145 VT150 VT175 VT2[illegible]
VT225 VT250 VT255 VT258 VT260
VTL30 £1 50

ITT
VR3605 VR3905 VR3935 VR3954
VR3985 £0.90
VR3913 VR3914 £1.00
VP3826 VR3906 VR3916 VR3926
VR3946 VR3948 VR3976 VR3986
VR3995 VR3997 VR6948 £0 65
VR392[illegible] VR3928 VR3977 £1 40
VR394[illegible] VR3994 £0 85
VR3961 £0.65
VR3912 £1.50
VR3917 £1 50
VR3965 VR3968 £0 85
VR3907 £1 00

JVC
HR3300 HR3330 HR3360
HR3660 HR4100 £1.30
HR7200 HR7300 £0 70
HR7[illegible]50 HR7600 HR7610
HR7650 HR7655 £0 75
HR7700 £0 75
HRD110 HRD111 HRD120
HRD121 HRD225 £0 90
HRD140 HRD150 HRD157 HRD158
HRD160 HRD250 HRD257 HRD[illegible]
HRD565 HRD566 HRD725 HRD755
HRP50 £0.80
HRD170 HRD180 HRD[illegible] HRD[illegible]
HRD300 HRD320 HRD370 HRD400
HRD430 HRD530 HRD700 HRD750
HRD950 HRS5000 HRS5500 £1 10

MATSUI
VX850 £0.75

MITSUBISHI
HS[illegible] HS318 HS319 HS41[illegible] £2.00
HS[illegible] HS301 HS302 HS303 HS3[illegible] £1 50
HS[illegible] HS304 HS306 HS320 HS33[illegible]
HS4[illegible] HS700 £1 50

NEC
N8[illegible] N831 N832 N833 £1 00
N895 £1 30
[illegible] PVC2400

NATIONAL
NV300 NV332 NV333 NV340 NV366 £1.35
NV600 NV688 NV777 NV788
AG6010 AG6015 £1.00
NV2000 NV2010 NV3000 £1.50
NV7000 NV7200 NV7500 NV7[illegible] £0.95
NV8600 NV8610 NV8620 £1.60
NV230 NV250 NV260 NV280 NV3[illegible]
NV380 NV430 NV450 NV460 NV46[illegible]
NV[illegible] NV730 NV770 NV780 NV81[illegible]
NV830 NV850 NV870 NV8[illegible] AG1[illegible]
AG1100 AG1500 £1 25

PHILIPS
VR6460 VR6520 £1.70
VR6540 £1.00
DV186 DV190 DV286 DV468 DV4[illegible]
[illegible] DV571 DV761 VR6180 VR[illegible]
VR6185 VR6285 VR6290 VR6291
VR6293 VR6362 VR6367 VR6390
VR6391 VR6393 VR6467 VR6468
VR6470 VR6561 VR6570 VR6587
VR6660 VR6676 VR6760 VR6761
VR6762 VR6870 VR6970 VR6970
VR72SB8 VR68SB4 VR86SB1
VR92SB3 £0.85
VR6442 VR6542 VR6843 VR6[illegible]
VR44SB9 £0 70

SAISHO
VR[illegible] £0 90
VR[illegible] £0 75

SALORA
SV[illegible] £1 00
SV[illegible] £1 50
SV800 £1 20
SV8100 £0.60
SV8500 SV8520 SV9500 £1.50
SV7300 SV7400 SV8400 SV8420
[illegible] SV9300 £1 20

SAMSUNG
[illegible] VI6[illegible] VI626
VX61[illegible] VX626 VX627 £0.85
VB[illegible] VB610 VB615 VB617 VB619
VB620 VB626 VB627 VB629 VI[illegible]
VI520 VI611 VX510 VX52[illegible] VX617
[illegible] VX625 £1.00
VB[illegible] VB910 VI900 VI910 £1 10

SANYO
[illegible] VTC5150 VTC6000 VTC6500
VTCM1 VTCM11 VTCM20 VTCM[illegible]
VTCM30 VTCM31 VTCM50 £0.75
VTC5300 VTC5350 VTC5400 VPR58 £1.00
VTC5500 £0.95
VTC9300 VTC9300 £2 20
VTC1100 VTC1300 VTC1500
VHR1100 VHR1150 VHR1200
VHR1300 VHR1500 £0 90
VHR2100 VHR2300 VHR250[illegible] VHR[illegible] £1 50

SHARP
[illegible] VC381 VC383 VC384
VC386 VC388 VC390 VC393
VC[illegible] VC8381 VC9[illegible] VC[illegible]
VC[illegible] VC9700 £1.25
VC6300 £1.50
VC7300 VC7500 VC7700 £1.50
VC8300 £1 50
VC[illegible]300 VC387 VC471 VC473
VC477 VC481 VC484 VC486 VC488
VC496 VC8481 £1 00
VC402 VC500 VC571 VC573
VC581 VC582 VC583 VC584 VC58[illegible]
VCSF3 £0 90
VC600 VC651 VC681 VC682
VC684 VC685 VC693 VC699 VC700
VC772 VC781 VC782 VC783 VC785
VC786 VC79[illegible] VC800 VC781
VC7822 VCHF3 VC6V3 VCA[illegible]
VCA10[illegible] VCA103 VCA104 VCA20[illegible] £0.70
[illegible] VC8000 £1 50

SONY
SL[illegible] SL86ES SLJ10 SLT6ME £1.40
SLC5 SLC7 SL37E SLT7ME £1 40
SLC[illegible] £1 65
SL8000 SL8080 SL82 SL86[illegible] £2 00

TOSHIBA
V5[illegible] £0.85
V5[illegible] V5[illegible]0 £2.30
V33 V53 V96 V9600 V9680 £0.85
V61 V63 V65 V66 V67 £1.50

TRIPLERS

UNIVERSAL £4.50
THORN 9000 SERIES £8 00
PHILIPS G9 £7.50
G8 520 550 £7 50
KT3 £4 50
DECCA 100 SERIES £7 50
120 130 £6.50
ITT VC 20 30 £7.00
VC8[illegible] £8.00
RANK T20A £7 00
UNIVERSAL TO FIT
20AX TUBE £8.00
30AX TUBE £8 00

DIODE SPLIT TRANSFORMER

LEADS TO FIT CHASSIS CODE
TX TYPE £2 50
[illegible] TYPE £2 50
KT3 TYPE £2 50

VIDEO MOTORS

AMSTRAD
VCR7[illegible] REEL MOTOR £17.00

AIWA
[illegible] CAPSTON MOTOR £25 00

AKAI
[illegible] VS9300 VS9500 VS9800
CAPSTON MOTOR £21.00
VP7100 VS9300 VS9500 VS9800
DRUM MOTOR £19 50

AUTHENTIC
N[illegible] REEL MOTOR £19 00

BLAUPUNKT
RTV[illegible] RTV[illegible] REEL MOTOR £13 00
RTV3[illegible] LOADING MOTOR £3 00

DECCA
[illegible] REEL MOTOR £19 00

FISHER
BVR[illegible] VBS[illegible] VBS7500
VBS7600 VBS990 REEL MOTOR £6.30

FERGUSON
PL 45979 CAPSTON MOTOR £21 00
HR3300 HR3660 HR4100 3V00 3V01
3V16 3V22 [illegible]92 8900 8901 8902
8903 8904 8906 8909 8912 89[illegible]
PL 55371V CAPSTON MOTOR £13.50
3V3[illegible] 3V36 3V38 3V39 8943
3V44 HRD11[illegible] HRD111 HRD120
HRD121 HRD225
PL 46414 DRUM MOTOR £19 50
HR3300 HR3320 HR3330 HR3360 HR3660
HR3660 HR4100 3V00 3V01 3V16
3V[illegible] 3292 8900 8901 8902 8903
89[illegible] 8906 8909 8912 8922
PL 1381V REEL MOTOR £19 00
3V29 3V30 3V31 3V32 3V39 8930
8931 8941 8942 HR7200 HR7300
HR7600 HR7610 HR7650 HR7655

FERGUSON & JVC
PL 58635V CAPSTON MOTOR £29 00
3V58 3V59 3V64 3V65 8950 8951
FV10B FV11R FV12L FV13H FV20B
FV21R FV22L HRD170 HRD180 HRD230
HRD370 HRD430
PL 58636W REEL MOTOR £17 00
3V58 3V59 3V64 3V65 8950 8951
FV10B FV11R FV12L FV13H FV14T
FV20B FV21R FV22L HRD170 HRD180
HRD230 HRD370 HRD430 HRD[illegible]
LOADING MOTOR £8.00
3V42 3V43 3V44 3V45 3V48 3V53
3V54 3V55 3V56 3V57 8915 8947
HRD[illegible] HRD140 HRD15[illegible] HRD157
HRD158 HRD160 HRD250 HRD257
HRD455 HRD565 HRD566 HRD725
HRD755 HRP50 R734F
[illegible] CAPSTON MOTOR £34 00
[illegible] HRD330 HRD337 HRD400
HRD05[illegible] HRD530 HRD700 HRD750
HRD[illegible] FV14T
HR[illegible] HRD150 CAPSTON MOTOR £30 00
HRD250, HRD565, HRD566
3V29, 3V30 CAPSTON MOTOR £30.00
8930, 8931

HINARI
VXL[illegible] VXL4 VXL20 VXL35
LOADING MOTOR £8.00
VXL20 REEL MOTOR £13 50

HITACHI
78154 CAPSTON MOTOR £20.00
VT52 61 62 63 64 65 640
VT3000 CAPSTON MOTOR £21 00
VT3000 DRUM MOTOR £19.50

ITT
VP3826 VR3906 LOADING MOTOR £8.00
VR3916 VR3926 VR3846 VR3948
VR3976 VR3997 VR6948
VR3912 CAPSTON MOTOR £21 00
VR3912 DRUM MOTOR £19.50
VR3605 VR3905 CAPSTON MOTOR £19 50
VR3935 VR3954 VR3985
[illegible] VR3914 REEL MOTOR £19.00
[illegible] VR3994

MITSUBISHI
[illegible] MOTOR REEL SPOOLING £33.50
HS[illegible] 302 310
HS38P 780 MOTOR REEL SPOOLING £31.50
HS530 304 320 330 700
[illegible] MOTOR REEL
TAKE UP GEN. £21 00
HS3[illegible] HS320 HS700

NEC
N830EG N831EG CAPSTON MOTOR £19 50
N832 N833EG
N895 LOADING MOTOR £8.00

NATIONAL
[illegible] N135V5L REEL MOTOR £13.00
NV300 NV332 NV333 NV340 NV366
VEM[illegible]212 MOTOR REEL GEN £30 00
NV730 NV770
VEM0217 REEL MOTOR £19.00
NV7000
MAX13V[illegible] CAPSTON MOTOR £30.00
NV3[illegible] NV332 NV333 NV340
NV3[illegible] NV600

ORION
[illegible] VC150 VC18[illegible] REEL MOTOR £13.50
VH201 VH205 VH212 VH250 VH254
VH288 VH3 VH300 VH303 VH312 VH700
VH704 VH708 VH712 VH770 VH774
VH750 VH820 VH844 VH900 VH974
VH1000 VH1204 VH200 VH2004
[illegible] VH3[illegible] VH3050 VH3060
VH4008 VH[illegible]A VP20[illegible] [illegible]
VH2204 VH3030 VH3050 VH3060
VH4008 VHF2A VP[illegible] VR2948
VR2949 VR2956 VR2957

ORION Cont.
NVHL NVHM LOADING MOTOR £8.00
VH250 VH254 VH288 VH300 VH404
VH412 VH412 VH530 VH535 VH600
VH630 VH635 VH640 VH666 VH704
VH730 VH735 VH744 VH770 VH774
VH820 VH844 VH850 VH888 VH893
VH900 VH974 VH1012 VH1204
VH1440 VH1500 VH1660 VH1800
VH2004 VH3030 VH3050 VH3060
VH4010 VH4015 VH402 VH5010
[illegible]15 VHF2A VP20 VR2948
VR2949 VR2956 VR[illegible]7 VR2966
VR2980 VXL20 VXL[illegible] VXL30

PHILIPS
[illegible] REEL MOTOR £16.00

SAISHO
VR[illegible] VR805 REEL MOTOR £13.50
VR905 VR200

SAMSUNG
[illegible] REEL MOTOR £11.00

SANYO
[illegible] RM11 REEL MOTOR
VTC[illegible] VTC5150 VTC5300 £6 30
VTC5[illegible] VTC6000 VTC650
VTC3000 CAPSTON MOTOR £25 00

SHARP
RMOTV 1018GEZ REEL MOTOR £13.50
VC200 VC381 VC384 VC385
VC386 VC483 VC3300 VC8387
VC9100 VC9300 VC9500 VC9700
RMOTV 1007GEZ REEL MOTOR £16.00
VC300 VC402 VC471 VC477
VC481 VC482 VC488 VC496 VC[illegible]0
VC571 VC573 VC581 VC582 VC583
VC584 VC5F3 VC8481 VC8561
VC78[illegible] VCA10 CAPSTON MOTOR £32.00
[illegible] VCA234 VCA[illegible]

SONY
BHF 1100 D CAPSTON MOTOR £25 00
SLC5 SLC7 SL37 SL3000

THOMSON
VK300 VK301 CAPSTON MOTOR £21.00
VK302 VK303 VK307 VK330[illegible]
VK300 VK302 DRUM MOTOR £19.50
VK303 VK305 VK308 VK330[illegible]

TOSHIBA
V55 V57 CAPSTON MOTOR £19.50
V61 V63 LOADING MOTOR £8.00
V71 V72 V73 REEL MOTOR £10.50
V[illegible] V81 V83 V85 V86 V93 V94
V300 V50[illegible] V700 DV90
V71 V73 V74 CAPSTON MOTOR £9.50
V75 V81 V83 V85 V700
V86 V93 V94 CAPSTON MOTOR £15.00

CASSETTE HOUSING

GRANADA
VHSDF[illegible] CASSETTE LIFT ASSEMBLY £15.00
VHSTJ £24.00

FERGUSON & JVC
3V38 [illegible] 3V45 3V[illegible]
3V36 [illegible] HRD111 HRD120
HRD1[illegible] HRD[illegible] £24.00
3V4[illegible] 3V43 3V44 3V45 3V48
3V53 3V54 3V55 3V57 8945 8[illegible]
8948 HRD14[illegible] HRD158 HRD1[illegible]
HRD15[illegible] HRD158 HRD16[illegible] HRD25[illegible]
HRD[illegible] HRD4[illegible] HRD565 HRD566
HRD7[illegible] HRD7[illegible] £24 00
8948 8950 FV10E FV1[illegible] FV1[illegible]
FV14T FV20B FV21R FV22L FV26
FV340 HRD23[illegible] HRD43[illegible] HRD[illegible] £24 00
[illegible] FV64 3V6[illegible] FV1R
[illegible] 8951 HRD1[illegible] HRD180
HRD37[illegible] £24 00

ITT
VR36[illegible] VR390[illegible] £24 00
VP3916 VR392[illegible] VR3946 VR3948
VP397[illegible] VR3986 VR3995 VR397
VR6948 £24.00

NATIONAL
NV73 £31 00

NEC
N830EG N831EG N83[illegible] N833EG £24 00
N895 £24 00

PHILIPS
CASSETTE LIFT ASSEMBLY
VR6[illegible] £15.00
DV186 DV190 DV286 [illegible]
VR618[illegible] [illegible] 618[illegible] VR628[illegible]
[illegible]
VR6760 [illegible] £15 00

TELEFUNKEN
[illegible] £24 00

THOMSON
[illegible] VK303 VK3[illegible]
VK420 [illegible] £24.00
VK342 VK343 VK35[illegible] VK352 VK36[illegible] VK36[illegible]
[illegible] VK34[illegible] £24 00

TOSHIBA
[illegible] £24 00
V[illegible]6[illegible] £24 00

PANASONIC MODE SWITCHES

NV200[illegible] [illegible]
7800 VSS0048 £4 00
NV230 [illegible]
[illegible] VSS0110 £2 50
NV830 VSS01[illegible] £3.00
NV300 [illegible] 340 366 688 77
778 VSS0160 £4.00
NVG21 25 NV[illegible] NVD80
VSS0175A £2 50

ON/OFF MAIN SWITCHES

GRUNDIG
PART NO 797[illegible] [illegible]
USED ON C7500 C7500TT C8500 C8502
C8710 C8714 C8494 M66 190
M66 190 99 M70 195 P40 345
ST66 1602 T55 340 T[illegible]
PRICE £3.25

ITT
PART NO 13 1024
USED ON CP0200 0211F 0323 0323 1
0341 15 0345F 0351 0351 1 0361
0361 1 9350 CT0500 0500 1 T
0500T
PRICE £3.50
PART NO LFC 005
USED ON CVC4[illegible]
PRICE £3.25

MATSUI/SAISHO
USED ON MATSU 2190 SAISHO FST2130TX
PRICE £3.50

PHILIPS
USED ON K30 K35 K40 KT3 KT4
PRICE £1.50

SONY
PART NO 15546[illegible]11 POWER SWITCH 26mm
REMOTE SWITCH
USED ON KV1612MK1 KV1612 MK2
KV1614 KV2052 KV2056 KV2062
KV2[illegible]66 KV2212 KV2216 KV2252
KV2256 KV2704 KV2705 KV2706
KV2752PE3 KV2756PE3 KX20PS1
KX20PS2 KX27PS1
PRICE £3.50
PART NO 15548[illegible]11 POWER SWITCH 21mm
REMOTE SWITCH
USED ON KV202[illegible] KV2024
PRICE £3.50
PART NO 15548201[illegible] POWER SWITCH
USED ON KV1810MK1 KV181[illegible] MK2
KV1820 KV1822 KV2000MK1
PRICE £7 50
PART NO 155496711 POWER SWITCH
26mm
USED ON KV1400 KV144[illegible] KV2[illegible]40 KV2060
PRICE £2.00

SONY
PART NO 155 5880[illegible] POWER SWITCH 21mm
REMOTE SWITCH
USED ON KV202
PRICE £2.50
PART NO 155 77400 21 FUNCTION SWITCH
USED ON KV1612MK1 KV1612 MK2
KV205[illegible] KV2056 KV2[illegible]12 KV2[illegible]15
KV221[illegible] KV2252 KV2256 KV2704
KV2705 KV2706 KV2752PE3
KV27[illegible]6PE3
PRICE £0.60
PART NO 155336[illegible]00 FUNCTION SWITCH
USED ON VARIOUS
PRICE £1.00

VIDEO LAMPS

UNIVERSAL VIDEO LAMPS 9V 80mA
310mm WIRES £0.30
PANASONIC VIDEO LAMPS £0.50
SHARP VIDEO LAMPS £0.50
HITACHI 381682 V163 64[illegible]
VIDEO LAMPS £1 35

VIDEO SENSOR LAMPS

AIWA AKAI ALBA AMSTRAD BLAUPUNKT
FIDELITY FISHER FUJITSU FUNAI GEC
GOLDSTAR GRANADA GRUNDIG HINARI
HITACHI ITT JVC HRD SERIES MATSUI
MITSUBISHI NEC ORION NATIONAL
PHILIPS SAISHO SALORA SAMSUNG
SANYO SHARP SIEMEN SONY
TELEFUNKEN THOMSON FERGUSON
TOSHIBA
SENSOR LAMP CODE NO VLO5 £1.60
AKAI GRANADA VHSTJ HITACHI VT3000
ITT VR391[illegible] VRP3833 JVC HR[illegible] 3300 3330
HR3[illegible]60 MITSUBISHI HS2[illegible] TELEFUNKEN
[illegible] THOMSON
VK[illegible] FERGUSON 3V00 3V16
3V2[illegible] 3V24 [illegible]92 8900 8901 8902 8903
8909 8912 8922 8925 £0 30
CASSETTE LAMP [illegible] 80mA [illegible] WIRES
CODE NO VL[illegible]1
BLAUPUNKT ORION VH1[illegible] NATIONAL
NV2000 NV201[illegible] NV3000 NV3150 NV8200
NV8400 NV8600 NV8610 NV8620 SHARP
VC2300 VC6000 VC6200 VC6300 VC7300
VC7700 VC8000 VC8300 £0 50
CASSETTE LAMP 6V 150mA CODE NO VLO2
AKAI VS10 GRANADA VHSX[illegible] ITT
VR3993 VR3994 JVC HR2[illegible] HR7600 761[illegible]
HR7650 HR7655 TELEFUNKEN VR530
VR535 VR539 VR550 VR630 VR650
THOMSON V309 V316 V357 V309 VK411
V8000 FERGUSON 3V31 8941 8942 £0.50
CASSETTE LAMP [illegible] 80mA 31[illegible] SKEO
CODE NO VLO6
AUTHENTIC N8[illegible] DECCA VR8310
GRANADA VHS[illegible] VHSW[illegible] VHSWJ3 ITT
VR391[illegible] 3914 396[illegible] JVC HP[illegible] 7400 735[illegible]
7[illegible]00 TELEFUNKEN VR450 [illegible] 929 55[illegible]
949 62 [illegible] THOMSON 410[illegible]
VK308 309 [illegible] FERGUSON 3V23 3V29
3V30 8923 8924 8929 8930 8931 8940 £0.50
CASSETTE LAMP [illegible] 80mA 21[illegible] SKEO
CODE NO VLO7
GRANADA VHSAY3[illegible] SHARP VC[illegible] 381
383 384 386 388 390 393 9300 9500 9700 £0.70
(CASSETTE LAMP 5V 115mA CODE NO VLO8)

NATIONAL LINE OUTPUT TRANSFORMER

TLF14[illegible]118 £19 00
TLF15542F £25.00
TLF14568F £26 00
TLF14567F £26 00
TLF14715F £27 00
TLF14749B £20 00
TLF16609B £23 00

CASSETTE DC MOTORS

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9V MOTOR £2.00
12V CW MOTOR £2 00
12V CCW MOTOR £2 00
[illegible] CCW MOTOR £2 90

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STEREO HEAD £1 10
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SONY FLYBACK TRANSFORMERS

Part No.	Models	Price
1-439-216-00	KV-2002E 2010E 2200E 2015 1820E 2010SE	
	KV-2012ME 2016ME 2015ME 2010ME	£14.00
1-439-256-11	KV-2704EC 2704UB 2704ET 2704E(A) 2704E	£40.00
1-439-286-21	KV-2215UB 2217UB 2215EI 2215FE 2212EX 2215ET	£30.50
1-439-289-21	KV-2705F 2705FE 2705UB 2705E 2706UB 2720EC	£40.00
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1-439-332-21	KV-2756 2730EC 2730FE 2764EC 2752UB 2752F	£30.00
1-439-333-00	KV-1882EC 1882UB 1882F 1882CH 1882AEB 1882AM KV-1882ME3 1882HK 1882AS 16TR1 862EC(PS) 1770R	£21.50
1-439-363-21	KV-19HT1A 19FX1MT 18G2 1602M7 1602GE ADM-16B KV-2092UB 2096UB	£22.00

FLYBACK TRANSFORMERS

FERGUSON		
00D-4208-001	TX9	£14.00
00D-4208-002	TX9	£14.00
00D-4 235-002-01G	TX90	£14.00
00D-4 247-001	TX90	£14.00
00D-4 247-001 HT1	TX90	£14.00
06D-3-093-001	TX100	£14.00
(110) 06D-3-087-001	TX100	£14.00
(110) 06D-3-088-001	TX100	£14.00
06D-3-088-001	TX100	£14.00
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29201-019-05		£8.00
29201-024-11		£14.00
29201-024-04		£14.00
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PS 140-17112	G11	£14.00
PS 140-10306	G90AE	£11.50
PS 140-10353	G90B	£15.50
PS 140-10151	K12	£15.00
PS 140-10283	K30 K30111	£15.00
PS 140-10246	K40	£13.00
PS 140-10247	KT4	£14.00
PS 140-10149	KT2	£9.00
PS 140-10161	KT3	£9.00
PS 140-17033	G8	£10.00
PS 140-17089	G9	£10.00
PS 140-10328	NC3	£14.00
ITT		
	CVC20	£11.50
	CVC25	£11.50
	CVC30	£11.50
HITACHI		
2432981	CPT 1444	£15.00
2434274	CPT 2174 CPT2176 CPT 2178	£18.00
OUTPUT TV MODULE	HM6251 (REF 2370551) HM6232	£5.50 £5.50

IDLERS & PULLEYS REPLACEMENTS

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VS1-2 VS4-5 VS15 VS3 6 12 58 59	T-UP IDLER	BV327815	£6 00
V9700	IDLER	BV321979	£6.00
VS125 126 155	IDLER ASSY	MZ366960J2	£11 00
VS165 240 244 245 247 248 250 512 515 516			
VS22 38 105 112 115 116 205 220			
VP7100 VS9300	T-UP IDLER	PU47752	£4.50
VS9500 VS9800			
VP7100 VS9300	UNLOADING	PU46381	£4.00
VS9500 VS9800	IDLER		
VP7100 VS9300	REW IDLER	PU46380	£6 00
VS9500 VS9800			
VP77 VS10	REEL IDLER	BV327815	£3.00
VP88	IDLER	BV336067	£5 00
VS1 3 4 9 12	REEL TABLE	BR327731	£5.50
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VS23 35 37 53 55	CLUTCH	ML373043	£13.00
VS66 75 VSA77			
VS9700	FF IDLER	BV321761	£3 20
VS9700	REW IDLER	VV321762	£4 25
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VCR7000	IDLER	150280	£1.50
TVR1 VCR4500	CLUTCH	150873	£3 75
VCR4600 VC5200 VCR9000			
TVR1 VCR4500 VCR4600 VC5200 VCR9000	GEAR HOLDER	151284	£3.50
TVR1 VCR4600	REF CLUTCH		£3.50
VCR5200			
VCR6000 VCR6100	CLUTCH	153202	£3.80
VCR4500 VCR9000	CLUTCH		£4 00
VCR4500 VCR4600	MDD KIT	(TAPE CREASING)	£4.50
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MDD KIT TAPE CREASING FOR AMSTRAD VCR4500 4600 4700			£4.50
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3V22 3292 8900 8901 8904 8906			
3V16 3V22 8902	T-UP IDLER	PU49280	£5.50
8903 8909 8912 8922			
3V23 3V29 3V30	REEL IDLER	PU48967	£2.50
3V31 3V32 3V35 8923 8924 8929 8930 8931 8940 8941 8942			
3V23 3V31	ROLLER ASSY	PU49042A	£4.00
3V29 3V30 3V31	T-UP IDLER	51402	£1.25
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3V29 3V30 3V31	T-UP CLUTCH	PU51380	£2 25
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3V35 3V36 3V38	REEL IDLER	PU55374	£2.85
3V39 3V49 8943 8944			
3V35 3V36 3V38	T-UP CLUTCH	PU55373	£2 00
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3V58 3V59 3V64	IDLER ARM	PU58645	£2.25
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3V42 3V43	CLUTCH ASSY	PU55822	£13.50
3V42 3V44 3V45	CLUTCH ASSY	PU57658	£11.50
3V48 3V53 3V54 3V55 3V57 8947 8948			
3V42 3V43 3V44	T-UP CLUTCH	PU56043-1-4	£2.80
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3V42 3V43 3V44	SUPPORT CLUTCH	PU56044-1-5	£2.80
3V45 3V48 3V53 3V54 3V55 3V56 3V57 8947 8948			
3V00 3V01 3V16	LOADING IDLER	PU43681	£4.00
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3V00 3V01 3V16	REW IDLER	PU46308	£6.00
3292 8900 8901 8904 8906			
3V16 3V22 8902	IDLER	PU49281	£1.70
8909 8912 8922			
3V16 3V22 8902	IDLER	PU49283	£1.00
8909 8912 8922			

FISHER			
FVHP420 520 530	FF-REW PULLEY	HI638531	£1.00
FVHP615 618 620	COMP IDLER ASSY	FI1430420400300	£3.30
FVHP622 710 711 FVHP720 721 722 FVHP725 730 830			
FVHP840 905 906 FVHP908 910 911 FVHP915 916 918			
FVHP615 618 620	GEAR IDLER ASSY	FI1430490400900	£4.50
FVHP622 710 711 FVHP720 721 722			
FVHP725 730 830 FVHP840			
FVHP615 618 620	REEL T-UP ASSY	FI1430410400900	£5.50
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FVHP725 730 830 FVHP840			
FVHP905 906 908	GEAR IDLER ASSY	FI1430490402400	£4 00
FVHP910 911 915 FVHP916 918			
FVHP975 980 990	IDLER	FI1430420400700	£4.50
FVHP999 5000 5005			
FVHP5050 5075 5100			
FVHD40 55 140	REEL DRIVE ROLLER		£6.00
FVHP1 10 20			
FVHP975 980 990	GEAR		£3.00
FVHP975 980 990	CLUTCH	FI1430510404200	£9.50
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FVHP420 520 530	TAKE UP IDLER		£3.60
FVHP990	LOADING GEAR		£2.00
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VBS3500	IDLER		£3.00
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VXL4 VXL35	CLUTCH		£6.50
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VT120-220 100 110	CLUTCH ASSY	6886824	£7.50
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VT8000-8300 7000	FF-REW IDLER	6413663	£2 80
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VT8000-8300 7000	PLAY IDLER	6414221	£3.60
VT8500-8700			
VT8000-8300 7000	FF-REW PULLEY	6383531	£0.80
VT8500-8700			
VT9300-9500 6500	FF-REW IDLER	8681471	£3.30
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VT9300-9500 6500	PLAY IDLER	6861482	£3.20
VT680 6800 9700		6861481	
VT9900			
VT9300-9500 9700	IDLER	681505	£3.00
VT9900 6500 680 6800			
	IDLER	687043	£3.80
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VT100 110 111 113	FF-REW ARM	6886792	£2 75
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VT400 405 410 413	FF-REW ARM	6897094	£1.30
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HR330 3660 4100	T-UP IDLER SML	PU49280	£5.50
HR7200 7600 7650	T-UP CLUTCH	PU53462A	£2.25
HR7655 7300 7350 7610			
HR7200 7300 7350	REEL IDLER	PU48967	£2.50
HR7600 7610 7650 7655 7700			
HR7600 7610 7650 HR7655 7700	ROLLER ASSY	PU49042A	£4.00
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HRD110 HRD120-121	T-UP CLUTCH	PU55373	£2.00
HRD225 HRD111			
HRD110 HRD120-121 HRD225 HRD111	IDLER ARM	PU55374-3-8	£2 85
HRD170 180 210 230 HRD320 370 400 430 470 530 700 750 950 3000	IDLER ARM	PU58465	£2.25
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HRD160 250 257 455 565 566 725 755 HRP50			
HRD140 150 157 158 HRD160 250 257 455 565 566 725 755 HRP50	TAKE UP CLUTCH	PU56043-1-5	£2.80
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VX730 735 750 755 VX810 820 850 880 990	CLUTCH	850A00005	£6.50
VX730 735 750 755 VX770 800 810 880	LIMITER POST LEVER ASSY		£1.30
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VX800A VX900	IDLER REEL		£1.50
VX800A VX820	REEL UNIT CLUTCH		£3.50
VX850 VX900	ASSY IDLER		
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HS337 338 347 349 HS411 412 421 HSB10 HSB20 HSB30 HSE10 HSE20 HSE30 HSE70	IDLER	552B01701	£6.50
HS306 307 318 319 HS400 410 710	IDLER	641C34301	£2.00
HS342 349 412 HSB10 HSB20 HSB30 HSE10 HSE20 HSE30 HSE70	IDLER	522B02002	£3.00

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HS306 307 318 319 HS400 410 710	TAKE UP REEL DISK	522A00102	£3 20
HS320	REEL DISK	522C06301	£3.00
HS337 338 411 421	REEL DISK	522P00601	£5.00
HS300 301 302 310	PULLEY	522CD5201	£2.25
HS306 307 318 319 HS400 410 710	GEAR WHEEL	641D71101	£1.50
HS306 307 318 319 HS400 410 710	GEAR WHEEL	641D71001	£1.50
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N830 N831 N832 N833	TAKE UP CLUTCH		£2.25
N830 N831 N832 N833	TAKE UP IDLER		£1.45
N830 N831 N832 N833	REEL IDLER		£2.85
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NV300 NV333 NV340 NV366	IDLER ARM REEL IDLER	VXL0997	£3.60 £2.85
NV300 NV330 NV333 NV340 NV366	IDLER UNIT	VXP0401	£0.75
NV300 NV330 NV333 NV340 NV366 NV8620	PLAY IDLER	VXP0433	£2.75
NV300 NV332 NV333 NV340 NV366 NV600 NV777 NV788 NV2000 NV2010 3000 7000 AG6010 AG6015	ACTION GEAR	VDG0016	£0.60
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NV370 NV430 NV870 NV730 NV830 NV850 NV910 NV770 NV870 NVG9 NVG10 NVG11 NVG12 NVG14 NVG15 NVG16 NVG30 NVG400 AG1000 AG1200 1500 1810 2100 AG2200 NVH65 NVH70	CAM GEAR	VDG0200	£1.20
NV370 NV430 NV870 NV730 NV830 NV850 NV910 NV770 NV870 NVG9 NVG10 NVG11 NVG12 NVG18	IDLER UNIT	VXP0581	£2.50
NV2000 2010 3000	IDLER UNIT	VXP0331	£1.00
NV2000 2010 3000	IDLER UNIT	VXP0329	£1.00
NV2000 NV3000	CAM GEAR	VDG0069	£1.00
NV7000 7200 7800	IDLER UNIT	VXP0344	£1.00
NV7000 7200 7800	CLUTCH	VXP0343	£4.00
NV8150 8200 8300 NV8400 8600 8610 8620	IDLER UNIT	VXP0245	£0.90
NV8200 8400 8600 NV8610 8620	PLAY IDLER	VXP0243	£0.90
NV8620	CLUTCH	VXP0343	£4 00
NV332 NV600 NV688	IDLER	VXP0488	£3.50
NVG20 NVG21 NVG25	PULLEY UNIT	VXP0767	£5.00
NVG40 NVG45			
NV230 NV250 NV280	WORM WHEEL	VXP0604	£2.00
NV430 NV450 NV460 NV465 NV650 NV730 NV770 NV810 NV870 NV890 AG1000			
NV370 NV380 NV630 NV830 NV890 NVG7 NVG10 NVG12 NVG15 NVG30 NVG120 NVG130 NVG400 NVH70 AG1000	IDLER	VXP0523	£3.50
NV370 NVG7 NVG11 NVG12 NVG14 NVG15 NVG16 NVG30 NVG120 NVG130 NVG400 NVH70 AG1000	CLUTCH GEAR WORM WHEEL	VXP0595 VXP0691	£1.00 £1.50
NV2000 2010 3000 NV7000 7200 7800 8050	LOADING GEAR	VDG0035	£0.60
NV230 NV250 NV370 NV430 NV450 NV460 NV630 NV730 NV770 NV780 NV810 NV830 NV890 NVG7 NVG10 NVG12 NVG14 NVG15 NVG16 NVG30 NVG120 NVG130 NVG400 NVH70 AG1000	LOADING GEAR	VXP0520	£1.50
NV230 NV250 NV260 NV280 NV430 NV450 NV460 NV630 NV730 NV770 NV780 NV810 NV830 NV870 NV890 NVG7 NVG10 NVG11 NVG12 NVG14 NVG15 NVG16 NVG30 NVG120 NVG130 NVG400 NVH70 AG1000	CLUTCH GEAR		£2.50
NV230 NV250 NV260 NV280 NV430 NV450 NV460 NV630 NV650 NV777 NV780 NV788 NV810 NV830 NV850 NV870 NV890 NV2000 NV2010 7200 7800 NVG7 NVG10 NVG12 NVG14 NVG15 NVG18 NVG30 NVG120 NVG130 NVG400 NVH70 AG1000	LIMITER ROLLER		£1.50
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MULTIPLE MODELS	IDLER	850A20004	£3.50
MULTIPLE MODELS	IDLER	850A20005	£6.50
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VH1 VH2A	IDLER		£1.20
VH1 VH2A	DRIVING GEAR		£0.60
VH1 VH2A	INTERMEDIATE GEAR		£0.65
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VR605 VR800 VR900	CLUTCH	850A20000	£6.50
VR1100 1200 1600 2500 3200 3300 VR3500 3600 3800	LIMITER POST		£1.30
VR1100 1200 1600 2500 3200 3300 3500 3600 3700 VR605 VR800 VR900	IDLER		£3.50
VR2500 3200 3300 3500 3600 3800 VR705 VR805 VR905	IDLER		£1.50
SANYO			
VHR1110 1150 1200 VHR1300 1500	IDLER	143-0-662T-14730	£5.00
VTC5000 5150 6000 VTC6500 VTCM10 M11 M20 M21 M30 M31 M50	FF-REW IDLER	143-0-741T 20001	£3.00
VTC9100 VTC9300	IDLER	143-0-551T-01400	£1.20
VTC9300	FF ROLLER ASSY	143-0-547T-00200	£2.20
VTCM10 M11 M20 M21 VTCM30 M31 M50	REEL DRIVE PULLEY	143-0-662T-10350	£5.00
VHR2100 2300 2500 VHR2700	IDLER	6130374899	£5.00
VTC5000 5150 6000 VTC6500	PULLEY	143-0-662T-01201	£5.20
VTCM10 M11 M20 M21 VTCM30 M31 M50	PULLEY	143-0-662T-10350	£5.50
VHR3100 3300 3310 VHR3400 3700 3800 VHRD500 VHRD700	REEL DRIVE ROLLER	143-0-662T-15621	£4.25
VPR5800 VTC5300 VTC5400	LOADING ROLLER	143-0-661T-03800	£1.00
VTC3000 VTC3000	FWD LIMITER IDLER		£3.50 £5.00
SHARP			
	IDLER	N1DL0005GEZZ	£1.50
	IDLER	N1QL0006GEZZ	£1.50
VC600 651 681 682 VC684 685 683 699 700 783 VC6FR VC6V3	IDLER ASSY	NPLYV0107GEZZ	£6.15
VC7300 VC7700 7750	PLAY IDLER KIT	NPLYV0041 - NDA1V1007	£5.00

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VIDEO SERVICE KITS

AMSTRAD

VCR7000
Contents
BELT SET PINCH ROLLER REEL IDLER VIDEO LAMP
Order Code: SK41 £5.50

FERGUSON & JVC

3V42/43
HRD455 HRD725

Contents		*Economy Kit Contents*	
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3V58/59/64/65
HRD170/180/210/230/300/320/370/400/430/530/700/750
HRS5000
Contents
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Order Code: SK44 £8.50

3V29/3V30
HR7200/7300/7350
Contents
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Order Code: SK05 £6.00

3V35/36/38/39/49
HRD110/111/120/121/225
Contents
BELT SET PINCH ROLLER TENSION BAND IDLER TYRES
Order Code: SK04 £5.50

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

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

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

Contents		*Economy Kit Contents*	
BELT SET T/U REEL TABLE TYRE SUPPLY REEL TABLE TYRE PINCH ROLLER T/U CLUTCH T/U IDLER REEL IDLER TENSION BAND		BELT SET T/U REEL TABLE TYRE SUPPLY REEL TABLE TYRE PINCH ROLLER T/U CLUTCH T/U IDLER TYRE REEL IDLER TYRE	
Order Code: SK35	£10.50	**Order Code: SK36**	£6.50

3V29/3V30
HR7200/7300/7350

Contents		*Economy Kit Contents*	
BELT SET T/U REEL TABLE TYRE SUPPLY REEL TABLE TYRE PINCH ROLLER REEL IDLER T/U CLUTCH T/U IDLER TENSION BAND VIDEO LAMP		BELT SET T/U REEL IDLER TYRE SUPPLY REEL TABLE TYRE PINCH ROLLER REEL IDLER TYRE T/U IDLER TYRE T/U CLUTCH	
Order Code: SK31	£11.50	**Order Code: SK32**	£5.60

3V44/45/48/53/54/55/57
HRP50/HRD140/150/158/160
HRD250/257/565/566/755

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER CLUTCH MECHANISM TENSION BAND		BELT SET PINCH ROLLER	
Order Code: SK39	£15.00	**Order Code: SK40**	£9.50

FISHER

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

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER IDLER GEAR IDLER UNIT TENSION BAND		BELT SET PINCH ROLLER IDLER TYRE	
Order Code: SK57	£13.00	**Order Code: SK58**	£5.00

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

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER IDLER GEAR IDLER UNIT TENSION BAND		BELT SET PINCH ROLLER IDLER TYRE	
Order Code: SK68	£12.50	**Order Code: SK69**	£3.60

HITACHI

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

VT11/33

Contents		*Economy Kit Contents*	
BELT SET T/UP REEL TABLE TYRE SUPPLY REEL TABLE TYRE PINCH ROLLER FF REW IDLER CLUTCH PLATE TENSION BAND		BELT SET PINCH ROLLER FF REW IDLER TYRE T/UP REEL TABLE TYRE SUPPLY REEL TABLE TYRE	
Order Code: SK45	£15.00	**Order Code: SK46**	£4.50

VIDEO SERVICE KITS *(Cont.)*

HITACHI

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

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER FF/REW ARM CLUTCH PLATE TENSION BAND		BELT SET PINCH ROLLER FF REW IDLER	
Order Code: SK49	£14.00	**Order Code: SK50**	£3.25

VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/38/450/498/510/520/25/26/530/35/36/540/545/46/48/570/75/576/580/85/88
Contents
TIMING BELT PINCH ROLLER FF REW ARM CLUTCH BASE TENSION BAND
Order Code: SK52 £11.50

VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/VTL30
Contents
BELT SET PINCH ROLLER FF/REW ARM CLUTCH PLATE TENSION BAND
Order Code: SK51 £15.00

PANASONIC

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

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

NV2000/NV2010

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER FF IDLER PLAY IDLER TENSION BAND VIDEO LAMP		BELT SET PINCH ROLLER IDLER TYPE PULLEY TYRE	
Order Code: SK13	£9.50	**Order Code: SK14**	£4.50

NV7000/NV7200/NV7800

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER IDLER UNIT PLAY IDLER TENSION BAND		BELT SET PINCH ROLLER IDLER TYRE CLUTCH TYRE	
Order Code: SK11	£10.00	**Order Code: SK12**	£4.20

NV300/NV330/NV333/NV340/NV366

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER IDLER UNIT PLAY IDLER TENSION BAND		BELT SET PINCH ROLLER IDLER TYRE PLAY IDLER TYRE	
Order Code: SK15	£8.00	**Order Code: SK16**	£4.00

NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG16/NVG18/NVG30/NVG120/NVG130/NVG400/NVH55 (PX AC)/AG1810 (P/K)

Contents		*Economy Kit Contents*	
LOADING BELT CAPSTAN BELT PINCH ROLLER IDLER TENSION BAND		LOADING BELT CAPSTAN BELT PINCH ROLLER IDLER TYRE	
Order Code: SK27	£9.50	**Order Code: SK28**	£4.50

NV332

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER PLAY IDLER FF/REW IDLER TENSION BAND FF/REW TYRE		BELT SET PINCH ROLLER PLAY IDLER TYRE FF/REW IDLER TYRE	
Order Code: SK29	£13.00	**Order Code: SK30**	£5.10

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

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER IDLER TENSION BAND		BELT SET PINCH ROLLER IDLER TYRE	
Order Code: SK23	£7.00	**Order Code: SK24**	£3.50

NV600/NV688

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER PLAY IDLER FF REW IDLER TENSION BAND		BELT SET PINCH ROLLER PLAY IDLER TYRE FF REW IDLER TYRE	
Order Code: SK25	£13.00	**Order Code: SK26**	£6.50

NV730/NV770

Contents		*Economy Kit Contents*	
SLOT IN BELT LOADING BELT PINCH ROLLER IDLER UNIT TENSION BAND		SLOT IN BELT LOADING BELT PINCH ROLLER IDLER TYRE	
Order Code: SK19	£7.00	**Order Code: SK20**	£4.30

NV370/380/480/630/780/830/850/AG2100PK/AG2200PK

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER IDLER TENSION BAND		BELT SET PINCH ROLLER IDLER TYRE	
Order Code: SK21	£7.00	**Order Code: SK22**	£3.50

NV777/NV788

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER IDLER UNIT TENSION BAND		BELT SET PINCH ROLLER IDLER TYRE	
Order Code: SK17	£7.50	**Order Code: SK18**	£4.00

VIDEO SERVICE KITS *(Cont.)*

SHARP

VC381

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER REEL IDLER TENSION BAND VIDEO LAMP		BELT SET PINCH ROLLER REEL IDLER TYRE	
Order Code: SK47	£9.00	**Order Code: SK48**	£5.00

VC500/VC571/VC581/VC582/VC583/VC584/VC5F3

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER REEL IDLER TENSION BAND		BELT SET PINCH ROLLER REEL IDLER	
Order Code: SK60	£9.50	**Order Code: SK61**	£6.50

VC781/VC7810/VC782/VC7822/VC785/VC786/VC793/VC800/VCA100/VCA102/VCA104/VCA202

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER REEL DRIVE UNIT TENSION BAND		BELT SET PINCH ROLLER REEL DRIVE UNIT TYRE	
Order Code: SK64	£13.50	**Order Code: SK65**	£6.25

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

Contents		*Economy Kit Contents*	
BELT SET PINCH ROLLER REEL DRIVE UNIT TENSION BAND		BELT SET PINCH ROLLER REEL DRIVE UNIT TYRE	
Order Code: SK62	£13.50	**Order Code: SK63**	£6.25

THIS MONTH SPECIAL OFFERS

STK461	**£6.00**	**STK7563F**	**£8.00**
STK5332	**£1.80**	**STK73410**	**£4.00**
STK5333	**£2.40**	**TA8205AH**	**£3.75**
STK5422	**£4.20**	**TA8210AH**	**£3.75**
STK5476	**£4.00**	**TA8215H**	**£3.75**
STK7308	**£3.50**	**TA8216H**	**£3.75**
STK7348	**£3.20**	**TIPL791A**	**£0.80**
STK7358	**£4.40**		

VIDEO REEL MOTOR PU51381V £15.00
3v29, 3v30, 3v31, 3v32, 3v39, 3930, 8931, 8941, 8942, HR7200 HR7300, HR7600, HR7610, HR7650, HR7655

HITACHI VIDEO HEAD £11.00
VT11, VT14, 16, 30, 33, 34, 330, 340, 503, 640, 5030

MITSUBISHI VIDEO HEAD £18.00
HS303, 304, 320, 700

HS306, 318, 710 £18.00

HS300, 301, 302, 310 £17.00

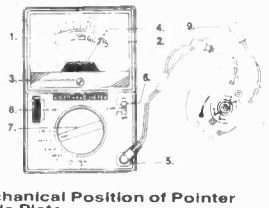
HS337, 347 £20.00

PHILIPS

CASSETTE LIFT ASSEMBLY 69120366 £11.00
DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, VR6285, 6290, 6291, 6293, 6362, 6367, 6393, VR6467, 6468, 6-70 6561, 6670, 6760, 6761, 6870, 6970

PRESSURE ROLLER ASSEMBLY £5.00
DV186, DV190, DV286, DV486, DV471, DV582, DV571, DV761, VR6180, VR6182, VR6185, VR6285, VR6290, VR6291, VR6293, VR6362, VR6367, VR6390, VR6391, VR6393, VR6467, VR6468, VR6470, VR6561, VR6570, VR6581, VR6670, VR6676, VR6760, VR6761, VR6762, VR6870, VR6970, VR6975, VR86B1, 63SB7, 68SB4, 71SB4, 72SB8, 92SB31

VIDEO HEAD TESTER



1. Mechanical Position of Pointer
2. Scale Plate
3. Pointer Adjusting Screw
4. Pointer
5. Measuring Socket
6. Power ON/OFF and Battery Check Switch
7. Range Selector Rotary Switch
8. CAL. ADJ (calibration volume)
9. Measuring Clip

PRICE

YF-225 VHS	**£30.00+VAT**
YF-225B BETAMAX	**£29.00+VAT**

MICROWAVE CONTROL PANEL. Mains operated, with touch switches. Complete with 4 digit display, digital clock, and 2 relay outputs one for power and one for pulsed power (programmable) Ideal for all sorts of precision timer applications etc. **Now only £4.00 ref 4P151.** Good experimenters board.

FIBRE OPTIC CABLE. Stranded optical fibres sheathed in black PVC. Five metre length £7.00 ref 7P29R or £2 a metre.

12V SOLAR CELL. 200mA output ideal for trickle charging etc. 300 mm square. Our price £15.00 ref 15P42R. Gives up to 15v.

PASSIVE INFRA-RED MOTION SENSOR. Complete with daylight sensor, adjustable lights on timer (8 secs -15 mins), 50° range with a 90 deg coverage. Manual ovende facility. Complete with wall brackets, bulb holders etc. Brand new and guaranteed. **Now only £19.00 ref 19P29**

Pack of two PAR38 bulbs for above unit £12.00 ref 12P43R

VIDEO SENDER UNIT Transmit both audio and video signals from either a video camera, video recorder or computer to any standard TV set within a 100' range! (tune TV to a spare channel). 12v DC op. £15.00 ref 15P39R Suitable mains adaptor £5.00 ref 5P191R. Turn your camcorder into a cordless camera!

FM TRANSMITTER housed in a standard working 13A adapter (bug is mains driven) £26.00 ref 26P2R. Good range device.

MINATURE RADIO TRANSCEIVERS A pair of walkie talkies with a range of up to 2 kilometres. Units measure 22x52x155mm. Complete with cases and earpieces £30.00 ref 30P12R

FM CORDLESS MICROPHONE. Small hand held unit with a 500' range! 2 transmit power levels. Reqs PP3 battery. Tuneable to any FM receiver. Our price £15 ref 15P42AR.

12 BAND COMMUNICATIONS RECEIVER. 9 short bands, FM, AM and LW DX/local switch, tuning 'eye' mains or battery. Complete with shoulder strap and mains lead. £19 ref 19P14R. Ideal for listening all over the world.

CAR STEREO AND FM RADIO. Low cost stereo system giving 5 watts per channel. Signal to noise ratio better than 45db, wow and flutter less than .35%. Neg earth. **£19.00ref 19P30**

LOW COST WALIKIE TALKIES. Pair of battery operated units with a range of about 200'. Our price £8.00 a pair ref 8P50R. Ideal for garden use or as an educational toy.

7 CHANNEL GRAPHIC EQUALIZER plus a 60 watt power amp! 20-21KHZ 4-8R 12-14v DC negative earth. Cased. £25 ref 25P14R

NICAD BATTERIES. Brand new top quality. 4 x AA's £4.00 ref 4P44R. 2 x C's £4.00 ref 4P73R, 4 x D's £9.00 ref 9P12R, 1 x PP3 £6.00 ref 6P35R Pack of 10 AAA,s £4.00 ref 4P92R

TOWERS INTERNATIONAL TRANSISTOR SELECTOR GUIDE. The ultimate equivalents book. New ed £20.00 ref 20P32R

GEIGER COUNTER KIT. Complete with tube, PCB and all components to build a battery operated geiger counter. £39.00 ref 39P1R

FM BUG KIT. New design with PCB embedded coil. Transmits to any FM radio. 9v battery req'd. £5.00 ref 5P158R. 35mm square.

FM BUG Built and tested superior 9v operation. £14.00 ref 14P3R

COMPOSITE VIDEO KITS. These convert composite video into separate H sync, V sync and video. 12v DC. £8.00 ref 8P39R.

SINCLAIR C5 MOTORS 12v 29A (full load) 3300 rpm 6"x4" 1/4" O/P shaft. New £20.00 ref 20P22R. Limited stocks.

As above but with fitted 4 to 1 inline reduction box (800rpm) and toothed nylon belt drive cog £40.00 ref 40P8R. 800 rpm.

ELECTRONIC SPEED CONTROL KIT for c5 motor. PCB and all components to build a speed controller (0-95% of speed). Uses pulse width modulation. £17.00 ref 17P3R. Potentiometer control.

SOLAR POWERED NICAD CHARGER. Charges 4 AA nicads in 8 hours. Brand new and cased £6.00 ref 6P3R. 2xC cell model £6.00.

ACORN DATA RECORDER ALF503. Made for BBC computer but suitable for others. Includes mains adapter, leads and book. £15.00 ref 15P43R

VIDEO TAPES. Three hour superior quality tapes made under licence from the famous JVC company. Pack of 10 tapes **New low price £15.00 ref J15P4**

PHILIPS LASER. 2MW HELIUM NEON LASER TUBE. BRAND NEW FULL SPEC £40.00 REF 40P10R. MAINS POWER SUPPLY KIT £20.00 REF 20P33R READY BUILT AND TESTED LASER IN ONE CASE £75.00 REF 75P4R.

12 TO 220V INVERTER KITs as supplied it will handle up to about 15w at 220v but with a larger transformer it will handle 80 watts. Basic kit £12.00 ref 12P17R. Larger transformer £12.00 ref 12P41R.

VERO EASI WIRE PROTOTYPING SYSTEM ideal for designing projects on etc. Complete with tools, wire and reusable board. **New low bargain price only £2.00 ref B2P1**

25 WATT STEREO AMPLIFIERIC STK043. With the addition of a handful of components you can build a 25 watt amplifier. £4.00 ref 4P69R (Circuit dia included).

BARGAIN NICADS AAA SIZE 200MAH 1.2V PACK OF 10 £4.00 REF 4P92R, PACK OF 100 £30.00 REF 30P16R

FRESNEL MAGNIFYING LENS 83 x 52mm £1.00 ref BD827R

12V 19A TRANSFORMER Ex equipment £20 but OK.

ULTRASONIC ALARM SYSTEM. Once again in stock these units consist of a detector that plugs into a 13A socket in the area to protect. The receiver plugs into a 13A socket anywhere else on the same supply. Ideal for protecting garages, sheds etc. Complete system **now only £19 !!!**

POWER SUPPLIES Made for the Spectrum plus 3 give +5 @ 2A, +12 @700mA & -12 @ 50mA. £8 ref Q8P3

UNIVERSAL BATTERY CHARGER. Takes AA's, C's, D's and PP3 nicads. Holds up to 5 batteries at once. New and cased, mains operated. £6.00 ref 6P36R

IN CAR POWER SUPPLY. Plugs into cigar socket and gives 3,4.5,6,7.5,9, and 12v outputs at 800mA. Complete with universal spider plug. £5.00 ref 5P167R

RESISTOR PACK. 10 x 50 values (500 resistors) all 1/4 watt 2% metal film. £5.00 ref 5P170R

QUICK CUPPA? 12v immersion heater with lead and cigar lighter plug £3.00 ref 3P92R. Ideal for tea on the move!

LED PACK . 50 red, 50 green, 50 yellow all 5mm £8.00 ref 8P52

IBM PRINTER LEAD. (D25 to centronics plug) 2 metre parallel £5.00 ref 5P186R. 3 metre version £6.00 ref 6P50

COPPER CLAD STRIP BOARD 17" x 4" of 1" pitch "vero" board £4.00 a sheet ref 4P62R or 2 sheets for £7.00 ref 7P22R

STRIP BOARD CUTTING TOOL. £2.00 ref 2P352R

WINDUP SOLAR POWERED RADIO! FM/AM radio takes rechargeable batteries. Complete with hand charger & solar panel 14P200R. Set of 2 AA nicads £2 ref L2P9

PC STYLE POWER SUPPLY Made by AZTEC 110v or 240v input. +5 @ 15A, +12 @ 5A, -12 @ 5A, -5 @ 3A. Fully cased with fan, on/off switch, IEC inlet and standard PC fly-leads. £15.00 ref F15P4

AMSTRAD MP3

UHF/VHF TV RECEIVER/CONVERTER

CONVERTS COLOUR MONITOR INTO A TV!

£9.00

TELEPHONE HANDSETS
10 brand new handsets with mic and speaker only £3.00 ref 3P146R

BENCH POWER SUPPLIES
Superbly made fully cased (metal) giving 12v at 2A plus a 6V supply. Fused and short circuit protected. For sale at less than the cost of the case! Our price is £4.00 ref 4P103R

SPEAKER WIRE
Brown twin core insulated cable 100 feet for £2.00 REF 2P79R

DISC DRIVES
Customer returned units mixed capacities (up to 1.44M) We have not sorted these so you just get the next one on the shelf. Price is only £7.00 ref 7P1R (worth it even as a stripper)

MICROSCOPE 1200X MAGNIFICATION
Brand new complete with shrimp hatchery, shrimps, prepared slides, light etc. £29.00 ref J29P4

LIGHT ALARM SYSTEM
Small cased alarms that monitor a narrow beam area for sudden changes in light level. Complete with siren that sounds for a preset time when unit is triggered. £7.00 ref J7P1

JOYBALLS
Back in stock popular Commodore/Atari equiv (replace standard joystick) £5.00 ref J5P8

AMSTRAD 1640DD BASE UNITS

BRAND NEW AND CASED

TWO BUILT IN 5 1/4" DRIVES

MOTHER BOARD WITH 640K MEMORY

KEYBOARD, MOUSE & MANUAL

OUR PRICE JUST

£79!!!!

CAR BATTERY CHARGER
Brand new units complete with panel meter and leads. 6 or 12v output £7.00 ref J7P2

CUSTOMER RETURNED SPECTRUM +2
Complete but sold as seen so may need attention £25.00 ref J25P1 or 2 for £40.00 ref J40P4

CUSTOMER RETURNED SPECTRUM +3
Complete but sold as seen so may need attention £25.00 ref J25P2 or 2 for £40.00 ref J40P5

SCART TO D TYPE LEADS
Standard Scart on one end. Hi density D type (standard VGA connector) on the other. Pack of ten leads only £7.00 ref 7P2R

OZONE FRIENDLY LATEX
250ml bottle of liquid rubber sets in 2 hours. Ideal for mounting PCB's fixing wires etc. £2.00 each ref 2P379R

VIEWDATA SYSTEMS
Brand new units made by TANDATA complete with 1200/75 built in modem infra red remote controlled qwerty keyboard BT appproved Prestel compatible, Centronics printer port RGB colour and composite output (works with ordinary television) complete with power supply and fully cased. Our price is only £20.00 ref 20P1R

COMMODORE 64 COMPENDIUM Pack consisting of a Commodore 64 computer, power supply, data recorder and software. All for £69 ref Q69P1

PPC MODEM CARDS Made for the Amstrad PPC1640/1512 range these are plug in modules that operate at 2400 baud. No data. £15 ref Q15P5

AMSTRAD LQ3500 PRINTER ASSEMBLIES Entire mechanical assemblies including print head, platen, cables, stepper motors etc etc. Infact everything bar the electronics and case! Our price just £10 ref Q10P3

AMSTRAD DMP4000 PRINTER ASSEMBLIES Entire printer assemblies including print head, platen, cables, stepper motors etc. Everything bar the electronics and case. Our price just £20 ref Q20P2

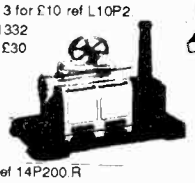
TOROIDAL TRANSFORMER 146VA with tappings at 8v, 10v and 32v will give 50v at 3A or 32 at 4A etc. Centre tapped primary. £9 ref Q9P2. Fixing kit is £2 ref Q2P1.

AERIAL BRACKETS Wall plate 7.5" sq complete with rawl bolts. 10" stand off brackets with standard tube clamps. Will take up to 2" mask. Substantial bracket (would take body weight). £7 ref Q7P1

TV SOUND RECEIVERS Popular units that with the addition of a speaker act as a tv sound receiver. Ideal as a stand alone unit or for connecting into Hi Fi! £12 ref Q12P4

CAMERAS Customer returned units. 3 for £10 ref L10P2.

STEAM ENGINE Standard Mamod 1332 engine complete with boiler piston etc £30 ref 30P2.00



TALKING CLOCK
LCD display, alarm, battery operated. Clock will announce the time at the push of a button and when the alarm is due. The alarm is switchable from voice to a cock crowing! £14.00 ref 14P200.R

HANDHELD TONE DIALLERS
Small units that are designed to hold over the mouth piece of a telephone to send MF dialling tones. Ideal for the remote control of answer machines. £5.00 ref 5P209R

AMAZING TALKING COINBOX!
Fully programmable talking, lockable coinbox BT approved, retail price is £79 ours is just £29! ref J29P2

ANSWER PHONES £15
Customer returned units with 2 faults one we tell you how to fix the other you do your self! £18 ref J18P2 or 4 for £60 ref J60P3 BT approved (retail price £79.95!! each)

COMMODORE 64 MICRODRIVE SYSTEM
Complete cased brand new drives with cartridge and software 10 times faster than tape machines works with any Commodore 64 setup. The orginal price for these was £49.00 but we can offer them to you at only £25.00! Ref 25P1R

90 WATT MAINS MOTORS Ex equipment but ok. Good general pupose unit £9.00 ref F9P1

HI FI SPEAKER BARGAIN Originally made for TV sets they consist of a 4" 10 watt 4R speaker and a 2" 140R tweeter. If you want two of each plus 2 of our crossovers you can have the lot for £5.00 ref F5P2

EMERGENCY LIGHTING SYSTEM
Fully cased complete with 2 adjustable flood lights. All you need is a standard 6v lead acid battery. Our price is just £10 ref J10P29

AMSTRAD 464 COMPUTERS
Customer returned units complete with a monitor for just £35! These units are sold as faulty and are not returnable

WOLSEY DMAC DECODERS
Made for installation in hotels etc as the main sat receiver no data but fully cased quality unit. £20 ref K20P1. Suitable psu £8 ref K8P3.

SWITCHED MODE PSU
Fully cased unit 215mmx145mmx55mm giving +5, +12 and +20v well made case complete with mains lead. £8 fer K8P3

REMOTE CONTROLS
Brand new infra red CONTROLS originally made for controlling WOLSEY satellite receivers. £2 ea ref K2P1 or 20 for £19 ref K19P1

TELEPHONES
Modern 1 piece phones BT approved. Last no redial. £8 ref K8P1

386 TOWER SYSTEMS
Tower case 52cmx40cmx20cm. 2 fans, speaker, 2.75w psu, IEC I/L and O/L. 386 m/board with onboard disc controller, ethernet, display driver, parallel and serial ports. There are several IC's missing from the m/board plus no data! £79 ref K79P1.

DOS PACKS
Complete set of PC discs with MS DOS 3.2, Locomotive basic, gemdesktop and gempaint. No manuals, 5 1/4" discs. £10 ref K10P2

CORDLESS TIE CLIP MICROPHONE
transmits between 88-108MHZ FM. 5.2cm x 2cm, uses LR44 watch battery. Complete with wire aerial & battery. £16 ref K16P1

CHASSIS MOUNT TRANSFORMERS
240v primary, 12v secondary 20VA £2 ref K2P2
240v primary, 16v secondary 10A (split winding). £10 ref L10P1

100 RED LED PACK (5MM) £5 REF K5P2

12V STEPPER MOTOR Ideal for models etc. 3" dia. £2 ref J2P14

INFRA RED BEAM SWITCH 24v DC 5m range source & sensor housed in plastic case. £12 ref J12P1

CAPACITOR BARGAIN PACK 100 CERAMICS £2 REF J2P2.

SPECTRUM JOYSTICKS TWO FOR £5 REF J5P2.

AMSTRAD PC CASE, POWER SUPPLY AND 1.44MEG FLOPPY DRIVE ALL THIS FOR £44 REF L44P1

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BUMPER PACK NO 2 25 of our popular £1 packs for just £12. Our choice of contents.

LCD 1 X 32 DISPLAY Bargain price of just £3 complete with loads of data for a similar display. £3 ref L3P1

USEFUL POWER SUPPLIES. 18v 900mA dc output (regulated) fully cased with mains cable and DC out cable. £6 ref K6P1.

UNCASED PC POWER SUPPLIES. Standard PC psu without case, fan etc. Good for spare or low cost PC! £4 ref L4P6

RADAR DETECTORS. Detects X and K bands (ie speed traps). Not legal in the UK so only available if you intend to 'export' it. £59 ref J59P1.

100 WATT MOSFET PAIR. Same spec as 2Sk343 and 2SJ413 (8A 140v, 100w) 1 N channel and 1 P channel. £3 a pair ref J3P9.

LOW COST CAPS. 1,000 capacitors £3 (33uf, 25v) ref J3P10.

VELCRO. 1 metre length 20mm wide, blue. £2 ref J2P16.

JUG KETTLE ELEMENTS. Good general purpose heating element just £3 ea ref £3P8 or 5 for £10 ref J10P3.

VERY BIG MOTOR. 200v induction 1.1kw 1410 rpm 10"x7" GEC 1" keyed shaft. Brand new. £95 ref J95P1

BIG MOTOR. 220-240v 1425rpm 2.8A 5/8th" keyed shaft GEC 6.5" x 8" complete with mounting plate. £38 ref J38P1

SMALL MOTOR. Electrolux 160 watt 3,000 rpm, 220-240v 5/8" shaft, precision built £18 ref J18P1

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EPROMS 27C256 PACK OF 10 £9 REF M9P1.
EPROMS 27C512 PACK OF 10 £10 REF M10P1.

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SOLAR POWERED WOODEN MODELS. Complete with solar panel, motor and full instructions. £9 ref J9P2. 3 diff £20 ref J20P3

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FERGUSON SRB1 REMOTE CONTROLS. Brand new units ideal for a spare or have two remotes! £4 each.

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SOME OF OUR PRODUCTS MAY BE UNLICENSABLE IN THE UK

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Y SPLITTER	.95
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AA (pkt of 4)	1.15
AAA(pkt of 4)	1.15
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GRUNDIG VIDEO 7V2	6.95
J SIZE 6V	2.95
N SIZE (MN9100)	.95
PHILIPS MEMORY 1V2	2.10
PHILIPS MEMORY 2V4	3.20
PP3	1 10

CAPACITORS

0 1 5 5v (back up)	1 95
63v	
1uf at 63v	.12
4 7uf at 63v	.12
47uf at 63v	.18
100uf at 63v	.22
220uf at 63v	.35
250v	
1uf at 250v	.20
4 7uf at 250v	.25
10uf at 250v	.35
22uf at 250v	.40
33uf at 250v	.55
47uf at 250v	.65
100uf at 250v	1.25
400v	
1uf at 400v	.23
4 7uf at 400v	.35
10uf at 400v	.70
22uf at 400v	.85

(All PCB Mounting)

DIODES

R2M	.95
BY133	.15
BY227	.20
BY229 800	.95
BY299 800	.35
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IN5408	.20
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FUSES

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250MA 315MA 500MA 630MA
800MA 1A 1 6A 2A 2 5A
3 15A 4A 5A 6 3A 8A 1.20
20mm Q B (PKTS OF 10)
500MA 630MA 800MA 1A
1 6A 2A 2 5A 3 15A 60

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VS1/5

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REEL PULLEY	1.95
REPAIR KIT	11.50
TENSION BAND	2.50
VIDEO HEAD	16.95

VCR5000

BELT KIT	1.95
PINCH ROLLER	3.95
REEL IDLER	3.95
REEL PULLEY	1.95
TENSION BAND	2.50
VIDEO HEAD	16.95

VCR6000

BELT KIT	1.95
CLUTCH ASSEMBLY	4.50
PINCH ROLLER	3.95
REEL IDLER	4.50
REPAIR KIT	12.95
TENSION BAND	2.50
VIDEO HEAD	17.95

AMSTRAD VIDEO SPARES

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VIDEO HEAD	14.95

VCR4600BELT KIT 1.95
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VIDEO HEAD 14.50

VC R7000

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REEL IDLER	3.95
REEL MOTOR	14.95
VIDEO HEAD	15.25

VCR6000

BELT KIT	1.95
PINCH ROLLER	3.95
VIDEO HEAD	17.95

FERGUSON VIDEO SPARES

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BELT KIT	1.95
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REPAIR KIT	12.95
REEL IDLER	2.95
TAKE UP CLUTCH	2.95
TAKE UP IDLER	1.95
VIDEO HEAD	8.75

3V35/39

BELT KIT	1.95
CAPSTAN MOTOR	21.50
CASSETTE HOUSING	25.95
LOADING BELTS (5)	1.95
MAINS TRANSFORMER	23.95
PINCH ROLLER	3.95
REEL IDLER	2.95
REPAIR KIT	12.95
TAKE UP IDLER	1.95
TAKE UP CLUTCH	2.95
VIDEO HEAD	8.75

3V44/45

BELT KIT	1.50
CASSETTE HOUSING	25.95
PINCH ROLLER	3.95
REMOTE CONTROL	15.95
REPAIR KIT	14.95
VIDEO HEAD	19.50

3V65/FV11

BELT KIT	1.75
CAPSTAN MOTOR	27.50
CASSETTE HOUSING	29.95
PINCH ROLLER	3.95
REEL IDLER	2.75
REPAIR KIT	11.95
VIDEO HEAD	17.95

FISHER VIDEO SPARES

FVH5000

BELT KIT	2.20
REEL IDLER	5.50
PINCH ROLLER	3.50
TENSION BAND	2.60
VIDEO HEAD	24.50

FVH615/720

BELT KIT	1.95
CLUTCH ASSEMBLY	5.95
PINCH ROLLER	4.50
REEL IDLER	5.95
VIDEO HEAD	15.95

FVH905/910

BELT KIT	1.95
CLUTCH ASSEMBLY	19.95
REEL IDLER	5.95
VIDEO HEAD FVH905	15.95

HITACHI VIDEO SPARES

VT8000/8700E

BELT KIT	1.95
CAPSTAN MOTOR	38.50
FF/REW IDLER	2.95
FF/REW PULLEY	.95
PINCH ROLLER	3.95
PLAY IDLER	3.95
REEL TABLE	3.95
TENSION BAND	2.95
VIDEO HEAD	15.70

VT9300/9700E

BELT KIT	1.95
CAPSTAN MOTOR	31.95
FF/REW IDLER	2.75
FF/REW PULLEY	.95
PINCH ROLLER	3.95
PLAY IDLER	3.95
REMOTE CONTROL	16.95
TENSION BAND	2.95
VIDEO HEAD	15.70

VT11/33E

AUDIO HEAD VT11E	25.50
AUDIO HEAD VT33E	14.95
BELT KIT	1.95
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CAPSTAN MOTOR VT33E	23.95
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RF CONVERTOR VT11E	29.95
TENSION BAND	2.95
VIDEO HEAD	15.70

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CASSETTE HOUSING	14.70
CLUTCH ASSEMBLY	7.95
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VT120/130E

BELT KIT	1.95
CAPSTAN MOTOR	24.95
CLUTCH ASSEMBLY	7.95
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PINCH ROLLER	3.95
REMOTE CONTROL VT120E	15.95
REPAIR KIT	15.95
TENSION BAND	2.95
VIDEO HEAD VT120E	21.95
VIDEO HEAD VT130E	24.95

PANASONIC VIDEO SPARES

NV230/430

REPAIR KIT GENUINE	11.50
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MODE SWITCH	3.95
PINCH ROLLER	3.95
REEL IDLER GENUINE	2.95
VIDEO HEAD NV230	17.50

NV333/366

REPAIR KIT GENUINE	11.50
BELT KIT	1.95
PINCH ROLLER	3.95
PLAY IDLER GENUINE	4.95
REEL IDLER GENUINE	1.25
VIDEO HEAD NV333	8.95
VIDEO HEAD NV366	19.95

NV370

REPAIR KIT GENUINE	11.75
BELT KIT	1.95
MODE SWITCH	3.95
PINCH ROLLER	3.95
REEL IDLER GENUINE	2.95
VIDEO HEAD	9.95

NV730

REPAIR KIT GENUINE	10.95
BELT KIT	1.95
MODE SWITCH	3.95
PINCH ROLLER	3.95
REEL IDLER GENUINE	3.95
TENSION BAND	2.45
VIDEO HEAD	18.95

NV777

REPAIR KIT GENUINE	11.95
BELT KIT	1.95
PINCH ROLLER	3.95
REEL IDLER GENUINE	3.95
VIDEO HEAD	18.95

NV2000/2010

REPAIR KIT GENUINE	18.95
BELT KIT	1.95
PINCH ROLLER	3.95
PLAY IDLER GENUINE	1.25
REEL IDLER GENUINE	1.25
VIDEO HEAD	8.95

NV7000/7200

REPAIR KIT GENUINE	14.95
BELT KIT	1.95
PINCH ROLLER	3.95
PLAY CLUTCH GENUINE	4.95
REEL IDLER GENUINE	1.25
VIDEO HEAD	8.95

NVG7/10/12

REPAIR KIT GENUINE	9.95
BELT KIT	1.95
MODE SWITCH	3.95
PINCH ROLLER	3.95
REEL IDLER GENUINE	2.95
VIDEO HEAD NVG7/9	17.30

PHILIPS VIDEO SPARES

VR6185/6291

BELT KIT	2.95
CASSETTE HOUSING	16.95
PINCH ROLLER ASSY	7.50
REPAIR KIT	21.50
REMOTE CONTROL	29.50
VIDEO HEAD	42.50

VR6367

BELT KIT	2.95
CASSETTE HOUSING	16.95
PINCH ROLLER ASSY	7.50
REMOTE CONTROL	13.25
REPAIR KIT	21.50
VIDEO HEAD	40.70

VR6460/6520

BELT KIT	1.95
PINCH ROLLER	3.95
REEL IDLER	2.95
REPAIR KIT	12.50
VIDEO HEAD	9.95

VR6462/6560

REPAIR KIT	12.95
CASSETTE HOUSING	16.95
PINCH ROLLER	3.95
REEL IDLER GENUINE	4.95
VIDEO HEAD GENUINE	44.95

VR6467

REPAIR KIT GENUINE	21.50
BELT KIT	2.95
CASSETTE HOUSING	17.95
PINCH ROLLER ARM ASSY	7.50
VIDEO HEAD GENUINE	40.70

VR6760

REPAIR KIT GENUINE	21.50
BELT KIT	2.95
CASSETTE HOUSING	17.95
PINCH ROLLER ASSY	7.50
VIDEO HEAD GENUINE	41.70

SANYO VIDEO SPARES

VTC5000

BELT KIT	1.00
REEL MOTOR GENUINE	7.95
REEL PULLEY GENUINE	5.95
VIDEO HEAD	22.50

VHR1100/1300

BELT KIT	2.25
PINCH ROLLER	3.50
REEL DRIVE ROLLER	5.95
REEL MOTOR	14.95
TENSION BAND	2.60
VIDEO HEAD	21.70

VHR3100/3700

BELT KIT	1.95
PINCH ROLLER	3.50
REEL DRIVE ROLLER	5.95
TENSION BAND	2.60
VIDEO HEAD	20.50

SHARP VIDEO SPARES

VC9300/381

BELT KIT	2.50
PINCH ROLLER	3.95
REEL IDLER GENUINE	3.95
REEL MOTOR GENUINE	12.95
TENSION BAND	2.95
VIDEO HEAD	14.75

VC481/482

BELT KIT	
2.50PINCH ROLLER	3.95
REEL IDLER GENUINE	3.95
REEL MOTOR GENUINE	19.95
TENSION BAND	2.95
VIDEO HEAD	14.75

VC581/582

BELT KIT	2.50
REEL IDLER GENUINE	3.95
PINCH ROLLER	3.95
VIDEO HEAD	14.75

VC681

BELT KIT	2.50
PINCH ROLLER	3.95
REEL PULLEY GENUINE	7.95
VIDEO HEAD	14.75

VCA140/VCT72

BELT KIT	2.95
PINCH ROLLER	3.95
REEL PULLEY GENUINE	7.95
TENSION BAND	3.50
VIDEO HEAD	14.75

SONY VIDEO SPARES

C5/6/7

BELT KIT C5/7	2.50
BELT KIT C6	1.95
PINCH ROLLER	4.50
REWIND KIT C5/7	4.95
REWIND KIT C6	3.95
VIDEO HEAD	14.95

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MITSUBISHI HS306	1.95
NEC 9053	2.95
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SAMSUNG VX710	3.50
SHARP 7300	2.50
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FERGUSON 3V29	.80
FERGUSON 3V35 LED	1.95
HITACHI VT63E END SNS	1.95
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PREPROGRAMED REMOTE CONTROLS 5 INDIVIDUAL APPLIANCES
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CREDIT CARD SIZE 9.95
WORKS MOST PHILIPS SETS
BASIC FUNCTIONS
ENGINEERS MUST

POWERMID
NO WIRES, JUST PLUG IN AND TRANSMIT BY YOUR REMOTE CONTROL TO ANY ROOM IN YOUR HOUSE !.....44.95

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PANASONIC NV688 .....27 70
PANASONIC NV730 .....18.95
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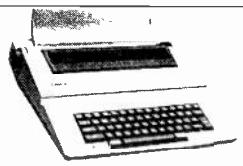

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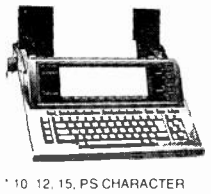

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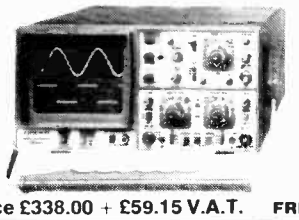
HM203-7 20MHz STANDARD



SPECIFICATION
- 2 Channels
- Bandwidth: DC - 20MHz
- Sens: Ch.1, Ch.2, 1mV/cm
- Timebase: 0.1s - 20ns/cm
- Triggering: DC - 40MHz
- Active TV - Sync - Separator
- Variable hold-off
- Trigger LED indicator
- Calibrator: 1KHz Square wave
- Component tester
- Plus many features

Price £338.00 + £59.15 V.A.T. **FREE Specialist Carrier Delivery**

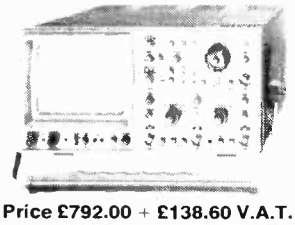
HM604 60MHz UNIVERSAL

SPECIFICATIONS
- 2 Channels
- Bandwidth: DC - 60 MHz
- Sens: Ch.1, Ch.2, 1mV/cm
- Timebase : 2.5s - 5ns/cm
- Triggering: DC - 80MHz
- Active TV - Sync - Separator
- After delay trigger
- Sweep delay
- Delay line
- Trigger LED indicator
- Calibrator: 1KHz & 1MHz Sq. Wave
- Component tester

Price £610.00 + £106.75 V.A.T. **FREE Specialist Carrier Delivery**

HM1005 100MHz UNIVERSAL

3 CHANNELS - UP TO 6 TRACES



SPECIFICATION
- 3 Channels
- Bandwidth: DC - 100MHz
- Sens: Ch.1, Ch.2, Ch.3, 1mV/cm
- Timebase A: 2.5s - 5ns/cm
- Timebase B: 0.2s - 5ns/cm
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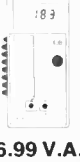

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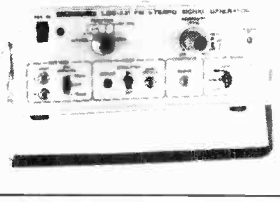

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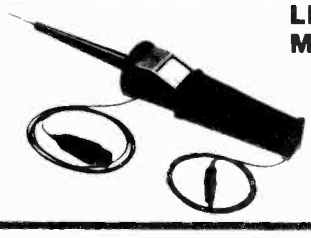

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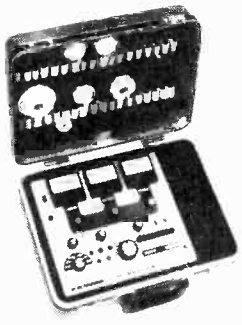

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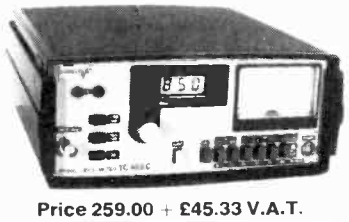

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FEATURES
- Five bands:
  Low VHF : 45-110MHz
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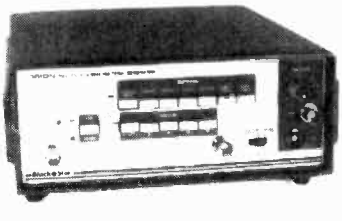

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COVER PHOTO

This month's cover photograph shows the Tatung 190 series chassis – see servicing article on pages 260-263.

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CHANNEL 5 SUNK

The Independent Television Commission's decision in mid-December not to award a Channel 5 franchise seems to have put paid to the prospect of an extra UK terrestrial TV service. Channel 5 was always a bit of a curiosity. It stemmed from the Thatcher government's wish to introduce as much competition as possible into the world of independent television. The ITC was given the responsibility, in the 1990 Broadcasting Act, of doing all it could to ensure the establishment of a fifth UK TV service.

The obvious ways of getting more TV are to use satellites or persuade people to link up with broadband cable networks. Trying to squeeze an extra network into the extremely limited frequency spectrum available in the u.h.f. band was never very sound, and would have provided a maximum coverage of only about 74 per cent of the population. The technical problems have been discussed at length in previous issues of this magazine. In particular the problem of where to tune all those VCRs, satellite TV tuners, computers and video games once chs. 35-38 had been assigned to Channel 5 was never satisfactorily addressed. It's a good thing that we won't, it seems, in practice have to try to deal with this one.

The potential franchise holders didn't exactly go overboard either. In the event only one applicant, the Channel Five Holdings consortium led by Thames Television, put forward a bid – for the hardly overwhelming sum of £1,000, i.e. a hundred pounds for each year of the ten-year franchise. But the technical problems were not the reason for the ITC's decision not to award the franchise to Channel Five Holdings. As with Channel 3, the ITC's responsibility was to ensure that its Channel 5 franchise holder had a viable business plan and looked able to provide a service for the full period of the franchise. It felt that Channel Five Holdings had underestimated the costs and overestimated the prospective number of viewers and amount of advertising likely to be obtained, especially in the current economic conditions. In addition there was the not inconsiderable fact that the members of the consortium were somewhat short of commitment to the project. Thames Television was to take a 35 per cent stake in the operation and was prepared to go ahead. A further 35 per cent stake was to have been taken by Time Warner, which is understood to be the world's largest media group. Other members of the consortium were to be the US network company Capital Cities/ABC, Associated Newspapers (the Daily Mail group), Pearson which amongst other activities publishes the *Financial Times*, and a large US media company called Cox. Had both Thames Television and Times Warner authorised the financial contribution involved, 70 per cent of the funding would have been guaranteed, the basic ITC requirement. But Times Warner had approved only a ten per cent stake – a further 25 per cent stake was to have been considered by the company's main board in several weeks' time. The ITC had already extended the deadline for the submission of firm financial proposals on two occasions. Seeing that the consortium was clearly reluctant to commit some £175m to the project it declined to agree to the bid offer.

Thames Television, as one would expect, expressed concern at the ITC's decision and announced that it would consider seeking a judicial review. But it's hard to see that the ITC could have reasonably acted otherwise than it did. It has not finally written off the prospect of a Channel 5 service. There is to be a review of the options, and the ITC has stated that it would be prepared to readvertise the franchise should a bidder with the required finance come forward. Splitting the franchise between a number of holders responsible for providing services in different areas would have been a logical approach, especially as the whole idea was to emphasise local news and programming. It's not clear why the ITC felt that it had to have a single franchise holder for the network. But in view of the very real technical problems we will be better off without Channel 5. This may be hard on Thames Television, but it can always go up there in the skies where it is already having success with its joint-venture UK Gold service. It's interesting that plans for an ITV-2 satellite channel, which was being considered by the ITV companies, have been put on ice. It seems that, at least for the present, there isn't the income to sustain extra general TV services for the UK.

More on the Finlux 3000 Chassis

Chris Watton

Steve Cannon's article on this chassis in the August 1992 issue of *Television* was informative and helpful. Here are some further notes, based on my own experience with these sets.

Skymaster Handset

As Steve mentioned, the Skymaster handset can be programmed to work with various VCRs. The programming is simple and the system works perfectly. Until, that is, the batteries are exhausted or the operating voltage is interrupted for some reason. The problem can be overcome by adding diodes to the PCB to make the program permanent. The positions are marked on the panel, which is drilled so that the diodes can be fitted. Use type 1N4148 diodes. For the various modes, add diodes as follows:

Mode 0: Don't add diodes.
Mode 1: Add diode Dt14.
Mode 2: Add diode Dt13.
Mode 3: Add diodes Dt13 and Dt14.
Mode 4: Add diode Dt12.
Mode 5: Add diodes Dt12 and Dt14.
Mode 6: Add diodes Dt12 and Dt13.
Mode 7: Add diodes Dt12, Dt13 and Dt14.
Mode 8: Add diode Dt11.

These modes enable the unit to control the following VCRs:

Mode 0: Finlux VR2008, Schneider 266.
Mode 1: Finlux VR1010, 1012, 1030, 2010, 2030 and 2040. Asa VR6000 and VR2019. Philips VR6443, 6543, 6862, 6462, 6660 6467, 6760.
Mode 2: Sharp 781, 783, 785, 100, 102, 501, 801, 851
Mode 3: Sharp 682, 683, 684, 685, 693, 6F3
Mode 4: JVC HRD170, 180, 210, 230, 310, 470, 755, 530EH, 120, 300.
Mode 5: DER machines.
Mode 6: Hitachi VT250, 120, 130, 150, 414E and 420.
Mode 7: Panasonic NVG12, 21, 25 and NV870. Blaupunkt RTV320.
Mode 8: Asa VR2017.

This works only with the Skymaster RC3010 handset.

I2C Lines

The I2C data and clock lines are protected against overloading at the inputs to most of the slave devices and at the microcontroller chip's outputs. For example the SCL and SDL protection resistors at the input to the tuner processor are Ra2 and Ra3 respectively. In normal operation there's no voltage difference across these resistors. If there's a short-circuit at say pin 4 of IC11 then a voltage will be present across Ra2 (330Ω).

As a general rule, if a fault is suspected on either of these lines a check across the relevant resistors should, in the case of an overload, enable the cause to be determined. Before condemning the chip make sure that the decoupling capacitor, where present, isn't leaky.

Tricks

These sets can perform some nice tricks, for example the ability to display internally generated test bars with FINLUX at the top of the screen. This is obtained by pressing the handset's 'prog' button. The on-screen display can be moved by pressing the volume control then, before the display disappears, pressing the 'prog' key after which the step keys will move the display's position or remove it completely. To change the colour of the display, press the 'inv' key instead of the 'prog' key in the procedure just outlined.

Faults

EW modulator diode Dz8 (BY299) on the line output panel has been the cause of a concave picture on a few occasions.

The horizontal black lines fault mentioned by Steve Cannon is quite common. In sets that incorporate the vertical switch module mounted on the scan coils a similar fault can appear when the BC637 transistor Tv3 on this panel is defective.

Neither Steve nor I has been able to provide a lengthy faults list – there simply aren't many faults with this reliable chassis.

Appreciation

Finally I'd like to wish Barrie Judge, who recently left Finlux after being the technical manager for many years, a happy and prosperous future. The technical training days he ran were particularly helpful.

VCR Clinic

Reports from Philip Blundell, AMIEIE, Eugene Trundle, Brian Storm, Nick Beer, Stephen Leatherbarrow, Michael Dranfield, John Edwards, Andy Gallagher, Mick Dutton, Mike Leach Richard Newman, Roger Burchett and Alfred Damp

Sharp VC651H

This machine was stuck in the pause mode – the pause light came on as soon as a cassette was inserted, preventing play and record though fast forward and rewind operated. I took on the repair because I thought that the machine was the same as the Philips VR6843 for which I have a manual, but although it's similar mechanically the electronics are different. The front controls are connected to a resistor ladder network which is read by the syscon chip. None of the switches were dirty or leaky, and the isolation diodes were all o.k. So suspicion fell on the syscon chip. Fortunately I was right about this, a new chip restoring normal operation. According to Willow Vale's COPS the chip can be an X0161GE, IX0263GE or an IX0174GE. **P.B.**

Philips VR6870

This machine produced no E-E sound unless the audio select button was pressed. All became clear when the front was removed: the audio level sliders were not located on the controls themselves! Thus although the knobs were set at maximum the controls were at minimum. Fitting the front correctly and resetting the levels cured the trouble. **P.B.**

Philips VR6870 and Clones

Problems with the power supply, which uses a UA4006 chip, have been reported on a few occasions in recent issues. The circuit diagram shows C2007, C2027 and C2011 as all being 10µF electrolytics. In fact C2011 should be 33µF. In the event of a dead machine with a ticking noise coming from the power supply change all three capacitors. **P.B.**

Sharp VC482/VC8482

Sometimes – not often – this machine would fail to carry out forward deck functions. The rewind and review modes worked correctly. With the fault present we found that there was 3·5V on the REEL-M-RVS line, which normally toggles between logic levels 0V and 12V. After a long search the cause of the problem was traced to diode D735 being leaky. **E.T.**

Sharp VC9300

Considering that the symptom was simply no switch on, it took us rather a long time to locate the cause of this fault. The syscon 'on' command turned on Q9008 in the power supply but Q9005 failed to come on. Thus the regulator wasn't being latched on. The culprit was the electrolytic capacitor C9008, which is a decoupler in Q9005's emitter circuit. **E.T.**

Panasonic NVJ35

The complaint with this machine was that its maximum record time was one hour and twenty minutes. When I tried it the machine just stopped after an hour and twelve minutes. It then resumed and recorded for about half an hour before again stopping. The farther along the tape it got, the shorter its record periods. A scope check showed that the reel pulses that reached the syscon chip were at about 3·5V. In my experience they are usually more than 4V peak-to-peak. When I checked the opto chip from which these pulses are derived I found that there was a fair covering of fluff on the reflective surface of the reel drive gear. This has alternating black and mirrored portions that generate the reel pulses optically. Needless to say cleaning the surfaces cured the problem. **B.S.**

Panasonic NVJ45

When this machine was tried out all the displays lit up at once and flashed rhythmically. Checks showed that there were no abnormalities in the filament and dynamic drives from IC7501. But R7504 in the grid supplies had rather a large voltage drop across it for a 100Ω resistor. When it was measured out of circuit the reading was about 1kΩ. A replacement restored normal operation. **B.S.**

Panasonic NVL28

This machine would record and then play back perfectly but was unable to produce colour with a prerecorded tape. Further checks showed that "super still" was also very poor with prerecorded tapes. My first checks were around the video head and drum assembly to make sure that the head hadn't been fitted out-of-phase – this can cause no chroma playback and still frame problems. But there was nothing amiss here. A look at the servo and colour circuitry suggested that the MN6740VCJK systems and servo main processor chip IC2001 might be responsible for the trouble as it feeds rotary signals to the colour circuits and many other signals to the slow and still servo circuits. Fortunately a replacement cured the fault.

I then had colour and perfect slow and still when playing back prerecorded tapes but any tape with copy guard on it caused pulling at the top of the screen. As a cure for this Panasonic recommend fitting a 22µF non-polarised or tantalum capacitor across C9568 in the digital pack. **B.S.**

ITT VR3919

One or two faults are being noted with these Mitsubishi clones. Failure to record with the unit always auto playing is caused by the retaining clip on the rather weak record prevent switch being broken. Tape damage, particularly edge creasing and tearing with large amounts of oxide dust appearing around post P4, is usually caused by a worn pinch roller. Intermittent low or no sound and counter plus tracking problems is caused by a worn audio/control head – it seems to wear badly in these half-lace mechanisms. **N.B.**

Ferguson FV20

This machine would, with or without a cassette inserted, intermittently go into rewind or fast forward then switch to standby. If there was no cassette present when this happened the machine would light the cassette symbol in the display. Checks showed that the end sense condition at pin 43 of the syscon microcontroller chip IC6001 was incorrect. The d.c.

pull-up was low because R628 (120kΩ) had gone high in value. **N.B.**

Hitachi VT11

The drum would intermittently run at very high speed, the picture dissolving into a large number of lines. The cause was a dry-joint on the drum PG head connector. To locate and repair this we had to remove the DD unit. A new cassette housing damper to prevent any more cassettes going into orbit completed the repair. **N.B.**

Sanyo VHR4350

A loop of tape being left at eject is not uncommon with these full-lace machines. The cause in this case was new to me. As the capstan brake was sticking there was excessive braking and lack of reel drive during the unlacing process. Cleaning proved the point, replacement cured it. **N.B.**

Logik VR950/Samsung VI611

This machine accepted a cassette but when rewind was selected the tape was rewound for a few seconds after which the machine shut down with the standby LED blinking. When fast forward was selected the reel motor refused to turn – there was just a click, then the machine shut down again. There was also no reel motor rotation in the play mode, so the tape was looped. The fast forward command comes from pin 22 of the syscon chip IC602. We found that the voltage here changed from 0 to 2V when fast forward was selected. This voltage change should have appeared at pin 2 of the BA6209 motor drive chip IC0212. It didn't because of a hairline crack in the print near this pin. When this was linked across all functions worked but there was again shut down after a few seconds. This was caused by the reel optocoupler, which was producing distorted pulses. **J.E.**

JVC HRD110/Ferguson 3V38

Rewind and fast forward were normal but when play was selected the capstan ran flat out, giving the fast search symptom. Plug CN11 on the servo PCB was dry-jointed and loose. Resoldering didn't cure the problem: soldering the leads direct to the PCB did. **J.E.**

Hitachi VT130 and VT14

Picture rolling in the E-E and playback modes is a common fault with Model VT130. The cause is C524 (220µF, 16V) which is on the top PCB near the converter module. You usually find that it's swollen and discoloured. The same fault occurs with Model VT14, but in this case the capacitor is C859 (470µF, 16V). It's best to fit a capacitor with a higher voltage rating in both models. **J.E.**

Ferguson 3V55

We all drop clangers from time to time but this was a beauty. The complaint was that the channel selector couldn't be moved from the auxiliary input position (position 0). As there had been several heavy thunder storms recently we came to the conclusion that either the timer or the mechacon microcontroller chip had succumbed. But substitution checks showed that neither was at fault.

We decided to force the machine into the timer mode by making the auxiliary line go low. This produced snow on the screen in the E-E mode and we were able to tune in stations in the auxiliary position. We then found that we were also able to tune in the other positions and when the auxiliary line was released everything worked normally. This whole business wasted several hours. What had happened of course was that the electrical storm had wiped the tuning memory clean and it then refused to select any channel other than auxiliary until this position contained information. **M.D.**

Osaki V20H

The fault with this machine was excessive drum speed followed by shut down. We traced the cause of C145 (100µF, 10V) which was leaky, upsetting the FG processing associated with the BA4558 chip IC104. **S.L.**

Matsui VCP100

This machine would very randomly fail to play a tape. It would stop and unload. We eventually noticed that this also occurred in rewind and fast forward. Lack of reel pulses seemed to be the obvious diagnosis, and sure enough we found that after the machine had been in use for a while they became low in amplitude and distorted. In this machine the relevant piece of optical wizardry is mounted on a neat PCB beneath the take-up reel. This is available from CPC – buy the GoldStar deck equivalent, it's cheaper. **S.L.**

Schneider SVC261RC

There were no E-E signals, just a blank screen. We struck lucky with our first check, at the 12V input to the i.f. unit. This supply was missing because R330 (4·7Ω) was open-circuit. It seemed to have failed because the customer had accidentally dropped a 1p piece into the machine. **S.L.**

Philips VR6870

This VCR came in dead. We soon found that the cause was the usual culprit – C2011 (33µF) was leaky. After replacing this capacitor we left the machine on test for the rest of the day then returned it. Two days later it came back with a note to say "no better, as before, worse". It was in fact dead. Further checks revealed that two more electrolytics were leaky, C2006 and C2007. C2006 is 220µF and is in the power supply on the main PCB. C2007 is 25µF and is on the sub-PCB – the circuit diagram gives the value as 10µF. **A.D.**

JVC HRD170/Ferguson FV11R

The problem with this machine was loss of capstan servo control – noise bars ran through the picture. The control track pulses were o.k. at pin 20 of the servo chip IC2, and someone had already changed this i.c. So further investigation was required. We eventually found that C25 (4·7µF, 25V) was the cause of the trouble. It tested o.k. but a replacement cured the fault. **M.Dr.**

Proline 5000XR and Amstrad VCR4600

The Proline 5000XR looks like the Amstrad VCR4600. The one that came to us had the same fault we've experienced with many VCR4600s, no E-E picture, just a blank raster, but the sound o.k. In the Amstrad VCR4600 the 1,000µF, 6·3V video coupling capacitor C817 at the i.f. block's output pin is the cause of the trouble. This capacitor has a different reference number, C710, in the Proline model. On test we found that it wasn't short-circuit, but we replaced it anyway, using a 25V type for good measure. This made no

difference. The cause of the trouble was actually inside the i.f. block: there was a dry-joint at the earthing pad to can, connected to a small, blue surface-mounted component near TR3, which is presumably the video output buffer transistor. Resoldering the joint put matters right. **M.Dr.**

GoldStar GHV1240

Playback was o.k. with this machine but the E-E pictures were very poor, as though they were slightly off tune. After checking the tuning we connected the scope to the i.f. module's video output pin and found that the waveform was very distorted. So the module was removed for testing. As we've had almost the same fault with Grundig tuner/i.f. modules, caused by a 1µF electrolytic, we weren't surprised to find a very dried up 1µF, 50V capacitor. Its reference number wasn't clear – C71 something – but you shouldn't have any trouble locating it as it's the smallest electrolytic in the can. Replacing it cured the fault. **M.Dr.**

Akai VS23

If you find that TR12 is short-circuit collector-to-emitter and FR1 is open-circuit with power supply V1084B502A the cause is likely to be shorted turns in L8. Replace L8, TR12 and FR1. **A.G.**

Sony SLV373

This new machine had apparently worked for a week. Then it came in with the complaint that there was no colour with playback of prerecorded tapes. I tried making a recording and sure enough the playback produced good colour. But there was no colour when I played back the recording in a known good machine – our old faithful Ferguson 3V29. So the Sony machine was working to its own standard. There was only very slight colour with playback of prerecorded tapes.

I ordered a service manual and hoped that the fault would go away by itself. Well, the manual came but the fault didn't go away. I dived in at the HA118016NT chroma processing chip IC801 on the YC board, checking all the waveforms and d.c. voltages while playing a prerecorded tape. The conditions at pin 19 were very wrong: the d.c. voltage was low and the waveform was completely different from that shown in the manual. Sony calls this waveform C ROT. It should be a squarewave at about 4·5V peak-to-peak. But it didn't look like a squarewave at all. So I traced it back to the head amplifier board where I found that the print at pin 6 of plug CN004 was broken. It was obvious that someone had been at it before, as the soldering around this plug was in an appalling condition for a new machine. After repairing the print and generally tidying up the plug all tapes played back correctly. **M.L.**

Philips VR6460

This machine had an intermittent fault. It would work normally for days or weeks at a time. Then it would 'hang up', going into permanent rewind no matter which button was pressed. Once the tape had been ejected it wouldn't accept another one. We were convinced that it was a mode switch fault and fitted a replacement. The machine worked for two weeks then the same thing happened again. Heating or freezing the servo board had no effect and another engineer had tried the microcontroller chip. We suspected plugs and sockets but couldn't fault them. By now the fault had once more cleared.

When the fault next appeared I was ready to do battle! Armed with the service manual and a logic probe I set to work checking the input conditions at the servo chip IC7125 from the mode switch. The manual is very helpful, giving the logic conditions for all functions at pins 4, 5 and 6. All three inputs were high, which is incorrect. The reason for this was soon apparent as the earth connection to the mode switch also measured high! This connection goes to a plug and socket on a small PCB (P667) which is mounted on the front deck. The panel is earthed by a single screw and star washer that had worked loose. A screwdriver was all that was needed to provide a complete cure. I now check this on all VR6460s that come in. **R.N.**

JVC HRD170/Ferguson FV11R

Two of these machines came in with the same fault. They would accept a tape and the front controls operated. There were no functions however because the drum wouldn't rotate, and there were no E-E signals. The tape would be ejected after a few seconds. In both cases replacing the STK5481 power supply module cured the trouble. **R.N.**

Ferguson 3V44/JVC HRD140

Because of the extremely intermittent nature of the fault with this machine it unfortunately bounced. Operation with prerecorded tapes was perfect, but with its own recordings there were occasionally tracking errors and an interference bar would roll through the picture. As a complete repair kit had already been fitted I decided that a mechanical cause of the trouble was extremely unlikely. Eventually scope checks revealed that the machine didn't always record a control track on the tape. After some time had been spent checking around I found that C430, which couples the control pulses to the head circuit, was dry-jointed. Resoldering was all that was required. **R.N.**

Amstrad VCR6000

As usual with calls from remote and exposed places the symptoms hadn't been very clearly explained over the phone. A quick glance at the owner's tapes showed a familiar sight however – crinkling of the bottom edge. But this wasn't a 4500 or a 4600. It seems that the fault had been present from new. Recordings made in the LP mode were unwatchable as the machine kept switching cyclically into the SP mode. Easing off the back tension showed that the tape was being pulled down by the pinch roller, which was some way off vertical. So was I as I battled back against the storm. **R.B.**

Philips VR6520

After a full mechanical service this machine displayed a flashing dew warning while the cassette down symbol was permanently lit. The reason for this was simple but could catch anyone out. Link W20 on the operation panel had been replaced with a choke which was shorting to link W21. This had obviously happened when I'd refitted the front panel. W20 is in the regulated 5V supply to the operations panel while W21 is in the serial data line from IC6501. The machine worked all right apart from this, though the functions weren't displayed. **R.B.**

Proline 5100XT

This machine is similar to the Amstrad 4600 Mk. II and suffers from the same tape-creasing problems. **R.B.**

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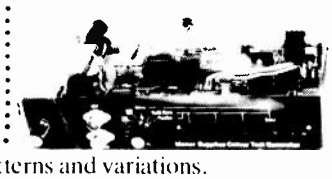

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NICAM on a Shoestring

Keith Wevill, B.Sc.

When Nicam stereo finally arrived at the Waltham transmitter, albeit on only ITV and Channel 4, I wanted to be able to receive the new digital stereo sound. A new TV set was low down on the priority list of our domestic budget however, so alternative methods were considered. The best compromise solution seemed to be the use of an external decoder that could be linked to the stereo system. In the April 1991 issue Keith Cummins described the use of the readily available Maplin decoder, but before ordering one of these I noticed that Sendz Components list a surplus Nicam decoder for £15. I decided to send off for one. When it arrived I realised why it was surplus and cheap: it was designed for the German market, and as such wouldn't work in the UK. Before consigning it to the cupboard I read through Eugene Trundle's series on Nicam stereo in the September, October and November 1990 issues and realised that the decoder required only a few simple modifications. In fact the modifications took less than an hour to do, and once the decoder had been set up I was rewarded with digital stereo sound.

System B/G and I Differences

The main differences between system B/G, used in Germany, and the UK system I are the vision bandwidth (5MHz instead of 5·5MHz) and the sound carrier frequencies. System B/G has the f.m. carrier at +5·5MHz with respect to the vision carrier and the Nicam subcarrier at +5·85MHz: the corresponding frequencies for system I are +6MHz and +6·552MHz. With system B/G there's also a second f.m. sound carrier at +5·74MHz – this is not present with system I transmissions. Thus all that was required was to change the Nicam frequency from 5·85MHz to 6·552MHz. It sounds complex, but only two components are needed and they cost under £5.

The Surplus Board

As received the board appears to be a complete Nicam stereo decoder and stereo amplifier module, designed for use in the Thomson ICC5 chassis. It contains a Nicam decoder, two intercarrier sound demodulators (5·5MHz and 5·74MHz), an audio source switch with provision for two scart sockets, tone and volume controls, two power amplifiers and a stereo headphone amplifier. The whole board is surrounded by a heatsink for the two power amplifiers and a 5V regulator. Figs. 1 and 2 show the board layout and a block diagram: a circuit diagram comes with the board.

The Nicam decoder consists of a Toshiba TA8662 demodulator, a Texas CF70123 demultiplexer and a TDA1543 DA converter, the demultiplexer and DA converter being mounted on a subpanel. For more information on the TA8662 and CF70123 refer to Eugene Trundle's articles. Our old friend the TDA120 is used in the intercarrier demodulator positions. Audio switching is performed by a 4053 CMOS analogue switch and a TDA8405, which also decodes the second analogue audio channel. A TDA8421 provides the volume, balance, bass and treble controls for the two TDA2040 power amplifiers and also provides independent volume control for the MC4558 headphone amplifier. Most of the resistors and capacitors and all the transistors are of the surface-mounted type. The TDA8405 and TDA8421 can be controlled by a microcomputer chip via an I2C bus.

The board requires three power supplies: 36V for the power amplifiers, 13V for the analogue circuits, and 7V for the 5V regulator that feeds the digital circuits.

Modifications

After consulting Eugene Trundle's articles it appeared that adapting to 6·552MHz Nicam was simply a matter of changing the input bandpass filter and the demodulator crystal. That was the easy part. The harder part was where to get suitable replacements. Fortunately the Maplin Electronics catalogue features a Nicam decoder, and I soon discovered that the firm stocks replacement filters, crystals

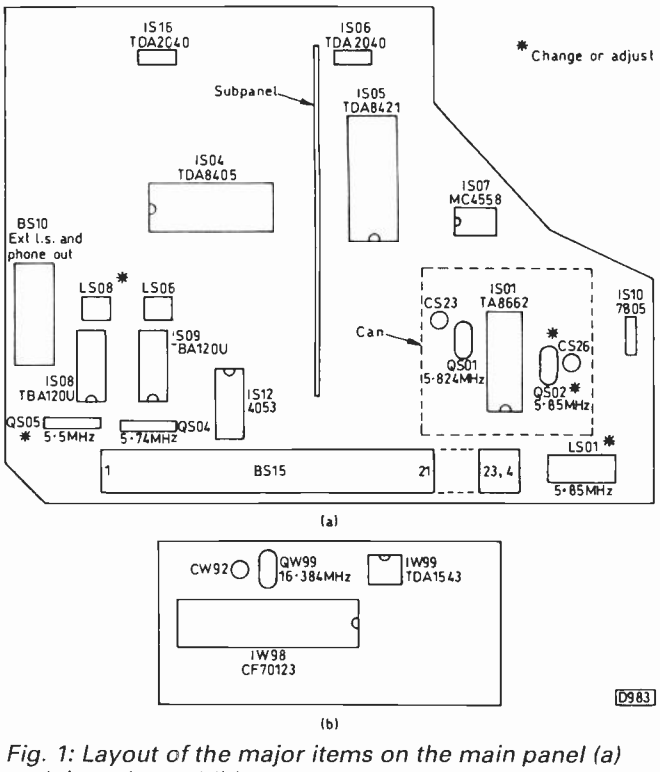

Fig. 1: Layout of the major items on the main panel (a) and the subpanel (b).

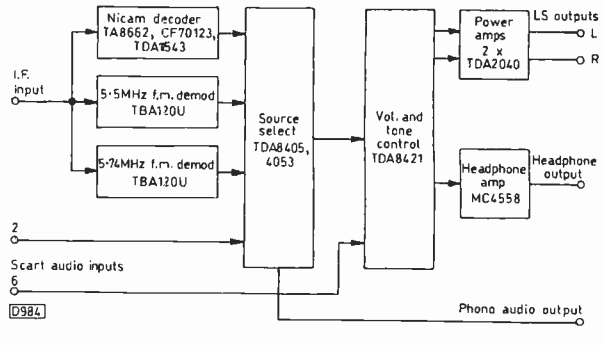

Fig. 2: Block diagram of the circuitry on the panels.

and also the TA8662 chip. I bought a filter and a crystal and found that they were both exact fits.

After fitting these I applied power and a suitable signal, which was initially obtained from the video output of my workshop TV set and was connected to pin 14 of the decoder's edge connector, and monitored the decoded output at pins 2 (left) and 12 (right) of the 4053 switch. The result: absolutely nothing! I then studied the circuit diagram in greater detail and realised that the input buffer transistor had no bias. In the intended application the bias is supplied from the main panel. So a resistor was added to provide bias and the decoder then burst into life. It was time to tidy up the modifications and produce a suitable interface to enable the decoder to be properly connected to the TV set and audio system.

As I don't as yet have any means of driving the I2C bus to control the switching I decided not to use the on-board switching, tone controls or the power amplifiers. Instead I decided to use the panel purely as a stereo decoder, feeding the signals to an external amplifier. This would simplify matters as no 36V supply would be required. There also had to be a way of selecting the normal mono f.m. sound, especially in this area at the time of writing. Other requirements were that a VCR could be connected to the interface and that the audio from the VCR could be selected for feeding to the external amplifier. In addition, because my stereo amplifier has no spare inputs, I would have to be able to feed the output from my tuner into the interface and use the amplifier's tuner input for either the tuner, the TV or the VCR sound. All the Nicam/f.m./VCR switching had to be automatic, and the interface should power up on the tuner input.

To simplify the TV interfacing I decided to use one of the module's intercarrier demodulators for the f.m. sound, thus removing the need to take an audio output from the TV set. This meant that the 5·5MHz ceramic filter had to be replaced with a 6MHz one and the demodulator coil had to be retuned. Fortunately the core has sufficient tuning range, and the board is laid out to take the most 6MHz filters.

As with Keith Cummins' adaptation of the Maplin Nicam decoder, I took the output from the TV set via a buffer

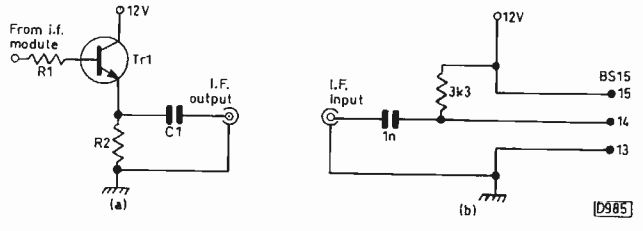

Fig. 3: Buffer circuit used in the TV set (a) and the modifications at the input to the panel (b).

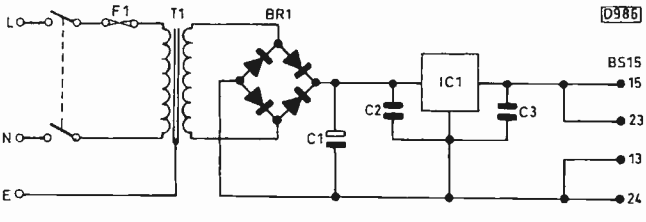

Fig. 4: A suitable power supply for the panel when used in the way described.

stage, see Fig. 3(a). This has to be fitted before the 6MHz intercarrier sound trap. Even in sets that are not designed for Nicam reception there's usually sufficient 6·552MHz carrier present at this point. In the Ferguson TX9 chassis the most suitable point to add the buffer stage is at pin 6 of the i.f. module – this takes the output from pin 12 of the TDA2540

Fig. 5: Eye pattern. See decoder setting-up.

i.f. chip. A similar point should be available in most sets – consult the circuit diagram.

If any connection is made to a TV set it's imperative that the chassis is isolated from the mains supply. Not all TV chassis are mains isolated, and care must be taken to establish whether or not the chassis is isolated. A suitably rated isolating transformer must be used when the chassis is not isolated. Transformers rated at 80VA and 120VA are available from Jaytee Electronic Services, 143 Reculver Road, Herne Bay, Kent CT6 6PL.

The modifications required to the Nicam panel are as follows:

(1) Replace filter LS01 with a 6·552MHz one.

(2) Replace crystal QS02 with a 6·552MHz one.

(3) Add a 3·3kΩ resistor and a 1nF capacitor as shown in Fig. 3(b).

(4) Apply power – a suitable power supply circuit is shown in Fig. 4. As the power amplifiers aren't being used no 36V feed is required.

(5) Connect a frequency counter to pin 8 of the TA8662 chip IS01 and adjust CS26 for a reading of 6·55185MHz ±50Hz.

(6) Check that the voltage at pin 16 of the multiway connector is more than 10V with a Nicam signal present and less than 1V with no Nicam signal.

The other crystal oscillators should be set up already and shouldn't need adjustment. If they do, monitor the 5·824MHz oscillator at pin 26 of IS01 and set it to 5·824MHz ±20Hz by means of CS23; set the CF70123 chip's clock to 16·384MHz ±50Hz by monitoring at pin 11 of IW98 and adjusting CW92. If all is well the decoder can be considered to be working.

As an alternative to using a frequency counter to set the 6·552MHz oscillator the X input of a scope can be connected to pin 19 of IS01 and the Y input to pin 20 to provide an X-Y display. These pins are conveniently brought out to chokes LS02 and LS03. Use x10 probes and set the gain settings to 1V/division. With a video signal connected and a Nicam signal present adjust CS26 for a square, upright pattern as shown in Fig. 5. Once set this can be used as an aid to precise tuning of the TV set as the pattern will be less well defined if the tuning is slightly out.

The modifications to the intercarrier sound channel are :

(1) Replace filter QS05 with a 6MHz one.

(2) Connect the module to the TV set, apply power, monitor pin 8 of IS08 and adjust LS08 for best sound.

Interface Details

A block diagram of the complete audio interface is shown in Fig. 6 while Fig. 10 shows the circuit. The 4052

chip IC1, a two-pole four-way CMOS switch, does the switching, with the VCR and radio/aux inputs buffered by a TL074 quad op-amp (IC2). The Nicam and f.m. inputs are fed straight into the 4052 from the decoder module. A TL072 dual op-amp chip (IC3) buffers the outputs.

The control logic consists of a set/reset latch formed by IC4a and IC4b, with the two pushbuttons S2 and S3 to select either the radio or TV mode. In the TV mode either Nicam, f.m. or VCR sound is selected depending on the state of the relevant control inputs, Nicam present or VCR scart status. LEDs indicate the state of the Nicam and VCR control lines and the TV and radio pushbuttons. R28 and C11 form a power on reset to ensure that the interface powers up in its radio mode. A three-position switch (S1) is used to force the control logic to select either Nicam or f.m.: in the centre position selection is automatic, with Nicam sound being given preference.

An optional feature mutes the TV set's internal audio amplifier when the interface's TV button is pressed. Connect this to the set's volume/mute control circuit at a point that mutes the sound when it's connected to chassis. A suitable point in the Ferguson TX9 chassis is pin 12 of PL5. Suitable points can be found in most chassis, especially those that use a d.c. voltage for volume control. If it's not required this feature can be deleted by omitting D9 and R33.

Construction of the Interface

Construction of the interface is not critical. It can be built on Veroboard or something similar. The chips, especially the CMOS ones, should be mounted in sockets. House the interface, decoder module and power supply in a suitable case with the on/off switch, pushbuttons and LEDs on the front panel. The mains input, BNC i.f. input, scart sockets, audio connections to the stereo amplifier and the Nicam/f.m. switch S1 are mounted on the rear panel.

The connections to the amplifier can be phono or DIN depending on your own preference. Make sure that the digital and analogue earths are separately connected to the power supply's 0V connection using short leads.

If you are using the aux input to your amplifier and want the interface to power up in the TV rather than the radio/aux mode, link pins 4 and 5 of IC4, remove the link between pins 12 and 13 of IC4 and connect the power on reset circuit R28 and C11 to pin 12. The aux/radio input can then be used as a spare amplifier input.

Mains power can be taken from the stereo amplifier so that the decoder/interface is powered when the amplifier is on. Alternative power supply arrangements can be used if more convenient. It's advisable that the decoder is powered by its own supply as the TV set may not be able to supply the necessary current.

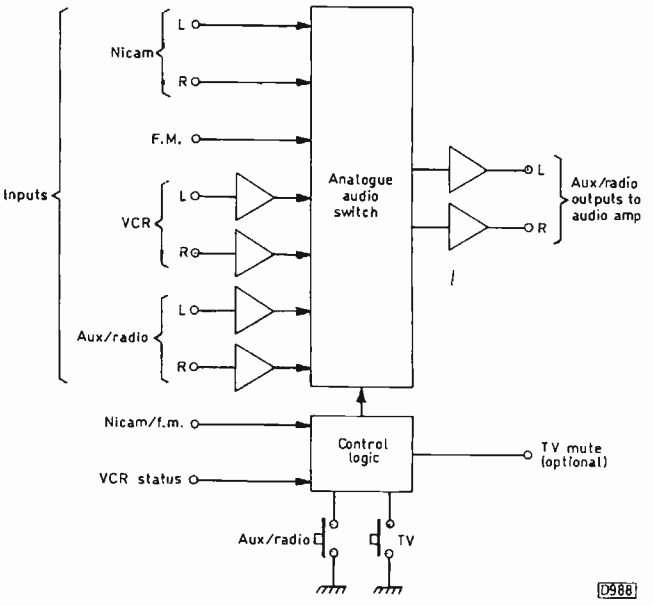

Fig. 6: Block diagram of the interface system.

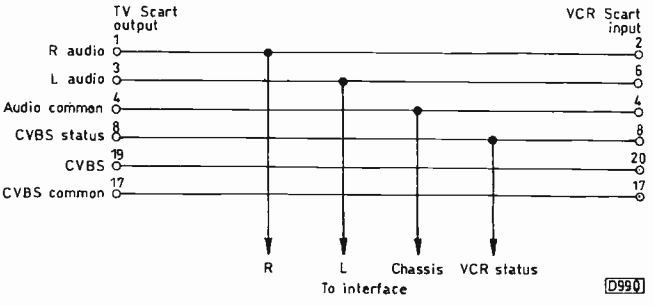

Fig. 7: VCR and TV set interface wiring.

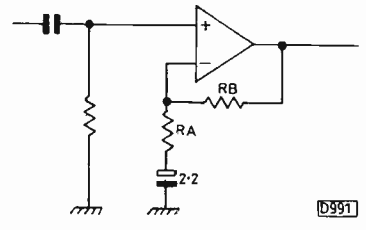

Fig. 8: Modification to provide gain at the input. Gain = (RA + RB)/RA. RB = 22kΩ.

Fig. 9: Six-pin DIN to scart connections.

Setting Up

The decoder's output levels are roughly the same as those from a CD player. They had to be attenuated therefore before being fed into my amplifier's tuner input. If the VCR or aux input levels are too low the input buffers can be modified to provide some gain – see Fig. 8.

The following setting-up procedure applies to the interface circuit shown in Fig. 10. Set the crystal oscillator as previously described then, with a Nicam signal present, adjust R1 and R3 so that the levels are the same as those from the radio input. Select f.m. and adjust PS01 on the decoder panel for the same level. Apply a VCR signal and adjust R6 and R8 for the same levels.

Although this interface uses scart connectors, some VCRs have 6-pin DIN connectors for audio and video in/out. Fig. 9 shows how to wire a 6-pin DIN to scart cable. For mono ignore pin 6 of the DIN connector and link pins 2 and 6 of the scart connector.

Results

Once the system has been set up the difference in quality between the internal amplifier and speaker of the TV set and an external hi-fi system is remarkable, even with ordinary f.m. sound. You can hear all the little background noises in the studio, shoes creaking and papers rustling, and outdoor scenes prove that the microphones used are very sensitive.

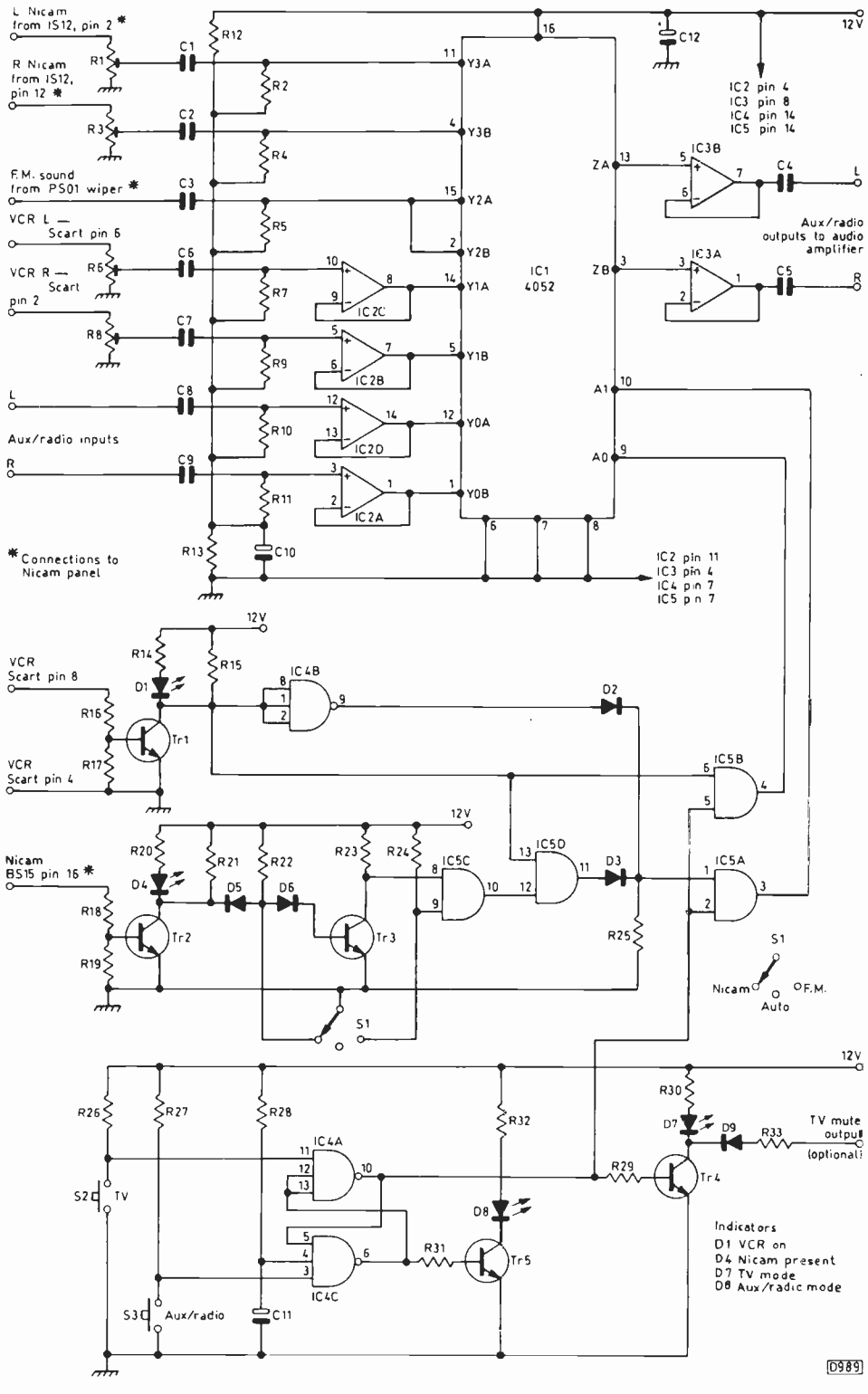

Fig. 10: Interface circuit.

Some films are outstanding in stereo, and music programmes are much better. The speakers should of course be placed either side of the TV set for the best effect.

I2C Interfacing

It seems a pity to have a complete stereo amplifier available and not be able to use it, so a future project will be to build an I2C controller and use it to control the switching and tone controls. It will then be possible to use the module in conjunction with a TV set and other signal sources as a self-contained stereo system.

Components list

For Nicam panel:

6·552MHz crystal – Maplin UK98G
6·552MHz filter – Maplin JM93B
6MHz filter – Maplin UL53H
3·3kΩ, 0·25W 5% resistor
1nF disc ceramic capacitor

For TV buffer stage:

R1 100Ω, R2 470Ω. 0·25W 5%
C1 1nF disc ceramic
Tr1 BC548
BNC socket

For power supply (Fig. 4):

T1 10VA with 15V secondary
BR1 1A bridge rectifier
C1 2,200µF, 25V electrolytic
C2 and C3 100nF disc ceramic
IC1 7812 regulator
F1 1A fuse with holder
On/off switch

For interface (Fig. 10):

C1-9 220nF
C10 10µF, 25V
C11 2·2µF, 25V
C12 10µF, 25V

R1	50k preset	R18	47k
R2	100k	R19	22k
R3	50k preset	R20	1k
R4	100k	R21	10k
R5	100k	R22	10k
R6	50k preset	R23	10k
R7	100k	R24	10k
R8	50k preset	R25	100k
R9	100k	R26	10k
R10	100k	R27	10k
R11	100k	R28	10k
R12	4·7k	R29	47k
R13	4·7k	R30	1k
R14	1k	R31	47k
R15	10k	R32	1k
R16	47k	R33	100Ω
R17	22k	All 5%, 0·25W	

IC1	4052	IC4	4023
IC2	TL074	IC5	4081
IC3	TL072	Tr1-5	BC548

D1,4,7,8 LEDs
D2,3,5,6,9 1N4148

S1 SPDT centre-off switch
S2, 3 Push-to-make switches
BNC socket
Two scart sockets
IC sockets – one 8-pin, two 14-pin and two 16-pin
Case
BNC-BNC cable (TV set to decoder unit)

Servicing the Tatung 190 Series Chassis

Duncan Grant

The 190 series chassis was introduced as a replacement for the 160/165 series chassis. There are remote and non-remote control versions, and with minor circuit variations it will drive 14, 20 and 21in. tubes. The 190 and 195 chassis are non-remote and remote control versions respectively with 14in. tubes; the 191 and 196 are non-remote and remote control versions with 20in. tubes; while the 197 is a remote control chassis designed to drive a 21in. FS tube. The 197 has a lower h.t. (109·5V instead of 115V) than the other versions and incorporates a different line output transformer. In the 20 and 21in. chassis the audio output chip has a heatsink and drives an 8Ω loudspeaker instead of the 16Ω one used in 14in. sets.

Overview

As with the 170 series chassis the switch-mode power supply provides mains isolation: it differs in using a f.e.t. chopper transistor and a more compact control chip, type TDA4605. A f.e.t. was chosen for this application because it will operate at a higher frequency than a bipolar type, enabling a more compact transformer to be used. Despite its small size the TDA4605 chip incorporates excellent protection and shutdown features and is very robust.

The small HD401220 control chip provides tuning, memory and basic control functions. In the standby mode it disables the 12V regulator, thereby removing the drive to the line oscillator.

Much of the circuitry (i.f., sync and the timebase generators) is incorporated in the TDA4505 chip which in addition to the usual functions has automatic switching for VCR playback and a divider system for generating the field sawtooth drive waveform, thus avoiding the need for a field hold control.

These are generally very reliable chassis with excellent protection circuitry and no "chain reaction" failures where an initial faulty component leads to the demise of a number of others.

Power Supply Operation

The power supply circuit is shown in Fig. 1. The main items are the TDA4605 control chip IC801, the BUK454-800 chopper transistor TR801 which is a MOS type f.e.t., and the chopper transformer T801. T801's primary winding is connected, in series with TR801, to the voltage developed by the mains bridge rectifier D801-4 across its reservoir capacitor C808. When TR801 switches on energy is stored in the transformer. When it's switched off this energy is transferred via the secondary windings to the loads. By varying the transistor's switch-on time the TDA4605 chip controls the amount of energy delivered to the loads. Thus the output voltages are virtually independent of the load conditions.

Rectifier D808/C806 produces a feedback voltage which is fed via a resistor network to pin 1 of the chip for control purposes. It determines the width of the drive pulses produced at pin 5 to suit the load conditions. R806 (set h.t.) adjusts the proportion of the feedback voltage applied to pin 1.

The feedback winding on the transformer is also connected, via R804/5, to pin 8 of IC801. Each negative-going waveform excursion (falling edge) from T801 triggers a zero-crossing detector in the chip, enabling the logic that controls the timing of the next drive pulse from pin 5. This ensures that the output pulses are correctly timed.

The charging network R811/C807 produces a sawtooth waveform whose amplitude is controlled by a switch behind pin 2 of the chip. This action generates a voltage that's proportional to TR801's drain current. Should the current drain reach the overload point the logic within the chip will set the output at pin 5 to low potential.

A proportion of the voltage across the reservoir capacitor C808 is fed to pin 3 of the chip where it's compared to an internal reference voltage. This is under-voltage sensing: if the supply voltage is too low the chip switches off.

D807 and C803 produce the supply for the chip. For start-up purposes pin 6 is also connected to the mains input via R802/3.

The chip has internal temperature sensing. If its temperature becomes excessive the internal logic is disabled. The chip then continues to check its own temperature. When the temperature returns to normal it will start up again.

Dead Set, Mains Fuse Intact

We'll start with the dead set symptom, with the mains fuse intact but no LED display. The best way to tackle this problem is to disconnect the supply to the line output stage by lifting one end of L403 – it lies alongside the line output transformer, on the edge of the board.

If the power supply remains dead, check the start-up resistors R802/3 (15kΩ, 0·5W). A change was introduced here: in later production sets these are 16kΩ, 0·6W metal-film resistors. Next check TR801 which could be short-circuit between its gate and source connections. This will short out the drive from the chip. Usually the mains fuse doesn't blow, but occasionally it will "soft blow".

Check the voltage at pin 6 of IC801. It should be about 10V with respect to pin 4. Until the supply from the transformer is established the voltage at pin 6 will not be steady: instead it will pulse on and off. If the voltage at this point is low, suspect that C803 has lost capacitance or is open-circuit. Note that when C803 is low in value the power supply may operate unloaded but will not operate when the load is connected. When C803 is open-circuit on the other hand the power supply won't operate at all.

If there's no voltage at all at pin 6 and the start-up resistors are o.k. suspect IC801.

If the power supply works when L403 is disconnected, connect a 100W bulb as a substitute load for the line output stage. When the h.t. supply is at just under 115V the bulb should light. If it doesn't and the supply reservoir capacitor C803 is o.k. the most likely culprit is R827 (47Ω, 4W wire-wound). You may find that this component is marked on the PCB as a link (LK820). In later production sets R827 is a rectangular-type resistor that rarely fails. In either case it's situated next to TR801 within the confines of the heatsink.

If the power supply remains dead accompanied by a high-pitched bleep at one or two cycles per second this will usually mean that there's a direct short-circuit across the h.t. or one of the other outputs from the power supply. As a

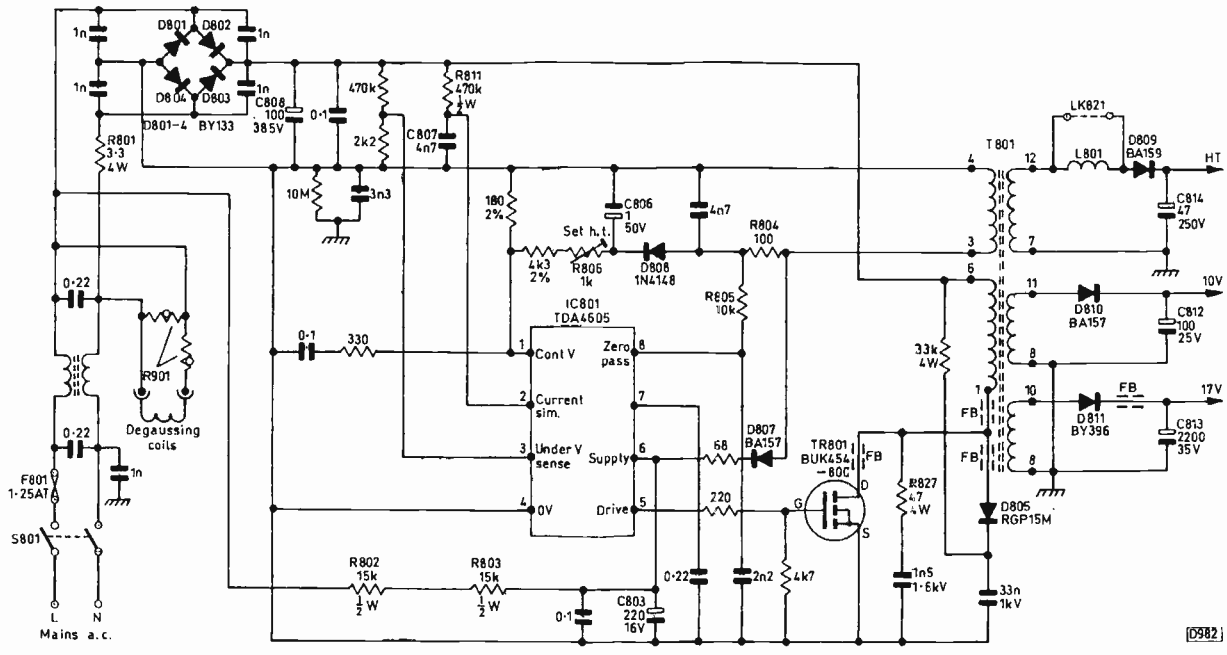

Fig. 1: The f.e.t. chopper power supply circuit used in the Tatung 190 series chassis. In remote control versions the on/off switch S801 has an extra, momentary-make contact. The h.t. varies with tube type.

result the power supply operates in the "shut-down" mode.

Dead Set, Mains Fuse Blown

If the mains fuse has blown there's normally no need to disconnect the supply to the line output stage as the problem lies in the power supply. First check the bridge rectifier circuit, then TR801 which you will probably find has gone short-circuit. The surge limiter resistor R801 (3·3Ω, 4W) may be open-circuit as a result. More than likely there will be no other damage. It's worth checking R811 (470kΩ, 0·5W) as well however since if this resistor is open-circuit or high in value a new TR801 will die instantly.

If TR801 seems to be in order it's a good idea to remove it from the heatsink and carefully examine the insulator and the heatsink itself for any signs of perforation.

IC801 is the next suspect. Occasionally, in very stubborn cases, it may be necessary to replace IC801 and TR801 as a pair.

The Line Oscillator

The line oscillator's free-running frequency is determined by R109 (30kΩ, 2%), R111 (4·7kΩ, hold control) and C111 (2·7nF, 1%) which are connected to pin 23 of the TDA4505 chip IC101. The line drive output appears at pin 26. If there's no output waveform at pin 26 though the waveform at pin 23 appears to be in order check that its frequency is correct. Oscillation will continue even if C111 is open-circuit or dry-jointed, but the frequency will be around 1·5MHz.

If everything seems to be in order here you may notice that the voltage at pin 26 is around 2·5V instead of the 4·2V shown on the circuit diagram though a line drive waveform is present. This doesn't mean that there's a fault in this area. If the line output stage in inoperative there will be no feedback pulse to pin 27. The mark-space ratio of the drive waveform will therefore be reduced, resulting in a lower d.c. voltage at pin 26 and insufficient output to the driver stage.

The cause of one rather elusive fault that made the set trip but wasn't, as you'd expect, in the line output stage was eventually traced to the track to pin 23 (line oscillator) of IC101 being open-circuit. This left pin 23 with no external circuitry connected and, although a waveform of sorts was present, the line output transistor was being switched on for too long. Hence the excess current flow and tripping power supply.

Another unusual fault whose cause you might expect to lie in the driver or output stage was rippled verticals. C112 was dry-jointed. The effect could be modified or eliminated by adjusting the line hold control R111 away from its correct setting.

The Line Driver and Output Stages

The first thing to check in the line driver stage is the value of the 18Ω feed resistor R413. It sometimes goes high, the result being one or more of the following symptoms: no drive to the line output transistor; lack of width with line foldover in the centre of the screen, particularly when the brightness control setting is increased; ragged verticals; and intermittent variations of these symptoms. If R413 is in order, check the voltage across it. The reading, again in the absence of feedback pulses, should be about 1·3V. Then check the line output transistor and transformer.

If e.h.t. is present but there's no raster and the line driver and output stages seem to be in order, check that the c.r.t. heater voltage is present at the base panel and that sandcastle pulses are present at pin 27 of IC101. It's important to remember that the c.r.t. heater winding on the line output transformer also supplies the feedback pulses to IC101's sandcastle pin 27. A careful check on the print that runs from pins 6 and 10 of the transformer, paying particular attention to the printed circuit-pads around the transformer pins, will usually solve the problem.

I have encountered only one case of repeated failure of the S2000AF line output transistor TR403. The cause was a dry-joint on the flyback tuning capacitor C404.

If the power supply has shut down, accompanied by a repetitive bleeping sound, but works with a dummy load,

check whether TR403 or the BY133 efficiency diode D401 is short-circuit.

Tripping

Non-remote control sets will continue to trip indefinitely if the line output stage is drawing excessive current. Remote control sets in this condition trip once or twice then go into the standby mode.

The best course to take when the power supply is tripping is to disconnect the scan coil plug and the c.r.t. base panel. This eliminates the scan coils and the c.r.t. from suspicion, which must then fall on the line output transformer T402. If the set trips with a peak-white raster that can't be turned down by means of the first anode control the likely cause is a dry-joint on the tag at the bottom of the first anode/focus voltage module, where it goes through the board. The consequence of this is that the first anode voltage rises to 1kV and the set trips.

Another possible cause of tripping is that the TDA3653B field output chip IC301 has gone short-circuit. Its supply is derived from the line output transformer, via R411 which in this event will usually have gone open-circuit. The value of R411 varies between models.

Before proceeding with the "going into standby" fault it is as well to clear the touchpad of suspicion by unplugging the membrane from its socket and also removing the batteries from the remote control unit in case either membrane is causing the problem.

The Field Timebase

Field timebase troubles are not common with these chassis, though as noted above the output chip IC301 occasionally goes short-circuit, taking R411 with it. No field scan usually produces a blank screen until the first anode control is turned up, because of the field blanking circuit in IC101 (TDA4505).

IC101 can be the cause of foldover at the top of the screen accompanied by excessive height. Before condemning this chip however check its supply voltage at pin 7. There should be 12V ±2 per cent here. If the voltage is more than about 12·24V the LM317T 12V regulator IC803 is likely to be faulty. When faulty it can produce 15V or more. As a result IC101 is overrun and overheats. Often the application of freezer to IC101 will remove the symptoms for a while, which is misleading since it suggests that IC101 is defective. Multifunction chips of this type are, in common with microcontroller chips, very sensitive to their supply voltage. If the 12V supply is low the result will be reduced height.

Though rare, another cause of reduced but linear field scanning is that R411 has gone high-resistance.

While on the subject of the 12V regulator, always measure the voltage at pin 7 of IC101 rather than that at pin 2 of IC803 since L101 and C103 form part of the smoothing for IC101's supply.

Other possible causes of foldover at the top of the picture are IC301's supply reservoir capacitor C409 (1,000µF, 35V) or broken tracks around IC301, especially if this chip has been replaced. If there's no supply voltage at pin 9 of IC301 check the print continuity from pins 8 and 9 of the line output transformer and of course R411.

A rare but very puzzling fault produces patterning over the bottom half of the screen only: the cause is the field output chip. The patterning waveform is clearly identifiable when the field drive or feedback waveform is scoped. The reason for the patterning appears to be the drive waveform from IC101 which is, or course, part of the linearity feedback loop.

Tuner and Tuning Faults

A pulse-width modulated output from pin 25 of the HD401220 control chip IC702 produces, in conjunction with TR717 and its associated circuitry, a 0-33V tuning voltage, thereby covering the whole u.h.f. band. When dealing with tuning problems such as drift it's advisable to unplug the touch-pad membrane as the symptom can be caused by a fault in the membrane. Later membranes are very much more reliable and don't seem to suffer from this problem. The most likely cause of no signals, tuning drift or failure to cover the whole band is the TAA550 33V regulator IC001. Check this item before suspecting the tuner unit.

A grainy picture, which would suggest that the tuner is faulty, can be caused by the absence of the supply to its r.f. section. Check that there is 12V at pin 2 of the tuner. If not check the print at the edge of the board – the set may have been dropped.

A misleading symptom that looks something like a noisy field fault, i.e. fine horizontal lines on the screen, can be caused by a faulty tuner – and may not necessarily respond to tuner tapping.

I've had two unusual cases of failure to tune, one with the voltage at pin 7 of the tuner stuck low and the other with it stuck high at 32V. The cause of the first fault was R769 (33kΩ) being open-circuit. The second fault was due to R005 (5·6MΩ) being open-circuit.

Sound Faults

The audio output chip (IC601) has given no trouble so far but it's important to understand the operation of the volume control circuit. The level of the audio signal at pin 12 of IC101 is controlled by the d.c. voltage at pin 11. This is derived from the control chip's pulse-width modulated output via TR710 and TR711. If this voltage is less than about 1V there will be no audio at pin 12 and thus no sound. The cause of no sound is usually in the circuitry that includes TR710 and TR711. Maximum sound is obtained when the voltage at pin 11 of IC101 is approximately 2·3V.

One very misleading symptom is loss of sound when changing channels, or rather the sound appears at minimum and can be restored by turning up the volume. Strictly speaking this is not a fault. The cause is that the control chip IC702 has been replaced but hasn't been initialised. The initialising procedure for IC702 is as follows:

(1) Switch the set off.

(2) While pressing the memory button, switch the set on again. The set is now in the test mode and will display 0.

(3) Press the "volume +" button.

(4) Switch the set off and on again.

Channel 1 will now be displayed and the controls will be set to their mid-positions, with the exception of volume which will be at minimum. Reset the volume to the preferred level and it will thereafter remain in the memory.

This procedure can be carried out at any time and is recommended prior to setting the first anode voltage or the background controls.

Another misleading though rare fault is a droning noise

superimposed on the sound. The cause is unfiltered pulse-width modulation reaching pin 11 of IC101 because C707 (470nF) has gone open-circuit. Incidentally if you scope pin 11 of IC101 you will see a sawtooth waveform that's an integrated derivative of the pulse-width modulation.

Colour Faults

In cases of colour drop out check the setting of the reference oscillator control R521. If it's set half-way, at 6 o'clock, turn it clockwise to about 8 o'clock. This will provide a more reliable colour lock, particularly with weak signals. The TDA3565 colour decoder chip IC501 is very reliable but is occasionally the cause of no colour or loss of one colour.

Hanover bars that cannot be eliminated by tuning L502 can be caused by a faulty chroma delay line (DL501). No colour can also be caused cracked print associated with the delay line if the chassis has been roughly handled.

Uncontrollable Brightness

First check R201 (8·2Ω) in the 200V feed to the RGB output transistors. If it seems to be o.k. check the sandcastle pulses at pin 7 of IC501. If they aren't correct, check that the line pulses are present at pin 27 of IC101, then suspect this chip. Failure of IC101 is very rare, but if it's faulty and doesn't produce the correct sandcastle pulses and is left for too long in this condition IC501 can be destroyed.

CRT Base Panel

A poor or drifting grey scale, often giving the impression that the tube is faulty, is usually caused by one or more of the RGB output transistor load resistors being open-circuit. The collector load for each of the three transistors consists of three 47kΩ resistors connected in parallel. Voltage checks won't tell you very much in this event, so carry out resistance checks.

Another fault that sometimes occurs on the c.r.t. base panel is a dry-jointed or open-circuit first anode supply decoupling capacitor. It's C901 (10nF, 2kV). The symptom is alternate light and dark vertical bars across the screen.

Control System

The control chip IC702 provides the tuning, memory and control functions, providing pulse-width modulated outputs at the relevant pins. These outputs are integrated, buffered then delivered as d.c. voltages to set the tuning and control levels.

Faults in this area can be misleading. So first of all it's best to rule out the touch-pad membrane as a possible cause. It can easily be unplugged, and doing this will often prove whether or not it's faulty. Membrane faults can cause the following symptoms: stuck on one channel; set in the test mode displaying zero and refusing to respond to any command; pulling off tune; decimal point permanently displayed; one or more control levels at zero or maximum; inability to turn controls down though they can be turned up or vice versa; or variations on these symptoms. This may seem to be a daunting list, but in practice checking is easy particularly if a spare membrane is available. Note that it's not necessary to peel off the membrane to test it: just plug in a new one, making sure that it's the right way round.

While on the subject of faulty membranes, it's a good idea to remove the batteries from the remote control unit in case the membrane is faulty in a way that causes permanent transmission. Although the remote control unit provides only channel selection, volume and standby control it can, if faulty, transmit a random stream of data which can change the colour, brightness or contrast as well as the volume or channel selection.

These problems have now been largely eliminated however and don't happen with later versions of the chassis. The remote control unit was completely redesigned, with a rubber touch pad.

Having eliminated the membrane as a cause of the fault we move on to the control chip IC702 and its associated circuitry.

If the fault is that the incorrect channel is displayed when a channel is selected via either the touch pad or the remote control unit the cause is almost certainly IC702.

If a channel number is displayed when the 12V regulator is disabled don't jump to the conclusion that the fault lies in the regulator circuit. Check at IC702's standby pin 22: if the voltage here is high, at the supply level, the 12V regulator will be disabled but the display should show the standby symbol. This obviously points to IC702 being defective. Similarly if there's a raster but no display, or the display disappears after a few seconds, this again points to a faulty chip.

The stuck on one channel fault can occasionally be caused by IC702, but before condemning it check the pull-up resistors R717-R723 (some of these are 270kΩ, others 180kΩ), also the print from these to the chip. If one of these resistors is open-circuit or dry-jointed the chip will latch up and can't be moved to any other channel.

The TC4511BP seven-segment decoder chip IC701 can occasionally be responsible for IC702 misfunctioning as the two are directly connected. This is more likely to be the case if the set has been subject to lightning damage.

If the channels can't be changed by using the front touch pad but will change via remote control operation it's likely that the set has been dropped and the print to all the pull-up resistors R717-723 is cracked. The fracture usually extends about an inch from the front of the PCB and cracks six or seven tracks alongside these resistors.

While on the subject of the control chip an item worth mentioning is the 78M05CV 5V regulator IC804. One faulty regulator I encountered produced an output of about 7V. The symptoms were erratic operation of IC702 and, when the tuning button was pressed, the decimal point (colon) would be blinking. The tuning sweep was very slow – it usually enters the fast mode when the tuning pad has been held for four seconds. Since the tuning sweep was being engaged only intermittently the fast mode wasn't being activated. A new 5V regulator cured the problem and IC702 fortunately hadn't suffered any ill effects.

This once more emphasises the fact that the supply to i.c.s of this sort is critical. With this particular type of chip the supply shouldn't be less than 4·9V or more than 5·1V.

Incidentally in one case where the output from the 5V regulator was low the infra-red receiver chip IC703 was unable to function, the result of course being no remote control operation.

In Conclusion

Some of the faults mentioned in this article are very rare. They can be reported because we've had experience with very large numbers of these sets. I've attempted to outline an approach to servicing these chassis in addition to listing the various fault conditions encountered. Should problems arise, the technical support from Tatung is excellent while spares are very reasonably priced.

Modern TV Receiver Techniques

Part 2

Eugene Trundle

The superhet principle is fundamental to all radio and TV receivers. The incoming r.f. signal from the aerial is selected by a tuned amplifier which has high gain and low inherent noise. Its output is fed, along with a pure c.w. (continuous wave) signal from an oscillator (called the local oscillator), to the mixer stage. This employs a non-linear device to beat the two inputs together, producing the sum and difference frequencies of its two inputs. A tuned circuit at the mixer's output selects the difference output, rejecting all other signals. This is passed on to the following amplifier stages as the intermediate frequency (i.f.) signal. In the UK the vision i.f. is usually 39·5MHz – in the rest of Europe 38·9MHz is more common. We'll take 39·5MHz as the norm here. Fig. 1 shows in block diagram form the arrangement just described.

The local oscillator is tuned in the same way as the r.f. amplifier, but runs at an exactly 39·5MHz higher frequency. The tuning of these two stages is variable so that, with a u.h.f. tuner, any of the 48 channels in Bands IV and V (470-854MHz) can be tuned in. The system keeps the tuning of the r.f. amplifier and the local oscillator in step over the whole u.h.f. band spectrum: thus whichever channel is tuned in the vision signal at the tuner's output is always at 39·5MHz. The accompanying f.m. sound carrier also beats with the local oscillator frequency, producing its own i.f. – 33·5MHz in the UK (system I). In fact the i.f. output signal spectrum produced by the tuner is a mirror image of the transmitted channel, consisting of the carriers (vision and sound) and their sidebands.

As an example, the vision and f.m. sound carriers for u.h.f. channel 28 are at 527·25MHz and 533·25MHz respectively. For reception of this channel the local oscillator runs at precisely 566·75MHz. Thus the difference frequency produced by the mixer is 566·75 – 527·25 = 39·5MHz in the case of the vision signal and 566·75 – 533·25 = 33·5MHz in the case of the f.m. sound signal. The Nicam sound carrier is broadcast at 6·552MHz above the vision carrier, so its i.f. is at 32·948MHz. The bandwidth of the tuned circuit at the mixer's output has to be sufficient to embrace these carriers and their sidebands. If all that we required was channel 28 we wouldn't need an analogue tuning system: use a crystal-controlled 566·75MHz local oscillator and it's all there! This is the principle of synthesis tuning, to which we'll return.

Interference Possibilities

Two input frequencies can give rise to a 39·5MHz difference-beat output signal: the wanted one, at 39·5MHz below the local oscillator frequency, and its mirror image at 39·5MHz above the oscillator frequency. In order to avoid patterning and interference, the r.f. amplifier is designed so that it provides about –60dB rejection at the image frequency, i.e. at 79MHz (approximately ten channels) above the wanted channel.

Other possible sources of interference are the sound carrier of a TV broadcast four channels above the wanted one and the vision carrier of a broadcast four channels below the wanted one: either of these would give rise to spurious beats within the vision i.f. passband if they were permitted to reach the mixer. To avoid this at least –56dB of rejection is built into the r.f. amplifier for n ± 4 channels.

A u.h.f. TV tuner typically uses three LC tuned circuits. The L section consists of a fixed-inductance half- or quarter-wave Lecher line printed on a low-loss insulating substrate while the C section consists of a varicap diode whose effective capacitance value depends on the reverse bias applied to it. For channel 21 the bias required is 0·6V, while at the other end of the u.h.f. spectrum a bias voltage of 28V brings in channel 68. Thus we can tune throughout Bands IV and V by varying the bias voltage between these limits, selecting a particular channel by stopping at a closely-stabilised voltage that corresponds with it. This is the principle of the varicap tuner – such tuners are produced for both v.h.f. and u.h.f. reception and are used in radio receivers and communications equipment as well as TV sets and VCRs.

Typical UHF Tuner Circuit

Fig. 2 shows the circuit of a typical u.h.f. TV tuner. The input is untuned to give best noise performance and optimum impedance matching over the very wide input frequency range (470-860MHz). The low-noise transistor TR701 is connected as an earthed-base preamplifier, the input signal being applied to its emitter via the pin diode attenuator D600/D601. Under normal reception conditions the external a.g.c. circuit passes a current of around 9mA through R323, holding D601 on and D600 off so that the full r.f. input signal reaches the emitter of TR701. Should the input signal level exceed some 2mV, the a.g.c. current begins to fall: the conduction of D601 is thus decreased while D600 is brought into conduction. Signal is in this way shunted away from TR701 to avoid the cross-modulation and interference that would arise because of the non-linearity of TR701 at high input signal levels. This pin-diode attenuator arrangement has a better performance than earlier voltage-controlled a.g.c. systems that applied a variable bias to the transistor itself.

The r.f. amplifier stage's selectivity and rejection characteristics are built into its collector tuned circuit and the coupling from here to the mixer stage. Lecher line L510 is parallel-tuned by varicap diode D605. The selected signals pass via C213 to the next resonant circuit which consists of L511/L512/D606: Lecher lines L511/2 are inductively coupled, forming with D606 a bandpass filter that provides

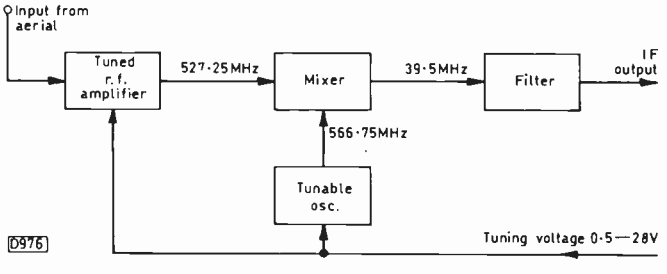

Fig. 1: Block diagram showing how the superhet system works. The frequencies used as an example illustrate operation on u.h.f. channel 28. The i.f. remains constant whichever channel is tuned in.

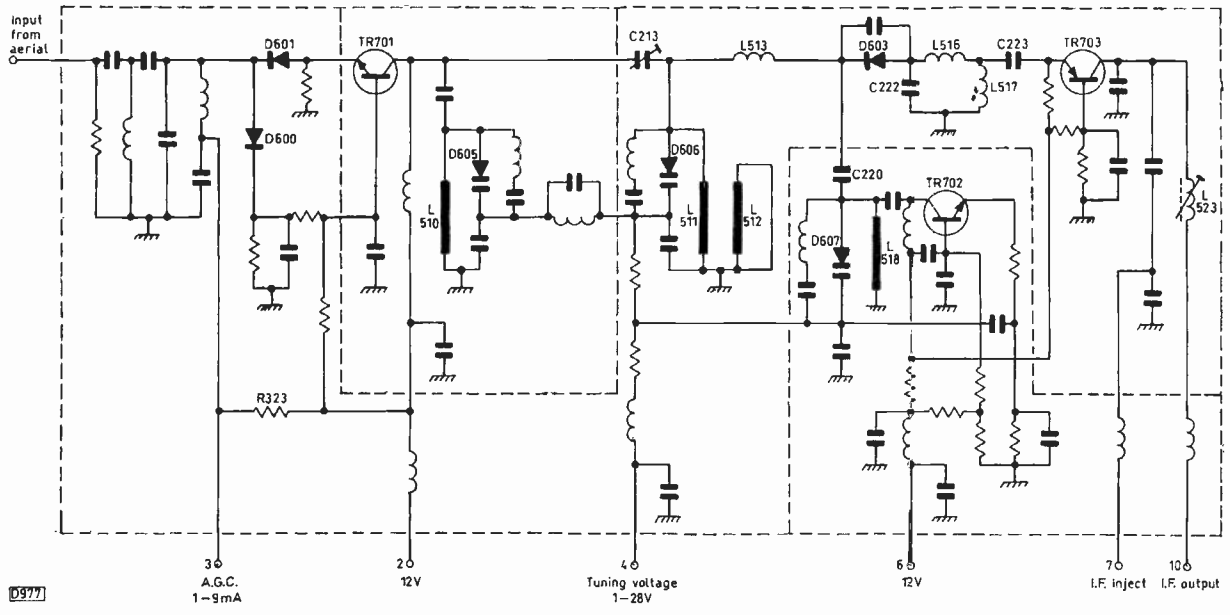

Fig. 2: Typical u.h.f. tuner circuit.

most of the image-frequency rejection. The selected carriers and their sidebands then pass via the small inductor L513 to the cathode of the mixer diode D603. This is a Schottky device whose main virtue is low-noise operation at high frequencies.

The local oscillator, TR702 and its associated components, is in its own screened compartment to minimise radiation. Its frequency is set by the parallel tuned circuit L518/D607, producing from 510·75MHz for ch. 21 (around 0·6V bias at pin 4 of the tuner) to 886·75MHz for ch. 68 (28V at pin 4). It's worth emphasising that the frequency is always 39·5MHz above that to which the r.f. amplifier is simultaneously tuned (the input vision carrier frequency). The output from the oscillator must be very pure, because any noise that accompanies it will be superimposed on the wanted signal produced by the mixer. The oscillator's stability with time and temperature must also be good: the tuning point is governed solely by the oscillator frequency, whose drift must be kept very low if the automatic frequency control (a.f.c.) system is to be able to cope – we'll be considering a.f.c. next month. C220 couples the local oscillator's output to the mixer diode.

D603's non-linearity results in strong cross-modulation between its inputs, the selected channel and the local oscillator signal. The output at its anode contains signal components at the oscillator and channel frequencies as well as their sum and difference frequencies. Filter C222/L516/L517/C223 selects the wanted (difference) frequencies, passing them to the base of the earthed-base amplifier transistor TR703 which also acts as a buffer. This transistor's collector circuit includes a further tuned circuit, L523 and the associated capacitors, which is broadly tuned to about 36MHz. The i.f. signal leaves the tuner at pin 10. The external circuit provides a d.c. path for TR703's collector and bandpass coupling at the input to the i.f. section of the receiver.

A high degree of immunity to interference pick-up and radiation of the oscillator signal is achieved by enclosing the entire tuner in a screened box. As Fig. 2 shows, the individual sections of the tuner are in separate screened compartments to provide isolation. In a modern tuner all the components are of the surface-mounted type, and no adjustment or alignment is required by the set manufacturer or in service.

VHF Tuners

Although the v.h.f. spectrum is not currently used for TV broadcasting in the UK, it's very much in use for this purpose elsewhere – both for off-air and cable transmissions. A v.h.f. tuner uses exactly the same principles outlined above, the main difference being that the LC elements in the tuned circuits are electrically larger. Another difference occurs with French System L tuners, where in Band III the local oscillator operates below the incoming channel carrier frequencies, producing vision and sound i.f.s at 32·7MHz and 39·2MHz respectively. This would lead to a problem in Band I, where the transmitted carrier frequencies are only just above the i.f. In this case the oscillator has to operate above the carriers. So the French broadcasters reverse all the carrier positions with low-band TV transmissions to restore the same i.f. characteristics.This is the reason why the sound carriers are below the vision carriers in the French Band I channels and the upper instead of the lower vision sideband is suppressed.

The Double-superhet Principle

Having converted one carrier frequency or set of carriers to another while retaining all their phase-, frequency- and amplitude-modulation characteristics there's no reason why

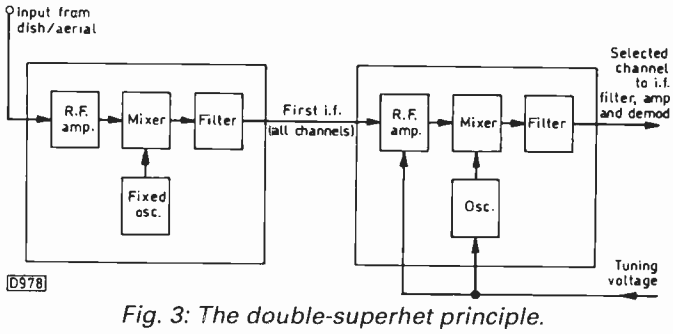

Fig. 3: The double-superhet principle.

we cannot beat the new carrier(s) with another local oscillator signal to produce a second i.f. signal for amplification and detection. The idea is depicted in Fig. 3. Careful choice of i.f.s is necessary to avoid spurious effects.

The double-superhet principle was first applied in radio receivers to give improved selectivity with very good adjacent-channel and image rejection. It's currently used, in conjunction with synthesis tuning, in RT and CB transceivers that work with very narrow-band channels. The improved selectivity is helpful for TV reception, but the real advantage of the system comes with satellite TV broadcasting, where the first few stages of the receiver are out on the wall or the chimney!

The Satellite TV Front-end

The difficulty of feeding s.h.f. signals via anything less complex and elaborate than a waveguide is overcome by converting the microwave satellite TV transmissions to u.h.f. right there at the dish: a u.h.f. signal can be downlinked via suitable coaxial cable without excessive loss. What comes down the cable is the first i.f., the beat product of the incoming s.h.f. carriers and a local oscillator in the LNB mounted at the focal point of the dish. It's neither practical nor necessary to vary the tuning of the LNB's local oscillator, which therefore runs at a permanent fixed frequency, typically 10GHz, at the l.f. side of the incoming signals.

Each incoming satellite TV vision carrier produces an i.f. corresponding to the frequency difference between it and the 10GHz local oscillator signal. The various satellites each have several transponders working on different but adjacent channels: Fig. 4 shows those for Astra 1A. Since all the carriers beat simultaneously with the oscillator signal, the result is block-conversion of the whole spectrum of channels to a lower frequency band which is selected by a wide-band filter at the LNB's output. The channel spacing and modulation characteristics remain the same. Note that the carrier frequencies aren't mirrored in the i.f. band, because the LNB oscillator operates at the l.f. side of the incoming signals. To take as an example Astra 1A ch. 1 at 11,214·25MHz, the difference frequency produced when this is mixed with the 10,000MHz local oscillator signal is 1,214·25MHz: the first i.f.bandwidth for the sixteen channels is 1,200-1,450MHz.

Low-noise Block

Fig. 5 gives an idea of the operation of a satellite TV LNB: the similarity with a conventional u.h.f. tuner is apparent. The low-noise r.f. amplifier depends on the waveguide or other input coupler to provide image rejection of over –50dB, the image frequency here (8-9GHz) being below the wanted frequency, again because the local oscillator works at the l.f. side of the input signals. The r.f. amplifier uses two or three low-noise gallium-arsenide (GaAs) field-effect transistors or high electron-mobility transistors (HEMTs) to provide an overall gain of about 20dB.

As with a conventional u.h.f. tuner the local oscillator must generate as little noise as possible and be very frequency stable. A drift figure of 1MHz (100p.p.m. or 0·01 per cent) is acceptable and can be corrected by the a.f.c. circuit in the indoor receiver. This provides compensation via the second local oscillator, correcting what it sees as drift of the transmitter frequency. These LNB stability requirements are achieved by the use of a dielectric resonator as the local oscillator: it has no electrical connection at all to the circuit. The broadcast and local-oscillator signals are again mixed by a Schottky-type diode, of either silicon or GaAs construction.

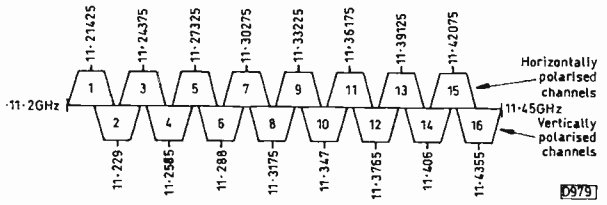

Fig. 4: The Astra 1A satellite's channel spectrum. Channel overlap is possible by using opposite polarisation (vertical and horizontal) for alternate channels.

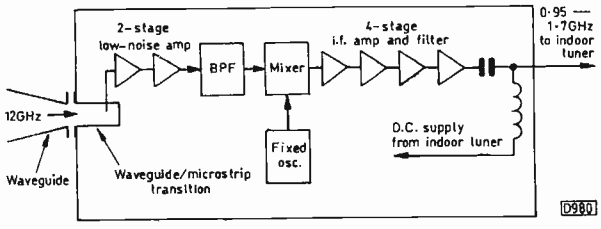

Fig. 5: Typical LNB block diagram.

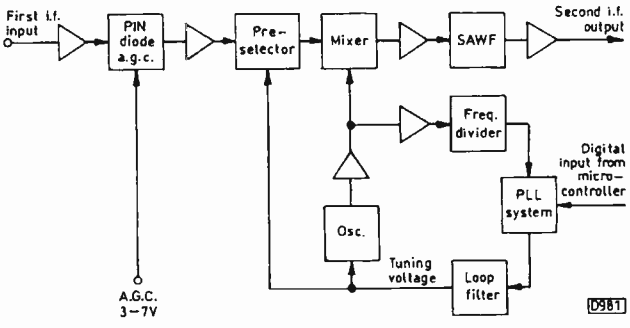

Fig. 6: Satellite TV tuner block diagram – the indoor unit.

The s.h.f. mixer diode's output, in the range 950-1,700MHz, is selected by a bandpass filter. Before being fed to the downlead it passes via a four- or five-stage i.f. amplifier with a gain of about 35dB. The overall gain of the LNB is about 50dB.

Indoor Tuner

An indoor tuner selects the satellite TV channels. It's very similar to a u.h.f. tuner – see block diagram in Fig. 6. The main difference is that the second i.f. is much higher – 140MHz, 200MHz, or most often 480MHz. A SAW filter is shown as part of the tuner in Fig. 6 – for satellite TV reception the i.f. amplifier and f.m. demodulator generally form a single package with the tuner. With an f.m. video satellite TV transmission the second i.f. bandwidth is normally 27MHz. A bandwidth of 24MHz gives lower noise at the expense of picture definition. For transmissions from the Eutelsat II craft a bandwidth of 36MHz is required.

Prescaling

With frequency-synthesis tuning the local oscillator is part of a feedback loop, in which it comes under the control of a very stable reference oscillator. For this purpose the tuner contains a prescaler: this is a simple countdown circuit

that divides the local oscillator frequency by a fixed ratio, typically 256 with a u.h.f. tuner. Thus, taking the u.h.f. channel 28 as an example, the prescaler output frequency that emerges from the tuner's prescaler pin will be 566·75MHz ÷ 256 = 2·2139MHz.

Prescalers are used in all frequency-synthesis tuners. These systems are recognisable by factory-pretuned stations (e.g. some satellite TV tuners), digital readout of station frequency (e.g. some car radios and hi-fi systems) and direct entry of broadcast channel numbers (as with many modern TV sets).

Next Month

Having dealt with the little metal box behind the TV set's aerial socket, next month we'll go on to look at the i.f. filtering, amplification and demodulation – a.m. with terrestrial transmissions, f.m. with satellite ones.

Test Case 362

Philbert was being allocated his field calls on this crisp, raw morning. Amongst them was one to a Finlux TV set. The reported symptoms were no-go and a burning smell: Philbert knew all about that! It would be the connections to the line scan coils. No problem. Off he roared in the big van, confident that this was one set he wouldn't have to bring back to the workshop for repair.

When he arrived on site he found a large set containing a Finlux 3000 series chassis. Brandishing his special rivets and his little soldering iron, Philbert whipped off the back cover – to be confronted with two perfectly good connections on the PCB, but burnt joints at both ends of Rz28 nearby. This is the feed resistor in the h.t. supply to line output stage. He resoldered the resistor's connections, but still the set didn't work. Test meter checks then showed that there was 140V at one end of the resistor, nothing at the other. So it was open-circuit. Philbert had no stock of this safety-fusible resistor in his van and didn't know why it had failed. He had to hump the set into the van then take it back to base.

Next day the set was on the bench in the good care of Roger. He fitted a new 1·5Ω, 0·5W resistor of the approved type in the Rz28 position and switched on. A few minutes later the set shut down again, with the new resistor wreathed in smoke and open-circuit. It seemed strange that the set had worked right up to the moment of the resistor's failure, with good sound and a good, correctly-proportioned picture.

For test purposes Roger fitted a beefier resistor on the back of the PCB. When he switched the set on it was clear that the temporary resistor was dissipating a lot more than the 0·5W rating of the correct type of resistor. Maybe excessive current was being drawn through it? If so, it had no effect on the picture or the scanning amplitudes at any setting of the brightness control.

Roger reasoned that leakage to chassis downstream from the resistor could be the cause of its distress. So he checked

the reverse resistance of the EW modulator diodes Dz7 and Dz8 and the line output transistor Tz4. They were all innocent, and the tuning capacitor Cz13 showed no discernible leakage. Maybe there were a few shorted turns of wire in the line output transformer? As a check the set was left running for fifteen minutes and was then switched off. When the transformer was felt its temperature was not excessive. So the theory of shorted turns was abandoned. The line output transistor was also cool to the touch.

After switching the set on again Roger scoped the waveforms at the base and collector of the line output transistor. They were correct. It's a pity that Roger didn't continue with his scope tests, perhaps nearer the seat of the problem. Instead he turned to his meter and measured the d.c. flowing through the hot-and-bothered resistor. With a normal-brightness picture present the reading was 430mA. This didn't seem excessive for a line output stage driving a 110° tube. In fact it was perfectly normal, as a check with an identical set would have shown.

Roger had by now run out of ideas. With the circuit diagram in his hand he went to Workshop Sage and poured out his troubles. Some 430mA was flowing through the 1·5Ω resistor, the calculated dissipation being less than 300mW. Why did it seem to be absorbing several times that? Sage had the answer. What had Roger overlooked when checking all this out? What was making the resistor cook, and what remedial action was required? For the answer, see page 283.

Servicing the Philips 2B Chassis

Richard Newman

The Philips 2B chassis was released in the latter half of the Eighties. There were various versions with screen sizes from 21 to 25in. All models can provide stereo sound from an external source while later ones are also equipped for Nicam reception.

The power supply and the line and field output stage circuits are very similar to those in the 2A chassis, which we covered in the December issue, so little need be said about them. There are considerable differences in the signals stages however, so we'll look at these in greater detail. The chassis also has a master microcomputer chip which controls various slave devices via an IIC bus: IIC stands for inter i.c. and is also known as an I2C bus.

These sets have proved to be very reliable, with very few stock faults. The following notes should be used in conjunction with the 2B chassis service information, Philips part number 4822 727 15883 – this should include all supplementary information.

The Power Supply

The power supply circuit is almost identical to that used in the 2A chassis: thus the fault finding and testing procedures described in the December issue can also be used with this chassis. There's one main difference, the use of a BUT12A as the chopper transistor (Tr7687). If this transistor repeatedly fails the official advice is to fit a 2SC3973B instead and increase the value of R3671 to 22Ω (5W) – see Fig. 1.

A power supply that operates off load but shuts down on load should direct attention to the degaussing thermistor, which is the usual cause. Again, as with the 2A chassis, the correct type as specified in the manual for the particular model must be used.

The chopper transformer T5663 is prone to dry-joints which should be attended to as a routine matter. C2664 (2·2nF) can split and go short-circuit, taking D6664 (BYD33J) with it. Use a good-quality replacement rated at 2kV.

The Line Output Stage

This along with the EW correction circuit is conventional. The only known faults are as follows: C2617 (1·5nF or 270pF depending on tube size) can split; C2609 (8·2nF or 6·2nF, again depending on tube size) can go short-circuit; and dry-joints around the line output transformer are common. So far I've never come across output transformer failure.

Sync/timebase Generator Section

The sync/timebase generator chip is a TDA8370. In addition to the line and field drive waveforms it produces a sandcastle pulse output and provides automatic adjustment for VCR operation. It also has a built-in anti-Copyguard circuit, which is functional only in the VCR mode of course. This prevents the synchronisation being upset when Copyguard tapes are played back through the set. A further feature of the chip is the video selector switch that's controlled by the IIC bus, giving selection between off-air or scart signals.

A small auxiliary panel contains a number of circuits

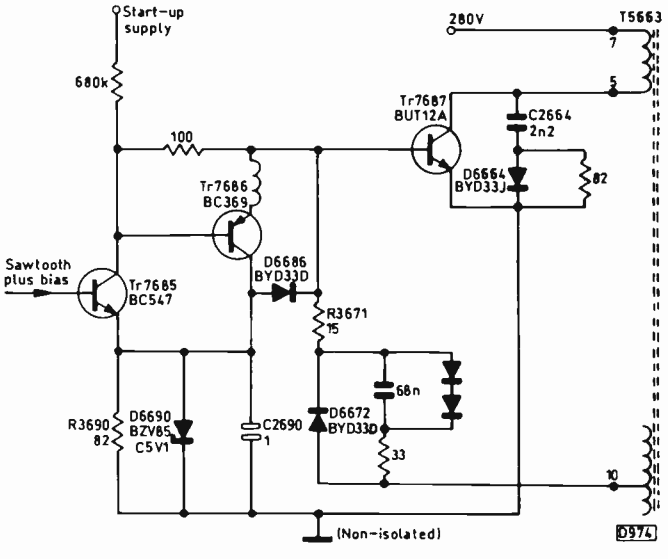

Fig. 1: Circuitry around the chopper transistor Tr7687 in the 2B chassis, incorporating the 2A chassis modifications described in the December issue – compare with Fig. 1, page 103. Note also the revised bias network R3690/D6690/C2690. For repeated failure of Tr7687 use a 2SC3973B transistor in this position and change the value of R3671 to 22Ω (5W).

including a start-up supply for the TDA8370 chip. At switch-on the 20V output from the power supply is fed to this panel via R3567. The voltage is then reduced to about 8·5V, which is applied to pin 23 of the chip to get it going. Once the line output stage comes into operation a 13V supply derived from the transformer is applied to pin 22 of the chip. The rectifier is D6644, which is fed from pin 3 of the transformer.

If there's no line drive, first check that the 20V input from the power supply is present. Then check D6637 (BZX79C12), R3639 (680Ω) and C2539 (100μF) on the auxiliary panel.

Colour Decoder

The colour decoder is on a separate subpanel that plugs into socket M10, the decoder chip being a TDA4510. Composite video from the tuner/i.f. module passes via the video selector switch in the TDA8370 sync/timebase generator chip to pin 2 of M10. The chroma signal is then filtered off and fed to pin 9 of the TDA4510. R – Y and B – Y outputs appear at pins 4 and 5 respectively of M10. The luminance signal (Y) appears at pin 7 of M10. Sandcastle pulses from the TDA8370 chip should be present at pin 8 of M10. The R – Y, B – Y and Y outputs are then fed to the TDA4580 video control chip IC7300.

The Video Control Chip

The TDA4580 is a fairly complex chip. It switches between signals from three different sources. These are the outputs from the colour decoder, the RGB signals from the scart connector and the RGB outputs from the teletext decoder. The chip also controls the saturation, contrast and brightness, provides RGB outputs for the c.r.t. base panel and carries out beam cut-off point stabilisation and beam limiting. I've had failure of this chip on several occasions, giving total loss of picture with the c.r.t. cut off.

Sound IF/decoder Section

Early versions of the 2B chassis were fitted with the German stereo decoder subpanel which of course functions only in the mono mode in the UK. The panel also contains the TDA8405 chip IC7103 which controls the audio source switching and is in turn controlled via the IIC bus. Tone control is provided by the TDA8420 chip IC7104.

Later sets have a Nicam decoder panel which also contains the f.m. sound channel. The two chips on this panel are both under IIC control. The TDA8405 identifies the presence of a Nicam signal and can be manually switched between f.m. and Nicam by using the stereo/mono switch at the front of the set. When Nicam is being received the language I and II LEDs both light up. The TDA8420 chip provides selection between internal and external sound sources, again under the control of the IIC bus, and tone control. Later sets use a TDA8421 in this position – it can be used only with the latest (/W155) version of the microcomputer control chip, see later.

The Stereo Output Stages

Earlier sets have two TDA1520 chips to provide the right and left outputs. They were also fitted with a mute relay which should be checked if there's a no-sound problem. Later models have a single TDA1521 chip and no relay. Both versions of the chassis have a speaker on/off switch that can give sound problems. Another cause of no sound with later sets is incorrect programming – see later.

Tuner/IF Section

This is a single unit which is not considered to be a serviceable item. Only one type, FE644Q, seems to have been fitted in UK sets.

The Operating Panel

This panel carries the microcomputer control chip whose /suffix indicates the program code. Early models have an MAB8441/007 chip. The next type used was the MAB8461/W069 or /W132. Sets with these chips have two ROMs, type PCD8571P or PCF8571P, on the main panel, along with a back-up battery. Later sets, including the Nicam version, have an MAB8461/W155 microcontroller which is used with an X2402 EEPROM – there's no back-up battery.

Apart from occasional failure of the microcontroller chip few faults have been noted in this area. If the set is stuck in standby check that the 6MHz crystal X1867 on the operating panel is running. The back-up battery on the main panel could have failed, or D6734 (BZX79C4V7) on this panel could be leaky. You can sometimes get odd faults when keyboard buttons are stuck.

I mentioned earlier that no sound can be caused by incorrect programming. This happens only with later sets that have an EEPROM and an MAB8461/W155 microcontroller. These receivers have programmed-in 'option codes'. If the code becomes corrupted or the EEPROM has had to be replaced the code has to be reprogrammed. Failure to do this often results in no sound. The procedure for programming the correct codes is very simple: only two codes are used in the UK, 18 for mono or 26 for Nicam.

To program the code, switch the set off then press the 'store open' and 'colour increase' buttons on the front of the set while switching it on again. A number will be seen in the channel display: this is the currently programmed-in code. Set the required code by pressing the C/P+ or C/P– button. When this has been done you press the 'store execute' (red) button on the front of the set. The code has now been stored and the set should start up normally.

Other Notes

The RGB drive circuits are on the c.r.t. base panel: the only problems we've had here have been the odd transistor failure and dry-joints.

The teletext decoder is the same as that used in the 2A chassis – see the December issue.

Some sets may exhibit a problem when playing back a VHS tape that's protected by Copyguard anti-copy signals. Should this happen change C2544 to 22nF, C2545 to 8μF and R3544 to 3·6kΩ (two 1·8kΩ resistors in series). For best results the value of C2544 may have to be slightly higher or lower.

Earlier and later versions of the chassis can be recognised by the AG number that precedes the serial number: version one is AG00, version two AG02 while version three is AG04 or higher.

In Conclusion

As mentioned at the beginning there are very few stock faults with this chassis. I hope that the brief descriptions and hints in this article will be of help to those engineers who are unfamiliar with it.

What a Life!

Donald Bullock

I can remember when my only problems in this trade consisted of getting spares within a reasonable time and coping with the customers. Mending the sets came easily – a dozen a day was nothing. Now there are many firms falling over themselves to supply spares faster and cheaper than ever before, but the sets are a different matter. I can't mend them easily or quickly any more. The customers? They don't change. They're still as nutty, devious and demanding as ever. And when you get the combination of a nasty set and a difficult customer life isn't worth living.

Take Mr. Devell for example. He phoned up the other day to ask how we charged for bench servicing. Was it by the hour or according to the fault? Now this is an old one, and after forty years I still don't know the answer. Who hasn't spent hours or even days cracking a difficult fault and then got a succession of sets with the same trouble? Is it right that the first customer should finance all the rest?

The first time I encountered the Fidelity ZX3000 chassis with its awful switch-mode power supply and that manual I spent ages, and in the process built up a pile of expensive dud BU426A transistors, before I got it right. After a month it blew again. I can now cure these sets in half an hour – thanks to experience gained with the sets of other paying customers. The same applies to those Philips sets with intermittent faults caused by cunningly concealed dry-joints in the line output stage.

Mr Devell's Set

So after learning that Mr. Devell's set was a 20in. Mitsubishi that died intermittently, sometimes after minutes and at other times after hours, I warned him to fear the worst. In spite of that he brought it along.

It was a Model CT2017BM. I put it on the bench and switched on. After five minutes it went dead. I took the back off and eased the chassis out carefully. Then it sprung to life again and no amount of tapping and flexing the PCB would bring the fault back. So I reassembled the set and put it on soak test.

Mr Hornett's KT30

Next I picked up Mr. Hornett's Philips set, which was fitted with the KT30 chassis. It was said to be dead. When I switching it on I found that it was continuously tripping. With a glow of impending affluence I studied the line output transformer's connections. Unfortunately they all looked good, but I nevertheless resoldered them and tried the set again. It was still suffering from the hiccups. So I went for the line output transistor. That would be the cause of the trouble! Why hadn't I done this before? It tested all right however, so I refitted it. Then I got my trusty Cirkit meter and went through the diodes in the line output stage, the bigger ones first. One or two of them read uncertainly when in circuit. These I unsoldered for re-testing. But they were all o.k.

This job wasn't going to be quite the easy meat I'd anticipated, and I was running out of quick-fix ideas. Before resorting to a study of the circuit I decided to check one or two of the capacitors in the line output stage – they live a hard life in this chassis. Again they were all o.k.

I got out the circuit diagram and started to make some systematic checks, starting in the power supply. The h.t. voltage was low and pulsing. I switched off, discharged the reservoir capacitor and carried out some resistance checks in the h.t. circuit but couldn't find anything wrong. Then I noticed that the 4·7Ω, 5W surge limiter R6291 had been changed. There was a healthy voltage at one side of it but a very low voltage at the other side. I checked again for a short-circuit, then noticed that the new resistor was marked 4·7kΩ instead of 4·7Ω. I fitted the correct component and obtained perfect results.

I was ready for Mr. Hornett when he called to collect the set. I charged him £28, told him what I'd found and how long it had taken me.

"Ah, that'll be the other place we took it to" he said. "Only they kept it for weeks. Said they couldn't get the spare. So we collected it, paid the bill and brought the set to you."

"Paid the bill?" I asked. "What for – and how much?"

"Thirty quid" he said. "It was Snoddies."

"Remarkable firm" I said, biting my lip and shaking my head.

Mrs Wireworm's Akai

Just then Mrs. Wireworm came in with her Akai VCR – a VS25EK. It was dead and there was a burning smell.

"I think it's finished" she said, "but my husband said its the condenser or the coil."

I opened it and looked at the power pack. A fusible resistor, FR2, was cooking. So was the 1kΩ resistor R18. As I didn't have a circuit I turned to Akai technical for a lead. To my surprise the engineer advised against repairing the power pack. "Send for a replacement power panel, modified" he said.

"But wouldn't it be better if we repaired this one?" I asked.

"We don't advise it. I can tell you how to, but you might end up with further trouble in the machine" he said.

So I ordered another. It came quickly and cured the trouble, much to Mrs. Wireworm's delight.

Back to the Mitsubishi

Then I noticed that the Mitsubishi set had died, so I pulled it over, took off the back and tapped about gently, first in the line output stage then in the power supply. Nothing happened, even when I assaulted the set with the hairdryer and freezer. So I switched it off and studied every inch of the main chassis print with my giant magnifier. But I found nothing suspect.

Then I remembered that I'd had trouble in the past with the relay circuit on the subpanel that's attached to the left-hand side of the cabinet. The relay switches the h.t. in when energised by a small d.c. voltage that's derived from a diode. The feed resistor goes intermittent. As a result the relay switches off and on, interrupting the power supply. It would probably be that.

I took out the panel, replaced the resistor – and the diode as well for good measure. Then I reassembled the set and ran it again to see whether it would fail. It did.

By now I was feeling nasty, and rounded on Greeneyes when she clopped in with my mug of tea. I felt the mug and pulled a face. "Too cold" I snapped.

"Nonsense" she said, "I've just made it."

I took a sip. "Too weak – you know I hate weak tea."

She looked hard at me. "You've got another difficult set,

haven't you?"

"Yes. It comes on and goes off when it likes. I don't know why."

"I expect it's a dry-joint again. You know, where the legs of one of those transformer things go into the panel. You've had them go loose before." And off she clopped.

I stopped and thought. She was referring to the line driver transformer here, and she was right. The one in this chassis is tiny and, being low in mass, vibrates away at line frequency when the set is running. As a result its four tiny legs get footloose in the panel. And since most of the supply voltages in a modern set are derived from the line output stage the whole works comes to a stop when the line drive is interrupted. I should have thought of that before. And because I didn't I felt nastier than ever.

I screwed in my jeweller's eyeglass and scrutinised the transformer while lifting and rocking it. Sure enough it was loose. When I took it out I saw that the pins were blackened. I cleaned off and tinned them, then resoldered the transformer back into the PCB. Time to try the set again. This time it worked and went on working. After giving the set a long soak test I phoned Mr. Devell to tell him about my success.

"How much?" he asked.

"Thirty five quid" I replied. "I feel generous, not to say sappy, today."

"Thirty five quid for a drop of solder!" said Mr. Devell. "I wish I had one of those meter things and a soldering iron. I could have done it myself in a couple of minutes."

I put the phone down and reflected. Not without Greeneyes he couldn't.

Camcorner

Reports from David C. Woodnott

Hitachi VM200E

The problem with this camcorder was a very liney playback picture. Its cause was traced to an open-circuit 2H chroma delay line. With this item open-circuit the chroma crosstalk cancellation system doesn't operate, producing the symptom described above. This fault could of course happen with any VHS machine, as the cancellation system is part of the VHS format. **D.C.W.**

Movalarm 614

This is a surveillance camera, not a camcorder. Its 1in. vidicon produced no pictures for the first half hour of operation. Then a picture appeared. When the unit had been switched off for any length of time this same delay occurred after switching on. The cause of the problem was traced to a leaky decoupling electrolytic capacitor at the line oscillator chip's supply pin. It effectively removed the line drive to the tube's scan coils. As a result the beam blanking (tube protection) circuit came into action, removing the video signal. When the faulty capacitor eventually charged it enabled the line oscillator to generate the line drive and the video signal was restored. Although this was a surveillance camera the principle applies to most cameras that use a tube. **D.C.W.**

Sharp VCC10P

The fault complaint was that the dew indicator appeared in the viewfinder, followed by shut down. We found that the sensor itself was faulty. When damp its resistance should increase, the reverse of what seems logical! The voltage across it should range from 0V (normal operation) to 5V (dew condition). This one produced 0·3V initially, rising quickly to the trigger level. **D.C.W.**

Philips VKR6850

The owner complained that there was no playback of recorded sound – he said that a friend who knows about videos had had a look at it. . . The original fault, no recorded sound, was the old faithful one – a contaminated microphone socket switch. When this had been attended to there was audio for recording but the machine didn't record the sound or play back prerecorded sound. Once the case had been removed the cause was obvious: the audio/control head had been screwed down far below its correct position. **D.C.W.**

Sharp VLMX7

A new model with an old problem, no functions. The cause was simply failure of the fusible link F901. After replacing it we were unable to find any cause of the failure despite a long soak test and much use.

The optical effects are quite amusing with this dual-lens/CCD package. PIP is available, with other digital effects, to encourage the user. On the servicing side a glance at the manual shows that extensive use is made of digital techniques. Our congratulations to Sharp on the ease with which the camcorder can be dismantled and the reduced number of securing screw types! **D.C.W.**

Panasonic NVG2B

This one had really taken a tumble – from the steps of an aeroplane at Hinari airport, so the lady said. The optics seemed to be o.k. and some functions worked. There were camera E-E pictures, but no mechanical functions. Investigation showed that the 24-pin connector B6003 had sheared from its normal position. It provides connection to the deck MDA drive systems, hence no mechanical functions.

A new main board would cost around £200 trade. With labour and a few case parts there would be a fairly hefty bill. The customer then let out that she had already received an estimate in excess of £500 from a large service centre. Could I do it for less? I looked at the main PCB with its severed B6003 and concluded that it was worth the risk. The customer agreed that if the attempt to rescue the PCB failed I'd be paid for my efforts (no, I don't work for free!).

A new B6003 connector was obtained and fitted. Some repair work to lifted print was required, but the surgery worked! A microscope is needed for this sort of work (by me anyway). The result of all this was a working camera at a lot less than £500, with still enough in it for me to make a decent profit.

I appreciate that this sort of repair is not viable for a large organisation: but my view is that we're in a service environment, and that to provide a good standard of work at a reasonable cost is an achievable goal. **D.C.W.**

Letters

REPAIRING HANDSETS

I've recently found an improved way of restoring handset buttons to their former glory when the conductive material has worn off the back (usually the BBC-1 and ITV buttons have to be pushed in with a force of about five Newtons). Go down to your local craft shop and buy a roll of 3/16in. wide copper tape with adhesive backing. This can be cut to size/shape and stuck on the back of the rubber buttons. It's a much easier operation than the kitchen foil and glue method I used to use.

Edward Branch,
Northallerton, N. Yorkshire.

CONVERTING POCKET TV SETS

I decided to take one of my pocket TV sets with me on a holiday in Crete. This meant that I had to convert the sound i.f. channel from 6MHz to 5·5MHz. The TV set I wanted to convert was a Citizen P422-1B, and I didn't have a service manual. When I removed the back to examine the signals PCB I found that there are three 6MHz ceramic filters and a SAW filter. I decided to change the filters to 5·5MHs ones, leaving the SAW filter. So CF202/3/4 were replaced with 5·5MHz filters from Maplin (part no. UL54J). If anyone else tries this, be careful when removing them – they are mounted on a double-sided PCB and the print is fine and easily damaged.

Two days later it was time to try out the set in Crete. I switched on and waited while the set tuned up the u.h.f. band. Then bang, there it was – a full colour picture with sound. Though I couldn't understand a word of Greek, it worked.

It's presumably possible to convert a system B/G set of this type brought into the UK to work on system I. To do so you would have to change the 5·5MHz ceramic filters to 6MHz ones, also the SAWF because of the narrower bandwidth of a system B type.

P.J. Roberts,
Bristol.

CUSTOMERS AND REPAIR PROCEDURES

Recent letters on the subject of unfair customer behaviour and procedures for dealing with insurance quotes have been interesting to read – I speak as someone who is a chartered engineer and industrial businessman rather than a service engineer.

Customers demand and should get value for money from repair work entrusted to the trade. There's no escape from the fact that the customer is always right: where problems that require rework activity arise in industrial situations it's normal to ask "how high?" when the customer says "jump!".

Something that's analogous with TV repair is car exhaust replacement – both are grudge purchases. The national exhaust operators train their staff to be courteous (perhaps excessively so) and to sell the full range of their services. I always return to the depot where I felt comfortable as I parted with at least £40.

John Hopkins (December) set out a very reasonable procedure for insurance quotes, but I can't agree with his suggestion that print-missing faults cannot be repaired to the manufacturer's standard. It's common industrial manufacturing practice to repair broken tracks, lifted lands and even faulty plated-through holes as part of the production process to reduce scrap costs. Likewise vehicle electricians splice a new piece of wire into a vehicle loom because the work involved in replacement would write off many a used car. The task of a TV service technician must be to produce a reliable repair which, in his opinion, will be safe in use. In the car MOT welding repair industry the same is true – fixing new plates over rusty holes is accepted by all.

Dealing with unfair customers is always difficult. I believe that there's a market for fixed-price TV or video repairs, for example "any TV or VCR older than four years repaired for £45 with a three-months guarantee". Such issues as "we don't pay you for drinking tea in our house" don't arise, and a polite refusal to attempt to deal with intermittent or spillage faults in older machines is in the customer's interest. Service operators who try to repair everything that comes their way should bear in mind that they are likely to make a low return on time and materials investment and end up with poor customer satisfaction. Perhaps this means that repair centres should offer refurbished (and soak tested) equipment instead of attempting the impossible task of making a living out of a job with no visible profit in it.

Ray Porter, M.Sc.,C.Eng., M.I.E.E.,
Stourbridge, West Midlands.

A STORM-DAMAGED PHILIPS CP90

We obtained a Philips CP90 for spares from a customer who claimed that it blew up during a thunderstorm. It was put to one side, awaiting a quiet period in which to check it out. Eventually a convenient time came and it was put on the workbench.

The set switched on all right and all the supplies were present and correct. It displayed normal channel indications, but there was only a blank raster and no sound. A scope check was made at the output pin (16) of the vertically-mounted subpanel that houses the i.f. amplifier/demodulator. The composite waveform was missing. Pin 18, where the video signal enters the TDA5080 scart/tuner selector chip, was the next convenient test point. A video signal was present and the chip had the correct control voltage at pin 17, i.e. 0V for off-air operation, 4V for external signal connection via the scart socket. When the chip was replaced we had a low-amplitude, distorted video signal at pin 16, but at least we were getting somewhere. When fine tuning was carried out while observing the scope display a picture appeared. It had two hum bars that nearly covered the entire screen, vertical rolling and line tearing. Sound was also now present, but was distorted and buzzy.

The video signal at pin 16 of the i.f. board goes three ways, to pin 3 of plug 14 on the teletext decoder board, to the TDA3561A colour decoder chip IC7260 and via pin 1 of plug 9 to the SECAM transcoder PCB. Replacing the TDA3561A chip made no difference, but when the teletext board was unplugged the set displayed a perfect picture with sound. It couldn't remember channels, but renewing the 2·4V memory cell cured that problem.

So the only problem now was to find the fault on the teletext PCB. When this was refitted to check voltages the fault symptoms reappeared, as expected – and hoped! The supply lines were found to be correct. The input video is coupled via C2801 (2·2µF) to pin 27 of the SAA5231 chip IC7785. As this chip seemed to be running far too hot a replacement was fitted. This finally cured the fault and the set was now in full working order.

Although we'd saved a nice set from the scrap heap, this incident does demonstrate the problem one has when an estimate is required for storm-damaged equipment. Nine times out of ten we haven't a clue as to the extent of the damage until work is actually started. Insurance companies please note!

John Edwards,
Bromley, Kent.

VALVE RADIO REPAIRS

I would like to add a few comments to Stanley Jackson's helpful article on overhauling valve radio receivers a while back.

First and most importantly, if the set has not been used for some time don't apply power to it until all the h.t. supply electrolytics have been reformed to at least the voltage they will see when the set is operating. This can avoid unnecessary damage to fuses, rectifiers, Brimistors or the electrolytics themselves. Unfortunately it's often too late to avoid the damage as the owner has already connected the set to the mains supply to see if it works and something has gone bang. When you've repaired the damage, the electrolytics will still need to be reformed. The main problem is how to do this? In desperation I've used a hand-wound Megger before now, but this gets rather tedious. Ideally you need a metered, current-limited variable voltage supply capable of providing 5-20mA, but these are not very common. A 33kΩ resistor and a suitable diode connected to an old h.t. transformer fed from a variac is a reasonable alternative. A LED in series with the resistor will give an indication of the current, and a high-impedance meter (Avo or a digital voltmeter) will let you know when the capacitor has reached the correct voltage. It's usually possible to reform all the h.t. electrolytics without disconnecting anything – it depends on the voltage at which the early stages are operated and how they are fed.

In sets of this vintage the normal insulation used in the coupling and decoupling capacitors is waxed paper rather then the polyester film used today. With time, unless they are kept warm through regular use, capacitors of this type will absorb moisture and become leaky. So test the insulation of all the coupling capacitors before applying any power. A 250V Megger is ideal for this: you can use a 500V one and turn the handle at half speed, but this is rather tricky to get right. You must test these capacitors at a reasonably high voltage, and an insulation resistance of less than 100MΩ is not normally acceptable (with a 1MΩ grid resistor even this will cause a 1-2V change in the grid bias). To do this test one end of the capacitor will have to be disconnected. It's normally kinder to cut a lead rather than try to unwrap it from a solder-covered tag. Either overlap the cut ends to rejoin them or wind a thin piece of wire round a suitably sized component lead to form a tube with which to join them. Decoupling capacitors are not so critical, but if the set hasn't been used for a long time some of them may have sufficiently low insulation to cause problems. Values as low as 100kΩ are not unknown. This may be acceptable if the capacitor is connected in parallel with a cathode bias resistor, but not if it's a screen grid decoupling capacitor.

Finally, give the set a quick visual check before applying power, looking for any obvious damage. Somewhat blackened resistors may still be all right, but it does no harm to check their value and look for anything that may have overloaded them. It's also worth looking to see whether all the valves are nice and silvery where they were gettered – they don't work very well when they are full of air! If the set looks as if it has been damp, it's not a bad idea to leave it somewhere nice and warm for a few days to dry out thoroughly.

Now you can switch on and start to look for all the interesting faults.

A few other comments. Although most post-war sets used an i.f. between 455-475kHz and had 6·3V heaters (if they were a.c. only types), earlier ones often had an i.f. of 110kHz and had lower-voltage heaters. Before removing a valveholder so that a differently-based replacement valve can be fitted, consider whether the new socket can be secured above the chassis with short wires run through the original one for the connections. This way if the correct valve is obtained at a later date it's easier to put the set back to its initial state.

If a wooden cabinet is French polished methylated spirit is not a suitable cleaning fluid as it will dissolve the polish and make a sticky mess. White spirit or Genclean might be o.k. (try it first in some place that won't show), but I'd use a damp cloth with a little detergent on it.

P.f. Gascoyne,
Wantage, Oxon.

RF DUB OUT REQUIRED

There have been numerous articles on copying videotapes. Usually the requirement is to copy an original camcorder tape on to the full-size VHS format, since this is how most people watch the pictures. When doing this you can eliminate any duff shots and, as all modern machines will assemble edit, you can indulge in a certain amount of processing. But those who shoot with VHS will get a VHS-VHS copy which, as second-generation VHS, will suffer from the VHS defects twice. Those who use Video 8 are perhaps better off as this copies on to VHS much better.

What we could really do with is a socket on the back of the machine labelled, for want of a better phrase, RF DUB OUT. This would effectively take the signal straight from the video heads – no demodulation, limiting or anything. Obviously it would need to be amplified and buffered. An RF DUB IN input would similarly be required: it would accept this r.f. signal which would be copied on to a second tape – no luma-chroma separation, white and dark clips etc. In this way copies would be in effect first generation. Professional machines appear to do this, though the signal has obviously to be demodulated for monitoring purposes. How about it, you designers put there?

Michael A. Harris,
Cheadle, Cheshire.

SHARP BRASS HUB

In your December issue Chris Watton queried whether the brass hub for Sharp idler motors is a genuine spare. I'm pleased to be able to confirm that it is, and that it has been available since 1987 when a technical bulletin was issued advising our Service Facilities of its introduction. Chris's method of fixing, using a hot soldering iron, is not quite the method we recommend however.

The pulley is supplied under part number BQC-

CORRECTION

The luminance signal delay time (page 180 last month) should have been given as about 800nsec, not 800μsec. In practice most luminance delay lines provide a delay of 270, 330 or 470nsec.

VC110ED/2 and comes complete with a split washer. Fit the washer on the motor shaft first, then push the pulley on to the shaft – after application of an adhesive such as Superglue. When it's necessary to replace the motor, the genuine item comes with the brass pulley already fitted – under the part number given in the manual.

Chris also mentioned that it's advisable to fit genuine idlers as he'd found pattern spares to be unreliable. Unfortunately the customer doesn't always realise that the idler fitted was not obtained from the VCR manufacturer: the subsequent unreliability reflects on both the repairer and the manufacturer of the machine. Since the idlers are available at a trade price of £2·70 each it's difficult to understand why companies should take a risk with the quality of their repairs.

W. Wilcock, Assistant Manager, Technical Support, Consumer Electronics Group, Sharp Electronics (UK) Ltd., Newton Heath, Manchester.

HELP WANTED

Can anyone supply the September 1978 and August 1986 issues of *Television*? J. Graham, 17 Crescent Road, Birkdale, Southport, Mersyside PR8 4SR. 0704 67431.

Does anyone have an ultrasonic handset for the B & O 20AX chassis, type 4402. Even a broken or non-working one would be useful! Tim Jarman, 7 Cadet Way, Church Crookham, Fleet, Hants GU13 0UG. 0252 616 938.

Wanted: More work or employed position by experienced freelance engineer. David C.J. Tilley, 6 Lime Road, Cowleymoor, Tiverton, Devon EX16 6JA. 0884 255 316.

Wanted: Panasonic MA26WO diodes; chopper transformer for the Panasonic U3 chassis, part no. 15767; Sony 470DLB22 c.r.t. Reasonable prices paid. Roger Burchett, 12 Ormonde Road, Hythe, Kent CT21 6DN. 0303 267 969.

An old-timer with over sixty years in the trade wonders whether anyone can supply the following: set of comb and cutters for the Sunbeam 777 Shavemaster razor; a tuner for the Co-op Model CC6303 (Z718C chassis)? R.A. Coates, 105 Mayfield Road, Whitby, North Yorkshire YO21 1LT.

Does anyone know how to disable the 'status' information (station identification in a black box superimposed on the picture for approximately five seconds after changing channels) on the Baird 8233 (TX10 chassis with Mullard VM6101/4 text decoder and 1511 interface panel)? A. Robertson, 261 Warrington Road, Abram, Wigan WN2 5RQ.

Can anyone supply a C1316C chip for the Dainchi midi-

CD Player Casebook

Reports from Mike Leach, P.J. Roberts, Nick Beer and Richard Newman

Crown CDK2300

No CD operation was the complaint with this midi system. The tray opened all right, but when a disc was inserted it would on occasions rotate extremely fast and at other times not at all. With the CD section being at the bottom of the cabinet it was hard to see exactly what was going on: the laser seemed to be trying to focus, but without success. It was quite likely that the laser unit was faulty, but having been caught out before I decided to make a few other checks first.

As with most CD decks that are mounted in little black boxes this machine isn't easy to work on. I was able to make some checks around the decoder section however and found that the d.c. conditions here were haywire. I came to the conclusion that either the main microcontroller chip or the decoder chip was faulty. The latter (IC3) is a CXD1130Q and as I had one in stock I decided to go ahead and replace it. While I was removing the chip it actually broke in half – I'd applied no pressure whatsoever to it and was using a standard soldering iron, not a hot-air gun. The replacement cured the ailing crown, and the two halves of the chip were left for the customer to see. **M.L.**

Sanyo CP17

The drawer wouldn't open, but if a disc was loaded manually the player would read the TOC and play the disc. I decided that the fault must be in either the drawer motor or the associated drive circuit. A voltage check was made across the motor when open was selected. There was very little voltage, certainly not enough to operate the motor. So attention was turned to the LB1645N drawer motor driver chip IC691. The voltage at pin 8 was low at 2·4V instead of the specified 9V. Now pin 8 is fed from the 9V rail via R691 (10Ω): pin 7 is connected directly to this rail and was o.k. at 9V. Obviously R691 was open-circuit. A cold check with the power disconnected proved this to be the case. A replacement restored normal operation and the test disc played satisfactorily. **P.J.R.**

Toshiba SM55

The customer said that the CD player section of this unit wouldn't play certain discs. He was most distressed that it wouldn't play his REM, Dire Straits etc. though it happily played his mother's Daniel O'Donnell. We agreed that it had a curious sense of taste! Anyway, we found that it sometimes failed to read the TOC or was tardy in doing so: at other times it simply cut out whilst playing. It seemed that there was a focus problem, and after many hours spent dismantling the unit I saw the simple reason why – the lens was dirty! **N.B.**

Philips CD380

This machine would run for weeks then decide not to read the TOC. A new deck assembly had been fitted, but this made no difference. I eventually found that the machine could be made to function by pressing the main PCB in roughly the centre. When I removed the panel I saw that there are a large number of chip components on the reverse side. A bright light, a large bench magnifier and a lot of patience finally revealed a chip transistor that had been glued rather than soldered. It was T6520 which is connected to pin 23 of the SAA7210 decoder chip IC6522. Removing the transistor, cleaning the print and fitting a replacement provided a complete cure. **R.N.**

CD 903? L. Mawdsley, One Way TV, 82 Sandhurst Road, Rainhill, Prescot, Merseyside L35 8NQ.

Can anyone supply the TBA240 chip? I require a number of them. Possibly there was an equivalent? Please contact Maurice Nalletamby, 57 Upwood Road, Lee, London SE12 8AE.

Private individual requires a Fisher RC53 remote control unit or possibly a damaged case containing the PCB with intact i.c. type D1943G 226AB. J. Calvert, 163 Hawton Road, Newark, Notts (0636 702 531).

Can anyone supply a head for the Sanyo VTC9300 Betamax VCR? Donald Bills, 69 Greenfields Road, Kingswinford DY6 8EG.

Can anyone supply a plug-in Siemens type switch-mode power supply panel for the Intel CTV6000 14in. colour portable? G. Green, 9 Richmond Road, Rubery, Worcestershire B45 9UL.

Could anyone supply a couple of upper video drum assemblies for the Philips VR2020? Paul Hardy, 43 Sheridan Avenue, Caversham, Reading, Berks RG4 7QB (0734 475 869).

Wanted, a hybrid line oscillator combination, circuit reference no. W700 (part no. 8 638 309 526A) for the Blaupunkt Model FM120. Please phone 0742 875 492 or write to Peter Korner, WKF Electronics, 2 Bramley Avenue, Aston, Sheffield S31 0AQ.

Can anyone supply an ex-equipment Panasonic r.f. converter unit, type ENC17352 or ENC17352-1, as used in NV7000 series VCRs – also if possible a service manual? R.W. Goad, 7 Chipstead House, Chipstead Road, Cosham, Hants PO6 3JJ (0705 382 918).

Satellite TV Faults

Reports from Hugh Allison and Steve Cannon

Amstrad SRD400

The arrival of UK Gold brought an unexpected rush of repairs. This was because a number of people weren't aware of the fact that their decoder didn't work until they tried to decode UK Gold. It was hard work tracking down a circuit diagram but we then found that most of these decoders have the following fault. Beneath IW05, the 40-pin chip to the left of the pay card slot, there's a plated-through hole that goes open-circuit, often with green gunge in attendance – I suspect kiddies pouring liquid through the card hole, as with front-loading VCRs. Getting the chip out is a nightmare. Fortunately however the problem hole feeds the 5V supply to the chip. So just look for 5V at pin 31. If it isn't there, get it from some place else rather than lift the chip – the 5V adjust pin is as good as any place. **H.A.**

Amstrad SRD400

Only the right-hand channel came through our monitor set, the left-hand channel being completely silent. A switching fault was at first suspected, but after checking the switching voltages around IC105 and trying to make sense of them we concluded that the switching part was working correctly. Scope checks were then made right at the start of the audio signal processing, the TBA229 sound i.f./demodulator chip IC302. The right-hand audio signal output at pin 4 was perfect, but there was no signal at the other output pin 5. We fitted a new chip and got both channels.

A couple of days later however the receiver reappeared with exactly the same fault. In again with the scope to find that the situation was as before: no left-hand audio output from IC302. Surely the chip couldn't have failed again? Unfortunately we didn't have a replacement in stock or another receiver from which to borrow one. A check on the input to the chip didn't really prove anything as you are talking about 10·7MHz and 10·52MHz for the left- and right-hand channels respectively. Maybe we could inject a modulated r.f. signal to prove whether or not the fault was indeed associated with the chip? The new Philips r.f. gizmo was sought. We'd had it for only about a fortnight and this was to be its trial run.

We removed the buffer transistor Q302 at the input to the chip and injected a 10 52MHz modulated signal. After pratting about with the gain and sweep we obtained a clear sinewave at pin 4, the right-hand channel output. We then set the generator to 10·7MHz and injected this. There was no output at pin 5. So the fault was definitely associated with the chip. Was it the chip again? We decided to make voltage comparisons around the chip between the two channels and found that there was 3V at pin 16, the right-hand channel filter network pin. At the corresponding pin for the left-hand channel, pin 9, there was nothing. A resistance check from this pin to chassis produced a reading of about 50Ω. At pin 16 the reading was in the kΩs range. The only component that's connected to pin 9 is C313, which is a 10nF ceramic capacitor of the type that causes trouble in various Panasonic sets. In a flash we whipped it out and tried a replacement. This provided a complete cure to the long-winded repair. **S.C.**

Ferguson SRB1

Although defunct as Marco Polo receivers these units are popular with satellite TV enthusiasts as low-cost MAC receivers. Both an in-built fault and fitting a MAC conversion chip the wrong way round can blow the fuses. Unfortunately these are not obvious: they are little black wired-in things. The most obvious telltale is the circuit reference number printed next to them on the board – it starts VP0 followed by a number. VP02 is the one that most often blows. These fuses are rated at 800mA and are available.

Now to the fault that blows them. Inside, with the covers off and the mains disconnected, you'll find a long oblong tinplate box just behind the display. The top cover comes off by twisting three lugs. Gentle pulling will enable you to extract the board, which is connected via plug-in pins. One or two components often stand up from the board. When in-situ their leads rub on the main board's earth plane, causing a short. Make sure that these components (often a resistor or a white-painted diode) are at say 45° to the board then refit it. **H.A.**

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AIWA	Part No.	Price
AV-66		
Video Head	VID 2546	£15.16
Pinch Roller	VID 1755	£3.87
Belt Kit	VID 7519	£1.23
Idler Replacement Set	VID 1001	£3.54
Idler	VID 1005	£1.81
Capstan Motor	VID 2160	£24.27
Tension Band	VID 1423	£3.54
Reel Table Rubber Tyre	VID 1335	£1.15
CTL Unit	VID 2637	£59.75
AV-77		
Video Head	VID 2546	£15.16
Pinch Roller	VID 1755	£3.87
Belt Kit	VID 7509	£1.29
Idler Replacement Set	VID 1000	£5.44
FWD Limiter	VID 1002	£3.71
Idler	VID 1004	£1.40
Idler	VID 1005	£1.81
Capstan Motor	VID 2118	£28.50
Tension Band	VID 1423	£3.54
CTL Unit	VID 2567	£46.43
AKAI		
VS-9800		
Video Head	VID 2511	£9.81
Pinch Roller	VID 1756	£3.13
Belt Kit	VID 7506	£1.56
Take Up Idler	VID 1025	£5.11
REW Idler	VID 1026	£6.51
Unloading Idler	VID 1027	£10.23
FF Rubber Tyre	VID 1029	£0.82
FF Rubber Tyre	VID 1030	£0.82
Unloading Idler Rubber Tyre	VID 1207	£0.90
Capstan Motor	VID 2119	£24.60
Drum Motor	VID 2120	£19.61
Cassette Lamp	VID 1943	£0.26
Tension Band	VID 1391	£3.54
Repair Kit	VID 7911	£15.45
Take Up Rubber Tyre	VID 1028	£0.82
ALBA		
VCR-4000		
Video Head	VID 2713	£16.29
Pinch Roller	VID 1787	£3.63
Belt Kit	VID 7596	£1.99
Idler	VID 1049	£3.21
Cassette LED	VID 1981	£1.71
Tension Band	VID 1399	£1.98
AMSTRAD		
VCR-4600		
Video Head	VID 2676	£14.35
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7593	£1.55
Clutch	VID 1226	£4.62
Gear Holder	VID 1227	£12.75
RF Clutch	VID 1231	£7.17
Cassette LED	VID 1981	£1.71
VCR-9000		
Video Head	VID 2502	£14.25
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7592	£1.15
RF Clutch	VID 1225	£4.20
Clutch	VID 1226	£4.62
Gear Holder	VID 1227	£12.75
Cassette LED	VID 1981	£1.71
BANG & OLUFSEN		
VHS-65		
Video Head	VID 2506	£13.72
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF×REW Idler Arm	VID 1020	£1.56
Clutch Plate	VID 1211	£8.27
Capstan Motor	VID 2147	£18.95
Cassette LED	VID 1981	£1.71
DECCA		
VHH-8300		
Video Head	VID 2511	£9.81
Pinch Roller	VID 1814	£3.05
Belt Kit	VID 7812	£0.99
Reel Idler	VID 1036	£2.55
Take Up Clutch	VID 1037	£2.31
Take Up Idler	VID 1038	£1.03
Brake Pad	VID 1361	£0.39
Reel Motor	VID 2169	£28.12
Capstan Motor	VID 2164	£37.18
Loading Motor	VID 2168	£10.31
Cassette Lamp	VID 1947	£0.42
Tension Band	VID 1389	£1.73
Repair Kit	VID 7913	£13.02
Take Up Reel Table Rubber Tyre	VID 1080	£0.66
Supply Reel Table Rubber Tyre	VID 1080	£0.66
FERGUSON		
3-V-30		
Video Head	VID 2647	£9.38
Pinch Roller	VID 1814	£3.05
Belt Kit	VID 7812	£0.99
Reel Idler	VID 1036	£2.55
Take Up Clutch	VID 1037	£2.31
Take Up Idler	VID 1038	£1.03
Brake Pad	VID 1361	£0.39
Reel Motor	VID 2169	£28.12
Capstan Motor	VID 2164	£37.18
Loading Motor	VID 2168	£10.31
Cassette Lamp	VID 1947	£0.42
Tension Band	VID 1389	£1.73
Repair Kit	VID 7913	£13.02
Take Up Reel Table Rubber Tyre	VID 1080	£0.66
Supply Reel Table Rubber Tyre	VID 1080	£0.66
3-V-36		
Video Head	VID 2647	£9.38
Pinch Roller	VID 1813	£3.05
Belt Kit	VID 7543	£0.99
Take Up Clutch	VID 1031	£2.04
Take Up Idler	VID 1038	£1.03
Reel Idler	VID 1039	£3.30
Brake Pad	VID 1361	£0.39
Capstan Motor	VID 2165	£21.22
Loading Motor	VID 2168	£10.31
Front Loading Motor	VID 2168	£10.31
Cassette LED	VID 1981	£1.71
Tension Band	VID 1389	£1.73
Remote Control	IR 9100	£12.95
Repair Kit	VID 7918	£12.14
Mains Transformer	VID 2223	£23.47
Take Up Reel Table Rubber Tyre	VID 1080	£0.66
Supply Reel Table Rubber Tyre	VID 1080	£0.66
Cassette Housing	VID 1099	£20.61
3-V-57		
Video Head	VID 2573	£17.29
Pinch Roller	VID 1813	£3.05
Belt Kit	VID 7540	£0.66
Clutch Mechanism	VID 1083	£14.56
Capstan Motor	VID 2188	£44.62
Loading Motor	VID 2167	£13.69
Front Loading Motor	VID 2168	£10.31
Cassette LED	VID 1981	£1.71
Tension Band	VID 1388	£2.06
Repair Kit	VID 7920	£15.85
Cassette Housing	VID 1315	£20.61
FV-10B		
Video Head	VID 2580	£19.15
Pinch Roller	VID 1817	£6.84
Belt Kit	VID 7564	£2.72
Idler Arm	VID 1091	£2.40
Reel Motor	VID 2193	£15.76
Capstan Motor	VID 2190	£25.43
Loading Motor	VID 2412	£6.18
Front Loading Motor	VID 2412	£6.18
Cassette LED	VID 1981	£1.71
Tension Band	VID 1386	£0.82
Repair Kit	VID 7921	£9.67
FV-12L		
Video Head	VID 2581	£24.87
Pinch Roller	VID 1817	£6.84
Belt Kit	VID 7564	£2.72
Idler Arm	VID 1091	£2.40
Reel Motor	VID 2193	£15.76
Capstan Motor	VID 2190	£25.43
Loading Motor	VID 2412	£6.18
Front Loading Motor	VID 2412	£6.18
Cassette LED	VID 1981	£1.71
Tension Band	VID 1386	£0.82
Repair Kit	VID 7921	£9.67
FIDELITY		
VCR-100		
Video Head	VID 2502	£14.25
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7593	£1.55
Clutch	VID 1226	£4.62
Gear Holder	VID 1227	£12.75
RF Clutch	VID 1231	£7.17
Cassette LED	VID 1981	£1.71
FINLUX		
VR-1030		
Video Head	VID 2558	£43.72
Pinch Roller	VID 1803	£2.97
Idler	VID 1006	£2.80
Tension Band	VID 1432	£5.69
Remote Control	IR 9034	£14.09
Repair Kit	VID 7930	£10.50
VR-2010		
Video Head	VID 2578	£56.31
Pinch Roller	VID 1827	£4.39
Belt Kit	VID 7588	£1.05
Idler	VID 1252	£4.37
Loading Gear	VID 1253	£7.01
Modification Set	VID 1254	£11.38
Tension Band	VID 1431	£4.70
Remote Control	IR 9034	£14.09
FISHER		
FVH-P520		
Video Head	VID 2500	£16.95
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7532	£1.31
Take Up Idler	VID 1015	£5.36
FF×REW Pulley	VID 1016	£0.90
Idler	VID 1023	£2.80
Tension Band	VID 1378	£2.31
Take Up Reel Table Rubber Tyre	VID 1293	£0.66
Supply Reel Table Rubber Tyre	VID 1293	£0.66
FVH-P530		
Video Head	VID 2500	£16.95
Pinch Roller	VID 1788	£2.95
Belt Kit	VID 7532	£1.31
Take Up Idler	VID 1015	£5.36
FF×REW Pulley	VID 1016	£0.90
Idler	VID 1023	£2.80
Tension Band	VID 1378	£2.31
Take Up Reel Table Rubber Tyre	VID 1293	£0.66
Supply Reel Table Rubber Tyre	VID 1293	£0.66
FVH-P720×720R×721		
Video Head	VID 2500	£16.95
Pinch Roller	VID 1810	£2.95
Belt Kit	VID 7532	£1.31
Gear Idler	VID 1013	£4.37
Idler	VID 1014	£2.85
Loading Gear Set	VID 1230	£1.65
Cassette LED	VID 1981	£1.71
Tension Band	VID 1376	£2.31
Take Up Reel Table	VID 1295	£7.83
Supply Reel Table	VID 1294	£6.35
FVH-P722×725		
Video Head	VID 2501	£24.43
Pinch Roller	VID 1810	£2.95
Belt Kit	VID 7813	£1.15
Gear Idler	VID 1013	£4.37
Idler	VID 1014	£2.85
Loading Gear Set	VID 1230	£1.65
Cassette LED	VID 1981	£1.71
Tension Band	VID 1376	£2.31
Take Up Reel Table	VID 1295	£7.83
Supply Reel Table	VID 1294	£6.35
FVH-P780K×RV		
Video Head	VID 2501	£24.43
Pinch Roller	VID 1818	£2.97
Belt Kit	VID 7568	£3.05
Idler	VID 1093	£4.62
Clutch	VID 1094	£14.16
Cassette LED	VID 1981	£1.71
Tension Band	VID 1377	£2.39
Supply Reel Table	VID 1296	£10.97
FUNAI		
VCR-4600		
Video Head	VID 2676	£14.35
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7593	£1.55
Clutch	VID 1226	£4.62
Gear Holder	VID 1227	£12.75
RF Clutch	VID 1231	£7.17
Cassette LED	VID 1981	£1.71
VCR-5843		
Video Head	VID 2708	£24.31
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7615	£1.65
Idler	VID 1364	£2.47
Cassette LED	VID 1981	£1.71
GEC		
V-4004		
Video Head	VID 2506	£13.72
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF×REW Arm	VID 1020	£1.56
Clutch Plate	VID 1211	£8.27
Capstan Motor	VID 2148	£18.95
Cassette LED	VID 1981	£1.71
Tension Band	VID 1379	£2.31
Repair Kit	VID 7922	£16.73
GOLDSTAR		
GHV-8000×8700×8210×8215		
Pinch Roller	VID 1815	£2.97
Belt Kit	VID 7585	£1.32
Idler	VID 1052	£1.64
Bracket Centre	VID 1223	£13.11
Clutch Gear	VID 1228	£2.22
Limiter Roller	VID 1440	£1.23
Cassette LED	VID 1981	£1.71
Tension Band	VID 1399	£1.98
VCP-4100×4130		
Video Head	VID 2645	£20.61
Pinch Roller	VID 1815	£2.97
Belt Kit	VID 7585	£1.32
Idler	VID 1052	£1.64
Bracket Centre	VID 1223	£13.11
Clutch Gear	VID 1228	£2.22
Limiter Roller	VID 1440	£1.23
Cassette LED	VID 1981	£1.71
Tension Band	VID 1399	£1.98
VCP-4200×4326		
Video Head	VID 2645	£20.61
Pinch Roller	VID 1815	£2.97
REW Belt	VID 7234	£0.41
Cassette LED	VID 1981	£1.71
GRANADA		
VHS-EY1×EY2		
Video Head	VID 2539	£16.35
Pinch Roller	VID 1822	£3.21
Belt Kit	VID 7605	£2.55
Reel Drive Unit	VID 1255	£6.51
Loading Gear A	VID 1268	£1.85
Loading Gear B	VID 1271	£1.32
Capstan Motor	VID 2404	£44.81
Cassette LED	VID 1981	£1.71
Tension Band	VID 1414	£3.13
GRUNDIG		
MVS-400		
Video Head	VID 2596	£15.96
Pinch Roller	VID 1757	£2.97
Belt Kit	VID 7567	£0.82
Idler	VID 1052	£1.64
Loading Gear	VID 1222	£1.52
Clutch Gear	VID 1228	£2.22
Limiter Roller	VID 1440	£1.23
Cassette LED	VID 1981	£1.71
Tension Band	VID 1400	£2.32
Remote Control	IR 8965	£21.87
VS-520 GB		
Video Head	VID 2595	£16.23
Pinch Roller	VID 1821	£8.58
Timing Belt	VID 1482	£7.92
Centre Pulley	VID 1482	£7.92
Cassette LED	VID 1981	£1.71
Tension Band	VID 1401	£3.71
HINARI		
VXL-30×35×4		
Video Head	VID 2518	£21.21
Pinch Roller	VID 1815	£2.97
Belt Kit	VID 7566	£2.31
Clutch	VID 1316	£6.02
Idler	VID 1317	£2.59
Loading Motor	VID 2167	£13.69
Cassette LED	VID 1981	£1.71

HITACHI	Part No.	Price
VT-11		
Video Head	VID 2504	£15.37
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF×REW Idler Arm	VID 1020	£1.56
Clutch Plate	VID 1211	£8.27
Capstan Motor	VID 2147	£18.95
Cassette LED	VID 1981	£1.71
Tension Band	VID 1379	£2.31
Repair Kit	VID 7922	£16.73
VT-16 S		
Video Head	VID 2505	£24.81
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF×REW Idler Arm	VID 1020	£1.56
Clutch Plate	VID 1211	£8.27
Capstan Motor	VID 2147	£18.95
Cassette LED	VID 1981	£1.71
Tension Band	VID 1379	£2.31
Repair Kit	VID 7922	£16.73
VT-33×330		
Video Head	VID 2504	£15.37
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF×REW Idler Arm	VID 1020	£1.56
Clutch Plate	VID 1211	£8.27
Capstan Motor	VID 2148	£18.95
Cassette LED	VID 1981	£1.71
Tension Band	VID 1379	£2.31
Repair Kit	VID 7922	£16.73
VT-61×62×63×64		
Video Head	VID 2628	£24.25
Pinch Roller	VID 1818	£2.97
Belt Kit	VID 7583	£1.48
FF×REW Idler Arm	VID 1020	£1.56
Clutch Plate	VID 1211	£8.27
Capstan Motor	VID 2154	£18.02
Cassette LED	VID 1981	£1.71
Tension Band	VID 1379	£2.31
Repair Kit	VID 7924	£14.25
VT-8000×8500		
Video Head	VID 2509	£15.37
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7803	£0.74
Take Up Idler	VID 1015	£5.36
Wind Roller	VID 1016	£0.90
FF×REW Idler	VID 1023	£2.80
Capstan Motor	VID 2155	£50.50
Tension Band	VID 1381	£2.14
Remote Control	IR 9057	£16.41
Repair Kit	VID 7928	£15.45
Take up Reel Table	VID 1302	£12.62
Supply Reel Rubber Tyre	VID 1300	£0.74
VT-9300×9500×9700		
Video Head	VID 2509	£15.37
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7802	£0.82
FF×REW Idler Arm	VID 1019	£2.94
Play Idler	VID 1075	£3.34
FS Brake	VID 1242	£1.78
Capstan Motor	VID 2156	£57.81
Cassette Lamp	VID 1951	£0.99
Tension Band	VID 1382	£1.98
Remote Contro	IR 9096	£16.45
Repair Kit	VID 7927	£15.21
Take Up Reel Table	VID 1303	£8.15
ITT		
VR-3913		
Video Head	VID 2511	£9.81
Pinch Roller	VID 1814	£3.05
Belt Kit	VID 7812	£0.99
Reel Idler	VID 1036	£2.55
Take Up Clutch	VID 1037	£2.31
Take Up Idler	VID 1038	£1.03
Brake Pad	VID 1361	£0.39
Reel Motor	VID 2169	£28.12
Capstan Motor	VID 2164	£37.18
Loading Motor	VID 2168	£10.31
Cassette Lamp	VID 1947	£0.42
Tension Band	VID 1389	£1.73
Repair Kit	VID 7913	£13.02
Take Up Reel Table Rubber Tyre	VID 1080	£0.66
Supply Reel Table Rubber Tyre	VID 1080	£0.66
VR-3993		
Video Head	VID 2647	£9.38
Pinch Roller	VID 1814	£3.05
Belt Kit	VID 7523	£1.13
Reel Idler	VID 1036	£2.55
Take Up Clutch	VID 1037	£2.31
Take Up Idler	VID 1038	£1.03
Roller Bar	VID 1363	£4.53
Brake Pad	VID 1361	£0.39
Reel Motor	VID 2169	£28.12
Capstan Motor	VID 2187	£46.16
Loading Motor	VID 2168	£10.31
Front Loading Motor	VID 2168	£10.31
Cassette Lamp	VID 1946	£0.49
Tension Band	VID 1389	£1.73
Repair Kit	VID 7914	£13.02
Take Up Reel Table Rubber Tyre	VID 1080	£0.66
Supply Reel Table Rubber Tyre	VID 1080	£0.66

JVC	Part No.	Price
HR-3300		
Video Head	VID 2511	£9.81
Pinch Roller	VID 1756	£3.13
Belt Kit	VID 7506	£1.56
Take Up Idler Large	VID 1025	£5.11
REW Idler	VID 1025	£5.11
Unloading Idler	VID 1027	£10.23
FF Rubber Tyre	VID 1029	£0.87
Unloading Idler Rubber Tyre	VID 1207	£0.90
Capstan Motor	VID 2119	£24.60
Drum Motor	VID 2120	£19.61
Cassette Lamp	VID 1943	£0.26
Tension Band	VID 1391	£3.54
Repair Kit	VID 7911	£15.45
Take Up Rubber Tyre	VID 1028	£0.82
HR-D110×111×120×121		
Video Head	VID 2647	£9.38
Pinch Roller	VID 1813	£3.05
Belt Kit	VID 7543	£0.99
Take Up Clutch	VID 1031	£2.04
Take Up Idler	VID 1038	£1.03
Reel Idler	VID 1039	£3.30
Brake Pad	VID 1361	£0.39
Capstan Motor	VID 2165	£21.22
Loading Motor	VID 2168	£10.31
Front Loading Motor	VID 2168	£10.31
Cassette LED	VID 1981	£1.71
Tension Band	VID 1389	£1.73
Repair Kit	VID 7918	£12.14
Mains Transformer	VID 2223	£23.47
Take Up Reel Table Rubber Tyre	VID 1080	£0.66
Supply Reel Table Cassette-Housing	VID 1099	£20.61
MATSUI		
VX-850		
Pinch Roller	VID 1815	£2.97
Belt Kit	VID 7566	£2.31
Clutch	VID 1316	£6.02
Idler	VID 1317	£2.59
Cassette LED	VID 1981	£1.71
MITSUBISHI		
HS-307		
Video Head	VID 2606	£32.97
Pinch Roller	VID 1808	£3.05
Belt Kit	VID 7542	£1.22
Reel Idler Unit	VID 1040	£8.73
FF Idler Rubber Tyre	VID 1081	£0.74
Capstan Rubber Tyre	VID 1264	£1.32
Cam Gear A	VID 1274	£1.32
Gear 2	VID 1275	£1.32
Cam Gear B	VID 1276	£1.40
Gear 1	VID 1277	£1.40
Cassette LED	VID 1981	£1.71
Tension Band	VID 1393	£2.80
Take Up Reel Table	VID 1307	£3.21
Supply Reel Table	VID 1299	£3.43
HS-311		
Video Head	VID 2607	£42.37
Pinch Roller	VID 1808	£3.05
Belt Kit	VID 7559	£3.13
Reel Idler Unit	VID 1040	£8.23
FF Idler Rubber Tyre	VID 1081	£0.74
Capstan Rubber Tyre	VID 1264	£1.32
Cam Gear A	VID 1274	£1.32
Gear 2	VID 1275	£1.32
Cam Gear B	VID 1276	£1.40
Gear 1	VID 1277	£1.40
Cassette LED	VID 1981	£1.71
Tension Band	VID 1393	£2.80
Take Up Reel Table	VID 1307	£3.21
Supply Reel Table	VID 1299	£3.43
NEC		
N-830 EG×831×832×833		
Video Head	VID 2647	£9.38
Pinch Roller	VID 1813	£3.05
Belt Kit	VID 7543	£0.99
Take Up Clutch	VID 1031	£2.04
Take Up Idler	VID 1038	£1.03
Reel Idler	VID 1039	£3.30
Brake Pad	VID 1361	£0.39
Capstan Motor	VID 2165	£21.22
Loading Motor	VID 2168	£10.31
Front Loading Motor	VID 2168	£10.31
Cassette LED	VID 1981	£1.71
Tension Band	VID 1389	£1.73
Repair Kit	VID 7918	£12.14
Mains Transformer	VID 2223	£23.47
Take Up Reel Table Rubber Tyre	VID 1080	£0.66
Supply Reel Table Rubber Tyre	VID 1080	£0.66
Cassette Housing	VID 1099	£20.61
N-895		
Video Head	VID 2514	£29.18
Pinch Roller	VID 1813	£3.05
Belt Kit	VID 7540	£0.66
Clutch Mechanism	VID 1082	£15.37
Capstan Motor	VID 2166	£51.68
Loading Motor	VID 2167	£13.69
Front Loading Motor	VID 2168	£10.31
Cassette LED	VID 1981	£1.71
Tension Band	VID 1387	£2.47

	Part No.	Price
Remote Control	IR 8947	£15.75
Repair Kit	VID 7919	£17.39
Cassette Housing	VID 1315	£20.61
N-9013×9014×9033×9034×9053×9054×9055		
Video Head	VID 2695	£19.51
Pinch Roller	VID 1828	£2.97
Belt Kit	VID 7601	£3.13
Reel Drive Pulley	VID 1265	£7.09
Cassette LED	VID 1981	£1.71
PANASONIC		
NV-2000×2010		
Video Head	VID 2520	£9.38
Pinch Roller	VID 1757	£2.97
Belt Kit	VID 7800	£1.96
Idler	VID 1054	£0.85
Idler	VID 1055	£0.85
Cam Gear	VID 1221	£0.59
Intermediate Gear	VID 1216	£1.23
Driving Gear	VID 1217	£0.57
Cassette Lamp	VID 1948	£0.74
Tension Band	VID 1397	£2.38
Repair Kit	VID 7901	£10.08
Take Up Reel Table	VID 1312	£11.13
Supply Reel Table	VID 1310	£7.34
NV-300×333		
Video Head	VID 2520	£9.38
Pinch Roller	VID 1787	£3.63
Belt Kit	VID 7521	£1.31
Play Idler	VID 1048	£3.08
Idler	VID 1057	£0.85
Idler Arm	VID 1220	£4.20
Cam Gear	VID 1215	£1.15
Intermediate Gear	VID 1216	£1.23
Driving Gear	VID 1217	£0.57
Reel Motor	VID 2158	£18.95
Capstan Motor	VID 2421	£39.43
Cassette LED	VID 1982	£1.62
Tension Band	VID 1399	£1.98
Repair Kit	VID 7903	£10.57
Take Up Reel Table	VID 1312	£11.13
PHILIPS		
Video Head	VID 2526	£10.47
Pinch Roller	VID 1757	£2.97
Belt Kit	VID 7530	£0.90
Idler	VID 1052	£1.64
Loading Gear	VID 1222	£1.52
Idler	VID 1270	£1.98
Idler	VID 1371	£5.94
Limiter Roller	VID 1440	£1.23
Cassette LED	VID 1981	£1.71
Tension Band	VID 1400	£2.32
Repair Kit	VID 7906	£7.98
VR-6540		
Video Head	VID 2537	£18.02
Pinch Roller	VID 1815	£2.97
Belt Kit	VID 7547	£0.99
Idler	VID 1060	£1.64
Master Cam	VID 1265	£7.09
Reel Motor	VID 2127	£26.06
Loading Motor	VID 2142	£15.02
Cassette LED	VID 1981	£1.71
Tension Band	VID 1420	£5.61
PYE		
DV-761		
Video Head	VID 2621	£55.43
Pinch Roller	VID 1827	£4.39
Belt Kit	VID 7588	£1.05
Idler	VID 1252	£4.37
Loading Gear	VID 1253	£7.01
Modification Set	VID 1254	£11.38
Tension Band	VID 1431	£4.70
SAISHO		
VH-2000×3800		
Pinch Roller	VID 1815	£2.97
Belt Kit	VID 7565	£0.91
Idler	VID 1060	£1.64
Reel Motor	VID 2121	£14.59
Cassette LED	VID 1981	£1.71
SALORA		
SV-8620		
Pinch Roller	VID 1808	£3.05
Belt Kit	VID 7600	£3.21
FF×REW Idler Arm	VID 1233	£3.20
FF×REW Idler Arm	VID 1234	£3.13
FF×REW Idler	VID 1235	£1.81
Cassette LED	VID 1981	£1.71
Tension Band	VID 1394	£3.21
Take Up Reel Table	VID 1308	£5.21
Supply Reel Table	VID 1305	£4.53
SAMSUNG		
VI-510×520×611×616×621		
Video Head	VID 2648	£17.35
Pinch Roller	VID 1815	£2.97
Belt Kit	VID 7598	£1.26
Idler	VID 1232	£1.48
Idler	VID 1346	£3.65
Reel Motor	VID 2407	£15.40
Capstan Motor	VID 2409	£25.06
Loading Motor	VID 2142	£15.02
Cassette LED	VID 1981	£1.71
VX-710×720×730		
Video Head	VID 2648	£17.35
Pinch Roller	VID 1759	£2.97
Belt Kit	VID 7608	£2.64
Cassette LED	VID 1981	£1.71
SANYO		
VHR-1100 EX×EE×G		
Video Head	VID 2583	£22.01
Pinch Roller	VID 1787	£3.63
Belt Kit	VID 7558	£1.05
Reel Drive Roller	VID 1076	£6.27
Reel Motor	VID 2198	£15.40
Cassette LED	VID 1981	£1.71
Tension Band	VID 1411	£2.64
VHR-1500 EX×G		
Video Head	VID 2585	£46.87
Pinch Roller	VID 1787	£3.63
Belt Kit	VID 7558	£1.05
Reel Drive Roller	VID 1076	£6.27
Reel Motor	VID 2198	£15.40
Cassette LED	VID 1981	£1.71
Tension Band	VID 1411	£2.64
VTC-M10×11×20×21		
Video Head	VID 2530	£18.59
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7609	£0.49
Reel Drive Pulley	VID 1079	£6.84
Idler	VID 1219	£1.89
Reel Motor	VID 2179	£18.22
Tension Band	VID 1408	£2.86
Supply Reel Table	VID 1319	£9.48
SENTRA		
VX-5000×8000		
Video Head	VID 2713	£16.29
Pinch Roller	VID 1787	£3.63
Belt Kit	VID 7596	£1.99
Idler	VID 1049	£3.21
Cassette LED	VID 1981	£1.71
Tension Band	VID 1399	£1.98

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Repairs to Lightning-damaged Equipment

Steve Cannon

When Benjamin Franklin carried out his famous experiment, flying a kite with a key tied to it while lightning danced all around him, he obviously didn't appreciate the dangers. In fact he was extremely lucky to have survived – some others who tried the same thing were indeed killed. Franklin followed up his experiment by devising the lightning rod, a device that provided a discharge path for the electric charge built up on the clouds above, providing a direct path to earth should lightning strike it – rather like TV aerials and telegraph poles in more recent times.

The innovative experiment and invention were made in 1752. Storm damage has been drastically reduced as a result. In those days storm damage was generally structural. These days, especially to those of us in the domestic electronics trade, storm damage is something quite different. If Benjamin were alive today and could see some of the effects of lightning on modern electronic goods he might wonder whether his invention was proving to be of any use at all.

The saying is that lightning never strikes the same place twice. Well I know a house that's been struck three times in about five years – and it's only round the corner from my own house. Really it's rather frightening. During the last storm here I was waiting for the flash and immediate ear-splitting thunder crack that would ensure the instant demise of any electronic device in the vicinity. Sure enough there was a flash and a colossal, ground-churning, window-shattering explosion with its epicentre only fifty yards away. I knew where I'd be making a call next morning.

Death of a Salora 1H6

This unfortunate customer has had a number of TV sets, including a Salora 1H6. After this particularly bad storm it duly appeared in the workshop. When we took the back off things didn't look too bad, though the coaxial socket didn't want to part from a particularly rough looking plug and the on/off switch was now permanently welded in its off position. Upon further examination however it turned out that ninety per cent of the copper print had literally disappeared. We can usually manage to deal with a small burn up by bridging and remaking the PCB, but this set had definitely gone to a better place. At about 3 a.m. that morning.

Lightning Effects

A fact about lightning is that it doesn't have to strike directly to cause problems. The pulse energy from a nearby lightning strike can easily upset or damage sensitive microcomputer-controlled equipment such as VCRs and modern TV sets. To be honest it's this sort of trouble that repeatedly occurs where I live. I suspect that the lightning actually strikes a telegraph pole in the school fields just behind our unfortunate customer's house. In this particular case however there is no doubt that the lightning had struck his house directly: black scorch marks down the wall were one of the giveaways. Needless to say we get other calls after a storm. Once we had ten in just one street. That occasion was a nightmare. I've never seen our stock of loan VCRs and TV sets diminish so quickly as on that day.

Types of Repair

Following a lightning storm we've found that the repairs required can be split into two groups. There are the minor ones such as resetting micros and even, occasionally, just fuse replacement, then there are the others. These certainly make up for the Noddies! Sometimes we find that we're still working on a few items a couple of weeks after a storm. It's strange really. One customer's VCR may require extensive microsurgery while his next-door neighbour's video may simply have to be disconnected from the mains and plugged back in again, thus resetting its micro. This is a rare situation, but it has happened. Usually and logically enough the major damage occurs very near to the strike site while the minor faults stretch across a good few streets away. But just occasionally the situation mentioned above occurs, where the two types of fault condition intermingle. It could be something to do with the different quality of the semiconductor devices used by various manufacturers.

An Unfortunate Hitachi CPT2478

An Hitachi Model CPT2478 (G6P chassis) that came over from one of our other branches recently was described as being dead. The customer had neglected to mention at the time of the call out that the fault occurred during a storm. As I put the set on the bench I didn't have a thought as to what I was letting myself in for. Sure enough the set was lifeless, and the reason was soon found: the mains input fuse had gone blast because the chopper transistor was short-circuit. A new fuse and MN650 transistor were fitted. When I switched the set on again the e.h.t. came up for a second, with an immense crackle, then the set shut down. I switched off, connected the e.h.t. meter to the cavity and a DMM to monitor the h.t. voltage. Both meters were watched when the set was switched on: as the e.h.t. reading was way above 30kV the over-voltage sensing circuit in the line output department came into operation, firing the crowbar thyristor Q902. This was what was shutting down the power supply. The h.t. seemed to be correct however at 111V.

When the set had been switched off and on a few more times another fault developed. This time the set was permanently shut down. It was obvious what had happened: the 2SD1453 line output transistor Q781 had given up the ghost. A replacement was soon fitted but the excessive e.h.t. fault was still present of course. The transformer was then replaced. If I'd known that the set had suffered storm damage I wouldn't have replaced the transformer as I wouldn't have expected lightning to affect this item.

The new transformer made no difference of course, which at the time disconcerted me. I wondered what else could cause the fault? Maybe the line drive was incorrect? This conclusion eventually paid off when I discovered that D971, D972, ZD791 and Q791 in the 12V regulator circuit

were faulty. As a result the supply to the HA51338SP sync/timebase generator/colour decoder chip IC501 was incorrect, which upset its operation to say the least. When I found that all the components in the 12V regulator circuit were faulty I began to get that familiar, nagging feeling.

When these components had been replaced and the set had been switched on the e.h.t. rustled up at the normal level. But, surprise, surprise, things didn't end here. There was a dark, blank screen. When I increased the first anode voltage I found that there was field collapse. At this point I had a sneaky suspicion that something had gone through the set like a dose of salts.

I replaced the µPC1378H field output chip IC681 and the 2·2Ω resistor in its power supply, which is derived from the line output transformer. The result of this was full field scan but no line or field sync. At least I was getting closer to a fault-free condition however. When I'd replaced the HA51338SP sync etc. chip IC501 I was a stage further. At last there was a picture.

It was not a very good picture mind you, but at least you could tune the set in and see something. Wow! The grey scale was all to pot, with very poor green. It looked like a green output stage fault, but I first scoped the colour-difference signals at the tube base panel – RGB mixing is done in the output stages in these sets. The amplitude of the G – Y signal was very low. As IC501 had already been replaced this device was ruled out – indeed its G – Y output was perfect.

Before going to the c.r.t. base panel the colour-difference signals scoot off to the teletext PCB, where they pass through IC2017 (AN5352) which switches either off-air picture or teletext signals through to the c.r.t. panel. The green signal at the input was o.k., but it was severely attenuated at the output. A new AN5352 chip restored a picture that was o.k. in all respects. Throughout the repair the sound had been perfect – since the power supply and the line drive faults had been put right anyway. So it seemed that the set was at last fully operational.

Just before I refitted the back I remembered that it was a teletext set. I felt that the lightning must have damaged something else on the teletext PCB and sure enough when I selected text via the handset only P100 was visible in the corner of the screen. This looked like a typical video input processor chip fault. In this decoder the VIP chip is an SN96551, IC2101. It didn't take me long to find that its –5V supply was missing. The feed is via the large, 1W 22Ω resistor R2153 which was open-circuit. I was sure that fitting a replacement wasn't going to effect a miraculous cure. It did restore the –5V feed, but P100 was still all that was visible on the screen in the text mode. A new SN96551 chip cured the final fault.

Finale

The set had indeed been resurrected. But before parcelling it up we ran it for a day or so to be sure. Everything was o.k. and it was soon back with its delighted owner. Fortunately he was insured, which made the repair profitable.

What is unfortunate is when, after a battle of wits that lasts for many hours, the set is repaired and we then find that the customer is without insurance for this sort of damage. He may decide, quite rightly in many cases, that the set isn't worth the cost of the repair. Thus a full day's work is wasted. Needless to say we always try to establish that the set's owner is insured. The vast majority of them are, making jobs like this one cost effective though time consuming.

TV Fault Finding

Reports from Philip Blundell, AMIEIE Nick Beer, Mike Leach, Steve Cannon, Chris Watton, Michael Dranfield, G. Bakawala, Alfred Damp, Richard Newman, John Edwards, and Chris Avis

Grundig CUC3300 and CUC3400 Chassis

Poor focus or focusing that can't be adjusted is usually a straightforward fault with Grundig TV sets that have the focus control mounted on the tripler – in most cases the control itself is the cause of the trouble. If the set is fitted with one of the above chassis however and the focus is so bad that the picture can hardly be seen – take care! Remove C433 (1,000µF). If it's marked 16V fit a 25V type instead. The 16V type can go short-circuit, as a result of which d.c. flows through the field scan coils. But instead of the symptom being a picture shift upwards or downwards the result is a full, defocused raster that's dim and impure. While you have the set working the deflection coils are getting hot and there's a risk of cracking the neck of the c.r.t. One to watch out for! **P.B.**

Sony KVM2121U

This brand new set arced badly – the vision was severely corrupted and the arcing was being picked up by any set within a mile! The cause, which we've come across before with new Sony sets, was that the e.h.t. cap had not been fitted securely. **N.B.**

Sanyo CBP2152

The text TV handset with this receiver didn't function. Cause of the fault was a fracture in one of the legs of the ceramic resonator. **N.B.**

Tatung 185 Chassis

There were no signals though the display showed the correct channel numbers. In addition the text display consisted simply of an over-bright P100 and channel changing was sluggish. The cause of the fault was no voltage at the cathode of the ZTK33 33V voltage stabiliser as one of the 10kΩ, 0·5W feed resistors R005/6 was open-circuit. We replaced them both. **N.B.**

Salora J Chassis

In the September issue Michael Dranfield reported a familiar fault with this chassis – excessive height with incorrect chroma phasing (green faces). On this occasion the field output chip was faulty. A far more common cause however is that the field hold control RT400 is noisy. Slight readjustment will usually provide a cure as long as the control is cleaned. **N.B.**

Samsung CI537V (P55 Chassis)

The complaint with this set was of intermittently low, unadjustable contrast. I managed to instigate the fault and, having previously decided on the checks I wanted to carry out, was able to make good progress while the fault lasted. The beam limiting and blanking circuits were eliminated simply by lifting the diodes in the respective feeds to the d.c. contrast control line to the colour decoder chip. The cause of the fault was definitely low voltage on the contrast control line. I was able to confirm this by using an external voltage from the bench power supply instead. This enabled complete control of the contrast range to be achieved. The cause of the trouble was then soon traced to the 12kΩ pull-up resistor for the d.c. line, on the front microcontroller PCB, going open-circuit intermittently. **N.B.**

Philips CTX Chassis

When this set was switched on from cold there was no colour. Then, as the set warmed up, the colour level increased gradually. It reached the point where it was barely adequate even with the colour control at maximum, then varied between this level and zero. The cause of the trouble was high-resistance connections to the TDA3560 colour decoder chip's holder. **N.B.**

Samsung CI212R

The audio output from this little portable was at maximum and couldn't be turned down. Checks showed that the microcontroller chip was sending the correct volume up/down signals, but they weren't reaching the audio section. The cause of the fault was that Q119 (2SC1685) was leaky between its base and collector, a replacement restoring normal operation. **M.L.**

Matsui 1460, 1660 and 2060

If the fault is no luminance check the KTA562 transistor Q201 before suspecting the TA7698 chip. I've had this fault on several occasions now. **M.L.**

Sony KVM2131U

This set was dead with no h.t. from the power supply. A resistance check across the h.t. line confirmed our suspicions that a short-circuit was shutting the power supply down, and in fact the BU506 line output transistor was very much short-circuit. When a new one was fitted and the set was switched on the e.h.t. crackled up for an instant then everything was as dead as before. This time the protection diode across the h.t. line, D611, was dead in addition to the line output transistor. So it seemed obvious that the power supply was producing an excessive h.t. output. We suspected the feedback path from the chopper transformer to power supply chip and checks here showed that the 68Ω fusible resistor R606 was open-circuit. When this and the other two items had been replaced the set breathed life again. **S.C.**

Finlux 3000 Chassis

There was no sound or picture, with just snow on the screen. Channel numbers were accepted and stored, but with no results. Ti4 on the signals panel controls the tuning voltage, and a quick check showed that its collector supply was

missing. There are two feed resistors from the 30V line, Ri37 and Ri39. The latter was open-circuit. Fitting a new 330Ω resistor put matters right. **S.C.**

Toshiba 221T3B

This set had a field fault when cold. At switch-on there was foldover at the top of the screen and several teletext lines were visible. As the set warmed up the display improved until the fault eventually cleared. Time to apply the freeze and fry technique. The cause of the fault seemed to be one of the output transistors, but a replacement left us in the same situation as before. More selective use of the freezer and hot-air gun eventually led us to the 10µF, 35V electrolytic C312. **S.C.**

Sony KVX2521U

The fault symptom was no picture. I soon found that there was no first anode voltage at the tube. As its heaters were alight and the e.h.t. rustled up the line output stage was clearly working. So I checked back to the source of the first anode voltage. This brought me to D803 and R807 (1kΩ) both of which were faulty. Replacing them restored a good picture. **C.W.**

Matsui 2085

This set was dead. The chassis was very difficult to remove – I had to loosen the fixing nuts and shift the tube over to get the control panel past the c.r.t. lug at the bottom. I then found that the 1·6A fuse was open-circuit and the chopper transistor short-circuit. These items along with the 120kΩ and 150kΩ resistors in the charging circuit and the 100µF, 25V chopper transistor base drive coupling capacitor were replaced. The set then came to life, but after a short time it stopped. This time the chopper transistor hadn't failed. A check showed that the voltage across the mains rectifier's reservoir capacitor was low at 205V instead of 320V. As the rectifiers were o.k. it was clear that the capacitor was open-circuit. A new 150µF, 350V capacitor restored normal operation. I presume that it was the cause of the initial transistor failure. **C.W.**

Mitsubishi CT2532TX

This set was dead though the mains input and rectifiers were o.k. and there was 320V across the reservoir capacitor. I decided to check the line output transistor in circuit before delving into the power supply. It gave a short-circuit reading, but was o.k. when checked out of circuit. There was little else to cause the short which turned out to be in the line output transformer, between pins 2 (h.t. feed) and 7 (chassis). **C.W.**

Grundig GSC100 Chassis

For field collapse first check that the 18V supply is present at pin 6 of the field output module. If this is o.k. check diode Di447 – this may save you trying a replacement TDA1170 chip. We've found that a 1N4007 is a suitable diode. **M.Dr.**

Hitachi C21-P818

This set was stuck in the AV mode, displaying AV alongside the channel no. 21 (BBC-1 here at Buxton). A check at the video input switching chip IC301 showed that the voltage at pin 9 was high: pressing the AV/RGB button didn't change this state. The switching signal here comes from the junction of pin 37 of the main microcontroller chip IC501 and the 10kΩ pull-up resistor R1569: when this pin was connected to chassis normal operation was restored. So it seemed that IC501 might be faulty. But a similar fault in a different model was caused by the associated EEPROM chip. As this is the cheaper device we ordered it first (be careful to fit the correct one, part no. E740004, as it's programmed). Unfortunately the cause of the fault turned out to be IC501 after all. When the replacement came it was a different type. It was accompanied by details of a modification required – the new chip works with a 5V instead of a 6V supply. **M.Dr.**

JVC CS2181EKT

This set had a tuning fault: it would display only a snowy raster though a signal fed into the scart socket was o.k. On investigation we found that there was no output at one of the tuner's prescaler sockets. The prescaler chip inside the tuner is an M54477L, which we couldn't find in any of our catalogues. A call was made to MCES to check whether they could repair the tuner, but we were told that they couldn't obtain this particular chip though they did have the prescaler chip used in other JVC tuners. We had to obtain a new tuner from JVC, at some £40 odd. **M.Dr.**

Hitachi CPT2060 (Salora J Chassis)

As this set was dead we replaced CB726 and CB712 (both 4·7µF). It remained lifeless however. Checks in the start-up circuit then revealed that diac DB725 (BR100) was short-circuit. **M.Dr.**

Nikkai Baby 10

The complaints with this set were that it switched itself off intermittently and suffered from field bounce on a change of scene. On test we found that the picture was oversized, with bent verticals. A check on the potted regulator chip IC402 showed that its output and input were the same. So a new one was ordered. When this came we found that it had been improved for the better, having a diecast case to improve the heat transfer to the heatsink and a fixing hole so that it could be screwed down tightly. **M.Dr.**

Matsui 1440A

The usual causes of a dead set are the STR50103A chopper chip, the SR2M protection diode and the 5·6Ω surge limiter resistor. If you find that they are all o.k., check R502 and R503 (both 330kΩ) and Q108 (2SB698). In one set Q108 was short-circuit collector-to-emitter and R503 was open-circuit. These components are in the start-up circuit. **M.Dr.**

Hitachi CPT1444

If the set is dead but the power supply is working check the feed resistors R710 (2·7kΩ) and R713 (2·2kΩ) in the supply to the line driver transistor Q702. The chances are that only R710 will be open-circuit, but replace both resistors and stand them clear of the PCB to improve the cooling. **M.Dr.**

Salora J Chassis

This set had a teletext fault: the selected teletext lacked field sync, rolling through the screen. A check showed that the field sync pulses were missing at pin 13 of the SAA5030

VIP chip. Fortunately this chip plugs into a socket: a replacement cured the fault. **M.Dr.**

Sony KV2020UB

A two-inch foldover at the top of the screen can be a problem with these sets. The cure is to replace C559 (0·022μF) and C560 (0·015μF). **G.B.**

Toshiba 140E4B

If the set is dead or intermittently dead check the pins of the line output transformer. The cause of the trouble is dry-joints here. **G.B.**

Sony KV1412

This set was dead and a scope check showed that there were no output pulses from the chopper control chip. Pin 4 read 2·5V but the circuit diagram said 2·9V. Was this 0·4V difference enough to stop the power supply working? The answer was yes. R602 (2·2MΩ) was open-circuit. **A.D.**

Sanyo CBP2145

The symptom was that one colour would drop out intermittently. Its cause was on the c.r.t. base panel, where the RGB output transistors are mounted in the same well-known way as the field output transistors in older Hitachi sets. The cure is to resolder the transistors and edge connectors on the board. **J.E.**

Logik 4298/Ferguson TX100 Chassis

For fast tripping go straight for the line output transformer. It's quite a common fault now. **J.E.**

Amstrad/Fidelity TVR3

The TV section was dead. There was h.t. across C306, the mains rectifier's reservoir capacitor, but no output from the STK7348 power supply chip IC301. Before condemning the chip I checked the rectifiers on the secondary side of the chopper circuit and found that D306 (FR304) was short-circuit. It provides the 120V supply for the line output stage. A new diode restored normal operation. **J.E.**

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 timebase generator chip IC741 restored normal operation. **J.E.**

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.**

Ferguson TX98 Chassis

This set was dead with 17V at the input to the TDA8138 regulator chip IC11 but no 5V output at pin 9 and no 12V output at pin 8. The chip itself was faulty – this is becoming quite a common fault. **J.E.**

Grundig CUC2401 Chassis

The customer reported that the set would occasionally switch to standby. This went on for several months. All he had to do was to switch the set back on again, and it could be several weeks before there was a repeat performance. Now however the set tripped off only minutes after being switched on. I replaced the tripler and ran the set for two days as a check. It remained on. As a final check I refitted the original tripler, which brought the fault back. **J.E.**

Fidelity AVS2000

The sound was o.k. but there was no raster because of field collapse. The TDA2270 field output chip IC4 was the cause of the problem. **J.E.**

Ferguson TX10 Chassis

This set came in with a shattered mains fuse. It was no surprise to find that the chopper transistor was short-circuit. A replacement brought the set back to life – until I'd put the back on! The new chopper transistor had again failed. After checking around I found that the cause of the trouble was that R724 (1·2kΩ) was open-circuit. **R.N.**

Philips 3A Chassis

This was a rather annoying fault as time was wasted due to an error in the manual. The power supply had shut down but was o.k. as it worked with a dummy load (60W bulb) connected across the 140V h.t. line in place of the line output stage. I found that when the line output stage was connected the protection circuit operated, firing thyristor Ty6698. Checks in the line output stage eventually revealed that the 315mA fuse F1601 was open-circuit. It's in the feed to the EW correction circuit. So I removed and checked the BD678 EW driver transistor Tr7599 which measured leaky. When I looked in the equivalents book for a suitable replacement I discovered that it's a Darlington device – the manual shows it as being an ordinary npn transistor. Thus the transistor wasn't faulty. A new fuse cured the problem. **R.N.**

Samsung CI537V (P55 Chassis)

Strange things happen in this business – apart from the customers. The power supply worked but the set didn't show the standby dash in the display and wouldn't come on. A replacement 12MHz crystal (XF001) restored the display, but when a channel button was pressed the set came on with no line timebase operation. Seconds later it returned to standby. D912, the start-up diode in the supply to the line oscillator, was found to have a high forward resistance of 2kΩ. Now why would two apparently unrelated faults occur simultaneously? **C.A.**

Osume CTV1484R/Nikkai TLG88/89

There was sound but no e.h.t. and only about 1V of drive at the base of the line output transistor Q111. The line driver transistor Q110 had a healthy input but not much came out at the other end. The unexpected cause was the line driver transformer EM115 whose primary winding read high at 80Ω. A check on the replacement produced a reading of 50Ω. **C.A.**

Test Report: The RA100 Desoldering Station

Donald Bullock

The number of multi-pinned devices used in the ever more complex products we are nowadays called upon to service is already high. It's certain to increase. The advent of surface-mounted chips and other components has also added to our difficulties. All this has necessitated a rethink about soldering and desoldering techniques.

There are few options available to us. The ideal solution is a desoldering station, but because of the expense only the larger organisations have in the main been able to adopt this solution. Most smaller workshops and one-man businesses have tended to struggle on, making do as best they can with resin-impregnated braid or a spring-loaded solder pump.

Finding themselves in this position Keith Lawrence and his colleague Robert Atkinson, design electronics engineers at AK Electronics, Dorset, set out to design and produce a high-quality desoldering station at a reasonable cost. The result of their efforts was very successful. So much so that the product is now on the market as an economical proposition for the smaller or one-man workshop.

Description

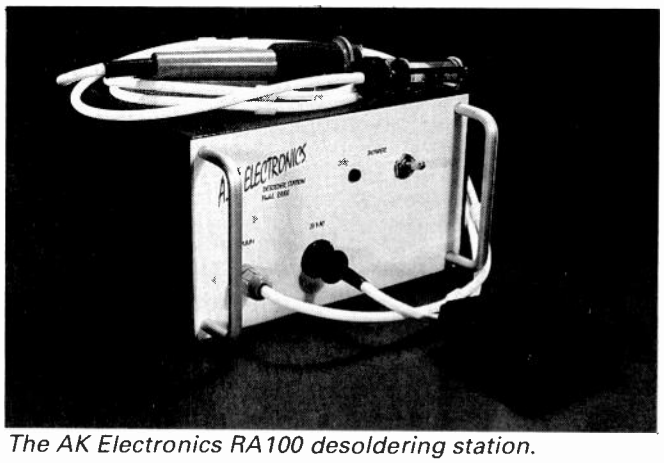
The RA100 desoldering station consists of a powerful compressor that's housed in a rack assembly some eight by ten by five inches, presented in fine charcoal crackle finish with a white control panel. The case is at earth potential. Isolated 12V and 24V supply voltages are provided.

The mains lead and foot-pedal control are at the back, where the air vent is also located. The front panel has an on/off toggle switch, a display lamp and a pair of non-burnable cords that, tandem-mounted, supply power and provide suction for the desoldering tool – the cords are of identical appearance.

The desoldering tool favoured by the manufacturers is the 24V, temperature-controlled Weller 45W Magnastat iron, whose solder chamber has a rock-wool filter. Other 12V and 24V irons can be used however.

On Test

We've been using one of these stations in our workshop in recent months. It is of pleasing, compact appearance and has performed well. It's superiority over traditional desoldering methods soon becomes apparent, particularly when the need to replace large processor-type chips arises.



The AK Electronics RA100 desoldering station.

So successful is the unit at freeing a component from its solder that care is required not to confuse the original item with the replacement. We also found that component removal is rapid compared with other methods. This not only saves time and makes a formerly tricky task routine, it also means that the component being removed absorbs less heat than with the braid or hand pump technique. Since there's no pin-mangling, the original chip can easily be refitted should it prove to be o.k., the result being as neat as before.

One result of having the unit in our workshop is a change in the way in which we track down short-circuits on PCBs. Previously we've tended to unsolder and test components associated with a chip before tackling the chip itself. Now chip removal and replacement are so simple that we tend to go for the chip first.

Conclusion

The RA100 desoldering station is a rugged instrument that has proved to be extremely helpful. It comes at £299·62 including VAT and is available from AK Electronics, Mudeford, Christchurch, Dorset or JJ Components, 63 The Chase, Edgware, Middx.

ANSWER TO TEST CASE 362
– SEE PAGE 267 –

The Finlux 3000 chassis problem seemed to be a straightforward case of excessive d.c. flowing through a feed resistor, Rz28, which as a result overheated. Had the power source been a huge battery rather than a chopper circuit the case would have been mysterious indeed.

Sage soon realised that the cause of the problem was a.c. passing through Rz28. Fig. 1 shows the smoothing circuit for the h.t. supply to the line output stage, including the 47µF reservoir capacitor Cu33. The chopper circuit runs at a frequency of several kHz. Cu33 smooths the output ripple, with further smoothing and line-pulse decoupling provided by Cz14 and Cz16. Should Cz14 go open-circuit, there will be excessive ripple current through Rz28 and Cz16. Should Cz16 fail, Cz14 will provide the line-pulse decoupling: the result will be that Rz28 and Cz14 develop a line-frequency sawtooth waveform. In either event excessive a.c. will flow via Rz28, which will overheat. The same situation could arise should Cu33 become inefficient.

The display produced by a scope connected across Rz28 showed a mess of hash and ripple. When Roger replaced Cz14 and Cz16 it was much reduced and Rz28 ran cool.

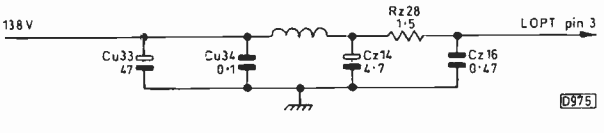


Fig. 1: Smoothing/decoupling arrangement used in the Finlux 3000 chassis for the 138V h.t. supply to the line output stage. Note that there are circuit variations in this area. Many sets have an over-voltage trip and in some Cz14 is 0·47µF.

Long-distance Television

Roger Bunney

November may have been a record month for rainfall, but for DX propagation it was remarkably poor. F2 layer reception was noted on only one day, the 8th, when ch. E2 signals appeared during the mid-morning period – an unidentified programme and the Fubk test pattern from Iran (IRIB). The Leonids meteor shower period in the middle of the month produced a few picture pings, but nothing that was startling. Tropospheric reception had its moments, with reception from France, Germany and the Benelux countries on the 5-6th, extending to Switzerland chs. E7, E31 and E34 and Austria chs. E8 and E36 on the 8th, and further reception on the 23-24th, this time mainly from Germany, Denmark and the Benelux countries. The rather sparse SpE log is as follows:

6/11/92	CIS (Russia) ch. R1.
7/11/92	TVE (Spain) chs. E2, 3; DR (Denmark) E3.
8/11/92	TVE E3; DR E3.
10/11/92	TVE E2, 3, 4.
15/11/92	DR E3; TVE E2, 3.
18/11/92	RAI (Italy) IA.
21/11/92	Unidentified ch. R1 programmes.
22/11/92	CIS R1, 2, 3.
25/11/92	EPT (Greece) E3.
26/11/92	HTV (Yugoslavia) E3; ORF (Austria) E2a; TVE E3; DR E3.
5/12/92	TVE E2, 3, 4; RTP (Portugal) E2, 3.

My thanks to Cyril Willis (King's Lynn), Brian Williams (Penarth), Simon Hamer (Powys), David Glenday (Arbroath), Roger Fussell (Torpoint) and David Oliver (Birmingham) for sending in reception reports during this exceptionally quiet month.

News Items

Sri Lanka: Bandula Gunasekera reports that there are no plans for a ch. E2 transmitter, but the Telshan company will be operating channel E3 and E4 transmitters by this summer.

Australia: Following a long media campaign the government has announced that community TV will be allowed to use "spare" u.h.f. channels until 1997, when a review will be carried out. The new sixth channel will be unscrambled, with transmissions starting this summer and financing by sponsorship and selling airtime to educational groups.

Portugal: The new private TV service in the Algarve, SIC, operates on ch. E34. Considerable retuning has been required to VCRs, satellite TV receivers etc. that produce an output on this channel.

Norway: The following TV2 transmitters are now in operation: Bergen E12 1kW; Oslo E12 10kW; Narvik E24 5kW; Skien E24 20kW; Gulen E29 10kW; Melhus E30 2kW; Mosvik E37 10kW; Kongsberg E43 10kW; Bokn E44 1kW; Vega E22 5kW; Kongsvinger E28 20kW; Halden E32 20kW. These powers are thought to be e.r.p. The main studio centre is at Bergen, with satellite distribution via Intelsat V F15 at 18·5°W. Population coverage is now 75 per cent. This will increase to 90 per cent by the end of the year when additional transmitters come into operation.

In brief: The RTBF-1 ch. E11 transmitter is still in operation at the time of writing despite news that it's to be closed down. . . The Russian OK-1 network now has teletext called Teleinf: there have been problems with the Italian-sourced equipment producing pages partially in Italian or English. . . TVP (Poland) has announced that transmissions will be 100 per cent PAL within a few months. . . Rumanian TV2 relays Moldavian TV during the hours 1845-1930 local time: the Moldavian programmes remain in SECAM form whilst the rest of TVR's output is PAL encoded.

Satellite TV

Another nail in the D2-MAC coffin: the Lyons-based Euronews service that started on January 1st via Eutelsat II F1 is using clear PAL instead of MAC. One reason for this is to gain access to older Scandinavian/Benelux cable systems that haven't the bandwidth to accommodate MAC.

The footprint of the Intelsat craft at 34·5° has been recentred on Geneva to improve coverage of Northern Europe. Launch of the Eutelsat II F5 craft has been brought forward to late 1993: by late 1994 six Eutelsat II craft will be in operation with 96 transponders. It seems that Eutelsat was recently approached with a view to selling one of its satellites to SES for co-slotting with the Astra craft at 19·2°E. Eutelsat I F4 has been relocated to the I F1 position at 25·5°E: I F1 has lost all horizontally polarised output and I F4 all vertically polarised output.

Because of the explosion of residual fuel Russian Proton rocket engines have been breaking up during in-orbit operations, producing excessive space debris. US scientists have visited Russia to discuss the problem. Arianespace used to suffer from this problem but now vents unspent fuel.

PanAmSat at 45°W now carries a full-time digitally-compressed video channel for the Quebec TV5 La Televisionale service.

The Kanal Market transmissions via Intelsat 601 at 27·5°W are now also being downlinked via Eutelsat II F4 at 7°E.

The now combined EBU OIRT operation is setting up additional Earth stations in Warsaw, Prague, Bucharest, Budapest and Sofia to improve its news feed, operating via Eutelsat II F4.

During the European Cable Communications conference in London last October Comsat/General Instruments transmitted via a 9·2m dish at Staten Island, New York to a 2·5m dish at Olympia six TV and 28 radio channels, digitally compressed, using a single satellite TV transponder, proving the feasibility of the new transmission mode.

The Spanish Hispasat satellite at 30°W is currently being tested in both the DBS and the telecom bands. Deutches Welle is transmitting radio and TV programmes to North America via the Intelsat K craft at 21·5°W. Kopernikus-3 (DFS-3) is now available for Ku and telecom band operation at 33·5°E following its launch last October.

1993 Meteor Showers

We are grateful to George Spalding of the British Astronomical Association for providing the following information on this year's meteor showers. First the dates:

Lyrids	April 19-25th, peaking at 0300 on the 22nd.
May Aquarids	April 24th-May 20th, peaking on the 5-6th.

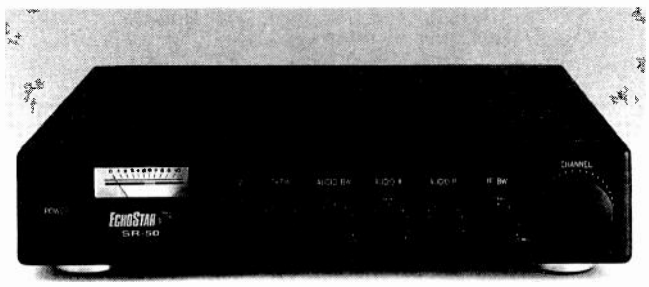
Delta Aquarids	July 15th-Aug. 20th, peaking on July 29th.
Perseids	July 23rd-Aug. 20th, peaking at 0200 on Aug. 13th.
Orionids	October 16-27th, peaking on the 21-23rd.
Taurids	Oct. 20th-Nov. 30th, peaking on the 1-10th.
Leonids	November 15-17th, peaking at 1600 on the 17th.
Geminids	December 7-16th, peaking at 2200 on the 13th.
Ursids	December 17-25th, peaking on the 23rd.

The Quadrantids shower passed on January 1-6th. Because of the influence of the Swift-Tuttle comet it's possible that the 1993 Perseids shower could be very active plus or minus several hours around the predicted peak above. From this year to the end of the decade it's worth checking for a massive Leonids display: there's a major peak every 33 years, the last one in 1966 producing MS reception resembling SpE – the build up may commence from 1993 onwards.

Review: A DXer's Satellite TV Receiver

Numerous satellite TV receivers are now available. Most have infra-red remote control with on-screen menus, hundreds of memory locations, parental lockout and up to four scart sockets. Few have any evidence of a control knob or switch, most of them being low-profile, rectangular black boxes with just a red LED glow. Fortunately all is not lost for the DXer: the EchoStar SR50 receiver, intended for the African and Middle Eastern markets, is now available in the UK. It's manufactured in Taiwan and is available under various brand names in different countries.

For the DXer the striking thing is the total manual control, with a mass of knobs along the front panel. From right to left these are channel tuning (no calibration) covering 910-1,780MHz; i.f. bandwidth (12-30MHz); audio A and B – each tunes to any audio subcarrier accompanying a tuned in TV channel, the range being 4·3-9·6MHz; audio bandwidth (150-400kHz); and skew. For a mono TV channel use the audio A control for tuning: for stereo operation control A tunes left and B right. Because of its originally intended markets the polarity system is for a mechanical arrangement with a small servo motor in the LNB/feedhorn assembly, the skew control providing control pulses. With a magnetic polariser, as generally used in the UK, an interface box that converts from three- to two-wire control should be fitted. A push-button switch selects vertical or horizontal polarisation, with LED indication. There are also a signal-level meter and an on-off switch. Other vertical/horizontal switch functions relate to rear-panel push connections



The EchoStar SR50 satellite receiver.

The rear panel has, from left to right, the usual F socket for a single LNB input; two 70MHz i.f. looping F sockets (these should be connected with the link provided since looping is unnecessary with on-board bandwidth limiting); two holes that give access to the video gain and a.g.c. presets (the latter often needs to be reset to optimise the signal/noise performance and minimise i.f. images); a C/Ku band slider switch for positive- or negative-going vision; audio left and right phono sockets; and video monitor feed sockets. The latter offer clamped, de-emphasised and filtered video from one and, from the other, an unclamped, non-de-emphasised and non-filtered MAC output or an unclamped, de-emphasised, non-filtered baseband output with slide-switch selection between the two. A block of four push connectors provides a 12V output when the polarity switch is in the vertical position and three connections for a mechanical polariser, i.e. 5V, pulse and earth. A slide switch selects 5·5MHz or 6MHz sound from the dual-standard modulator. Test signal on/off provides vertical bars at the u.h.f. output – a screw adjustment enables the modulator to be tuned over chs. 30-40. Two Belling coaxial sockets provide the modulator u.h.f. output and terrestrial diplexing. The final slide switch selects between 18V and 14/18V: in the left position a constant 18V is supplied from the LNB input socket while in the other position the d.c. output is 14V with vertical polarisation and 18V with horizontal polarisation as selected by the front polarisation-selection switch. Selection depends on the type of polariser in use.

Mains connection is via a 1·8m length of twin flex. The steel case has black front and rear panels and a dark grey, ventilated cover. Dimensions are 13·5in. wide, 3in. high and 10·5in. deep excluding knob and rear projections.

Apart from the mains transformer and the i.f. tuner the circuitry is on a single, clearly-marked PCB with easy access. The only tuned items in the 70MHz i.f. strip are the coils in the input selectivity circuit, which also has two varicap diodes and is liberally swamped in a dry "gunge". The main i.f. shaping is provided by a single SAWF after the first i.f. preamplifier. I personally feel that the noise performance could be improved by additional bandpass filtering at the input to the i.f. strip. Otherwise the circuitry is conventional. A slide-on heatsink would help the hot-running 7812 regulator towards the centre of the PCB.

Several operating problems were noticed. First there's the difficulty in establishing the transponder/frequency to which you are tuned, as the only "calibration" consists of a 270° sweep of dots. Once you are tuned to a strong signal the a.f.c. makes it difficult to tune away, the a.f.c. holding on to the channel until the signal abruptly clicks off. This means that tuning through a single satellite's channels can be troublesome. There's also a.f.c. with the audio subcarrier tuning, but this is much less "aggressive". Once a weak signal has been tuned in it can be considerably improved by reducing the i.f. bandwidth. Weak audio signals can similarly be lifted from the noise by reducing the audio i.f. bandwidth.

I've now tried out eight of these receivers. Several modifications can be incorporated to provide better DX operation. The a.f.c. can be defeated by taking the tuning voltage supply from the stabilised 24V rail. This has the additional advantage that the tuning range is extended to around 835-1,880MHz. Channel/tuning calibration can be added by drilling (carefully!) two small holes in the rear panel – near the mains input is easiest – and fitting 1mm sockets. Connect one to the tuning line and the other to chassis. By connecting a DMM (Maplins at present have some bargains) to these sockets voltage measurements to two decimal points can be made, enabling a voltage/frequency list to be tabulated.

Adding a TAD (threshold assistance device) board between the input to the i.f. strip and the video demodulator substantially reduces the noise (sparklies) on the picture with a weak signal. The improvement obtained is dramatic. The Eurosat TAD board is available for most receivers that have a 70MHz i.f. strip and is relatively easy to fit. It's expensive however at around £79 in the UK.

I can recommend the SR50 as a receiver for satellite TV DXing. It's a stable, solid receiver of traditional design, is easy to use and, for the facilities offered, is relatively inexpensive. You don't see it widely advertised in the satellite TV magazines but dealers should be able to obtain it from Eurosat while Aerial Techniques have it in stock – also modified versions.

Cowboys

Ed Rowland

It has always seemed to me to be wrong that in this country of ours anyone who is so inclined can, regardless of lack of training or skill, put together a set of tools and inflict himself upon the British public as a "television engineer". Here are some examples of the sort of thing that this totally unregulated approach can cause.

A Monochrome Colour Set

A customer of mine recently asked me if I could call on her mother, a pensioner in her seventies, and take a look at her TV set as she had just had it repaired and still had problems.

When I arrived at the house and looked at the set the first things I noticed were that in addition to the pictures being without colour the cabinet (it was a floor-standing model) was badly damaged with large chunks of veneer missing. The old lady then related her tale of woe. She had been having trouble with the remote control handset and had had difficulty in getting some of the channels. So she'd looked through the local paper and telephoned a number of the advertisers that offered television and video repairs. An "engineer" had duly arrived and decided that he would have to take the set away, which he promptly did, trundling it on its castors down the garden path to his car.

He returned that same evening, accompanied by two schoolboys – presumably to help him carry the set. A charge of forty pounds was made and he then left without switching the set on. Imagine the customer's dismay when she switched on and discovered that not only did the handset still not function but in addition the set now displayed a black-and-white picture. Also the cabinet had been damaged.

When she rang to complain she was told that her remote control unit was beyond repair and that – wait for it! – her set was in fact a monochrome model, explaining the lack of colour. Sounds incredible? Maybe, but nevertheless perfectly true. And there's nothing to prevent such people offering their "services" to a vulnerable public.

Insurance Problem

Another instance was related to me by an acquaintance of mine. It seemed that a lady called into his shop and asked him if he could supply her with a note for her insurance company. She'd accidentally damaged her portable colour set by dropping it. Certainly my friend said, if she would drop the set into his shop he'd look at it and if necessary write it off.

The lady then explained that she couldn't do this as she no longer had the set. Further discussion revealed the full story. After dropping the set she'd picked a telephone number out of the newspaper and an "engineer" had subsequently called round to inspect the damage. He told her that the set was beyond repair, but that he would take it off her hand for spares. When she asked him for a letter for her insurance company he replied that since he worked as a TV engineer only part time he didn't have any letterheads.

It seems that in these circumstances she would have great difficulty in obtaining anything from her insurers as she had neither the set nor written confirmation of the accident.

A Dead Matsui

An engineer friend of mine who has a workshop close by recently took in a dead Matsui 2180TT colour receiver. The owner said that it had been to another dealer who had told him to scrap it as it was beyond repair. In fact the basic cause of the problem was that R512 (0·47Ω), which is in series with the chopper transistor's emitter, had been replaced with a 470pF capacitor. As a result IC501, in which the chopper transistor resides, had been destroyed at switch-on.

Incompetence? Myopia? Who knows. We can all make mistakes. But surely if you replace a component and then

find there's a fault that wasn't there before one of the first suspects has to be the replacement you fitted.

In Conclusion

The above incidents are only three of many that I could relate. I'm sure that other engineers have had similar experiences. What surprises me is that in so many instances the victims of these charlatans simply treat this sort of thing as bad luck on their part.

So what can be done? Not a lot with the law as it stands. As a result of the UK's entry into the European Community we may eventually have rules similar to those that operate in other countries, where a tradesman must belong to a recognised guild and thus have proof of reasonable competence before he's permitted to offer his services to the public. Sadly it seems that in this country the cowboy repairer is going to be with us for some time to come.

Teletopics

CLOSED CAPTIONS SERVICE

The National Captioning Institute (NCI) has launched a video captioning service in the UK. The NCI was formed in the United Sates in 1979 to add captions to TV broadcasts and prerecorded video tapes for the benefit of those with hearing difficulties – some 7·5 million in the UK are affected in this way. A system called "closed captioning" is used – the captions are included on line 22 of the vertical blanking interval. They are thus invisible without the use of a Video Caption Reader, which is smaller than a satellite TV receiver and is connected between the VCR and the TV set. Closed captioning was originally developed for the NTSC system but a low-cost, multistandard chip was developed by ITT Semiconductors after being awarded a $1 million contract by NCI.

The UK service works as follows. PAL tapes are sent to NCI in America. In most cases NCI simply converts American captions to match the PAL tape, for example anglicising the spellings. Captions on a computer disc are sent back to the video company, which uses an encoder to added them on its master tape. Video companies like the system because they don't have to make two versions of the same tape, one with and the other without the captions. The benefit for retailers is that they don't have to stock two kinds of tape.

The Video Caption Reader costs about £100 (Radio Rentals quotes £117·50 inlusive of VAT, £100 for those eligible to complete a VAT exemption form). It's available from Blockbuster/Ritz video shops, Radio Rentals and Sound Advantage, a subsidiary of the RNID. Closed captioning is supported by major home video companies including BBC Enterprises, Buena Vista, CIC, Columbia Tristar, Fox Video and Warner. Some 200 titles were due for release by the end of 1992. NCI's UK office is at Thurston House, 80 Lincoln Road, Peterborough PE1 2SN (telephone 0733 891 391).

SATELLITE TV

GfK Marketing Services Ltd. has started a monthly monitor of satellite TV use in the UK. The findings in its first report are as follows: (1) At the end of October 1992 the estimate for direct-to-home (DTH) satellite TV installations was 1·96 million. (2) This represents an increase of 50,000 from September to October. (3) The net increase in DTH installations (allowing for disuse) from January to October was 402,000. (4) After allowing for Northern Ireland, the Channel Islands and the Isle of Man these figures are consistent with those published by BARB. (5) Continental Research, which carries out the *Financial Times* satellite TV monitor, estimated that the number of dishes in use at the end of October 1992 was 2·61 million, 650,00 more than GfK. (6) The gap between the GfK and Continental Research estimates cannot be attributed primarily to sampling error.

The 25 per cent gap between the GfK and Continental Research estimates is likely to lead to some wrangling. Both are based on monitoring a relatively modest number of households however, so the emphasis in assessing the situation must be on the fact that these are all estimates. Continental Research's estimate for new dish installations in November is 102,000 – improved deliveries from manufacturers during the month helped.

Eurosat Distribution Ltd. (1 Oxgate Centre, Oxgate Lane, Edgware Road, London NW2 7JA – 081 452 6699) has been appointed distributor of the Nais flat satellite aerial which is manufactured by Matsushita. With an eighteen month warranty and a lifetime expectancy of at least five years, the company expects the aerial to generate similar interest in the UK to that achieved in Germany in recent months.

HRS Electronics, Garretts Green Lane, Birmingham B33 0UE (021 789 7575) has been appointed an official distributor for its spare parts and components for satellite TV systems by Pace Micro Technology Ltd.

DOLBY SURROUND SOUND

Several programmes have now been produced by Granada featuring Dolby Surround Sound. The system, which was originally developed by Dolby in the Seventies for cinema use, encodes rear/side sound information in the right and left stereo channels. Decoders extract this information and feed it to separate speakers. Many films available on tape now have Dolby Surround Sound. Some recent Toshiba TV models incorporate a decoder, and the lastest VCR from Akai, Model VSA1100 at £630, has this feature.

TEST AND SERVICING EQUIPMENT

RDA, Unit E, Woodfieldside Business Park, Pontllanfraith, Blackwood, Gwent NP2 2DG has launched a range of TV/video pattern generators in various forms with synchronisation/genlocking options. The basic synchronisable pattern generator PCB is available at £450. Alternative versions, in stand-alone or rack-mounted form, from industrial to broadcast quality, with or without genlocking, are available in the price range £1,200 to £2,500. The Camsin PCB offers a semi-graphic output that can be genlocked to external video or sync signals: it's bus-based and can be controlled by any type of 8-bit processor.

Two new Unaohm signal-strength measurement/monitoring equipments are now available from Satellite Solutions (UK) Ltd., 35 Quarry Park Close, Moulton Park, Northampton NN3 1QB (0604 670 900). The EP800 is a compact, portable satellite TV field strength monitor with

continued on page 290

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BC184	£0.09	BF458	£0.22
BC212	£0.09	BF459	£0.22
BC213	£0.09	BF469/BF471	
BC214A	£0.07		£0.25
BC214B	£0.07	BF471	£0.25
BC214L	£0.09	BF472	£0.25
BC237	£0.07	BF870/BF472	
BC238	£0.07		£0.25
BC307	£0.12	BU108	£0.75
BC308B	£0.07	BU126	£0.70
BC327-25	£0.07	BU208	£1.00
BC328-40	£0.05	BU208A	£1.00
BC337	£0.07	BU208D	£1.15
BC372	£0.95	BU208T	£1.00
BC392	£1.50	BU326A	£1.00
BC411	£0.25	BU406	£0.90
BC461	£0.25	BU406D	£1.50
BC547	£0.07	BU407	£0.50
BC548	£0.07	BU426A	£1.00
BC549	£0.07	BU500	£1.00
BC557	£0.30	BU508A	£1.00
BC559B	£0.07	BU508AF	£1.70
BC639	£0.18	BU508D	£1.00
BC640	£0.30	BU806	£0.75
BC131	£0.50	BU807	£0.75
BC132	£0.40	BUT11	£0.95
BC137	£0.35	BUT11AF	£1.95
BC237	£0.22	BUW84	£1.65
BC238	£0.22	BUX84	£0.60
BC239B	£0.30	SD12659	£0.75
BC239C	£0.40	T9064V	£2.28
BC244	£0.30	TIP110	£0.45
BC244C	£0.30	TIP112	£0.45
BC278A	£0.80	TIP29	£0.30
BC334	£0.80	TIP30	£0.45
BC408	£0.90	TIP31	£0.30
BC595	£0.07	TIP32	£0.30
BC596	£0.15	TIP41	£0.27
BC597	£0.15	TIP42C	£0.40
BC598	£0.07	TIP47	£0.98
BC599	£0.14	TIPL791A	£1.20
BC14	£0.40	ZTR604	£0.55
BC19	£0.22	ZTX650	£0.70

DES AND THYRISTORS

BA7	£0.07	FB2506	£1.50
BA90	£0.20	IN4001	£0.06
BA91	£1.40	IN4002	£0.06
BA93	£0.75	IN4004	£0.10
BA13	£1.50	IN4005	£0.10
BA96	£0.75	IN4006	£0.08
BA6	£2.50	IN4007	£0.08
BAP	£4.50	IN4148	£0.10
BAP	£4.50	IN5408	£0.25
BR1 800R	£1.75	KBL08	£1.95
BZ6	£0.20	OA91	£0.20
BZ7	£0.08	OT112	£2.20
BZ8	£0.20	RGP15G	£0.45
BZ9	£0.90	RGP15J	£0.55
Diod SKB2 02	£0.90	RGP15K	£0.35
BZ9	£1.10	RGP30K	£0.70
BZ9 SK2 08	£1.10	RHI	£1.30
BZ4	£0.65	RM11C	£0.45
BZ9	£2.00	SG261	£8.50
BZ10	£2.00	SG613	£12.00
BZ3	£2.00	SKB 02	£0.60
BZ6 BYB96R	£0.55	SKB 08	£1.20
0.800 BYV96		SKB2 02	£0.90
	£0.55	SKB2 08	£1.10
BZ7	£0.20	SKE1 02	£0.60
BZ8	£0.50	SKE1M15	£0.65
BZ9	£1.15	SKE2G2 02	£0.75
BZ9	£0.50	SKE2G3 04	£1.30
BZD	£0.30	SKE4F1 04	£0.45
BZ6D	£0.55	SKE4F1 06	£0.45
BZ56	£0.50	SKE5F3 10	£2.20
BZ96E	£0.50	SR2M	£0.75
T10	£0.50	T9053V	£1.40
SS 600	£0.55	T9064V	£1.50

ASK FOR SEMICONDUCTORS NOT LISTED

DEO HEADS

STRAD

SSR-VCR7000 (Saisho/Orion)	£16.00
F1-VCR4500 5200 9000	£15.00
F2-VCR4600 4700	£14.00
F3-VCR6000	£16.00
ECIAL OFFER PSF3 Genuine complete assy	£17.50

RGUSON

SSV-2 Head universal	£7.50
SSVA 3V42 44 45 46 etc	£17.00
SS4VB-3V32 HR7655	£22.00
SS4VC-3V48 HRD565	£24.00
48 58 59 65 FV10 11 13 14 20 21 26	
d most other Fergusons	POA

TACHI

SSHA-VT8000 9000 series	£15.00
SSHB-VT11 33 etc	£15.00
082-VT120 220	£22.00
081-VT130 135	£25.00

NASONIC

SSN-2 Head universal	£7.50
SSU1N-NV100 370 380	
hilips VR6460	£11.00
SSU2N-NV230 470 480 G9 10 15PX	£17.80

VIDEO HEADS Continued

3HSSU3N-NV430,460	£14.70
3HSS3N-NV777 330	£18.50
3HSS4NB-NV730	£19.00
3HSS4NA-NV366	£24.00
NVG30 33 40 45 46 130 & most other Panasonics	POA

SANYO

3HSSSY-VHR1100 1110 1300	£18.00
3HSS3SY-VHR1500	£28.50

SHARP

3HSSSP-VC9300 9500 9700 381 481 482 483 486 etc	£15.50
3HSSSPB-VC581 583 651 670 etc	£14.50
VC7000 8000 series (Brass)	£42.00

OTHER MAKES

Alba 4000 Goldstar 8000 Sentra 8000 Solavox 1000	£16.50
Fisher FVHP510 520 530 615 710 etc	£18.00
Fisher VBS7000 9000 etc	£25.00
Hinari VXL2 4 3 20 25	£16.00
Hinari VXL5 6 20H	£15.00
Mitsubishi HS306 710	£23.90
Orion VC150 180 VH1 2 3 etc	£16.00
Saisho VR100 605 705 805 905	£16.00
Samsung Universal 2 Head	£18.50
Toshiba V71 73 74 75 81 82 83 84 85 87	£17.00
Toshiba V93	£19.00

ASK FOR VIDEO HEADS NOT LISTED

The above heads are new.

BELT KITS

A range of belt kits in stock from 60p to £2.40. Makes for most models available including: Alba, Akai, Amstrad, Ferguson/JVC, Fisher, Funai, GEC, Goldstar, Granada, Grundig, Hinari, Hitachi, Mitsubishi, NEC, Orion, Panasonic, Philips, Saisho, Samsung, Sanyo, Schneider, Sharp, Sony, Tensai, etc – Please state model and make.

CLUTCH BASE

Hitachi 520 at £4.50

LINE OUTPUT TRANSFORMERS

LOPT Hitachi 2174 76 78	£17.50
LOPT Hitachi CPT1476	£18.00
LOPT Hitachi CPT2276 etc	£19.00
LOPT Matsui 1440	£18.00
Decca 100	9.50
ITT CVC20	12.50
ITT CVC253032	9.50
ITT Compact 80 Series 110	16.75
ITT Compact 80 Series 90	19.75
ITT CVC45	18.00
ITT 1109f	14.00
ITT CVC1204	11.50
ITT CVC80013	21.50
ITT CVC1100	16.50
ITT CVC11501175	20.00
ITT 6325	18.50
ITT 3546	18.50
ITT 12001	20.00

Other ITT transformers available

Fidelity all models up to 20" ZX3000	15.50
Fidelity Panel for ZX2000	1.00
Fidelity 22" ZX3000	18.50
Hinari CT45 & TVA1	17.50
Philips KT3	12.95
Thorn TX100 Green Spot 110	14.50
Ferguson TX90 LOPT specify sizescreen	17.75
Ferguson 3V35/36 Mains Transformer	23.00
Ferguson 3V44/45 Mains Transformer	18.85
Transformer	18.85
Sony – Please state model for price	

TRIPLERS

Universal Tripler	£6.20
Universal Tripler with focus unit	9.50
Decca 120130 series tripler	8.50
Ferguson 9000 triplers	at £4.50
Thorn TX10 Focus Unit Kit	10.00
Trip Grundig CUC2401 etc	£17.00

OTHER GRUNDIG TRIPLERS IN STOCK

Hitachi and Matsui LOPTs in stock

VIDEO MOTORS

A range of **Reel Motors** made by Ferguson, Hitachi, Sanyo, Sharp & Panasonic are available, please state model and make.

We stock **capston motors** makes include Ferguson JVC, Hitachi and Sharp.

Also available are Ferguson **Mode Control Motors**, please state make, model.

Mode Motor Assembly 3V35-49 at £12.50

Sharp Reel Motor Pulley only £1.20

Replacement of plastic pulley on a number of Sharp Reel Motors with the above metal pulley gives better rewind/FF performance.

IDLER ASSEMBLIES

FERGUSON

Take up Clutch (Mechanical models)	£5.00
3V29/30 Take up Idler	£2.00
3V29/30 Take up Clutch	£2.85
3V29/30 Reel Idler	£3.00
3V35 Reel Idler	£3.00
3V35 36 38 39 Take up Clutch	£2.85
3V58 59 64 65 FV10 11 12 13 14 Idler Arm	£1.80
Clutch Assembly 3V44 45 48 49 52 53 54 55	£11.50
Clutch Assembly 3V42 43	£14.00

FISHER

FVHP615 905 910 Idler Assembly Original	£5.00
FVHP615 Gear Idler Assembly	£4.35
FVHP905 910 Gear Idler Assembly	£5.00
FVHP520 530 Idler	£3.00
FVHP520 530 Pulley	£0.70

HITACHI

VT11 33 etc Original Idler Arm	£2.50
VT11 33 etc Idler Replacement	£1.75
VT9300 9500 etc Play Idler	£3.65
VT9300 9500 etc F/F Idler	£2.95
VT9300 9500 etc Idler	£2.95
VT8000 8500 etc F/F Rew Idler	£2.95
VT800 8500 etc Play Idler Assembly	£3.00
VT8000 8500 etc FF/Rew Pulley	£0.70
VT11 33 etc Clutch Assembly	£8.00
VT400 500 series clutch/base complete	£3.50

PHILIPS

VR6460 6920 Idler Arm (Original)	£3.00
DV464 6462 6463 650 etc Idler Mod Kit (Original)	£4.50
VR6542 6843 Reel Idler	£6.50
VR6542 Reel Drive Pulley	£7.75
VR6843 Reel Drive Pulley	£9.00

PANASONIC (All Original)

NV370 Idler Arm Unit VXP0521 Gen	£3.00
NV8600 8610 Play Idler VXP0243	£0.95
NV332 777 778 Idler Unit VXP0463	£3.50
NV600 688 Idler VXP0515	£3.00
NV333 366 Idler Arm 2 Unit VXL0997	£10.50
NV8400 8600 8610 etc VXP0245	£0.95
NV333 366 etc Idler VXP0401-NV700 7200	
7800 Idler VXP0344	£0.90
NV2000 3000 Play Idler VXF0331-NV2000 3000 Idler Unit VXP0329	£1.10
G Mech Play Gear VXL1490	£1.90
Back Tension Bands	From £1.50
All Panasonic Maintenance Kits	POA

QUOTE PANASONIC PART No FOR PARTS NOT LISTED

SANYO

Idler VHR1100 1300 1500	£5.50
Idler VHR2100 2300 2500 2700	£5.50
Reel Drive Pulley Unit	
VTC5000 5150 6500	£5.00
Idler Roller Assembly VTC5000 5150 6500	£2.25

SHARP

Idler VC9300 9500 etc	£1.75
Idler VC481 581 etc	£1.95
Idler (original) VC9300 481 581 etc	£3.50
Idler Assembly (original) VC651 681 685	£6.50
Idler Assembly (original) VC780 781 785 787 793 VCT72	£6.50

AMSTRAD

4500 4600 MOD KIT INCLUDES PINCH ROLLER AND IDLER CLUTCH	£5.00
Limiter Post Assembly	£1.75

Makes & Models: Hinari VXL4, Matsui VX730,735,735A,755, 770,800A,810,820,880,990, Saisho VR1100,1200,1200HQ, 1600,2500,3200,3300,3300X,3500, 3600,3700

IDLERS FOR AKAI, SAMSUNG, MITSUBISHI, NEC, ETC. IN STOCK

REMOTE CONTROLS

Bush, Ferguson, Grundig, ITT, Philips, Pye, Sony, Hitachi, Matsui, Logik, Panasonic, Saisho, Salora, Samsung, Tashiko, Tatung, Toshiba. Various models TV & Video ..... **From £10.00**

MANY HITACHI TV REMOTE CONTROLS NOW IN STOCK.

SONY REMOTE CONTROL RUBBER PADS.

STATE MODEL FOR PRICE.

Universal Remote Control £25.00

TV ON/OFF SWITCHES

ITT, Philips, Decca, Thorn, Fidelity, Grundig, Sony and Hitachi. State model for price.

SONY PUSH SWITCH 70p

MAINTENANCE KITS

Available for Alba, Amstrad, Ferguson, Fisher, Goldstar, Goodmans, Granada, Hinari, Hitachi, JVC, Matsui, Mitsubishi, Nikkai, Panasonic, Philips, Saisho, Salora, Schneider, Sentra, Sharp, Sony, Tashiko, Toshiba.

PINCH ROLLERS

A range of Pinch Rollers is in stock, most of them at **£2.80**. Makes include Akai, Amstrad, Ferguson, Fisher, Funai, GEC, Goldstar, Grundig, Hinari, Hitachi, ITT, JVC, Marantz, Mitsubishi, NEC, Nordmende, Orion, Panasonic, Philips, Samsung, Sanyo, Schneider, Sharp, Sony, Tensai, Thomson, Toshiba etc. Please state model and make.

Philips Pinch Roller for models VR6180, 6185, 6285, 6362, 6367, 6467, 6468, 6470, 6561, 6670, 6760, 6761, 6870 ..... **£6.00**

BACK-UP BATTERIES

Philips 1.2V Back up Battery	£1.75
Philips 2.4V Back up Battery	£2.80
Ferguson TX10	£2.00

Wider Range Available

OTHER SPARES

Universal Video Copying Kit	£4.25
Universal Copying Kit (Scart)	£5.20
Universal Camcorder Kit	£6.90
Video Cassette Lamps from	£0.50
CRT Anode Caps	£0.60
Video Tape Splicing Kit	£6.95
Hitachi TV Frame Module HM6251	£8.00
Hitachi TV Frame Module HM6232	£10.50
Cassette Housing Assembly Ferguson 3V35 36 38 39 42 43 44	£25.25
Cassette Loading Roller Assembly 3V23 3V31, 3V32	£3.50
5.5V Back Up Cap	£1.85
Degaussing Positor Blue	£4.00
Degaussing Positor White	£1.30
Cassette Housing Assembly Hitachi VT11	£15.00
End Sensor for Hitachi VT63 64 65 (Pair)	£2.75
Cassette LED Sensor for Panasonic etc	£1.60
I C Circuit Protectors	£0.60
Clear Service Cassette	£5.90
Satellite LNB	£35.00
Video Idlers Spring Kit	£5.95
Video Washer & E Clip Kit	£5.50
Universal Video head Puller	From £7.90
Akai VS22 Series Power Board	£26.00
Soldering Iron 25W	£9.50

MANY OTHER VIDEO AND TV SPARES IN STOCK

Back Tension Bands in Stock for Akai, Fisher, Hitachi, Ferguson, JVC, Mitsubishi, Panasonic, Sanyo and Sharp.

☆ ☆ ☆

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99-programme storage capacity, stereo/dual and D2 MAC audio, a microprocessor that enables complex operations to be used simply, an LC display that shows the features of the signal being measured (frequency, channel number, memory location and attenuation level), manual or automatic selection of input sensitivity in eight ranges, a scart socket for external decoding, a PC connector to enable the meter to be used as a TV monitor, carrier/noise ratio measurement by means of one key press and a hard copy printer output. The EP737 is an all-in-one equipment for satellite, cable and u.h.f. TV use, combining a high-quality tuner and c.r.t. display with precision instrumentation. The c.r.t. doubles as a high-definition TV monitor with a picture-zoom capability. In the spectrum analyser mode the instrument can quickly detect unwanted signals or amplifier overload conditions. A loudspeaker gives assessment of TV and f.m. radio signals and audible peak-strength detection. The backlit LCD provides a digital frequency readout.

The recently introduced Granada CT128 Astra satellite meter enables alignment and skew to be set quickly and accurately by simultaneously measuring the power of a vertically-polarised channel and that of adjacent horizontally-polarised channels. It's not necessary to know whether the LNB has built-in polarisation offset – the installer simply selects "skew" then rotates the LNB for minimum meter deflection. With the Eutelsat II F3 satellite in operation at 16°E, accurate dish alignment and skew adjustment are more important than ever. For further details contact Granada, PO Box 31, Ampthill Road, Bedford MK42 9QQ (0234 226 493).

The new TCK50 Antex soldering kit consists of a 50W soldering iron with an accurately adjustable temperature control in its handle, a heavy duty bench stand with a specially profiled bezel, the new "mini" desolder pump and a solder pack.

HSE REGULATIONS

As mentioned last month, the new workplace health, safety and welfare regulations came into force in the UK on January 1st. New workplaces that come into use for the first time on or after January 1st have to comply with them from the start – the same applies to any modifications, extensions or conversions begun on or after January 1st. Existing workplaces have until January 1st 1996 to comply. The Health and Safety Commission (HSE) has published a guide to the new regulations. *Workplace Health, Safety and Welfare – Approved Code of Practice*, ISBN 0 11 886333 9, is available at £5·00 from HMSO or through booksellers. The HSE has an Information Centre for public enquiries regarding the new regulations. It can be reached on 0742 892 345.

PUBLICATIONS

Ferguson has produced for dealers a fault diagnosis pocket book for the ICC5, IKC2 and TX85/86/89/98/99 chassis. Part number for ordering is 00XM119001.

HS Publications, 7 Epping Close, Derby DE3 4HR (0332 513 399) has just published at £3·95 inclusive of post and packing *The Story of BBC Colour Television*. This 32-page book has over 40 illustrations, many of which are extremely rare – a special centre-page spread features twelve photographs in full colour. Coverage includes early reasearch work, u.h.f. field trials in the Fifties, the Alexandra Palace colour studio, experimental OBs and colour test charts.

The British Amateur Television Club has published a new edition of *An Introduction to Amateur Television*, which includes detailed information on how to set up an ATV station and lots of video and r.f. construction projects, and *Slow Scan Television Explained*, which covers basic principles, explanations of all modes, commercial hardware and computer-based systems and various construction projects. Both books are priced at £5. They can be obtained from Ian Pawson, 14 Lilac Avenue, Leicester LE5 1FN (0533 769 425). For BATC membership details apply to Dave Lawton, Grenehurst, Pinewood Road, High Wycombe, Bucks HP12 4DD (0494 28 899).

Did you ever get your copy of *The Setmakers?* This highly recommended 464-page hardcover book is a fascinating history of the radio/TV manufacturing industry in the UK from the earliest days to quite recently, with much about the characters who built up the industry. It's lavishly illustrated with nearly 500 photographs, over a hundred of which are in colour. You can obtain a copy for £17·45 inclusive of post and packing from John O'Neill, 13 Green Curve, Banstead, Surrey SM7 1NS (0737 355 240).

The address of the Out of Print Book Service has been changed to 13 Pantbach Road, Birchgrove, Cardiff CF4 1TU (0222 627 703).

IN BRIEF

The largest net growth in UK broadband cable subscribers yet recorded occurred during the three months to October 1st 1992 when 49,667 new subscribers were connected. At that date 380,297 homes were connected to broadband networks – the total number of cable subscribers was 601,872. . . Alba has introduced at £400 a double-deck VCR, Model VCR222, whose features include long-play, dual scart sockets, an LCD remote control handset and a one month, eight-event timer. . . The European Commission is to investigate the dumping of TV sets with screen sizes of 15·5cm and over imported from Malaysia, China, Korea, Singapore, Thailand and Turkey following complaints from EC producers including Philips, Thomson and Nokia. Imports from these countries took a 22 per cent share of the European market in 1991, rising from 2m sets in 1988 to 5·6m in 1991. Amongst imports to be investigated are Matsushita and Sony sets from Malaysia; Hitachi, Mitsubishi, Sanyo and Toshiba sets from Singapore; Hitachi, JVC and Sanyo sets from Thailand; and Dae Woo, GoldStar and Samsung sets from Korea. . . Sharp claims to have introduced the world's largest thin-film transistor liquid-crystal display. The 14·2in. VGA-compatible LQ14D311 has a range of 262,144 colours, which means that it complies with the worldwide c.r.t. standard in this screen size. The 540 x 480 x 3 transistor matrix is arranged in a vertical-stripe configuration so that both vertical and horizontal lines are perfectly straight. . . Finally a correction: in the item on CD-I last month (page 193) the technology should have been described as 16-bit, not 8-bit.

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N3215K	£4.50	AN7163	£2.95	LA3210	£0.95	MB3730	£2.20	STK5337	£7.25	TA7271P	£2.50	TEA1017	£2.75	2N3055	£0.50
N3310K	£2.95	AN7166	£3.70	LA3370	£2.50	MB3731	£2.75	STK5338	£4.50	TA7280P	£2.95	TEA1039	£2.20	2N3773	£1.50
N3312	£2.95	AN7168	£2.75	LA3375	£2.50	MB8841	£5.75	STK5421	£6.50	TA7281P	£2.75	TEA1042	£3.75	2N3819	£0.30
N3320K	£4.95	AN7169	£2.95	LA3376	£2.20			STK5422	£6.50	TA7299P	£2.95	TEA1060	£2.20		
N3331K	£5.75	AN7171K	£3.50	LA4108	£2.20			STK5451	£5.30	TA7317P	£1.50	TEA1061	£2.20		
N3792	£2.95	AN7172K	£2.95	LA4137	£1.95	SAA1124	£2.50	STK5471	£5.50	TA7607AP	£2.20	TEA1080P	£2.50	2SA769	£0.95
N3821K	£5.95	AN7173K	£3.50	LA4145	£1.70	SAA5030	£3.50	STK5481	£5.95	TA7609P	£2.70	TEA2018A	£1.95	2SA1106	£2.75
N3822K	£6.95	AN7178	£2.50	LA4160	£2.20	SAA5042	£8.00	STK5482	£5.95	TA7611AP	£2.20			2SA1111	£0.95
N3830K	£6.50	AN7310	£1.20	LA4162	£2.50	STA301A	£3.95	STK5730	£4.25	TA7628P	£1.95	UPC575C	£1.00	2SA1186	£3.95
N5010	£5.95	AN7420	£1.95	LA4170	£1.75	STA401A	£4.50	STK6732	£11.75	TA7640AP	£1.30	UPC1025H	£2.30	2SA1232	£2.50
N5011	£3.95	BA5408	£2.20	LA4182	£1.95	STA431C	£2.75	STK7308	£5.50			UPC1188H	£2.75	2SA1265	£2.40
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N5135K	£3.95	BA6209	£1.95	LA4192	£1.75	STK0040	£6.25	STK7404	£6.95	TDA1010A	£1.40	UPC1230H	£2.50	2SA1303	£3.80
N5150	£5.50	BA6229	£2.20	LA4260	£2.30	STK0049	£6.50	STK8050	£9.50	TDA1011	£1.40	UPC1237H	£1.20	2SA1306	£0.45
N5151N	£6.50	BA6239A	£2.20	LA4261	£2.30	STK433	£5.25	STK8250	£8.95	TDA1015	£1.50	UPC1241H	£1.95	2SA1307	£1.10
N5256	£2.20	BA6302A	£1.80	LA4265	£2.30	STK435	£5.50	STK8260II	£12.50	TDA1170N	£1.50	UPC1263C	£2.30	2SA1516	£2.50
N5265	£1.75	BA7004	£2.00	LA4270	£2.75	STK437	£7.50	STR450	£5.20	TDA1170S	£1.50	UPC1277H	£2.50		
N5410	£3.95	BA7005	£2.20	LA4280	£2.95	STK443	£8.95	STR451	£5.20	TDA1510	£3.60	UPC1278H	£2.50		
N5435	£2.20	BA7751AL	£1.95	LA4282	£2.50	STK457	£7.50	STR453	£5.20	TDA1510S1	£3.95	UPC1318AU	£2.75	2SB560	£0.50
N5510	£2.75	HA1339A	£3.50	LA4440	£2.50	STK459	£7.75	STR454	£5.20	TDA1515A	£2.50	UPC1335V	£2.75	2SB596	£0.60
N5515	£2.20	HA1374	£2.95	LA4445	£2.20	STK463	£9.50	STR455	£5.20	TDA1516Q	£3.50	UPC1363C	£2.75	2SB631	£0.60
N5521	£2.20	HA1377	£2.20	LA4446	£2.20	STK465	£9.95	STR456A	£5.20	TDA1518Q	£2.95	UPC1364C	£4.20	2SB633	£1.35
N5560	£2.95	HA1387	£2.95	LA4460	£1.80	STK1050I	£7.25	STR457	£5.20	TDA1522	£1.95	UPC1365C	£2.95	2SB649	£0.55
N5610N	£4.50	HA1388	£2.95	LA4461	£1.80	STK1060	£7.95	STR1229	£5.70	TDA1770A	£2.95	UPC1373H	£1.20	2SB698	£1.80
N5615	£2.95	HA1392	£2.20	LA4465	£2.30	STK1070II	£9.75	STRD1806E	£5.95	TDA2002	£0.80	UPC1387C	£1.95	2SB775	£1.80
N5620X	£3.50	HA1394	£2.50	LA4466	£2.30	STK2028	£7.50	STRD1816E	£6.20	TDA2003	£0.95	UPC1391H	£1.50	2SB817	£2.50
N5622	£3.20	HA1396	£3.75	LA4475	£2.50	STK2029	£6.50	STR2005	£5.95	TDA2004	£1.95	UPC1403CA	£6.75	2SB863	£2.95
N5635N	£3.75	HA1397	£2.50	LA4476	£2.50	STK2038II	£9.50	STR2012	£6.20	TDA2005	£1.95	UPC1420CA	£5.20	2SB965	£1.95
N5700	£1.75	HA1398	£2.50	LA4495	£2.95	STK2048II	£9.75	STR2013	£5.20	TDA2005M	£2.50	BD131	£0.35	2SB1015	£1.00
N5750	£3.75	HA11211	£2.30	LA4498	£2.95	STK2125	£6.75	STR3105	£4.75	TDA2005S	£2.50	BD132	£0.35	2SB1185	£1.20
N5760	£2.20	HA11219	£1.75	LA4500	£2.50	STK2129	£6.95	STR3115	£5.95	TDA2006	£1.50	BD135	£0.25		
N5790	£2.95	HA11223W	£2.50	LA4505	£2.80	STK2139	£8.00	STR3123	£4.75	TDA2009	£2.75	BC136	£0.25	2SC1403A	£4.50
N5836	£3.20	HA11226	£4.50	LA4508	£2.50	STK2155	£9.50	STR3125	£5.50	TDA2020	£1.50	BD137	£0.25	2SC1413A	£2.60
N5900	£2.20	HA11235	£1.95	LA4700	£3.50	STK2230	£6.50	STR4211	£4.50	TDA2030	£1.50	BD138	£0.25	2SC1573	£0.50
N6250	£1.50	HA11244	£2.95	LA5527	£1.95	STK2240	£9.50	STR5015	£6.20	TDA2540	£1.70	BD139	£0.25	2SC1827	£0.80
N6256	£2.75	HA11251	£2.50	LA7031	£2.60	STK2250	£9.50	STR5412	£5.20	TDA2577	£2.95	BC140	£0.25	2SC1946A	£10.50
N6270	£3.50	HA11715	£4.75	LA7032	£2.95	STK3041	£6.50	STR6020	£5.20	TDA2578A	£2.50	BC243C	£0.50	2SC1969	£1.75
N6310	£5.50	HA11717	£4.75	LA7033	£2.75	STK3042	£6.50	STR9012	£5.20	TDA2579	£4.50	BC244C	£0.50	2SC1986	£0.95
N6320	£2.95	HA11721	£8.00	LA7035	£4.95	STK3044	£5.75	STR9014	£5.20	TDA2579A	£3.50	BC607	£0.95	2SC1978	£1.20
N6326N	£3.50	HA11724	£7.50	LA7042	£2.80	STK3062	£6.75	STR11006	£6.20	TDA2600	£6.00	BC608	£0.95	2SC2166	£1.00
N6327	£3.50	HA11745	£7.50	LA7223	£2.75	STK3082II	£6.95	STR20005	£5.50	TDA2611A	£1.30	BD711	£0.65	2SC2335	£1.20
N6332	£4.75	HA11747A	£7.50	LA7224	£1.95	STK3102II	£5.75	STR20012	£5.20	TDA2653A	£3.50	BC712	£0.65	2SC2542	£1.95
N6337	£3.95	HA11747ANT	£7.50	LA7520	£3.25	STK3152II	£9.50	STR30125	£4.75	TDA3501	£4.50	BD911	£0.95	2SC2570	£0.50
N6340	£3.75	HA11781NT	£3.95	LA7755	£3.20	STK4017	£5.75	STR30130	£4.75	TDA3505	£4.20	BD912	£0.95	2SC2580	£2.80
N6342N	£2.50	HA11827NT	£8.50	LA7800	£1.50	STK4025	£6.50	STR40090	£5.75	TDA3510	£4.50	BD939	£0.50	2SC2792	£4.95
N6344	£4.75	HA11870NT	£5.25	LA7801	£1.50	STK4121 I	£6.95	STR41090	£6.20	TDA3560	£3.90	BD940	£0.50	2SC2837	£2.95
N6346N	£3.75	HA12005	£3.20	LA7806	£2.50	STK4122II	£5.95	STR44115	£6.20	TDA3561A	£4.50	BDT31A	£0.60	2SC3026	£5.50
N6350	£7.50	HA12047	£3.50	LA7808	£2.75	STK4131II	£6.75	STR50020	£6.20	TDA3562A	£4.50	BDT52	£0.60	2SC3263	£3.20
N6356	£3.85	HA13001	£1.90	LA7910	£1.75	STK4132I	£6.75	STR50103	£4.50	TDA3654	£2.95	BDT61A	£0.75	2SC4236	£5.50
N6357N	£4.50	HA13007	£4.50			STK4141I	£7.50	STR50113	£5.70	TDA3730	£4.75	BT152 600R	£1.50		
N6359N	£5.50	HA13108	£2.95	LB1403	£1.50	STK4142I	£7.95	STR50115A	£5.70	TDA3771	£4.75	BTY79-200R	£1.50	2SC288	£0.80
N6360	£2.60	HA13117	£2.75	LB1405	£1.50	STK4142II	£7.30	STR50213	£6.20	TDA4427	£2.95	BTY87 100R	£1.75	2SC401A	£1.20
N6362	£4.50	HA13118	£2.75	LB1416	£1.50	STK4151II	£7.50	STR54041	£5.20	TDA4437	£3.90			2SC526	£0.80
N6363	£8.50	HA13119	£2.50	LB1640	£2.20	STK4152II	£7.85	STR58041	£5.20	TDA4440	£2.75	BU208A	£1.00	2SC669	£0.65
N6367P	£5.50	HA13128	£3.95	LB1649	£2.50	STK4161II	£7.95	STR59041	£6.20	TDA4500	£3.95	BU208D	£1.30	2SC768	£1.20
N6387	£5.50	HA13403V	£5.50			STK4162II	£7.95			TDA4501	£4.50	BU326A	£1.20	2SC811	£2.95
N6394	£5.20	KA2206	£1.75	LC4066B	£2.95	STK4172II	£8.95			TDA4510	£3.95	BU406	£0.95	2SC870	£4.00
N6671K	£4.95	KA2210	£2.40	LC7132	£3.50	STK4181II	£8.95	TA7193P	£4.00	TDA4600	£2.75	BU407	£0.70	2SC871	£4.50
N6676	£5.50	KA2213	£1.30	LC7136	£4.50	STK4191II	£9.50	TA7205AP	£1.00	TDA4600-2	£2.50	BU408	£0.95	2SC880	£0.60
N6677	£4.95	KA2214	£1.50	LC7815	£2.95	STK4192II	£9.50	TA7217AP	£1.50	TDA4600 2D	£2.50	BU426A	£0.80	2SC8988	£2.95
N6875	£2.95	LA1130	£2.50	LC7818	£2.95	STK4332	£4.50	TA7222AP	£1.30	TDA4600 3	£2.95	BU426E	£0.70	2SD1046	£1.90
N6875	£3.50	LA1132	£2.50	M5218L	£1.95	STK4352	£5.90	TA7229P	£3.25	TDA4925	£3.50	BJ500	£1.50	2SD1148	£1.90
N7105	£2.50	LA1170	£1.75	M5218P	£0.95	STK4793TV	£9.50	TA7230P	£1.50	TDA4935	£3.95	BJ508A	£1.00	2SD1207	£0.60
AN7106K	£2.50	LA1185	£1.60	M51102L	£2.95	STK4803	£8.50	TA7232P	£1.95	TDA5660P	£3.30	BJ508D	£1.00	2SD1276	£1.20
AN7143	£2.50	LA1240	£1.95	M51104L	£3.20	STK4833	£9.50	TA7233P	£2.50	TDA7000	£2.95	BJ508V	£1.20	2SD1397	£2.00
AN7147	£2.50	LA1260	£2.95	M51358P	£1.75	STK4843	£8.95	TA7240AP	£2.95	TDA7250	£4.95	BUT11	£1.20	2SD1398	£1.50
AN7148	£2.30	LA1266	£2.95	M51393AP	£4.50	STK4853	£9.50	TA7241AP	£2.95	TDA7255	£4.95	BUT11AF	£1.30	2SD1426	£2.95
AN7149	£2.50	LA1365	£1.50	M51397AP	£5.50	STK5315	£6.75	TA7243P	£2.95					2SD1427	£3.30
AN7158N	£3.95	LA2400	£1.50	M54543L	£1.75	STK5324	£5.75	TA7250BP	£2.95	TEA1002	£2.95	TIP41C	£0.35	2SD1439	£2.20
AN7161N	£3.50	LA3101	£1.75	M54544L	£2.75	STK5325	£6.75	TA7251BP	£2.95	TEA1009	£1.80	TIP42C	£0.35	2SD1457	£3.95
AN7161 NFP	£3.50	LA3160	£0.95	MB3712	£1.50	STK5332	£3.50	TA7270P	£2.50	TEA1014	£2.20	ZTX650	£0.30	2SD1987	£3.75

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37-592	29	370HUB	29	420DYB	19
42-556	29	37JGA	29	420EDB	19
42-570	29	37SX101Y	19	420EFB	19
42-590	19	38EAC	29	420EGB	29
42-592	19	38EAF	29	420ERB	19
AXT37-001	29	38EAD	29	420GAB	29
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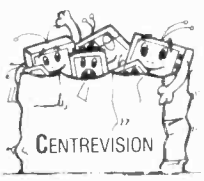

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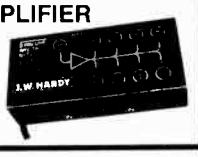

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NOTE: The above dishes can be motorised using the components at the end of this list

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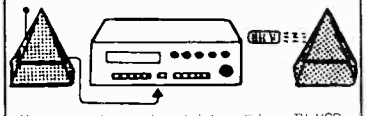

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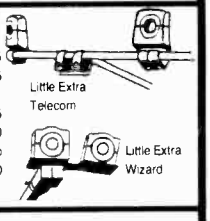
(Note: Second LNB required – see LNB section)



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Aries Basic 60cm Mesh Black wall pole mount	£22.89

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90cm Dish offset	£84.41
1.2 mtr. Dish offset	£134.00
Az-el Mount for 0.9-1.2 mtr. Dish	£32.00
Polar Mount for 0.9-1.2 mtr. Dish	£46.00
Wall Floor Stand for Polar Mount 1.2 mtr.	£45.00
12" Jager Jack for 1.2 mtr. Dish	£62.98
18" Jager Jack for 1.2 mtr. Dish	£74.99
1.2 mtr. Dish & Polar Mount	£180.00
1.2 mtr. Kit Dish Polar Mount Wall Floor Stand	£225.00

THE TECHNISAT FLAT PLANE

45cm Flat plate antenna	£149.95

SATELLITE ANTENNA ACCESSORIES
Secondary Satellite Reception
The Little Extra designed for offset Astra receiving antenna where a second satellite can be received from a single fixed antenna

Little Extra Astra Eutelsat	£16.75
Little Extra Astra Telecom	£16.75
Little Wizard Astra Eutelsat	£13.95
Uni LNB Carrier 20-40mm	£3.50
Uni LNB Carrier Round Adp	£2.50
LNB/LNB Push Button Switch Box	£9.95

LNBs

FSS 10.95 to 11.75 GHz
DBS 11.75 to 12.5 GHz
K5 12.5 to 12.75 GHz Telecom Band

CONTINENTAL MICROWAVE

FSS 40mm collar 1.2dB	£45.00
FSS 40mm collar 1dB	£55.00
K5 23mm collar, 1.2dB	£60.00
FSS Dual 40mm collar, 1.2dB	£80.00

MARCONI

FSS Blue Cap White 1.8dB	£35.00
FSS Blue Cap Black 1.8dB	£35.00
FSS Twin V H 40mm Col. 1.6dB	£80.00
FSS Dual V H 40mm Col. 1.6dB	£80.00

NORTHERN TELECOM

FSS 23mm collar 1.2dB	£44.00

M.T.I.

FSS 60mm collar 1.5dB	£60.00
FSS Dual V H 60mm col 1.5dB	£110.00

J.W. HARDY SPECIALS

FSS 4 bolt fix Hempt 1dB	£52.00
FSS 4 bolt fix Hempt 9dB	£62.50
FSS 4 bolt fix Hempt 8dB	£95.00
FSS K5 Dual Band LNB 1dB	£105.75
FSS 4 bolt fix Gardner 0.8dB	£155.00
K5 4 bolt fix Maspro 1.5dB	£52.00

MARCONI LNB ACCESSORIES

Blue Cap Cap Only	£2.94
White LNB Cover	£2.94
Black LNB Cover	£2.94
Black Radome Cover	£2.94

LNB Feeds, Polorota

FEEDS

Horn offset C120 32mm Collar	£10.58
Horn offset WR75 32mm Collar	£10.58
Horn offset C120 40mm Collar	£17.63
Q M T V H Microwave Splitter	£34.55

Feeds with combined Magnetic Polorota

Horn offset WR75 32mm Collar	£26.00
Polyrod Lens offset WR75 23mm	£40.00
Polyrod Lens Prime WR75 23mm	£40.00

MAGNETIC POLOROTA

Racal C120	£40.00
Racal WR75	£40.00

Pulse to Magnetic Polorota Interface

IRTE Interface P to Mag	£29.95

CLAMPS & "V" BOLTS

ANTENNA TO MAST CLAMPS

15mm Aerial to 2" Mast Clamp	£1.68
Universal Aerial Cross Clamp	£1.69
Amstrad Dish to Mast Clamp	£5.64
80 65 55cm Vertical Mast Adaptor	£9.40

MAST TO MAST CLAMPS

Universal Mast Cross Clamp	£2.06
Universal Mast to Mast Clamp	£3.29
2" – 15.2" Mast Coupler	£11.14

"V" BOLTS & MAST GRIPPERS

1.75" V Bolt & M8 Nut	£0.22
2.5" V Bolt & 3/8" Nut	£0.42
2.5" V Bolt & M6 Nut	£0.22
Universal Mast Gripper	£0.50

MASTING

ALLOY STRAIGHT MASTS

1' – 1" 18g (1.2mm)	£0.77
3' – 1" 18g (1.2mm)	£1.98
5' – 1" 18g (1.2mm)	£3.36
6' – 1" 18g (1.2mm)	£4.04
10' – 1.5" 16g (1.6mm)	£10.19
13' – 1.5" 16g (1.6mm)	£13.25
16' – 2.0" 16g (1.6mm)	£21.64
16' – 2.0" 14g (2.0mm)	£26.79
20' – 2.0" 14g (2.0mm)	£33.45

STEEL STRAIGHT MASTS
Prime Steel to BS6323
Zinc Plated Inside & Out

13' – 1.5" 18g	£9.87
13' – 1.5" 16g	£13.01
20' – 2.0" 16g	£27.21

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10' – 1.0"	£3.53
10' – 1.25"	£5.82
10' – 2.00"	£7.20
20' – 2.00"	£15.86

MAST LASHING EQUIPMENT

Rope Grips 1/4"	per set of 2 £3.53
Metal Thimble	per set of 2 £0.68
3 Way Guy Collar	£2.68
4 Way Guy Collar	£3.74
50 mtr. Guy Wire	£24.15
2" – 15" Mast Coupler	£11.14

ALLOY SHAPED MASTS

2' – 1" 18g L-Cranked	£1.43
3' – 1" 18g L-Cranked	£1.97
3' – 1" 18g S-Cranked	£2.61
5' – 1" 18g Cranked	£4.16
6' – 1" 18g Cranked	£4.86
6' – 1.25" 18g Cranked	£6.03

STEEL SHAPED MASTS

1' – 1" – 35mm Arm for Sat	£5.65
4' – 1" – 35mm Arm for Sat	£8.00
9' – 1" – 35mm Arm for Sat	£14.95
4' – 1" – 35mm Arm for Sat Black	£9.40
9' – 1" – 35mm Arm for Sat Black	
4' – 1" – 1.5" Arm for Sat	£8.00
9' – 1" – 1.5" Arm for Sat	£14.95
S-Arm for Sat	£8.59

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CHIMNEY BRACKETS
Aluminium Painted

6" – 6" Welded Painted Ch	£2.35
6" – 9" Welded Painted Ch	£3.10
7.5" Welded Painted Ch	£4.70
13.5" Cradle Welded Painted Ch	£6.30
Double Lash Pad Welded	£6.82

CHIMNEY LASHING EQUIPMENT

Standard Repair Kit (no Bracket)	£3.36
Full Repair Kit Extra (no Bracket)	£5.00
5 mtr. Wire Coil	£2.00
25 kilo Lashing Wire	£50.00
Rope Grips 1/4"	per set of 2 £1.40
Metal Thimble	per set of 2 £0.68
Corner Plates Standard	per set of 3 £0.42
Corner Plates Extra	per set of 3 £1.30
4.75" J-Bolt & 5/8" Nut	£0.32
1.75" V-Bolt & M8 Nut	£0.22
2.5" V-Bolt & 3/8" Nut	£0.42

LOFT & LIGHT OUTDOOR

Loft Facia Pressed Foot	£1.36
Loft Facia Swivel Bracket	£1.48
Light 1" Pole Bracket with 1" stand off	£2.45
12" – 1" Alloy with foot (Loft stand)	£2.00
12" – 1" Alloy with Swivel Bracket (Loft Stand)	£2.50
24" – 1" Alloy 90° foot (Loft Stand)	£3.90
24" – 1" Alloy 90 with Swivel Bracket	

WALL BRACKETS
Aluminium Painted

6" – 6" Welded Painted Wall	£2.55
6" – 9" Welded Painted Wall	£3.10
9" – 9" Welded Painted Wall	£3.53
12" T&K Welded Painted Wall	£7.05
18" T&K Welded Painted Wall	£8.74
24" T&K Welded Painted Wall	£10.72

SATELLITE WALL BRACKETS

2" – 1" – 35mm L-Patio Wall	£19.95
2" – 1" – 1.5 L-Patio Wall	£19.95

SATELLITE GROUND STANDS
Polyester Black Powder Coat

2" – 1" – 35mm L Patio Wall	£19.95
2" – 1" – 1.5" L-Patio Wall	£19.95
2" – 1.5" dia. Straight Patio	£14.85
2" Ground-Wall Stand Poly	£28.20

Zinc/Galvanized

2" – 28" Tripod Ground Stand	£30.00

FIXINGS

NYLON PLUG & BOLT
Bolts have 13mm Hex Head & Nylon Plug. Require a 10mm Bore Hole

Mungo 10 – 50mm Nylon P & Bolt	£0.50
Mungo 10 – 90mm Nylon P & Bolt	£0.70
Spit 10 – 60mm Nylon P & Bolt	£0.70
Hilta HRD-H 10 10S P & Bolt	£1.00
Mungo 10 – 50mm Ny P & Bolt 100	£23.58
Spit 10 – 60mm Ny P & Bolt 100	£39.16

STEEL EXPANSION ANCHOR
The Nut has a 13mm Hex Head & Anchor requires a 10mm Bore Hole

Spit 10 – 70mm Steel Exp An	£0.56

PVC WALL PLUGS

5.5mm PVC Wall Plug Red 100	£1.00
7mm PVC Wall Plug Brown 100	£1.00

PLASTER BOARD PLUG & SCREEN
With Self Screw Plug & Screw

35" – 9mm Plug & P. Head Screw	£0.50

STEEL SCREWS COUNTER SUNK

NO 14 – 1.25" CS Self Tappers SC	£0.10
NO 14 – 1.25" CS Self Tappers BZ	£0.15

CABLE CLIPS
THE UNI-CLIP RANGE

5mm Round Black Uni-Clip 100	£2.09
5mm Round White Uni-Clip 100	£2.09
6mm Round Black Uni-Clip 100	£2.23
6mm Round White Uni-Clip 100	£2.23
7mm Round Brown Uni-Clip 100	£1.85
7mm Round White Uni-Clip 100	£1.90
7mm Round White Uni-Clip 100	£1.85
9mm Round White Uni-Clip 100	£2.76
9mm Round White Uni-Clip 100	£2.76
11mm Round Black Uni-Clip 100	£3.52
13 – 6mm for Sat1002 Bi-Clip 100	£3.95
26 – 7mm for K1015 Bi-Clip 100	£5.28

THE TOWER CLIP RANGE

6mm Round Black Tower Clip 100	£1.85
6mm Round Brown Tower Clip 100	£1.85
6mm Round White Tower Clip 100	£1.85

ADHESIVE TAPE (PVC)

20 mtr – 0.75" Black PVC Tape	£0.59

VOLEX COAXIAL CABLE

Attenuation figures are approx at 860MHz per 100 Metres
Coax Cut from The Drum

DOMESTIC COAX
Domestic TV Low Loss Coax

C55BC 21dB Brown	Mtr £0.40
C55WC 21dB White	Mtr £0.40

Domestic Signal Screened Coax for TV Low Loss & Satellite Use

C56BC 17dB Black	Mtr £0.40
C56WC 17dB White	Mtr £0.40

Domestic Double Screened Coax for TV Low Loss & Satellite Use

SA1100BC Black	Mtr £0.68
SA1100Wc White	Mtr £0.68

Special Use Satellite Coax

SAT1002 Coax – 2 core Black	Mtr £1.25
K1015 Coax – 7 core Black	Mtr £2.25

LIGHT COMMERCIAL COAX
Light Commercial Double Screened Coax for TV Low Loss, Satellite & SMATV Networks

C1100B1 19dB Black	Mtr £0.68
C1100W1 19dB White	Mtr £0.68
C1125B1 15dB Black	Mtr £0.89

COAX ON 100 METRE DRUMS
Price per 100 metres
See above details for Coax usage

C55B1 21dB Brown 100mm Drum	£17.57
C55W1 21dB White 100mm Drum	£17.57
C56B1 17dB Black 100mm Drum	£17.57
C56W1 17dB White 100mm Drum	£17.57
SA1100B1 Black 100mm Drum	£33.61
SA1100W1 White 100mm Drum	£33.61
SA1100Z Coax – 2 core Black 100mm D	£70.27
K1015 Coax – 7 core Black 100mm D	£134.55
C1100B1 19dB Black 100mm Drum	£32.90
C1100W1 19dB White 100mm Drum	£32.90
C1100B Dual 19dB Black 100mm Drum	£82.25
C1125B1 15dB Black 100mm Drum	£30.54
C1125W1 15dB White 100mm Drum	£25.85

DOMESTIC COAX
Supplied on 25 Metre Drum
Price per 1000 Metres

C55B2 21dB Brown 250m Drum	£158.00
C55W2 21dB White 250m Drum	£158.00
C56B2 17dB Black 250m Drum	£158.00
C56W2 17dB White 250m Drum	£158.00
SAT100B2 Black 250m Drum	£290.00
SAT100W2 White 250m Drum	£290.00

LIGHT COMMERCIAL COAX
Supplied on 250 Metre Drum
Price per 1000 Metres

C1008B2 19dB Black 250m Drum	£2.94
C100W2 19dB White 250m Drum	£2.94
C100B 1 Dual 19dB Black 250 Drum	£7.09

COMMERCIAL GRADE COAX
Supplied on 250 Metre Drum
Price per 1000 metres
Drum size 500 & 1000 Metre to order

CT100PE 18.7dB Black 250m Drum	*£3.65*
CT125PE 15.3dB Black 250m Drum	*£4.99*
CT167PE 11.9dB Black 250m Drum	*£8.51*
CT1230PE 8.9dB Black 250m Drum	*£12.22*
CT1261PE 8.4dB Black 250m Drum	*£12.93*

UNDERGROUND & HEAVY INDUSTRIAL COAX
Price per 1000 Metres
Drum size 250, 500 or 1000 Metre to order

CT1100RBS 18.7dB	D size to order £5.01
CT1125RBS 15.3dB	D size to order P.O.A.
CT1167RBS 11.9dB	D size to order £8.79
CT1230RBS 8.9dB	D size to order £14.06
CT1264RBS 8.4dB	D size to order £14.87

COAXIAL CABLE

LIGHT COMMERCIAL COAX
Supplied on 250 Metre Drum
Screen Copper Braid Copper Tape
Screen Copper Braid Copper Tape

DS1001 Black Far East Supp	100m D £30.63

Screen Copper Braid Alloy Tape

RG6 Black Far East Supp	100m D £21.55

FLEXIBLE CABLES

LOUDSPEAKER CABLE
Cut from the Drum – Price per Metre

L.S. Cable Grey 2 13.2mm	Mtr £0.20
L.S. Cable Black 2 13.2mm	Mtr £0.20

LOUDSPEAKER CABLE
Price per 100 Metres

L.S. Cable Grey 2 13.2mm	100mm D £8.40
L.S. Cable Black 2 13.2mm	100mm D £8.40

COAXIAL CONNECTORS

PIB Connector Sealing Tape

19mm – 10m PIB Self Amal Tape	£4.63
25mm – 10m PIB Self Amal Tape	£5.90

STANDARD COAX CONNECTORS

Coax Plug Alloy British soft claw	each £0.35
Coax Plug Alloy Screw on	each £0.50
Coax Coupler British White	each £0.30
Coax Coupler British Black	each £0.30

Bulk Purchase Prices

Coax Plug Alloy Belling Lee	100 £31.11
Coax Plug Alloy British soft claw	100 £23.50
Coax Plug Alloy Foreign	100 £18.43
Coax Plug Alloy Screw on	100 £34.56
Coax Coupler British White	100 £16.45
Coax Coupler British Black	100 £16.45

COAX CONNECTORS (In Line)

"F" Coaxial Connectors

F-Screw on C1100 RG6	each £0.30
F-Screw on C56	each £0.30
F-Crimp Bonded Ring CT100 RG6	each £0.26
F-Crimp Bonded Ring CT125PE	each £1.26
F-Crimp Bonded Ring CT167PE	each £2.95
Crimping F Tool for Above	£40.89
F-Crimp Loose Ring CT100	each £0.22
F-Elbow Socket to Plug	each £1.22
F-Coupler Socket to Socket	each £0.50
F-Coupler Plug to Plug	each £1.00
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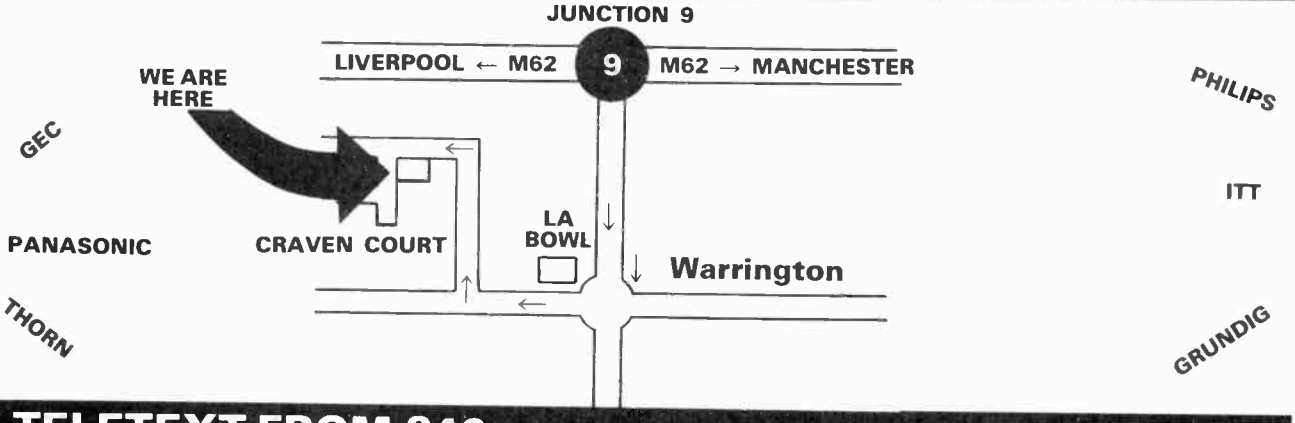

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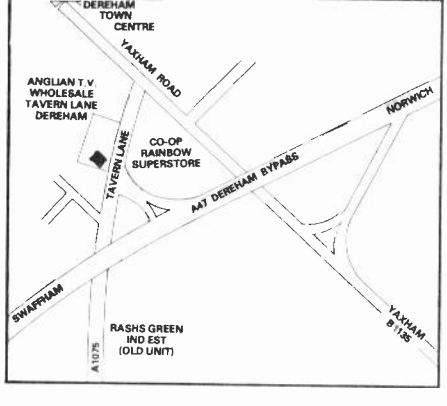

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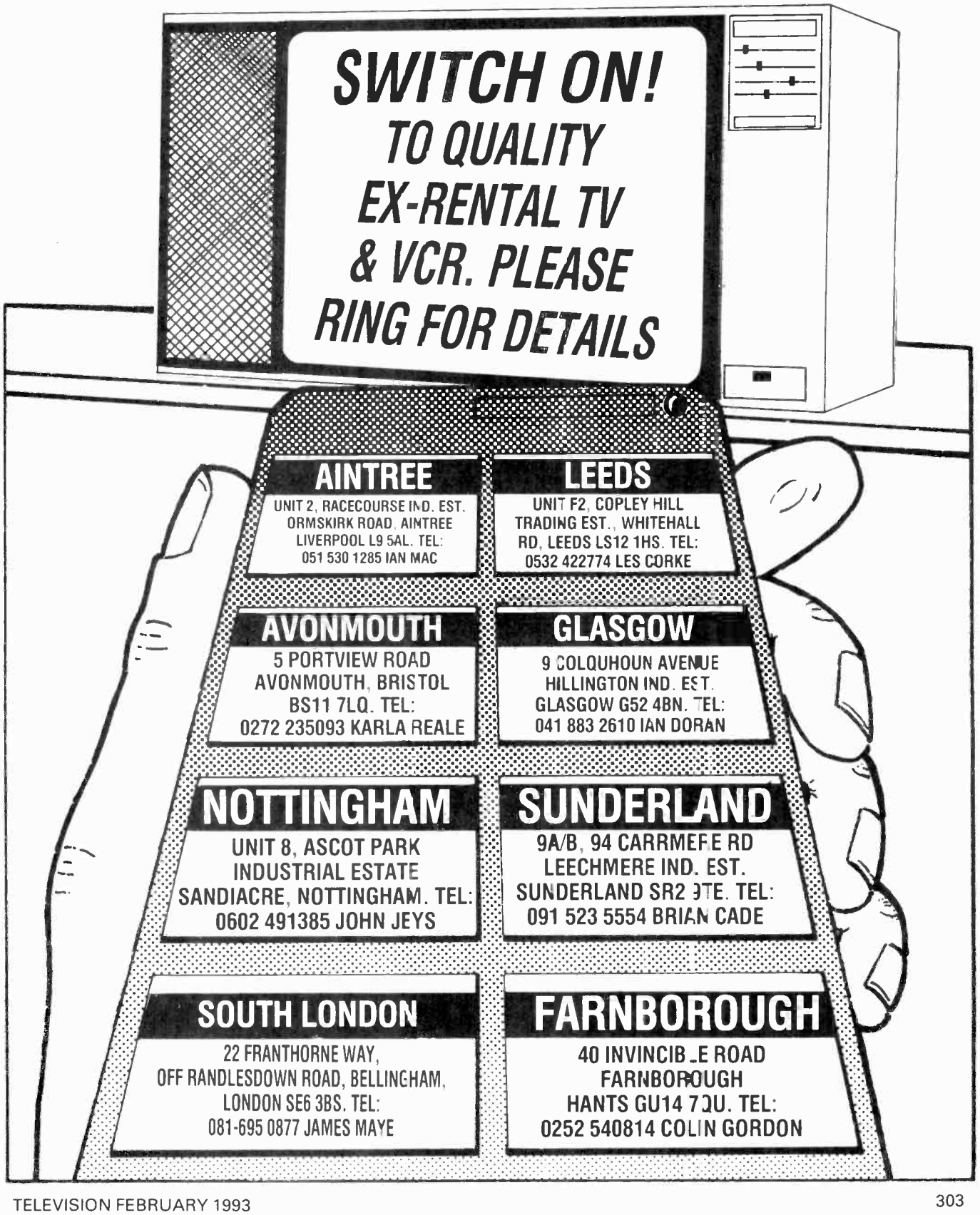

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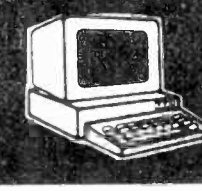

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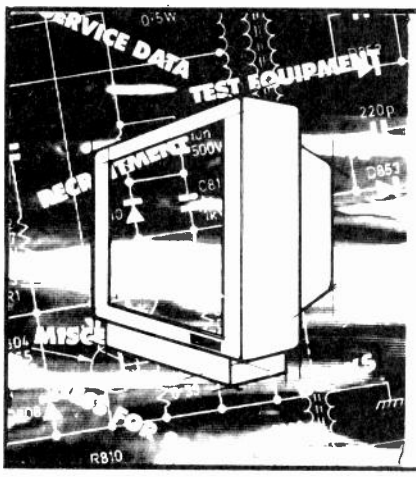

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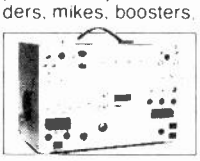

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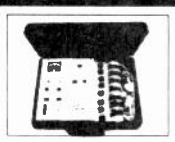

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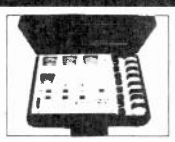

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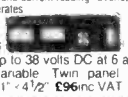

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TX10 TUBE BASE ON PANEL £3.00
TX9IF £2.00
THORN PANEL No.515-353, 548.02, 565-01, 509/102, 515/173, 508/161 ..... £5.00
THORN TX STEREO SOUND O.P. PANEL (I.C. TA7227P) £1.00
THORN VIDEO AERIAL AMP 01 M4-597401 ..... £6.00
ULTRASONIC TRANSDUCER 15p
IN LINE 12-35 VOLT SUPPRESSOR 43000 MRD 20p

CAMCORDER SANYO NP22 6v 1300mah Rechargeable Battery Pack £6.00

SATELLITE UNIT
Video Out/Audio Out, L and R Polariser ± 35M/A and Decoder Socket
£10

VIDEO AMSTRAD HANDSETS (EXPORT) WILL WORK IN HOME MARKET

PB500 Panic and Button Transmitter 180MHz £1.00
G11 CAP 250V. 470M £1.35

NOT WORKING NEW PROFESSIONAL SATELLITE RECEIVER WITH HAND SET, METAL CASE WITH METER, DOLBY CHANNEL C WITH POLARIZER SUPPLY
£20 £5 post
SEND FOR DATA AND PHOTO

SATELLITE FINDER KIT AND LNB TESTER WITH METER BOX £25

BSB or D2-MAC 35cm DISH and LNB 11.7 to 12.7 £20

SEND FOR DATA D2 MAC SATELLITE RECEIVER, LNB AND DISH. £50 (£10 Post)

PHILIPS STEREO HEADPHONE £4.00

PHILIPS C.D. MECH. 691-30212 £10.00

Gas Soldering Irons New Type £10.00
Variety Nickel Cadmium Batteries from Telephone Type to Sub-C 50p per cell. Mainly in packs of 6 to 8

HITACHI UHF-VHF SMALL TUNER
E1598A £2.00
E1595A £5.00

06D44025-001 Mains input choke for TX9 £4

THORN M494B1 on Remote Panel £5

THORN FRAME IC TX100 etc IC TDA 3652 IS OBSOLETE REPLACEMENT TDA 3654 £2.00

TX100 REMOTE PANEL No.56413IC M293B/and SAA5012 £10 etc

NICAM UNIT — Ferguson made for ICC5 Chassis — home market and export — has circuit diagram and can be converted to most sets — **£15.**

FERGUSON SUA1 SATELLITE DECODER £50 + £5 carriage

Philips Stereo Headphones No. SBC 3140 £4.00
144MHz Changed Over Relay Aerial 50p

THICK FILM HITACHI HM9205A £4.00

TX90 FERGUSON BATTERY MAINS CONVERTOR £5 each

TX9-TX100 FRONT PANEL £5 WITH REMOTE £10 NON REMOTE 8 push button £10

LARGE Foacs Pots. Fits Pye, GEC, ITT, Deeca 75p

PHILIPS UNIVERSAL BATTERY TESTER SBC 1695 £5.00
BATTERY CONVERTER FOR TA185 FERGUSON TX85 £8.00
ONE I.C. K35 Decoder £10.00 PHILIPS Decoder Calculator £7.00
REGULATED PWR. SUP. 500M A 5V 12V DC switched + A £5.00
ITT Tuner & IF Can HF module 2 U.K. £10.00
K13-K30 IF £5.00 STR5481 £5.00

TX100 Push Button Unit 16 C.H. £19.00
WIRE PIPE Stud detector £4.00
MICROWAVE leak detector £4.00
WIRE & PIPE detector £4.00

CAR ADAPTOR fused 3 Amp Long Lead with plug for TV etc 25p 500 off, 15p Each

SALORA 19" RACK MOUNT SAT RECEIVER with Variable Tuning £30.00 Post £5.00

STEREO SOLAR RADIO VHF AND MW £10.00

COST £25
PHILIPS METER ANALOG £9

G11 470 MFD 25Vs £1.35

CASSETTE MAINS LEADS 30p
SCART Socket, Print Type 20p

TELEPHONE EXT. LEAD 3 Metre 30p

LEAD SCART TO D PLUG 50p

BSB SAT/REC HALF COMPLETED. CHASSIS, TUNER AND MOD £5 + Post £3

PHILIPS NEW TYPE U/V HANDSET £10

GLASS BEADS Diodes 200v/1 2A 50 for £1.00

G11 LOPT Panel £4.00
G11 Up Switch £20.00
G11 HF Panel £3.00
G11 Decoder Panel £2.00
G8 Push Button Unit £2.00
G8 Con/Panel New Back Type £4.00

MIXED TOSHIBA HAND SETS FIVE FOR £12

EACH 10 off £1.00 MDA2062

Have you got Acid Rain in your garden? PH METER £5.00
Video Power Supply for Amstrad. Last year mods. £1.50
Mains Transformer for Amstrad Video 25p (£1 post)

DAMAGED AMSTRAD 1640 Colour Monitor Chassis £6 + post £3

LATEST VIDLO
For Latest Philips, GEC Pye and Hitachi Front panel with memory chip and push button and pots and LED's £6.00 NEW

FERGUSON CHASSIS

IKC 2712	£20
IKC-2000	£20
IC/K-2705 PAL/SECAM/NTSC	£20
TX89	£20
TX98	£20

TX100 FRONT PANEL £5 8 Button

GEC, HITACHI DECODER PANEL
TBA810AS, TBA120, HAV1215A, UPC1365 £10

SCART TO SCART LEADS TX90 REMOTE PANEL IC TMS1000 AND M293 £12

5 Mixed AMSTRAD **VIDEO MOTORS** £5.00

SATELLITE TUNER UNIT 2427611 with Base Band, Video Out £15.00

TX10 8 way button unit £8.00
24v O 24v 3Amp MAINS TRANSFORMER £3.00
10 MIXED FERGUSON CIRCUIT DIAGRAMS £5.00
MSH1FCF09 £2.22

SALORA SAT RECEIVER CONVERSION KIT
For models 24M60, 25M90, 28M90, SB1206E, SB1365
£15

TX90 TO TX100 8 BUTTON UNIT £4.00

DECODER C-CAM
PHILIPS MADE for K40 CHASSIS
IC No. TDA 3590
£5.00

RGB. CONVERTER £20.00
TV – Video – Hi-Fi
Video in: R.G.B. out in black metal case with black knobs
56420A 20A/600V THYRISTOR £1.75

LCD VIDEO AMSTRAD HANDSET for models 1900 **£8 each**

ITT BG2032-642A TRIPLER £5.00

ITT/NOKIA RF IF MODULE £20

COAX PLUG TO PHONO LEADS £1

SCART TO SCART LEAD £1

TV GAMES AERIAL VIDEO COMBINER SWITCH £1.50

MIXED 20 BRIDGE RECTIFIERS (1 Amp to 5 Amp) **£1.50**

BRIDGES RECTIFIER Mixed BR-31 to 34 2 Amp to 5 Amp 8 for £1.00

NEW LUXOR SATELLITE ANTENNA POWER DRIVER £15.00

T6070V TX9 Transistor £1.00

1 METRE SCART LEAD £1.00

VIDEO SCART TO SCART ALL PIN, LONG LEAD £3.00 ALL PINS

TX90 TX925 TX100 Mains Switch with Stand-by and Lead 50p each

TDA 3562A 10 off each £1.50

U.H.F. Modulator MPM8010 30p

2433752 £20
2432984
2432871
2432301
2435016 **£10 EACH**
2433952
2434393
2432211
T9048A
DST858243
TFB3069D
K4L.O.P.1
K35 L.O.P.1
K40
2434852
2432904

SPLIT-DIODE

2433752 £20
TX100 Green Spot £15.00
TX100 Yellow Spot
L.O.P.T. £10.00
TX90 White Spot
L.O.P.T. £15.00
Split Diode 110F £12.50
Orion 65-3M
GLC 85-979346
TX9 Thorn 2432101-2 £5

2434141 EACH
2434392
2435066 **£10**
2434393

DST 858243
TFB4023AD £10.00
MSH1FPT131 £12.00
MSH1FBW27 £12.00
DST186N243 £10.00

TOSHIBA
DST 186N243 £10
TFB 4023AD £10
CP90 Philips Split Diode £10.00

36761
36881
269120/10
37051
CTk Lopt
36212
33651
36072
36362
36882
36761
36831
36832
36833
36921/79
36922/79

TX85 2435701 2434393 2435016 2435014
£10

TRANSFORMERS

24357/01 £10
2435012 £10
FERGUSON 47003481 £10
AMSTRAD TVR3
LPTS £10
TFB3069D EQU
TFB4009AN

AT2076/00 AT2076/55
AT2076/11 AT2076/11
AT2076/55 AT2860/15
AT2076/35 RCO ST CT3325
AT2076/38 OT2041
AT2076/51 HB165KA Orion
CVC 820 2076/51
CVC 800 2432461 2433451

BRIDGE RECTIFIERS 10 FOR £1.00
4 Amp for Video Power Supply

SHARP MSH1FC09
£10 EACH
0004-235
002-01
FIT MOST SETS New Thorn Hand Set Type u/v (£10)

VIDEO MOTOR for VT568 type VC 62DD8 £8.00
AMP TUNER IF for VT568 Hitachi & GEC £9.00

SATELLITE TUNER 950MHz-1750MHz £5.00

TTT PANEL
CMC 301 CMC 113 CMC 302
CMC 115 CMC £5.00 303 CMC 96.4

VIDEO LEADS 4 for £1

SEL ITT IFB254F 2 Front Panel £15.00

DECCA — GEC — ITT 6 push button £5.00

BURGLAR ALARM £2.00 with siren 9 VOLT

RELAYS 35p 5V-12V-24V-48V Large and Small

25 Way Plug and Socket with Case £1.50

KIKUSUI
20 MHz OSCILLOSCOPE (5020) £200
40 MHz OSCILLOSCOPE (5042) £250
60 MHz OSCILLOSCOPE (7060A) £1000
DELAY PROGRAMMABLE
FERGUSON CHASSIS
IKC 2174 £20.00
IKC 7701 £20.00

12V/1 AMP POWER SUPPLY WITH MAINS PLUG £4

PHILIPS HALOGEN LIGHT. NEW. NO ON/OFF SWITCH. NO HANDLE WITH CORD. BLACK IN COLOUR £5

PHILIPS HAND SET G11 TEXT ULTRASONIC £10
G11 TEXT IN RED HAND SET £15.00
G11 HAND SET ULTRASONIC £10
PHILIPS RC5 EASY CONTROL £10

TRV3 Amstrad Cassette Mechanisms. New with 2 motors and sound head. £15
TVR3 Power Supply. £5. Amstrad Television Tuner UHF. Small, Fits most Amstrads. £6.

SENDZ SEE BACK PAGE

PHILIPS SBC 522 RGB1 GENERATOR £90
PHILIPS SBS 850 ANALOG MULTIMETER £11.50
PHILIPS SBS 521 RF SIG GENERATOR £90.00
FERGUSON TX110 – IK2 and IK7 MANUAL £1 each

FERGUSON ICC5 STEREO O.P. PANEL ICs TDA8405 TDA8421 TBA1204 £10

U/V TRIPLERS £2.00

4600 TO 8600 AMSTRAD VIDEO HAND SET WITH LCD £10

NICAM MKII KIT MODULE £20.00 with data

Burglar Alarm Has time delay to set £2

Mains Transformer £4.00
240v in 110V to 120v out 1 amp post £3

SENDZ COMPONENTS

TO ORDER SEE BACK PAGE

LA11440	£1.00
TAA7750	50p
HA 411485	£1.00
UPC1373	50p
M58657P	£1.00
M391BB1	£3.00
M50441/550	£1.00
M58658P	£1.00

Receiver TX100 Panel
I.C. No. SAB3035
—MAB8400P D066
—SAA1060
—PCF8571P

20 off £2.00 High Voltage Condenser
IN5 to 8NZ 1500V to 2KV

TX9 C CAM Decoder	£5.00

4 Types Fidelity front panels with i.c. & pats	£2.00 each
BB 103	10p
BB 105A×12	£1.00
BB 105B×12	£1.00
BB 105G×12	£1.00
BB121a	10p
47	10p each

1A/1600V	10p
DG3P EQV—BY228	10 for £1.00
2 amp bridge rec. wire end	15p
SKE4G2/02	15p
Eqv. BYX71/600 500ns.	

3 Way regulated adaptor 240V 6V/7.5/9V/300mA	£3.50
Rank/Toshiba preh unit 0354	£9.50
4 Push button unit preh	£1.00
6 Push button VHF/UHF for v/cap. GEC—Decca type	£7.00
7 Push button for CVC5 TFT	£8.00
KT3 12 Push button unit	£2.00
KT3 (Export) 12 P.B.u.	£2.00
6 Push button Unit Thorn	£1.00
6 Push button GRC	£6.00
6 Push button PYE 731	£6.00
Hearing aid unit	£3.00
Rank Z718.4 P/B/Unit MECH	£4.00
7 Button Unit GEC with Lamps	£7.00
697 Push Button Unit	£6.00
Z916B panel	£5.00
T513AP panel	£5.00

TT14 GEC TEX-DECODER
13 IC Panel with cable form £9.50

PHILIPS
Decoder SAA IC 5020-5030
5040B-5050
K40 Text Panel £8.00

ICC5 TUBE BASE ON PALEL	£5.00
ICC5 DECODER PANEL	£15.00

DIODES

Bridge KBF408	40p
BY 126	10p
BY 127	10p
BY 133	10p
BY 134	10p
BY 176	25p
BY 179	40p
BY 184	25p
BY 187	10p
BY 190	40p
BY 196	30p
BY 198	10p
BY 204/4	8p
BY 206—BY 407 Eqv.	8p
BY 208/800	8p
BY 210/400	5p
BY 210/800	10p
BY 223	60p
BY 224/600 4.8A/600v bridge	50p
BY 226	15p
BY 227	15p
BY 228 1500v	20p
Flat BY229 black	15p
BY 229 Red	20p
BY 229/400	30p
BY 229/600 Tag	30p
BY 229/800	30p
BY 237	5p
BY 254	10p
BY 255	30p
BY 298	10p
BY 299	10p
BY 406	8p
BY 527	20p
BY 407a	10p
BY 448	10p
BY 500/200—5 amp	8p
BY 527	10p
BY 602	10p
BYV 26C	10p
F247	10p
GP20G	5p
GRP80G (TX10)	30p
NK 3102	50p
BYV 28/200	20p
Bridge TX10 800/3 amps	30p
KBPC35-02 Bridge	£1.50
Bridge Rec. D35B10	40p
BY 171/800	12p

K35 Decoder	£8.00
K35 Sound OP	£4.00
Thick Film Daughter Kt3 33122-127-43891	£3.00
12 CH. K30 Tex Rec Front Panel with I.C	£5.00

Plug in

K4 Focus Pot	£1.00

Fidelity Tube Base with transistor & focus pot £1.50

Transformer CVC 32 LOPT	£4.00
TX10 Tube Base on Panel	£3.00

PHILIPS HAND SET

K35-K4-K40, etc	£10

Universal Tripler
with small focus pot. Green type £7.00

Black Triplers

KT3 Triplers	£6.00
S.T.C. Universal Tripler	£6.00
ITT CVC 5-8-9	£3.50
Rank 725LE Tripler	£2.00
Rank 11TCP A/823	£3.50
TU 25 30K Rank	£3.00
11 TEZ Rank	£3.00
G9 Philips	£4.00
GEC 2110	£4.00
3500 Thorn	£3.00
8500 Thorn	£4.00
9000 Thorn	£7.00
9500 Thorn	£4.50
9600 Thorn	£4.00
2040 GEC	£3.50
GEC 1VM25 Tripler	£2.00
Universal Tripler	£5.00
G8 Tripler	£5.00
CVC20-32	£5.00
Decca 80/100	£4.50
Grundig TVK 52	£2.50
ITTBQ Pye 731	£3.00
ITTHY	£4.00
D22 for Pye 18" colour portable	£4.00
LP 1193/63	£4.00
BG 100/41	£3.25
ERO Tripler print type with focus P07	
BG2087	£5.00
GEC 8 touch unti assy complete with all I.C's + pots	£4.00
G11 E.W. Transformer	50p
G11 E.W. coils	£1.00
G11 Transient Suppressors 245V	20p
G11 Scan Coils	£5.00
G11 100K tuner pots	12 for £1.00
KT3 IF panel	£6.00
KT3 bnc OSc transformer	£1.00
KT3/K30 infra-red receiver head	£1.00
K30 drawer unit with IC's (home)	£10.00
K30 drawer unit with IC's (export)	£10.00
KT3 AE Sockets	50p
KT3 receiver panel	£8.00
KT3 line driver transformer	50p
Ove. K30, GEC, etc. Pre-mains stand-by switch	£1.00
Sun Ferguson Decoder	£50
SRX200 Dish and LNB	£80
CEC Line O/P Trans. & Rec Stick for Portable	£3.00
CVC 20/25/30/35/40 decoder panel	£10.00
CVC 20/25/30/35/40 decoder panel (untested)	£5.00
CVC 40/45 IF panel	£5.00
40K Transducer	50p
Philips NE511N	£1.20
LM337M Reg	30p
Focus Unit	£4.00

THORN CASSETTE HOUSING
PAS26805U £18.00

LITHIUM BATTERY
BR-2/3 Volts 20p

TUNER, SAT 2000 KHC £8

MIXED FUSES
1¼ AND 20mm and
Black Print Type
100 off £2

Voltage Regulators

+5V/UA78P05SC	30p
-8V/79M08c	30p
+6V/78M06c	30p
LM 3171	30p
LM 337	30p
LM 342-18	30p
LM 340T 5.0	50p
+12V/LM 340T12	50p
+18V MC78M18	20p
+24V 78M24	30p
MC 7724cp	40p
MC 7824	40p

Power Supply for
Sinclair Spectrum +2 £5.00

MR 508	10p
MR 501	10p
MR 502	10p
BCW 71R	30p
BYF 1202	10p
BYF 1204	10p
BYF 3126	40p
BYF 3214	40p
BYX 10	10p
BYX 38/300	25p
BYX 55/350	10p
BYX 55/600 (Bead)	10p
BYT 71/600	15p
BYV 95B	10p
BYV 95C	12p
BYV 96D	10p
BYZ 106	10p
BPW 41	15p
BYW 56 2A/1000v G11	8p
BYW 29/50	15p
BYW 95C	10p

Bush Thyristor RCA 76122	£1.00
Transformer 240v/20v-500Ma Chassis type Transformer	75p
240v/12 Volts 500ma	75p
CVC 20 tube base	£2.00
Tube Base Rank & G11	£1.20

BRIDGES

KBL 005	30p
KBL 02	30p
KBP 04	30p
W02	15p
W004	15p
W005	20p
800V Bridges 2½ Amp	30p

K30 Drawer Ass with pots cable forme £1.00

TX10 Drawer Ass £3.00

Modulator for Ferguson Sat Receiver
5.5Meg or 6Meg £1.75

Radio Telescopic Aerial £1.00

Philips Silicon Grease £1.50 each

Freeze Philips £1.50 each

Foam Cleaner Philips £1.50 each

Contact Cleaner Philips £1.50 each

100 Coax Plugs EACH 14p

De-solder pump + 2 nozzles Philips £4.00

Flat Red LED and Green 5p

500gm 60/40 Solder reel £6.00

K30 Thermistor 2322669809 75p

De-solder Pump £2.50

Portasol Flameless Gas Soldering Iron £16.00

100 Mixed 20mm Fuses £2.50

Hill Meter Leads, S/Rubber and Probes £4.00

CV 8617	10p
Y 716	10p
Y 729	30p
Y 730	10p
Y 827/6A/1KV	20p
Y 860	30p
Y 933	5p
Y 969	50p
Y 997	30p
Min 12 volt Relays	75p
R 1038	40p
R 1039	40p
R 2009	80p
R 20106	£1.00
R 2029	50p
R 2210	60p
R 2237	60p
R 2265	50p
R 2305	50p
R 2306	30p
R 2322/2323	pair 80p
R 2323	15p
R 2396	50p
R 2461	80p
R 2030	50p
R 2433=BD124	30p
R 2540	£2.00
R 2737	40p
R 2738=TIP41	30p
R 2725=TIP41c	40p
R 3129=TIP47	40p
T 6068V	50p
R 4050	£1.00
S 2006b	80p
2SD898B	£1.00
2SC1942	£1.00

Hitachi sets etc.

STR454	£2.00
STR6020	£6.00
S 2000AF line o.p.	£1.00
2SC940	£1.00
BU 105/04	80p
BU 108	£1.00
BU 124	50p
BU 126	80p
BU 180a	65p
BU 204	60p
BU 205	75p
BU 206	£1.00
BU 207	£1.00
BU 208	80p
BU 208A	75p
BU 208D	90p
BU 222	£1.00
BU 326	£1.00
BU 407	60p
BU 500D	£1.00
BU 508A	90p
BU 508AF	£1.00
BU 508D	80p
BU 705	£1.00
BU 806A	£1.00
BU 807	£1.00
BUK 454/600	£1.00
BU 824	50p
BUT 11	50p
BUT 13 600V-28A	£1.00
BUW 11	50p
BUW 84	60p
BYW 20-08-9	£1.00
BYW 95	10p
BUX 39 25A-150V	£1.00
BUX 84	50p
BUY 49	20p
TIC 106a	30p
TIC 116m	30p
TIC 116n/Y 1003	30p
TIC 126N	30p
TIC 225S	30p
TIC 226E	30p
TIC 226m	30p
TIC 236m	30p
TAG 226/600	30p
TICV 106D (T092 case 2A/400V)	10p
TIP 29	25p
TIP 30	25p
TIP 30A	25p
TIP 30B	25p
TIP 30C	25p
TIP 31	25p
TIP 32	25p
TIP 33B	50p
TIP 33C	70p
TIP 34A	50p
TIP 34B	60p
TIP 34C	70p
TIP 35A	50p
TIP 35C	70p
TIP 35D	80p
TIP 36	50p
TIP 36C	70p
TIP 41	15p
TIP 41B	40p
TIP 41D	70p
TIP 42	10p
TIP 42/BRC 6109	10p
TIP 48	40p
TIP 49	30p
TIP 57	30p
TIP 100	30p
TIP 102	30p
TIP 110	20p
TIP 115	50p
TIP 117	50p
TIP 125	35p
TIP 126	40p
TIP 127	40p
TIP 130	30p
TIP 131	6p
TIP 136	30p
TIP 140	50p
TIP 142	80p
TIP 640	50p
TIP 2955	35p
TIP 1761A-1000V/4Amp	75p
T6032	30p
T6036	40p
T6040	40p
T6047	30p
T6049	30p
T6051	40p

Philips Handset IC	£3.00
SAA3010P	£3.00
MAB8461WO63	£3.00
MAB 8420P-C031	£3.00
MAB 8400B-6	£3.00
MAB 8440P-D070	£3.00
MAB 8440P-D033	£3.00
MAB 8440P-D056	£3.00
MAB 8441P-T001	£3.00
MAB 8441P-T132	£2.00
M58484P	£2.00

FERGUSON ICs

Ferg-TX982	£3.00
TMP47C 634N 2685	£3.00
ST6391B1/B2 ICC7	£4.00

CMC 301 front panel	£5.00
CMC 303 front panel	£5.00

CMC 302 Panel with TC mains switch etc £5.00

Turntable Satelite Modulator
Sound 5.5MHz MPM 1000T
Sound 6.0MHz MPM 1040

Safe Block £5.00

FEROX
RF Filter Clamp for CoAx Cable Cost £2.50 (25p each)

Ferguson TX85	£2.00
TX86	£2.00
Switch Mod Transformer	£2.00
TX98	£2.00

ICC5 Ferguson Switch Mod Trans
3112-338-32642 £4.00

ICC5 L.O.P.T.
DST 88B243
DST 85B243 £10.00 each

ICC5 MAIN ICs
ICC5 Remote I.C
CCUFRG07 £7.00
CCUFRG09 £8.00
IC FERG TX982 £3.00
IK7 ST6391 B1 £3.00
IK2 IC TMP47C634N+2685 £3.00

Ferguson Hand Set
ICC5 Mod £8.00

KT3/K30 T/Text	£12.50
KT3/K30 Full remote	£15.00
KT3 Power supply	£4.00
GEC infra-red 2236-2026	£4.00
GEC 8 button full remote	£14.00
GEC push pad handset button blobs	10p each

Pye & Philips handset KT3-K30 chassis.
No RC5150-RC5176-RC5071-RC5177
Special Price £13.00

RC4001 KT3 and Tektex	£14.00
IT CVC 32 handset repaired	£15.00
CVC 32 Hand Set	£15.00
CVC 45 3 and 2 Pin	
TX10 Hand Set Text	£12.50
TX9 with Text	£12.50
TX9 & TX10 button print	£2.00
TX10 Focus Pots	£5.50

Mains Stand By Switch with Coil £1.00

PHILIPS
UNIVERSAL HAND SET £12.00 RC5
KT3 – K45

We have all parts for Philips Handsets

RC5353	£15.00
RC5300	£12.00
Philips RC5	£15.00

TEXT-TYPE
Replace Hand Set for
Philips KT3-K30, K4 etc £12.50

THORN HAND SETS
9000—9600—TX9—TX10—TX100
Text and Non-Text £10.00

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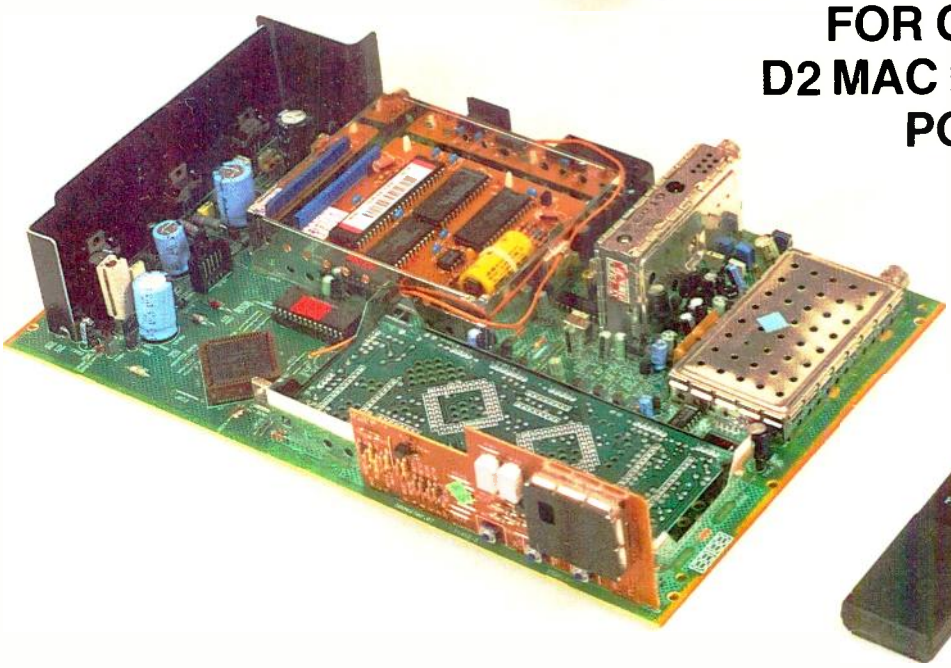

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TDA3561	£3.00
TDA3560	£4.00
TDA3561A	£3.00
TDA3566	£3.50
TDA3564	£4.00
TDA3565	£3.00
TDA3571A	£2.75
TDA3581	£3.00
TDA3590	£3.00
TDA3591	£1.00
TDA3592A	£3.00
TDA3650	£7.00
TDA3651	£3.00
TDA3651AQ	£3.50
TDA3652	£3.50
TDA3653AQ	£2.00
TDA3654	£2.00
TDA3654Q	£2.00
TDA3710	£3.50
TDA3800	£4.00
TDA3180	£2.00
TDA4260	50p
TDA4501	£3.00
TDA4505N4	£3.00
TDA4420	£2.00
TDA4439	£2
TDA4600	£3.00
TDA4601	£2.00
TDA8190	£3.00
TDA8703	£3
TDA9403	£1.50
TDA9503	£3.00
TDB2033	£1.00
TDD1610S	50p
TDG306P	£2.00
TDA1060	£3.00
TEA1009	50p
TEA1039	£2.00
TEA1060	£2.00
TEA2017	£2.00
TEA2029C	£3
TEA5114	£1.00
TDA3300B	£6.00
SIL4516	50p
SN16861NG	50p
SN16862AN	£1.00
SN16964AN	50p
SN29764AN	£1.00
UA721	40p
UA7300	40p
MPS43A	25p
MJ13005	40p
MJE51T	25p
MJE340	28p
MJE660	25p
MJE661	25p
MJE3055	£1.00
MJE2801	30p
MJE2955	50p
MJE13005	50p

Transistors

A1222	25p	BF181	20p
A1223	25p	BF182	20p
A1233	25p	BF184	20p
AC106	25p	BF194	10p
AC121	25p	BF195	10p
AC124	25p	BF196	10p
AC128	25p	BF197	12p
AC137	25p	BF198	10p
AC151	25p	BF199	10p
AC131	25p	BF200	20p
AC138	25p	BF222	10p
AC152	25p	BF224	15p
AC153K	25p	BF238	20p
AC142K	25p	BF240	16p
AC169	25p	BF244	40p
AC176	25p	BF245b	20p
AC178K	25p	BF255	20p
AC179	25p	BF256	20p
AC186	25p	BF257	20p
AC188	25p	BF258	25p
ACY21	25p	BF262	15p
AD143	50p	BF263p	25p
AD149	50p	BF264	15p
AE17A	25p	BF271	10p
AF139	25p	BF273	10p
AF181	£1.00	BF274	10p
AF239	25p	BF324	25p
AF367	25p	BF337	50p
AL102	£1.75	BF355	30p
BLY49	50p	BF362	20p
BF115	20p	BF363	15p
BF121	20p	BF367	15p
BF127	20p	BF391	15p
BF137	20p	BF394	10p
BF157	20p	BF419	30p
BF160	20p	BF422	15p
BF161	20p	BF423	15p
BF164	60p	BF448	30p
BF179	30p	BF470	30p
BF180	20p	BF471	30p
		BF597T	10p
		BF694	10p

Thorn Transformers

DT2076/78	£10.00
90D3-035-003	£10.00
90D4-106-003	£1.00
90D3-038-001	£5.00
OT204130	£3.00

I.C.s

UPD114LC-2	£1.00
MN1250BJC	£1.00
M50441-5505P	£1.00
M491BB1	£2.00
HA513385	£1.00