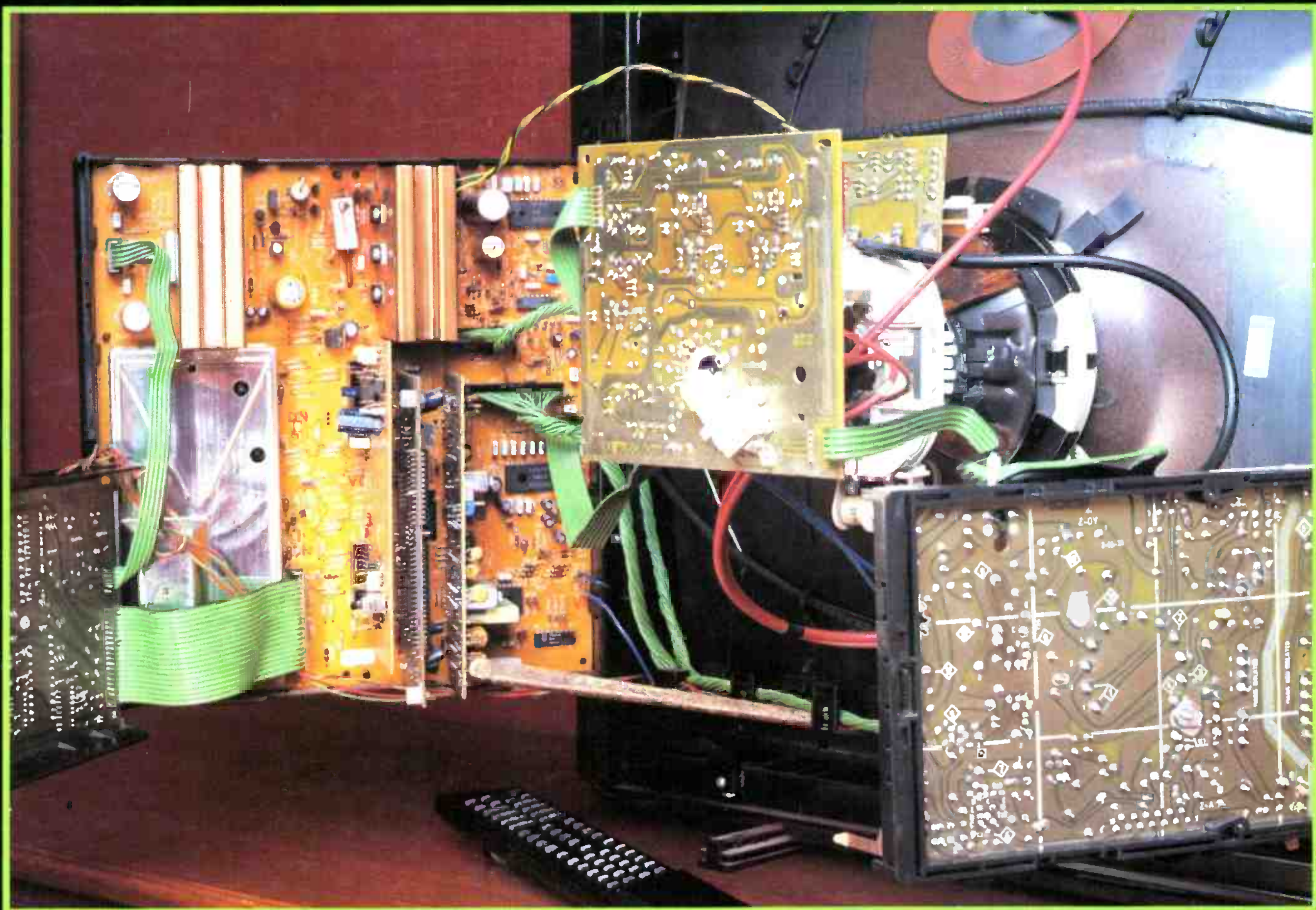
AUGUST 1992 £1·95

TELEVISION

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

FREE CATALOGUE INSIDE



Servicing the Finlux 3000 Chassis
AD Converters for DMMs • DX-TV
Servicing the Microvitec Cub
CD-I Update • Logic Probe Test
TV Fault Finding • VCR Clinic

A REED BUSINESS PUBLICATION

08
9 770032 647030

TELEVISION

August 1992

Vol. 42, No.10
Issue 502

On sale July 15th

CORRESPONDENCE
All correspondence regarding advertisements should be addressed to the Advertisement Manager, "Television", Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.Editorial correspondence should be addressed to "Television" Editorial Department, Reed Business Publishing, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

INDEXES AND BINDERS
Indexes to Vol. 39 are available at £2.00 from the Editorial office (address above) Indexes to Vols. 37 and 38 are available at £1.50 each. Photostats of the indexes to Vols. 31 – 36 can be supplied at £1.00 each. Make cheques etc. payable to Reed Business Publishing Ltd.

Binders that hold twelve issues of *Television* are available for £5 each from Television Binders, 78 Whalley Road, Wilpshire, Blackburn BB1 9LF. Make cheques payable to "Television Binders".

SUBSCRIPTIONS
An annual subscription costs £23 in the UK, £28 overseas (by surface mail – airmail quote on request). Send orders with payment to Quadrant Subscription Services Ltd., Oakfield House, Perrymount Road, Haywards Heath, Sussex, RH16 3DH.

Subscription hotline for 24-hour ordering with Credit Card number 0789 200 255.

BACK NUMBERS
Some back issues are available at £2.50 each from Television Back Issues, Room L333, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Make cheques/postal orders payable to Reed Business Publishing Ltd. Telephone Kathy Lambart on 081 652 8116 for details of issues available.

this month

OUR NEXT ISSUE DATED SEPTEMBER WILL BE PUBLISHED ON AUGUST 19th

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
BC214L	7p
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
BC461	28p
BC477	18p
BC478	18p
BC516	22p
BC537	25p
BC546	8p
BC547	8p
BC548	8p
BC549	8p
BC550	8p
BC556	8p
BC557	7p
BC558	8p
BC559	8p
BC560	8p
BC637	20p
BC638	20p
BC639	20p
BC640	20p
BCY70	16p
BCY71	16p
BCY72	15p
BD115	30p
BD124P	50p
BD131	25p
BD132	25p
BD133	50p
BD135	20p
BD136	20p
BD137	20p
BD138	20p
BD139	20p
BD140	20p
BD144	90p
BD157	38p
BD166	30p
BD175	30p
BD177	30p
BD179	32p
BD181	45p
BD182	60p
BD184	60p
BD187	30p
BD201	33p
BD202	38p
BD203	42p
BD204	42p
BD222	31p
BD225	31p
BD232	31p
BD233	30p
BD234	32p
BD235	28p
BD236	30p
BD237	21p
BD238	24p
BD239	30p
BD240	40p
BD241A	40p
BD243A	50p
BD244	50p
BD245	50p
BD246A	50p
BD265	45p
BD267	45p
BD269	45p
BD278	50p
BD311	100p
BD314	100p
BD315	150p
BD317	150p
BD331	40p
BD332	40p
BD361	60p
BD362	60p
BD370	30p
BD371	30p
BD410	50p
BD433	28p
BD434	30p
BD435	31p
BD436	30p
BD437	28p
BD438	36p
BD439	40p
BD440	40p
BD441	40p
BD533	50p
BD534	38p
BD535	38p
BD536	38p
BD537	40p
BD538	40p
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
BU205	70p
BU206	100p
BU208	70p
BU208A	60p
BU208AT	90p
BU208D	80p
BU209	140p
BU225	190p
BU226	190p
BU312	120p
BU325	55p
BU326	75p
BU406	70p
BU406D	85p
BU407	55p
BU407D	80p
BU408	75p
BU408D	85p
BU409	95p
BU426A	70p
BU500	100p
BU508A	70p
BU508AF	95p
BU508D	80p
BU508DF	115p
BU526	75p
BU536	100p
BU546	140p
BU608	150p
BU626	150p
BU636	150p
BU801	80p
BU806	75p
BU807	70p
BU902	130p
BU903	130p
BU920	130p
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	60p
TIP33C	60p
TIP34	50p
TIP34C	60p
TIP35C	65p
TIP36C	65p
TIP41A	20p
TIP41C	22p
TIP42A	20p
TIP42C	22p
TIP47	40p
TIP48	40p
TIP50	60p
TIP51	120p
TIP52	120p
TIP53	120p
TIP54	140p
TIP105	65p
TIP106	65p
TIP107	65p
TIP110	40p
TIP111	50p
TIP112	40p
TIP115	45p
TIP116	45p
TIP117	50p
TIP120	37p
TIP121	46p
TIP122	47p
TIP125	47p
TIP126	56p
TIP127	56p
TIP130	30p
TIP131	30p
TIP141	90p
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
2N930	18p
2N1131	28p
2N1132	28p
2N1613	24p
2N1711	24p
2N1893	30p
2N2102	50p
2N2218A	24p
2N2219	24p
2N2221	23p
2N2222	23p
2N2369	15p
2N2484	20p
2N2646	40p
2N2904	20p
2N2905	20p
2N2906	18p
2N2907	18p
2N2926	8p
2N3019	28p
2N3053	18p
2N3054	40p
2N3055	38p
2N3055H	50p
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	180p
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
BYX55/350	30p
BYX55/600	25p
BYX70/500	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
SKE4F2/06	60p
SKE4F2/08	80p
SKE4F2/10	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	280p
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
LA4422	130p
LA4430	130p
LA4440	230p
LA4445	200p
LA4460	130p
LA4461	130p
LA4500	200p
LA4505	220p
LA4507	360p
LA4508	260p
LA4510	160p
LA4520	230p
LA4550	200p
LA4555	190p
LA4570	150p
LA5112	120p
LA5523	150p
LA5527	150p
LA5700	300p
LA6324	200p
LA7011	220p
LA7031	250p
LA7033	400p
LA7040	280p
LA7042	280p
LA7046	300p
LA7224	150p
LA7505	250p
LA7507	250p
LA7520	200p
LA7620	500p
LA7800	180p
LA7801	100p
LA7802	300p
LA7806	260p
LA7808	250p
LA7820	150p
LA7823	280p
LA7910	150p
LA7940	200p
LC7131	260p
LC7132	400p
LC7137	450p
LF347	110p
LF351	45p
LF353	48p
LF355	60p
LF357	70p
LF398	300p
LM301	26p
LM311	35p
LM319	165p
LM324	30p
LM335Z	120p
LM339	35p
LM348	50p
LM358	45p
LM380	80p
LM381	150p
LM382	130p
LM386	60p
LM387	100p
LM393	45p
LM709DIL	30p
LM710	45p
LM723	40p
LM741DIL	18p
LM741MET	45p
LM747	55p
LM748	30p
LM1458	30p
LM1889	300p
LM3900	40p
LM3909	80p
LM3911	160p
LM3914	160p
LM3915	160p
LM3916	270p
M50115P	320p
M50117P	500p
M50119P	525p
M50784	300p
M50786	500p
M50790	600p
M51161	300p
M51381P	200p
M51387P	900p
M51544	150p
M51848	150p
M54523P	200p
M54563P	200p
M58484	500p
M58655P	400p
M51516	260p
M51518	200p
MB3614	180p
MB3712	140p
MB3713	130p
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
MC3403	60p
NE555	20p
NE556	40p
NE565	110p
NE566	130p
NE567	115p
NE571	290p
NE592	65p
NE5532P	140p
SAS560	110p
SAA1006	300p
SAA1008	450p
SAA1010	400p
SAA1024	250p
SAA1025	250p
SAA1961	400p
SAA1075	350p
SAA1124	200p
SAA1220	400p
SAA1250	280p
SAA1251	380p
SAA1272	280p
SAA1274	280p
SAA3004	400p
SAA5000	200p
SAA5010	220p
SAA5012	400p
SAA5020	350p
SAA5030	440p
SAA5040A	280p
SAA5040B	400p
SAA5050	650p
SAB3013	200p
SAB3035	600p
STA301A	200p
STA401A	220p
STA403A	270p
STA404	290p
STA405A	280p
STA431A	250p
STA432A	220p
STA434A	270p
STA435A	270p
STA441C	220p
STA456C	240p
STA471	210p
STA901M	280p
STA8012	260p
STK0025	420p
STK0029	360p
STK0039	380p
STK0040	520p
STK0049	510p
STK0050	440p
STK0059	620p
STK0060	820p
STK0070	1100p
STK0080	580p
STK011	370p
STK015	490p
STK016	800p
STK025	700p
STK043	900p
STK050	2200p
STK056	820p
STK077	600p
STK078	620p
STK080	600p
STK082	580p
STK084	660p
STK085	1050p
STK086	870p
STK420	400p
STK430	500p
STK433	490p
STK435	400p
STK436	490p
STK437	500p
STK439	550p
STK441	680p
STK443	740p
STK457	500p
STK459	560p
STK460	720p
STK461	620p
STK463	780p
STK465	720p
STK501	580p
STK561	550p
STK563	480p
STK583	600p
STK734B	510p
STK745	600p
STK760	600p
STK770	750p
STK772B	480p
STK780	650p
STK1039	500p
STK1040	700p
STK1049	800p
STK1050	750p
STK1060	760p
STK1070	940p
STK1080	990p
STK2025	700p
STK2028	560p
STK2029	480p
STK2038	900p
STK2048	950p
STK2110	680p
STK2120	820p
STK2125	650p
STK2129	610p
STK2139	800p
STK2155	950p
STK2230	470p
STK2240	820p
STK2250	760p
STK3041	460p
STK3042	425p
STK3044	525p
STK3062	600p
STK3082	700p
STK3083	550p
STK3102II	600p
STK3152II	990p
STK3156	560p
STK4017	450p
STK4019	600p
STK4021	425p
STK4025	600p
STK4026	800p
STK4028	620p
STK4032II	650p
STK4036	500p
STK4038	680p
STK4042II	900p
STK4044	1000p
STK4046	1100p
STK4048	1280p
STK4060	580p
STK4101	650p
STK4111	650p
STK4112	950p
STK4121	600p
STK4122	560p
STK4131	650p
STK4132II	750p
STK4141II	420p
STK4142	800p
STK4151	680p
STK4152	750p
STK4161	700p
STK4162	650p
STK4171	850p
STK4172II	800p
STK4181	820p
STK4182II	800p
STK4191	850p
STK4192	800p
STK4231II	990p
STK4272	720p
STK4273	650p
STK4301	700p
STK4311	800p
STK4332	410p
STK4352	640p
STK4362	600p
STK4372	570p
STK4392	690p
STK4432	900p
STK4773	900p
STK4793	1100p
STK4803	720p
STK4813	950p
STK4833	810p
STK4843	720p
STK4853	900p
STK4863	850p
STK4873	990p
STK4893	1400p
STK4913	1180p
STK5314	550p
STK5315	600p
STK5322	620p
STK5324	520p
STK5325	450p
STK5331	400p
STK5332	220p
STK5333	275p
STK5335	450p
STK5337	600p
STK5338	350p
STK5339	500p
STK5342	300p
STK5361	420p
STK5372	300p
STK5412	400p
STK5421	525p
STK5422	500p
STK5431	650p
STK5434	650p
STK5436	600p
STK5441	500p
STK5451	480p
STK5457	425p
STK5461	700p
STK5462	675p
STK5466	675p
STK5467	500p
STK5471	400p
STK5473	600p
STK5476	500p
STK5478	500p
STK5479	350p
STK5481	420p
STK5482	300p
STK5483	550p
STK5488	600p
STK5490	500p
STK5725	600p
STK5730	600p
STK6431	850p
STK6722	900p
STK6732	1500p
STK6822	1200p
STK6922	600p
STK6932	600p
STK6962	320p
STK6972	630p
STK6981B	850p
STK6982	800p
STK7216	500p
STK7217	550p
STK7226	800p
STK7308	410p
STK7309	450p
STK7310	550p
STK7348	410p
STK7356	500p
STK7358	500p
STK7402	660p
STK7404	400p
STK7406	800p
STK7408	880p
STK7410	1200p
STK7554	1000p
STK7561	700p
STK7563	950p
STK8050	880p
STK8250	550p
STK8260	1500p
STK8280	1850p
STK73410	550p
STR370	400p
STR371	450p
STR380	400p
STR381	450p
STR383	475p
STR384	400p
STR440	475p
STR441	440p
STR450	520p
STR541	350p
STR452	600p
STR453	600p
STR454	450p
STR455	500p
STR456	600p
STR457	600p
STR470	600p
STR1096	380p
STR1195	450p
STR1229	450p
STR2005	500p
STR2012	500p
STR2013	400p
STR2024	850p
STR2105	600p
STR3113	300p
STR3115	500p
STR3123	490p
STR3125	580p
STR3135	300p
STR3212	330p
STR3214	330p
STR3215	330p
STR3315	330p
STR4142	550p
STR4211	370p
STR4512	450p
STR5015	600p
STR5100	650p
STR5214	550p
STR5315	700p
STR5412	400p
STR6020	400p
STR9005	600p
STR9012	550p
STR10006	550p
STR11006	550p
STR12006	600p
STR13006	650p
STR15006	650p
STR16006	650p
STR20005	550p
STR20012	600p
STR20015	600p
STR30113	400p
STR30115	350p
STR30123	600p
STR30130	400p
STR30134	320p
STR40090	450p
STR41090	500p
STR44111	650p
STR44115	650p
STR45111	700p
STR50020	550p
STR50092	650p
STR50100	650p
STR50103A	300p
STR50113	650p
STR50115	650p
STR51041	650p
STR52041	650p
STR50213	650p
STR53041	650p
STR53043	650p
STR54041	400p
STR55041	650p
STR58041	400p
STR59041	600p
STR60001	650p
STR61001	750p
STR80145	700p
STRD1806	475p
STRD1816	475p
T2800D	52p
TA7054	190p
TA7061	115p
TA7063	70p
TA7066	120p
TA7089	300p
TA7119	150p
TA7120	55p
TA7130	80p
TA7137	83p
TA7140	130p
TA7157	140p
TA7176	200p
TA7193	320p
TA7200	200p
TA7205	80p
TA7207	150p
TA7208	145p
TA7214	260p
TA7217	145p
TA7220	220p
TA7222	120p
TA7223	210p
TA7225	300p
TA7226	290p
TA7227	190p
TA7229	300p
TA7230	120p
TA7232	120p
TA7233	150p
TA7237	400p
TA7238	400p
TA7240	180p
TA7241	190p
TA7242	250p
TA7243	320p
TA7245	350p
TA7267	290p
TA7269	600p
TA7270	200p
TA7271	250p
TA7272	260p
TA7273	350p
TA7274	260p
TA7280	250p
TA7281	220p
TA7282	200p
TA7283	200p
TA7288	220p
TA7299	300p
TA7310	100p
TA7312	120p
TA7313	110p
TA7314	210p
TA7315	200p
TA7317P	240p
TA7324	200p
TA7325	90p
TA7328	150p
TA7335	110p
TA7336	250p
TA7341	250p
TA7343	120p
TA7357	400p
TA7358	120p
TA7401	300p
TA7607	200p
TA7608	360p
TA7609	210p
TA7611	280p
TA7612	360p
TA7614	200p
TA7616	400p
TA7621	520p
TA7622	420p
TA7628	150p
TA7629	220p
TA7630	200p
TA7632	400p
TA7640	150p
TA7641	170p
TA7658	130p
TA7668	160p
TA7680	300p
TA7688	250p
TA7698	500p
TA7699	800p
TA7705	300p
TA7750	200p
TA7757	250p
TA7769	200p
TA7784	250p
TA8205	400p
TA8210	400p
TA8215	400p
TAA550	25p
TBA120S	40p
TBA396	70p
TBA520	120p
TBA530	120p
TBA540	100p
TBA560	120p
TBA800	40p
TBA810AS	60p
TBA820	65p
TBA820M	40p
TBA920	120p
TBA950	100p
TBA990	60p
TC5020	200p
TC5081AP	180p
TC9106	500p
TC9109	450p
TC9122P	430p
TC9125BP	410p
TC9132	400p
TC9134	750p
TC9142	320p
TC9143	300p
TC9145	150p
TC9148	200p
TC9149	225p
TC9150	425p
TC9152	425p
TC9153	300p
TC9156	300p
TC9163	375p
TC9164	400p
TC9172P	300p
TC9176P	500p
TCA740	130p
TCA940	100p
TCEP100	100p
TD62308AP	200p
TD62382	200p
TD62506	200p
TD62705	250p
TD6304AP	300p
TD6306P	350p
TD6350P	200p
TD6359P	300p
TDA1001	200p
TDA1002	200p
TDA1003	150p
TDA1005A	220p
TDA1010A	100p
TDA1011	120p
TDA1012	120p
TDA1013A	120p
TDA1015	100p
TDA1016	200p
TDA1020	150p
TDA1022	350p
TDA1023	200p
TDA1024	200p
TDA1025	320p
TDA1028	220p
TDA1029	250p
TDA1035	120p
TDA1037	190p
TDA1044	250p
TDA1048	225p
TDA1053	400p
TDA1054	200p
TDA1060	190p
TDA1062	200p
TDA1072	300p
TDA1074	420p
TDA1082	290p
TDA1083	200p
TDA1085	400p
TDA1097	550p
TDA1151	60p
TDA1154	50p
TDA1170	85p
TDA1180	140p
TDA1190	90p
TDA1200B	80p
TDA1220	150p
TDA1235	350p
TDA1236	295p
TDA1270	150p
TDA1327	250p
TDA1410	219p
TDA1412	100p
TDA1510	380p
TDA1512	200p
TDA1514A	450p
TDA1515A	200p
TDA1516Q	350p
TDA1518	300p
TDA1520	350p
TDA1521	300p
TDA1522	200p
TDA1524	350p
TDA1540	420p
TDA1541	1600p
TDA1596	260p
TDA1670A	300p
TDA1675	250p
TDA1701	320p
TDA1770A	300p
TDA1870A	300p
TDA1872A	450p
TDA1904	120p
TDA1905	150p
TDA1908A	90p
TDA1940	280p
TDA1941	300p
TDA1950	280p
TDA2002	70p
TDA2003	80p
TDA2004	90p
TDA2005	90p
TDA2006	70p
TDA2007	180p
TDA2008	175p
TDA2009	160p
TDA2020	140p
TDA2030	80p
TDA2040	200p
TDA2048	750p
TDA2054M	120p
TDA2151	300p
TDA2170	300p
TDA2270	340p
TDA2320	80p
TDA2510	450p
TDA2532	120p
TDA2540	100p
TDA2541	120p
TDA2542	150p
TDA2543	300p
TDA2545	200p
TDA2556	350p
TDA2575A	100p
TDA2577A	160p
TDA2578A	200p
TDA2579	250p
TDA2582	200p
TDA2590	170p
TDA2593	150p
TDA2594	300p
TDA2595	300p
TDA2600	350p
TDA2611A	100p
TDA2630	300p
TDA2640	220p
TDA2653A	250p
TDA2654	250p
TDA2670	150p
TDA2690	100p
TDA2730	250p
TDA2760	400p
TDA2780	600p
TDA2791	270p
TDA2795	250p
TDA2822M	60p
TDA3047	200p
TDA3048	150p
TDA3082	300p
TDA3083	250p
TDA3190	100p
TDA3300B	480p
TDA3301B	380p
TDA3310	120p
TDA3330	500p
TDA3410	170p
TDA3420	250p
TDA3501	400p
TDA3502	600p
TDA3505	300p
TDA3506	300p
TDA3507	500p
TDA3540	300p
TDA3541	200p
TDA3560	260p
TDA3561	200p
TDA3561A	220p
TDA3562	260p
TDA3563	350p
TDA3565	300p
TDA3566	330p
TDA3580	500p
TDA3586	750p
TDA3590	320p
TDA3591	450p
LINEAR IC's – Cont.	
TDA3592A	350p
TDA3640	350p
TDA3651	200p
TDA3652	500p
TDA3653	150p
TDA3654	150p
TDA3710	320p
TDA3730	550p
TDA3740	600p
TDA3750	400p
TDA3760	470p
TDA3771	460p
TDA3791	400p
TDA3800	350p
TDA3803A	500p
TDA3810	300p
TDA3950	300p
TDA4050	250p
TDA4180	400p
TDA4190	250p
TDA4200	380p
TDA4280	400p
TDA4282	400p
TDA4290	250p
TDA4400	350p
TDA4420	180p
TDA4421	400p
TDA4426	250p
TDA4427	500p
TDA4431	200p
TDA4437	450p
TDA4439	300p
TDA4440	250p
TDA4442	320p
TDA4445	250p
TDA4480	280p
TDA4500	360p
TDA4501	450p
TDA4502	900p
TDA4503	300p
TDA4505	300p
TDA4510	300p
TDA4555	600p
TDA4556	650p
TDA4560	450p
TDA4600	160p
TDA4600-2	200p
TDA4601	160p
TDA4605	300p
TDA4610	400p
TDA4660	480p
TDA4950	180p
TDA5330T	380p
TDA5600	450p
TDA5660P	260p
TDA5700	200p
TDA5708	560p
TDA5709	560p
TDA5800	600p
TDA5820	480p
TDA5850	225p
TDA7000	200p
TDA7010T	120p
TDA7050	200p
TDA7052	150p
TDA7211	150p
TDA7220	150p
TDA7240	300p
TDA7241	250p
TDA7250	600p
TDA7255	600p
TDA7273	100p
TDA7274	100p
TDA7275	75p
TDA7284	100p
TDA8115	300p
TDA8140	300p
TDA8145	150p
TDA8153	370p
TDA8160	150p
TDA8170	300p
TDA8173	325p
TDA8190	280p
TDA8191	425p
TDA8196	150p
TDA8440	380p
TDA8442	280p
TDA8443	400p
TDA8451	600p
TDA8452	280p
TDA9403	250p
TDA9503	200p
TDA9513	350p
TEA1002	850p
TL061	40p
TL064	80p
TL071	38p
TL072	55p
TL074	80p
TL081	40p
TL082	46p
TL083	55p
TL084	70p
ULN2002	70p
ULN2003	69p
ULN2068	270p
ULN2804	170p
UPC20C	220p
UPC554	130p
UPC555	60p
UPC556H	80p
UPC571	220p
UPC574	60p
UPC575C2	90p
UPC576	200p
UPC577	64p
UPC580	300p
UPC592	95p
UPC595	190p
UPC596	190p
UPC1001	120p
UPC1018	170p
UPC1020	200p
UPC1023	60p
UPC1025	230p
UPC1026	95p
UPC1028	90p
UPC1031H	150p
UPC1032	80p
UPC1158H	70p
UPC1177H	250p
UPC1180C	200p
UPC1183	200p
UPC1186	80p
UPC1187	150p
UPC1188H	350p
UPC1197	140p
UPC1198H	200p
UPC1222	130p
UPC1225H	220p
UPC1230	210p
UPC1238	120p
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

LINEAR ICs — Cont.

UPC1363	190p
UPC1363C	300p
UPC1364C	350p
UPC1365	250p
UPC1367	500p
UPC1370C	300p
UPC1373	85p
UPC1377C	200p
UPC1378	180p
UPC1382	110p
UPC1384	425p
UPC1387C	250p
UPC1394	170p
UPC1397	350p
UPC-1403CA	650p
UPC 1420CA	450p
UPC-1421CA	650p
UPC-1423CA	550p
UPC1470	200p
UPC1504C	400p
UPC1505C	400p
UPC-1514CA	200p
UPC-1515CA	250p
UPC1520CA	250p
UPC1536C	550p
ZN423	100p
ZN424	100p
ZN425	320p
ZN426	260p
ZN427	560p
ZN429	215p
ZN435	340p
ZN448	510p
ZN459	190p
ZN1040	640p
ZNA134H	2150p
ZNA234E	1250p

JAPANESE TRANSISTORS

2SA473	35p
2SA490	60p
2SA505	120p
2SA509	120p
2SA550	150p
2SA562	50p
2SA603	100p
2SA606	300p
2SA608	15p
2SA634	50p
2SA636	50p
2SA640	60p
2SA673	20p
2SA684	60p
2SA699	100p
2SA708	300p
2SA715	60p
2SA720	20p
2SA725	80p
2SA726	25p
2SA733	30p
2SA747A	600p
2SA748	90p
2SA769	130p
2SA770	200p
2SA771	130p
2SA781	150p
2SA798	55p
2SA814	170p
2SA844	30p
2SA872	40p
2SA872A	50p
2SA886	90p
2SA899	60p
2SA907	650p
2SA909	500p
2SA913	120p
2SA916	30p
2SA921	50p
2SA933	40p
2SA934	40p
2SA935	40p
2SA937	40p
2SA939	140p
2SA940	50p
2SA950	25p
2SA952	50p
2SA953	60p
2SA954	75p
2SA958	70p
2SA965	60p
2SA966	70p
2SA968	70p
2SA970	50p
2SA979	85p
2SA984	50p
2SA992	30p
2SA1006	120p
2SA1008	125p
2SA1009	200p
2SA1010	225p
2SA1011	140p
2SA1012	100p
2SA1013	100p
2SA1015	20p
2SA1016	40p
2SA1018	100p
2SA1020	50p
2SA1021	80p
2SA1023	60p
2SA1026	90p
2SA1029	60p
2SA1036	60p
2SA1037	50p
2SA1038	40p
2SA1048	30p
2SA1051	300p
2SA1052	40p
2SA1060	150p
2SA1069	150p
2SA1076	280p
2SA1077	300p
2SA1081	80p
2SA1082	80p
2SA1084	100p
2SA1085	75p
2SA1091	100p
2SA1093	300p
2SA1094	190p
2SA1095	300p
2SA1096	80p
2SA1102	180p
2SA1103	200p
2SA1104	200p
2SA1105	250p
2SA1106	160p
2SA1111	120p
2SA1112	150p
2SA1115	40p
2SA1123	70p
2SA1124	80p
2SA1127	50p
2SA1133	200p
2SA1141	350p
2SA1142	150p
2SA1143	40p
2SA1145	50p
2SA1152	150p
2SA1156	150p
2SA1162	30p
2SA1169	500p
2SA1170	500p
2SA1175	40p
2SA1184	120p
2SA1186	500p
2SA1198	70p
2SA1206	100p
2SA1208	70p
2SA1209	100p
2SA1210	120p
2SA1215	600p
2SA1216	550p
2SA1217	100p
2SA1220	120p
2SA1227A	300p
2SA1232	250p
2SA1242	80p
2SA1244	120p
2SA1246	80p
2SA1249	100p
2SA1261	150p
2SA1262	160p
2SA1263	280p
2SA1264	280p
2SA1265	280p
2SA1283	60p
2SA1284	60p
2SA1285	60p
2SA1286	60p
2SA1290	150p
2SA1294	450p
2SA1295	500p
2SA1301	350p
2SA1302	300p
2SA1303	400p
2SA1304	110p
2SA1306	110p
2SA1307	160p
2SA1309	50p
2SA1315	100p
2SA1316	80p
2SA1317	30p
2SA1318	30p
2SA1321	80p
2SA1329	200p
2SA1346	30p
2SA1352	100p
2SA1353	100p
2SA1356	100p
2SA1358	130p
2SA1362	100p
2SA1370	100p
2SA1371	100p
2SA1380	100p
2SA1381	100p
2SA1382	120p
2SA1385	180p
2SA1386	400p
2SA1423	30p
2SA1442	200p
2SA1443	250p
2SA1489	300p
2SA1491	300p
2SA1493	500p
2SA1516	380p
2SA1535	175p
2SA1538	80p
2SA483	175p
2SA495	100p
2SA496	100p
2SA537	170p
2SA544	650p
2SA571	650p
2SA614	150p
2SA639	150p
2SA642	50p
2SA677	80p
2SA678	60p
2SA683	70p
2SA706	250p
2SA711	280p
2SA719	50p
2SA764	200p
2SA777	80p
2SA778	100p
2SA786	100p
2SA794	120p
2SA816	150p
2SA817	50p
2SA836	60p
2SA837	270p
2SA839	150p
2SA900	100p
2SA942	60p
2SA949	80p
2SA957	250p
2SA963	120p
2SA985	150p
2SA988	150p
2SA993	50p
2SA999	50p
2SB324	55p
2SB370	45p
2SB546	70p
2SB560	35p
2SB561	50p
2SB562	35p
2SB566	110p
2SB595	80p
2SB596	75p
2SB598	60p
2SB600	500p
2SB646A	90p
2SB647	30p
2SB648	55p
2SB649	40p
2SB688	120p
2SB703	125p
2SB705	200p
2SB707	200p
2SB716	30p
2SB718	70p
2SB727	200p
2SB754	80p
2SB755	310p
2SB772	45p
2SB774	50p
2SB775	160p
2SB791	280p
2SB795	60p
2SB825	135p
2SB861	160p
2SB882	180p
2SB886	225p
2SB950	180p
2SB951	190p
2SB1009	110p
2SB1077	180p
2SB1109	100p
2SC182	75p
2SC369	80p
2SC372	80p
2SC380	20p
2SC382	120p
2SC388A	60p
2SC394	60p
2SC403	80p
2SC454	45p
2SC458	15p
2SC460	10p
2SC461	30p
2SC491	200p
2SC495	60p
2SC496	80p
2SC497	150p
2SC515A	100p
2SC535	50p
2SC536	20p
2SC558	275p
2SC563	120p
2SC603	40p
2SC605	100p
2SC619	100p
2SC641	80p
2SC643	500p
2SC644	25p
2SC647	300p
2SC681	340p
2SC683	120p
2SC708	100p
2SC710	20p
2SC711	40p
2SC717	50p
2SC730	450p
2SC732	40p
2SC733	25p
2SC735	40p
2SC738	40p
2SC739	150p
2SC761	150p
2SC762	150p
2SC783	105p
2SC790	80p
2SC792	380p
2SC805	225p
2SC805A	250p
2SC828	25p
2SC829	20p
2SC839	25p
2SC869	120p
2SC870	100p
2SC898	275p
2SC900B	300p
2SC930	20p
2SC941	25p
2SC943	160p
2SC944	140p
2SC945	20p
2SC950	40p
2SC959	225p
2SC980	120p
2SC982	60p
2SC983	120p
2SC998	600p
2SC1000	60p
2SC1001	950p
2SC1008	50p
2SC1010	225p
2SC1012	75p
2SC1013	170p
2SC1014	140p
2SC1030	190p
2SC1047	60p
2SC1050	280p
2SC1060	90p
2SC1061	85p
2SC1070	65p
2SC1079	250p
2SC1096	60p
2SC1098	120p
2SC1103A	130p
2SC1106	180p
2SC1114	415p
2SC1115	280p
2SC1116	290p
2SC1124	270p
2SC1128	120p
2SC1150	400p
2SC1160	150p
2SC1161	110p
2SC1162	35p
2SC1164	600p
2SC1165	750p
2SC1166	100p
2SC1167	120p
2SC1170	300p
2SC1172	150p
2SC1173	45p
2SC1195	210p
2SC1212	120p
2SC1213	50p
2SC1214	40p
2SC1215	60p
2SC1216	200p
2SC1222	50p
2SC1226	75p
2SC1252	850p
2SC1275	700p
2SC1278	110p
2SC1279	30p
2SC1306	90p
2SC1308K	350p
2SC1312	40p
2SC1317	25p
2SC1318	25p
2SC1325	400p
2SC1327	20p
2SC1328	40p
2SC1342	90p
2SC1343	225p
2SC1345	60p
2SC1346	100p
2SC1358	350p
2SC1359	60p
2SC1360	70p
2SC1364	50p
2SC1383	35p
2SC1384	35p
2SC1390	55p
2SC1393	80p
2SC1394	70p
2SC1398	70p
2SC1400	50p
2SC1403	500p
2SC1407	550p
2SC1413	240p
2SC1419	150p
2SC1424	450p
2SC1426	700p
2SC1429	100p
2SC1444	275p
2SC1446	100p
2SC1447	130p
2SC1448	100p
2SC1449	120p
2SC1450	200p
2SC1454	320p
2SC1470	120p
2SC1471A	400p
2SC1472	40p
2SC1473	70p
2SC1474	125p
2SC1475	60p
2SC1505	80p
2SC1506	75p
2SC1507	140p
2SC1509	45p
2SC1514	65p
2SC1515	60p
2SC1520	120p
2SC1541	110p
2SC1545	120p
2SC1567	140p
2SC1568	75p
2SC1569	140p
2SC1570	40p
2SC1571	50p
2SC1573	50p
2SC1576	450p
2SC1580	600p
2SC1583	30p
2SC1585	270p
2SC1586	540p
2SC1617	340p
2SC1623	50p
2SC1624	140p
2SC1625	150p
2SC1626	75p
2SC1627	60p
2SC1628	75p
2SC1634	50p
2SC1664	300p
2SC1669	100p
2SC1674	50p
2SC1675	200p
2SC1678	120p
2SC1683	100p
2SC1684	45p
2SC1685	60p
2SC1729	900p
2SC1730	40p
2SC1735	70p
2SC1740	40p
2SC1741	45p
2SC1752	70p
2SC1755	90p
2SC1756	40p
2SC1758	30p
2SC1765	1000p
2SC1775	20p
2SC1781	65p
2SC1789	100p
2SC1809	40p
2SC1810	250p
2SC1815	15p
2SC1819	140p
2SC1826	60p
2SC1827	120p
2SC1829	500p
2SC1832	400p
2SC1833	40p
2SC1834	50p
2SC1844	50p
2SC1845	20p
2SC1846	100p
2SC1847	120p
2SC1855	85p
2SC1856	50p
2SC1861	400p
2SC1865	700p
2SC1870	700p
2SC1871	600p
2SC1875	260p
2SC1881	210p
2SC1890	45p
2SC1904	125p
2SC1906	30p
2SC1907	75p
2SC1909	250p
2SC1913	190p
2SC1921	60p
2SC1923	25p
2SC1929	180p
2SC1938	150p
2SC1940	110p
2SC1941	40p
2SC1942	190p
2SC1944	350p
2SC1945	350p
2SC1946	1500p
2SC1947	450p
2SC1955	900p
2SC1957	70p
2SC1959	20p
2SC1962	200p
2SC1966	1150p
2SC1967	1300p
2SC1969	160p
2SC1970	200p
2SC1971	400p
2SC1972	600p
2SC1973	150p
2SC1983	130p
2SC1984	150p
2SC1985	120p
2SC1986	160p
2SC2001	60p
2SC2002	40p
2SC2003	25p
2SC2004	60p
2SC2021	40p
2SC2022	200p
2SC2023	180p
2SC2026	60p
2SC2027	250p
2SC2028	75p
2SC2029	120p
2SC2037	100p
2SC2053	120p
2SC2055	150p
2SC2056	450p
2SC2058	40p
2SC2060	60p
2SC2061	75p
2SC2068	90p
2SC2071	140p
2SC2073	70p
2SC2075	80p
2SC2078	95p
2SC2081	950p
2SC2085	100p
2SC2086	60p
2SC2091	80p
2SC2092	100p
2SC2094	1200p
2SC2097	2300p
2SC2098	600p
2SC2099	2500p
2SC2102	1900p
2SC2118	1100p
2SC2120	50p
2SC2131	550p
2SC2139	350p
2SC2141	150p
2SC2149	500p
2SC2150	400p
2SC2153	70p
2SC2166	80p
2SC2168	175p
2SC2181	2100p
2SC2188	70p
2SC2199	600p
2SC2200	250p
2SC2221	650p
2SC2222	1350p
2SC2228A	60p
2SC2229	25p
2SC2230	80p
2SC2233	100p
2SC2235	60p
2SC2236	30p
2SC2237	600p
2SC2238	70p
2SC2240	25p
2SC2245	1050p
2SC2258	120p
2SC2259	80p
2SC2270	75p
2SC2271	60p
2SC2274	40p
2SC2275	50p
2SC2278	120p
2SC2283	800p
2SC2284	1200p
2SC2287	900p
2SC2290	1800p
2SC2291	125p
2SC2295	60p
2SC2298	120p
2SC2307	500p
2SC2308	40p
2SC2310	50p
2SC2312	300p
2SC2314	70p
2SC2316	150p
2SC2320	40p
2SC2324	120p
2SC2329	480p
2SC2331	150p
2SC2333	200p
2SC2334	240p
2SC2335	120p
2SC2344	150p
2SC2347	60p
2SC2353	120p
2SC2360	120p
2SC2361	150p
2SC2362	50p
2SC2365	500p
2SC2366	6000p
2SC2369	100p
2SC2371	45p
2SC2373	210p
2SC2383	50p
2SC2389	45p
2SC2407	110p
2SC2408	120p
2SC2412K	50p
2SC2413	50p
2SC2429	900p
2SC2431	900p
2SC2437	1000p
2SC2440	350p
2SC2458	40p
2SC2459	50p
2SC2461	400p
2SC2462	50p
2SC2470	65p
2SC2481	120p
2SC2482	40p
2SC2483	120p
2SC2484	240p
2SC2485	200p
2SC2491	200p
2SC2495	1900p
2SC2498	50p
2SC2500	80p
2SC2502	200p
2SC2509	800p
2SC2516	125p
2SC2519	60p
2SC2523	500p
2SC2527	300p
2SC2534	150p
2SC2535	300p
2SC2538	100p
2SC2539	1000p
2SC2540	1900p
2SC2542	300p
2SC2545	65p
2SC2546	75p
2SC2547	65p
2SC2550	70p
2SC2551	70p
2SC2552	150p
2SC2553	200p
2SC2555	150p
2SC2562	90p
2SC2563	200p
2SC2564	230p
2SC2565	260p
2SC2568	120p
2SC2570	60p
2SC2571	350p
2SC2577	125p
2SC2578	220p
2SC2579	130p
2SC2580	240p
2SC2581	290p
2SC2588	600p
2SC2590	75p
2SC2591	140p
2SC2592	200p
2SC2603	40p
2SC2608	800p
2SC2610	85p
2SC2611	40p
2SC2613	250p
2SC2615	400p
2SC2621	90p
2SC2625	380p
2SC2626	600p
2SC2630	1900p
2SC2631	65p
2SC2634	45p
2SC2635	450p
2SC2636	50p
2SC2637	120p
2SC2640	1800p
2SC2653	100p
2SC2654	180p
2SC2655	75p
2SC2656	550p
2SC2660	150p
2SC2665	200p
2SC2668	50p
2SC2671	120p
2SC2681	270p
2SC2682	120p
2SC2688	70p
2SC2690	120p
2SC2694	3200p
2SC2695	2600p
2SC2705	70p
2SC2710	50p
2SC2712	50p
2SC2719	80p
2SC2721	120p
2SC2738	200p
2SC2740	450p
2SC2749	350p
2SC2750	300p
2SC2751	400p
2SC2752	140p
2SC2753	100p
2SC2767	300p
2SC2769	400p
2SC2773	700p
2SC2774	600p
2SC2785	60p
2SC2786	50p
2SC2787	50p
2SC2791	650p
2SC2792	550p
2SC2793	700p
2SC2808	40p
2SC2810	360p
2SC2812	40p
2SC2814	40p
2SC2824	75p
2SC2825	900p
2SC2826	200p
2SC2827	200p
2SC2832	300p
2SC2834	400p
2SC2837	360p
2SC2839	40p
2SC2853	70p
2SC2876	120p
2SC2877	120p
2SC2878	40p
2SC2879	3200p
2SC2883	60p
2SC2898	350p
2SC2899	120p
2SC2901	60p
2SC2909	60p
2SC2911	120p
2SC2912	120p
2SC2915	8200p
2SC2921	650p
2SC2922	610p
2SC2928	550p
2SC2929	280p
2SC2934	75p
2SC2937	250p
2SC2938	400p
2SC2939	400p
2SC2944	620p
2SC2958	75p
2SC2960	60p
2SC2962	800p
2SC2979	250p
2SC2987	325p
2SC2988	250p
2SC2995	60p
2SC2999	50p
2SC3001	1400p
2SC3012	300p
2SC3019	320p
2SC3021	1250p
2SC3025	500p
2SC3026	550p
2SC3030	750p
2SC3037	125p
2SC3038	125p
2SC3039	140p
2SC3040	260p
2SC3042	300p
2SC3057	150p
2SC3058	2500p
2SC3059	900p
2SC3060	1100p
2SC3061	1600p
2SC3068	60p
2SC3070	120p
2SC3074	200p
2SC3075	150p
2SC3076	120p
2SC3086	150p
2SC3089	250p
2SC3098	200p
2SC3099	100p
2SC3101	750p
2SC3102	2800p
2SC3104	1650p
2SC3105	3600p
2SC3112	35p
2SC3114	40p
2SC3116	75p
2SC3117	120p
2SC3122	50p
2SC3130	100p
2SC3133	600p
2SC3138	410p
2SC3149	180p
2SC3150	200p
2SC3151	230p
2SC3152	200p
2SC3153	250p
2SC3156	400p
2SC3157	200p
2SC3158	260p
2SC3159	200p
2SC3164	350p
2SC3169	200p
2SC3170	300p
2SC3173	180p
2SC3175	200p
2SC3178	340p
2SC3179	160p
2SC3181	240p
2SC3182	250p
2SC3199	50p
2SC3209	120p
2SC3210	550p
2SC3211	300p
2SC3212	350p
2SC3225	100p
2SC3244	80p
2SC3246	70p
2SC3257	275p
2SC3259	350p
2SC3260	320p
2SC3261	400p
2SC3262	400p
2SC3263	350p
2SC3264	510p
2SC3266	50p
2SC3268	110p
2SC3269	50p
2SC3270	50p
2SC3277	280p
2SC3280	250p
2SC3281	250p
2SC3284	600p
2SC3286	250p
2SC3296	125p
2SC3298	120p
2SC3299	120p
2SC3300	140p
2SC3303	120p
2SC3306	150p
2SC3307	600p
2SC3309	150p
2SC3316	280p
2SC3317	350p
2SC3318	400p
2SC3320	480p
2SC3327	60p
2SC3331	40p
2SC3333	120p
2SC3336	850p
2SC3345	170p
2SC3346	200p
2SC3352	200p
2SC3353	400p
2SC3355	70p
2SC3356	120p
2SC3358	80p
2SC3361	50p
2SC3376	300p
2SC3377	50p
2SC3378	120p
2SC3383	80p
2SC3387	550p
2SC3393	80p
2SC3399	50p
2SC3400	60p
2SC3401	50p
2SC3402	50p
2SC3409	400p
2SC3412	80p
2SC3416	80p
2SC3417	90p
2SC3419	120p
2SC3420	120p
2SC3422	110p
2SC3423	100p
2SC3446	250p
2SC3447	200p
2SC3450	350p
2SC3456	200p
2SC3457	200p
2SC3459	250p
2SC3460	250p
2SC3461	350p
2SC3466	300p
2SC3467	70p
2SC3468	70p
2SC3481	600p
2SC3482	300p
2SC3486	350p
2SC3502	120p
2SC3503	90p
2SC3504	120p
2SC3505	600p
2SC3506	600p
2SC3507	650p
2SC3509	750p
2SC3518	120p
2SC3519	550p
2SC3526	120p
2SC3531	225p
2SC3547	100p
2SC3549	200p
2SC3552	300p
2SC3568	200p
2SC3583	170p
2SC3584	200p
2SC3595	220p
2SC3596	280p
2SC3604	650p
2SC3605	60p
2SC3606	100p
2SC3607	150p
2SC3608	120p
2SC3631	130p
2SC3636	280p
2SC3651	600p
2SC3657	400p
2SC3659	600p
2SC3668	120p
2SC3675	160p
2SC3678	280p
2SC3679	200p
2SC3680	380p
2SC3685	450p
2SC3687	650p
2SC3688	750p
2SC3691	150p
2SC3692	150p
2SC3705	120p
2SC3715	480p
2SC3717	120p
2SC3719	150p
2SC3729	450p
2SC3743	270p
2SC3746	120p
2SC3747	120p
2SC3752	250p
2SC3769	700p
2SC3781	150p
2SC3783	600p
2SC3787	100p
2SC3789	75p
2SC3790	120p
2SC3795	200p
2SC3798	220p
2SC3807	120p
2SC3811	80p
2SC3832	200p
2SC3833	250p
2SC3853	220p
2SC3854	250p
2SC3855	280p
2SC3857	500p
2SC3858	550p
2SC3870	200p
2SC3883	280p
2SC3890	150p
2SC3895	400p
2SC3897	650p
2SC3907	420p
2SC3909	450p
2SC3927	550p
2SC3946	120p
2SC3950	120p
2SC3953	120p
2SC3954	150p
2SC3973	275p
2SC3975	275p
2SC3987	100p
2SC3996	1200p
2SC4006	100p
2SC4020	280p
2SC4023	325p
2SC4056	350p
2SC4106	200p
2SC4123	450p
2SC4124	250p
2SC4169	60p
2SC4236	550p
2SC4237	750p
2SC4242	200p
2SC4267	50p
2SC4301	550p
2SD138	180p
2SD199	280p
2SD200	210p
2SD201	260p
2SD257	195p
2SD313	40p
2SD315	75p
2SD325	45p
2SD330	110p
2SD348	460p
2SD357	40p
2SD358	40p
2SD371	240p
2SD380	650p
2SD381	80p
2SD388	170p
2SD389	90p
2SD400	20p
2SD401	50p
2SD402	120p
2SD415	120p
2SD424	400p
2SD426	150p
2SD427	350p
2SD438	45p
2SD467	60p
2SD468	25p
2SD471	75p
2SD525	90p
2SD526	70p
2SD545	60p
2SD549	120p
2SD551	400p
2SD555	500p
2SD560	150p
2SD571	80p
2SD575	530p
2SD600	80p
2SD601	40p
2SD602	60p
2SD612	100p
2SD613	70p
2SD636	30p
2SD637	40p
2SD638	60p
2SD639	40p
2SD640	350p
2SD642	50p
2SD655	60p
2SD661	60p
2SD666	70p
2SD667	70p
2SD668	120p
2SD669	40p
2SD673	350p
2SD676	250p
2SD716	115p
2SD717	180p
2SD718	100p
2SD722	240p
2SD725	350p
2SD734	60p
2SD-741	120p
2SD-743	130p
2SD-756	100p
2SD-757	120p
2SD-758	140p
2SD-762	140p
2SD-763	140p
2SD-768	180p
2SD 772	200p
2SD 773	40p
2SD-774	60p
2SD-777	400p
2SD-784	650p
2SD-786	100p
2SD-787	80p
2SD-788	100p
2SD-789	80p
2SD-792	400p
2SD-794	100p
2SD-795A	140p
2SD-811	450p
2SD-819	400p
2SD-820	450p
2SD-821	550p
2SD-822	400p
2SD-826	100p
2SD-836	150p
2SD-836A	200p
2SD-837	80p
2SD-838	400p
2SD-841	160p
2SD-844	200p
2SD-845	550p
2SD-850	260p
2SD-856	80p
2SD-858	250p
2SD-863	60p
2SD-864	200p
2SD-866	150p
2SD-866A	140p
2SD-868	450p
2SD-870	400p
2SD-871	450p
2SD-879	60p
2SD-880	40p
2SD-882	80p
2SD-892A	100p
2SD-894	120p
2SD-895	200p
2SD-896	200p
2SD-900	400p
2SD-905	450p
2SD-916	130p
2SD-917	300p
2SD 921	320p
2SD-923	360p
2SD 946	120p
2SD-947	100p
2SD-950	300p
2SD-951	350p
2SD-957A	520p
2SD-958	60p
2SD-965	100p
2SD-970	170p
2SD-973	60p
2SD-973A	70p
2SD-985	120p
2SD-986	120p
2SD-1012	60p
2SD-1020	40p
2SD-1021	120p
2SD-1022	400p
2SD-1024	150p
2SD-1030	75p
2SD-1031	130p
2SD-1037	750p
2SD 1046	200p
2SD-1047	225p
2SD-1051	130p
2SD-1060	130p
2SD-1062	150p
2SD-1063	200p
2SD-1064	250p
2SD-1065	200p
2SD-1069	150p
2SD-1071	450p
2SD-1073	350p
2SD-1088	150p
2SD-1094	520p
2SD-1110	225p
2SD-1111	60p
2SD-1113	225p
2SD-1128	200p
2SD-1133	100p
2SD-1135	150p
2SD-1138	80p
2SD-1140	40p
2SD-1142	350p
2SD-1148	175p
2SD-1151	50p
2SD-1159	90p
2SD-1160	150p
2SD-1163A	220p
2SD-1164	120p
2SD-1168	450p
2SD-1169	280p
2SD-1173	350p
2SD-1185	400p
2SD-1186	400p
2SD-1187	250p
2SD-1189	125p
2SD-1190	150p
2SD-1191	120p
2SD-1192	90p
2SD-1196	150p
2SD-1197	150p
2SD 1207	50p
2SD-1210	280p
2SD-1211	120p
2SD-1218	75p
2SD-1223	75p
2SD-1225	120p
2SD-1227	40p
2SD-1229	250p
2SD-1237	300p
2SD-1246	30p
2SD-1247	40p
2SD-1248	270p
2SD-1251	180p
2SD-1263	90p
2SD-1264	120p
2SD-1265	75p
2SD-1266	180p
2SD-1267	160p
2SD-1267A	125p
2SD-1271	200p
2SD-1271A	225p
2SD-1272	200p
2SD-1273	100p
2SD-1275	160p
2SD-1276	200p
2SD-1277	190p
2SD-1278	600p
2SD-1279	175p
2SD-1289	300p
2SD-1291	400p
2SD-1292	60p
2SD-1297	425p
2SD-1302	40p
2SD-1308	140p
2SD-1309	140p
2SD-1310	140p
2SD 1313	1000p
2SD-1326	200p
2SD-1328	60p
2SD-1347	70p
2SD-1348	85p
2SD-1350	150p
2SD-1376	125p
2SD-1379	100p
2SD-1380	100p
2SD-1383	100p
2SD-1384	50p
2SD-1389	200p
2SD-1390	350p
2SD-1391	450p
2SD-1392	150p
2SD-1395	150p
2SD-1396	240p
2SD-1397	175p
2SD-1398	130p
2SD-1399	300p
2SD-1400	280p
2SD-1402	280p
2SD-1404	125p
2SD-1406	80p
2SD-1407	160p
2SD-1408	125p
2SD-1409	170p
2SD-1412	100p
2SD-1413	175p
2SD-1414	700p
2SD-1415	190p
2SD-1417	125p
2SD-1425	360p
2SD-1426	350p
2SD-1427	380p
2SD-1428	360p
2SD-1429	410p
2SD-1430	280p
2SD-1431	400p
2SD-1432	400p
2SD-1433	750p
2SD-1438	140p
2SD-1439	270p
2SD-1441	380p
2SD-1445	200p
2SD-1448	140p
2SD-1450	60p
2SD-1451	260p
2SD-1452	350p
2SD-1453	140p
2SD-1455	250p
2SD-1457	220p
2SD-1459	120p
2SD-1468	60p
2SD-1479	200p
2SD-1487	225p
2SD-1491	100p
2SD-1494	300p
2SD-1496	450p
2SD-1497	350p
2SD-1505	120p
2SD-1507	60p
2SD-1509	100p
2SD-1511	100p
2SD-1519	250p
2SD-1521	70p
2SD-1541	350p
2SD-1548	250p
2SD-1554	500p
2SD-1555	350p
2SD-1556	700p
2SD-1564	100p
2SD-1565	75p
2SD-1571	200p
2SD-1572	100p
2SD-1576	450p
2SD-1577	480p
2SD-1579	120p
2SD-1589	100p
2SD-1590	100p
2SD-1591	310p
2SD-1593	125p
2SD-1595	160p
2SD-1604	200p
2SD-1608	210p
2SD-1609	70p
2SD-1630	50p
2SD-1632	500p
2SD-1633	125p
2SD-1637	50p
2SD-1647	50p
2SD-1649	260p
2SD-1650	300p
2SD-1651	270p
2SD-1663	450p
2SD-1664	40p
2SD-1666	120p
2SD-1667	120p
2SD-1668	120p
2SD-1677	300p
2SD-1730	150p
2SD-1732	400p
2SD-1739	350p
2SD-1740	125p
2SD-1748	90p
2SD-1760	80p
2SD-1762	70p
2SD-1773	160p
2SD-1783	100p
2SD-1796	180p
2SD-1815	100p
2SD-1825	120p
2SD-1843	100p
2SD-1846	350p
2SD-1849	325p
2SD-1850	325p
2SD-1858	40p
2SD-1877	250p
2SD-1878	300p
2SD-1879	275p
2SD-1884	300p
2SD-1886	450p
2SD-1887	450p
2SD-1896	300p
2SD-1910	280p
2SD-1911	400p
2SD-1913	60p
2SD-1929	50p
2SD-1939	75p
2SD-1941	500p
2SD-1959	280p
2SD-1961	50p
2SD-1978	50p
2SD-1984	150p
2SD-2012	50p
2SD-2046	50p
2SJ-48	425p
2SJ-49	425p
2SJ-50	425p
2SJ-56	700p
2SJ-74	80p
2SJ-75	280p
2SJ-76	220p
2SJ-77	350p
2SJ-79	225p
2SJ-103	75p
2SJ-106	40p
2SJ-108	60p
2SJ-115	525p
2SJ-116	1000p
2SJ-117	550p
2SJ-118	600p
2SJ-119	700p
2SJ-122	800p
2SJ-161	650p
2SJ-162	680p
2SK-19	45p
2SK-40	50p
2SK-49	50p
2SK-55	100p
2SK-68	100p
2SK-73	75p
2SK-106	40p
2SK-107	40p
2SK-109	120p
2SK-118	50p
2SK-125	100p
2SK-133	650p
2SK-134	415p
2SK-135	415p
2SK-147	160p
2SK-150	150p
2SK-162	115p
2SK-163	40p
2SK-168	40p
2SK-176	800p
2SK-192	45p
2SK-195	150p
2SK-197	140p
2SK-214	170p
2SK-216	200p
2SK-217	35p
2SK-218	400p
2SK-240	140p
2SK-270	50p
2SK-294	350p
2SK-310	200p
2SK-312	750p
2SK-315	70p
2SK-320	120p
2SK-322	140p
2SK-323	130p
2SK-358	300p
2SK 370	40p
2SK-371	40p
2SK-386	600p
2SK-388	850p
2SK-405	450p
2SK 413	500p
2SK-414	500p
2SK 415	500p
2SK-429	180p
2SK-511	450p
2SK-513	325p
2SK 517	200p
2SK-531	350p
2SK-534	700p
2SK-537	900p
2SK-538	450p
2SK-539	1100p
2SK-555	400p
2SK-556	500p
2SK-557	400p
2SK-566	475p
2SK-695	550p
2SK 719	300p
2SK 724	600p
2SK 725	600p
2SK-727	1200p
2SK-735	600p
2SK-758	300p
2SK-787	1100p
2SK-794	500p
2SK-872	950p
2SK-903	500p
2SK-1057	600p
2SK-1058	800p
2SK-45	100p
2SK-51	100p
2SK-59	100p
2SK-73	60p
2SK-74	50p
2SK-77	50p
2SK 81	50p
2SK-85	160p
2SK-87	45p
2SK-88	70p
2SK-121	150p
2SK-129	175p
2SK-165	225p
2SK-166	300p

COMPUTER ICs

2114	150p
2532	200p
2716	100p
2732	200p
2732A	220p
2764	150p
27C64	200p
27128	150p
27256-25	150p
27512	300p
4116	40p
4164-15	80p
4164-12	90p
4164-10	100p
41256-15	80p
41256-12	100p
41256-10	110p
41464-12	150p
41464-10	200p
6116	80p
6264-15	160p
6264-12	200p
6264-10	210p
62256-12	300p
6502	300p
6502A	360p
65C02	930p
6522	280p
6551	380p
6800	210p
6802	220p
6803	500p
6808	500p
6809	500p
6810	150p
6818	380p
6840	290p
6845	200p
6850	90p
8080A	380p
8085A	300p
8086	500p
8088	480p
8156	300p
81LS96	130p
81LS97	130p
81LS98	130p
8224	240p
8226	240p
8243	250p
8250	750p
8251	200p
8253	160p
8255	160p
8256	700p
8257	220p
8271	3400p
8279	270p
8283	400p
8284	440p
8287	260p
8288	650p
8748	700p
8755	800p
Z80ACPU	100p
Z80BCPU	160p
Z80ADMA	200p
Z80APIO	150p
Z80BPIO	150p
Z80ACTC	140p
Z80BCTC	200p
Z80ASIO	210p
Z80ASIO-1	210p
Z80ASIO-2	210p
Z80ADART	260p
74S289	180p
74S387	200p
75107	65p
75110	75p
75113	100p
75122	110p
75150	95p
75154	100p
75162	700p
75182	95p
75183	95p
75188	55p
75189	55p
75195	185p
75451	40p
75454	65p
75492	55p
8T26	95p
8T28	110p

SIMMS

256Kx9-80	1000p
256Kx9-70	1100p
1MBx9-80	3000p
1MBx9-70	3200p

SIPS

256Kx9-80	1100p
256Kx9-70	1200p
1MBx9-80	3100p
1MBx9-70	3200p

OPTO COUPLERS

4N25	50p
4N26	50p
4N27	50p
4N28	50p
4N29	90p
4N30	90p
4N31	90p
4N32	100p
4N33	100p
4N36	58p
4N37	58p
4N38	68p

BRIDGE RECTIFIERS

W005 1A/50V	16p
W01 1A/100V	18p
W02 1A/200V	19p
W04 1A/400V	21p
W06 1A/600V	23p
W08 1A/800V	28p
BR81D 2A/100V	33p
BR82D 2A/200V	33p
BR84D 2A/400V	37p
BR86D 2A/600V	43p
BR88D 2A/800V	43p
BR32 3A/200V	43p
BR34 3A/400V	43p
BR36 3A/600V	44p
BR62 6A/200V	80p
BR64 6A/400V	72p
BR251 25A/100V	150p
BR252 25A/200V	165p
BR254 25A/400V	185p
BR256 25A/600V	200p
BR258 25A/800V	240p
BR351 35A/100V	185p
BR352 35A/200V	200p
BR354 35A/400V	220p
BR356 35A/600V	230p
BR358 35A/800V	260p
BY164 1.5A/100V	40p
BY179 1.5A/800V	40p

TRIACS

TIC206D 4A/400V	60p
TIC225D 6A/400V	69p
TIC226D 8A/400V	68p
TIC236D 12A/400V	85p
TIC246D 16A/400V	105p
TIC253D 20A/400V	190p
TIC263D 25A/400V	205p
T2800D 8A/400V	52p

THYRISTORS

2N5061 0.8A/60V	20p
C106D 4A/400V	28p
TIC116C 8A/300V	59p
TIC116D 8A/400V	79p
TIC116M 8A/600V	79p
TIC126D 12A/400V	75p
TIC126M 12A/600V	90p
BR103	37p
BR303	85p
BT106	180p
BT116	80p
BT119	180p
TIC44	22p
17088	200p
17089	200p
17127	200p
15/80H	230p
15/85R	230p
SG264	550p
SG613	800p

SERVICE AIDS

SERVISOL PRODUCTS

VIDEO HEAD CLEANER	140p
SWITCH CLEANER	150p
SILICONE GREASE	170p
FREEZE IT	170p
FOAM CLEANER	170p
ANTI STATIC	170p
AEROKLEANE	140p
AERO DUSTER	170p
PLASTIC SEAL	160p
GLASS CLEANER	160p
COLDKLENE	160p

IF YOU PURCHASE MORE THAN ONE SERVISOL PRODUCT P&P WILL BE CHARGED AT 300p

GRANDATA LTD

K.P. HOUSE, UNIT 15,
POP IN COMMERCIAL CENTRE,
SOUTHWAY, WEMBLEY,
MIDDLESEX, ENGLAND
Tel: 081-900 2329 Fax: 081-903 6126
FOR EVEN MORE BARGAINS

SOLDERING IRONS

ANTEX

25 Watt 240Vac SOLDERING IRON (XS25W 240V) £7.00
15 Watt 240Vac SOLDERING IRON (X15W 240V) £7.00
25 Watt SPARE ELEMENT £3.80
15 Watt SPARE ELEMENT £3.80

WOODEN HANDLE

30 Watt 220/100 Volts SOLDERING IRON £3.50
40 Watt 220/100 Volts SOLDERING IRON £3.50
60 Watt 220/100 Volts SOLDERING IRON £3.50

SOLDERING IRON STAND

SOLDERING STAND (Made by ANTEX) £2.80
SPARE SPONGE £0.55

SOLDER

18 SWG 500 GRAMMES £5.00
20 SWG 500 GRAMMES £6.50
22 SWG 500 GRAMMES £7.00

DESOLDERING AIDS

DESOLDER PUMP £3.20
SPARE NOZZLE £0.60
SOLDER MOP Standard Gauge 1.2mm £0.60

VIDEO HEADS

AIWA

AV 66/AV 77 £14.00
G700 £12.00
G900 £22.00

AKAI

VS-105/112/115/116/125/126/201/220/250/301/303/304/205/244/247/248/VSP8 £15.00
VP7100/VP77/VS9300/VS9500/9800 £6.50
VP88/VS1/2/4/5/10/VS9700/VS9800/VSP1 £15.00
VS35/37/38/53/55/66/765/767/768 £32.00
VS512/515/516 £28.00
VS465 £30.00
VS11/12 £20.00
VS6/8/9 £30.00
VSX9 £32.00

ALBA

VCR4000/5000/6000 £21.00

AMSTRAD

VCR 4500/5200/9000/TVR1 £11.00
VCR 7000 £11.00
VCR 6000/6100 £15.00
TVR2/TVR3/VCR4600/VCR4600 MKII/VCR4700 £11.50

AUTHENTIC

N850 £8.00

AWA

ATVI £8.00

BAIRD

8900/8901/8902/8903/8906/8922/8928 £6.50
8904/8923/8924/8925/8929/8935/8941/8943/8944 £6.50
8909/8912 £8.00
8930/8931/8933/8940 £8.00
8942 £23.00
8945 £20.00
8947/8948 £16.00

BAIRD

8950 £17.00

BOSCH BAUER

VRP20 £10.00
VRP25 £10.00
VRP30 £33.50

CANON

VR10 £10.00
VR30A/30B/30E/40A £33.50

DAEWOD

912 £22.00
VCP 11 RAF £22.00

DECCA

8300 £10.00
8400/8500 £6.50

FUNAI

E11/VIP1000/VP1400/VCR4000/V1/2S/VCR4500/4800/VCR5200/5600/6400/6600/VIP3000/E1100 £12.00
VCR4600/5400/5800 £12.00
VCR5480/5843 £22.00
VCR6800/6803 £16.00

FISHER

FVHP510/520/530/615/622/710/715/720/721/722/910/FVHP620/711/905/906/908/911/915/916/5000/FVHP420/5005/5050/5075/5001/618/730/830/918 £12.25
VBS3500/7500/7600/9900/VB53500/7100/7600/9900/VBR330 £20.00
VBS7000/VBS7100/VBS9000 £22.00
FVH711/715/721/722/FVHD720 £15.00
FVHP725/830 £30.00
FVHP990 £32.00
FVHP975 £27.00

FIDELITY

HQS200/VCR600/6100 £16.00
VCR100 £12.00
VTR1000 £13.00

GOLDSTAR

8000 3HSSDB £19.00
GVH51/GVH1221/VCP4000/VCP4100/VCP4200 £18.00
GHV12321/1245/1246/8210/8215/GHVP1240/1241/GHVP1247/1248/VCP400 £16.50

G.E.C.

4000H/4001H/4002H £16.00
V4001H/V4004 £16.00

GRANADA

CS1/DS2 £21.50
VHSAH1 £13.00
VHSAH3 £31.00
VHSAN3 £8.00
VHSAY3 £14.00
VHSBH1/CH1 £21.00
VHSBP1 £8.50
VHSBY3 £26.00
VHSD52 £16.00
VHSEH2 £21.00
VHSEY1/EY2 £14.00
VHSFG2/FG4 £16.00
VHFS1/FS2 £13.00
VHSTJ1/TJ2/TJ3/WJ3/VHSYJ2 £7.00
VHSVH4/WH1/XH1/YH2 £16.00
VHSWJ1/XJ3 £7.00

GRAETZ

4312/4605/4905/4912/4913/P4833/TR4605/4812/4905/4912/TR4913/4914/4943 £6.50
4935/4943/4963/4985/4993/TR4833/4935/4985/4993 £6.50
4920/4927/4930 £17.00
4946/TR4906/4916 £16.00
TR4994 £23.00
TR4995 £33.00

GRUNDIG

VS410/440/450/460/500/505/510/520/521/530 £17.00
BARCELONA/MVS400/440/500/600/SE5100/6100/TVR4500/VS400/440/500/505/510/518/600/610 £18.00
MADRID/SE5140/VS540/VS5480 £35.00
MVS550/620/630/640 £38.00
VS120 26.00

HINARI

VXL2/VXL3/VXL4/VXL20/VXL25/VXL35 £11.50
VXL5/V20H £13.00
VXL6 £18.00
VXL7 £22.00
VXL8/VXL9/VXL10/VXL11/VTV100 £18.50

HITACHI

VT11/VT14/16/30/33/34/330/340/503/640/5030 £12.00
VT7/VT17/VT18/VT19 £23.50
VT35/VT38/VT39 £33.00
VT100/110/111/112/113/115/118/120/125/128/220/225/VT400/405/410/413/414/415/418/510/518/520/525/526/VTM625/626 £18.00
VT3000 £10.00
VT4000/4200/5000/5500 £15.00
VT77/680/3000/6500/7000/8000/8030/8040/8100/8300/VT8500/8700/9000/9300/9500/9700/9900 £12.00
VT8/VT9/VT56/VT57 £34.00
VT65 £35.00
VT130/VT135/VT138/VT145/VT250/VT255/VT258/VT420/425/426/428/430/431/435/438/535/536/VTL301/VTM630/635/636 £29.50
VT52/61E/VT62E/VT63/VT64/VT640 £20.00
VT150 (4 HEAD) £27.00
VT530 £25.00

ITT

VR3605/3905/3935/3943/3954/3985/3993 £6.50
VR3833/VR3913/VR3914/VR3963/VR3975/VR3912 £6.50
VR3986 £20.00
VP3826/VR3906/3916/3926/3946/VR3948/6948 £16.75
VR3927 £17.00
VR3976 £24.50
VR3977 £31.00
VR3994 £23.00
VR3995/3997 £31.50
VR3917 £16.00

JVC 3HSS

HR2200/HR3300/HR3320/HR3330/HR3350/HR3360/HR3660/HR3750/HR3860/HR4100 £6.50
3292/8903/8900/8901/8902/8903/8906/8922/8928/3VO1/3V06/3V22 £6.50
HR3660/HR7600/HR7610/HR7650/HR7700/HRD110/HRD111/HRD120/HRD121/HRD220/HRD225/HRS100 £6.50

FERGUSON 3HSSL PIN

8904/8924/8941/8943/8944/3V16/3V23/3V24/3V31/3V35/3V36/3V38/3V39/3V49 £6.50
HRD140/HRD141/HRD143/HRD150/HRD157/HRD158/HRD160/HRD5101/HRS10 £15.50

FERGUSON

8947/8948/3V42/3V44/3V45/3V46/3V47/3V52/3V54/3V55/3V56/3V57 £15.50
8950/8951/3V64/FV10/FV11/3V65/FV20/FV21/FV22/FV26 £17.00
3V48 £24.50
3V43/3V53 £31.50
8930/8940/3V29/3V30 £7.50
8945 £24.00
3V00 £10.00
FV31 £22.00
FV37 £38.00

JVC

HRD170/171/210/211 £17.00
HRD565/566 £24.50
HRD725/HRD755 £31.50
BR7000E/BR7000S £30.00
HR7200/7300/7350/2650 £7.20
HRD455 £20.00
HRD520 £22.00
HRD300/HRD400/HRD600 £29.00
HR4100 £10.00
HRD750 £33.00
HRD250/257 £27.00

JVC & FERGUSON

3V32/8942/HR7655 £23.00
HRD180/230/3V59/FV12L/FV20B/FV22/26/30/32/33 £30.50
HRD370/3V58/FV13H/HRD430/HRD470 £27.00
HRD530/700/FV14T £33.50
GRC1/GRG2/3V41 £30.00

LOGIK

VR960 £16.00
VR950 £16.00

LOEWE

OC410/420/440 £24.00
OC50/OC55/OC60/OC65 £15.00

LUXOR

9225 £21.50

MATSUI

VX500E/VX600A/VX800A/VX810A/VX880A/VX770B/VX773B £13.50
VCRL3/VX730 £16.00
VX735/VX755 £16.00
VX735A/VX755A/VX765/VX850 £17.50

MITSUBISHI

HS303/HS304/HS320/HS700 £19.50
HS306/HS318/HS710 £20.00
HS307 £37.00
HS319 £37.00
HS330 £32.00
HS400 £29.00
HS349 £28.00
HS411 £32.00
HSE30 £28.00
HS338 £28.00
HSE11 £37.00
HS300/HS301/HS302/HS310 £18.50
HS200 £6.50
HS337/HS347 £22.00

NATIONAL PANASONIC 4HSS-3HSSN

NV3000/NV300/NV7200/NV333/NV7500/NV7800/NV7850/NV322/NV332/NV340/NV390/NV2000/NV2010/NV7000/NV8170/NV8200/NV8400/NV8600/NV8610/NV8620 £6.25

NATIONAL

NV777/NV330 £17.00
NV430/AG1000 £11.00
NV280/NV460/470/480 £16.50
NV730/NV770 (4 HEAD) £18.50
NV366 £18.50
NV180/NVD48 £23.00
NV370/NV380/NV100/NV630 £8.50
NV788 £36.00
NV810/NV830 £30.00

NATIONAL Cont.

NV850/NV950 £35.00
NV870/NV890/NV970 £39.00
NVG33/NVG46/NVL23/NVL25/NVL28 £38.00
NVG30/NVG31/NVG40/NVG130/NVJ30/NVL20 £20.00
NVG10/NVG11/NVG12/NVG14/NVG16/NVG120/NV250/NV280/NV450/NV465 £16.50
NVG18 £25.00
NVG20/NVG21/NVG22/NVG25/NVG28/NVG200/NVD48 £25.00
NVG50/NVG300 £30.00
NVG45/NVG46 £30.00
NVH70 £50.00
NV688 £25.50
NV600 £23.00
AG-6800/6810 £39.00
AG-6100/6200/6300 £32.00
NVH65 £50.00
NVG7/NVG9/NV230 £18.00
NV780 £36.00
NVG15/NVG400 £48.00
NVM7/NVMC20/NVF70 £52.00

N.E.C.

N9011/N9012/N9013E/N9014E/N9014G/N9015/N9016/N901A/N902A/N9033/N9034/N9054/N9063/N9065/N9066/N906A £20.00
N911A/N915A/N916A/N917 £27.00
PCV754/PV2300/PV2400/PV2760/PV794/PV770/PV774/PVC763E £18.00
N380/N381/N830/N831/N832/N833/N834/N835/N836 £7.00
82611AH1 (for model DX3000) £45.00
N895 £31.50

NORDMENDE

460/9-460/V100/V140/V200/V250/V304/V341/V450/V550 £7.00
V1001/V1005/V1015/V1025/V1035/V1041/V1055/V1065/V1105/V2005 £18.00
V110/V333 £20.00
V101/V102/V103/V112/V141/V142/V200/V300/V3005/V300/V301/V302/V350/V500 £7.00
V1205/V1215/V1235/V1245 £20.00
V1305 £33.50
V380 £27.00
V502/V503/V5005 £37.00

ORION

VH3/VH555/VH600/VH700/VH844/VH900/VH1000 (ALL MODELS) £13.00
VH1/VH2A £7.00

PHILIPS

VR6460/VR6520/64VR60/VR6420 £8.50
VR6711 4 HEAD £41.00
6920/VR6440 £58.00
VR6441/VR6540/VR6541/VR6640/VR6642 £14.00

RANK

BV6900AS £18.00
N830EA/RV300/RV310/RV320/RV330/RV340/RV350/RV380 £7.00

SAISHO

VR100/VR605/VR705/VR805/VR905/VR1000/VR1100/VR1200/VR1600 £12.50
VR3300X/VR3600X/VR3650/VR3800 £14.00
VR3200/VR3500 £15.00
VR2000/VR3300/VR3600 £15.00

SALORA

6500/6600 £21.50
SV7300/8200/8300/9200 £19.50
SV7400/8400 £23.00
SV8100 £13.50

SAMSUNG

SVX301/VB900/VB910/VVT510/VT320/VT5600/VX510/VX511/VX520/VX616/VX626/VX627/VX717/SV716/717/SVX303/305/VB510/520/610/616/617/619/620/626/627/629/710/971/VI520/616/621/626/900/810/VX617/619/629/710/712/VX720/730/970/971/972 £19.00
VB770/VI730/770/VK8220/VX750/770/8225 £21.00

SANYO

VTC5000/VTC5400/VTC6000/VTC6500/VPR5000/VTC1500/VTCM10/VTCM11/VTCM20/VTCM21/VTCM25/VTC2000/VTC5100/VTC5150/VTC5300/VTC5400/VTC5350/VTC5370/VTCNX10/VTCNX15/VTCNX20/VTCNX30/VPR5800 £18.50
VTC5500/VTC5150/VTC9100/VTC9300/VTC9350/VTC9355/VTC9455/VTC9500 £19.00
VHR1110/VHR1150/VHR1300/VHR1700/VHR2300 £16.00
VHR3150/VHR3300/VHR3400/VHR3310/VHRD500 £18.00
VHR1100/VHR1200 £18.00
VHR1500/VHR2500 £28.00
VHR2700 £24.50

SHARP

VC390/VC393/VC496 £30.00
VC488 £48.00
VC779 £20.00
VC789/VC790 £32.00
VC300/VC381/VC383/VC386/VC387/VC388/VC482/VC483/VC486/VC3300/VC8381/VC9100/VC9300/VC9500/VC9700/VC9400/VC9600/VC200/220/384/385/471/477/481 £13.00
VC582/VC583/VC651/VC681/VC750/VC780/VC781/VC683/VC684/402/500/571/573/581/584/585/600/682/685/693/VC700/772/7810/782/7822/783/8481 £13.00
VC6000/VC6200/VC6300/VC7300/VC7700/VC7750/VC8000/VC8300 £20.00
VC793 £36.00
VC473/785/786 £25.00
VC699/VCA501/VCA602 £29.00

SONY

DSR-19R (FOR SL-T 9ME) £39.00
DSR-21R (FOR SLC 8-C9) £30.00
DSR-35R (FOR C20/C30/C40/SLF1UB/SLF1E) 2 PIN SLC24PS/SLC33E/SLC44PS/SLF30PF/SLF60PS/SLK85/SLT20ME/SLT30ME £15.00
DSR-43R (FOR SLC7 RANGE/SL5000/SL5100/SL3000) 1 PIN SLC6E/SL36ES/SL37E £13.00
SL3000/8000/8080/SLC5E/SLT7ME £16.00
SLV201/202 £29.50
SLK95/SLT50ME £29.00

TOSHIBA

V63 £18.00
V9680 £42.00
V8600/V8700 £38.00
V21/V31/V33/V50/V51/V53/V9600 £14.50
V55/V57 £7.00
V71/V73/V74/V75/V81/V82/V83/V84/V85/V86/V87/V80/V77 £14.00
V93/V80 £20.00
V5470/V5480 £18.00

TRIUMPH

VR9500/VR9501/VR9525 £13.00

THOMSON

TX8000/V309/316/320/321/323/326/4100/4200/4300/VK305T/306T/309BL/3301/312T/410T/411T £6.50
TX8500/V318/342/343/351/352/353/4210/4230/4260 £15.75

VCR PINCHROLLERS

AKAI

VS9300, VS9500, VS9700, VS9800, VP7100, VP77 £2.50
VS1, VS2, VS3, VS4, VS5, VS6, VS9, VS10, VS8, VS15 £2.50
VS105, VS112, VS115, VS116, VS126, VS244, VS245, VS247, VS248, VS515, VS516, VS205 £2.50
VS201, VS301, VS303, VS304, VS603, VS606, VS607, VP58-P82 £2.50
VS125, VS155, VS165, VS220, VS240, VS250, VS512, VSX9 £2.50

AMSTRAD

VCR4500, VCR4600, VCR4600, VCR6000, VCR6100, VCR9000 £2.50
VCR5200 £2.50
VCR7000 £2.50
TVR1 £2.50

AIWA

AV66, AV77 £2.50
G700, G900 £2.50

ALBA

VCR3000X, VCR4000 £2.50
VCR5000, VCR6000 £2.50

AUTHENTIC

N850 £2/50

BLAUPUNKT

RTV100, 200, 202, 222, 224, 301, 306, 307, RTV309, 311, 312, 315, 316, 317, 319, 320, 328, RTV404, 414, 434, 444, 478, 707, RTX100 £2.50
RTV211, 214, 321, 322, 348, RTX250, 260 £2.50
RTV324, 325 £2.50
RTV330, 454, 520, 530, 535, 560, 660, 670, RTV720, 730, 740, 800, 810, 900, 910, 920 £2.50

DECCA

VR8300 £2.50
VRH8495DK (Pressure Roller Assembly) £6.25

FERGUSON

3V00, 3V16, 3V22, 3V23, 3V24, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922, 8923, 8924, 8925, 8929 £2.50
3V29, 3V30, 3V31, 3V32, 8930, 8931, 8940, 8941, 8942 £2.50
3V35, 3V36, 3V38, 3V39, 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 3V58, 3V59, 3V64, 3V65, FV10, FV11, FV12, FV14, 3V49, 8943, 8944, 8945, 8947, 8948, 8950, 8951, FV13H, FV20B, FV21R, FV22L, FV26D, FV30B, FV32L, FV33H, FV39S, CV141L £2.50

FISHER

FVHP420, FVHP520, FVHP530 £2.50
FVHP615, FVHP710, FVHP715, FVHP716, FVHP722, FVHP725, FVHP830, FVH618, FVH620, FVH622, FVH622, FVH711, FVH720, FVH721, FVH722, FVH725, FVH730, FVH840 £2.50
FVHP905, FVHP970, FVHP980, FVHP990, FVHP5000, FVHP5005, FVHP5050, FVHP5075, FVHP5100, FVHP905, FVHP906, FVHP908, FVHP910, FVHP911, FVHP915, FVHP916, FVHP918, FVHP975 £2.50
VBR330, VBS3500, VBS7000, VBS7500, VBS7600, VBS9000, VBS9900 £2.50

FIDELITY

HQS200, VCR100, VCR600, VCR6100 £2.50
VTR1000 £2.50

FIJITSU

HS760, VX715, VX720D £2.50

FUNAI

V1, V2, VCR4000, VCR4500, VCR4530, VCR4600, VCR4800, VCR5200, VCR5400, VCR5840, VCR5843, VCR6000, VCR6600, VCR6800, VCR6803 £2.50
VIP1000, VIP1400, VIP3000 £2.50

GEC

V4004 £2.50

GRANADA

VHSAH1, VHSAH3, VHSVH4, VHSWH1, VHSXH1, VHSYH2 £2.50
VHSAN3, VHSBP1 £2.50
VHSAY3 £2.50
VHSBH1, VHSCH1, VHSFS1, VHSFS2, VHSEH2, VHSEH3 £2.50
VHSBY3, VHSCC1 £2.50
VHSDS2 £2.50
VHSDP1, VHSFP2 (Pressure Roller Assembly) £6.25
VHSEY1 £2.50
VHSFG2, VHSFG4 £2.50
VHSFJ4, VHSYJ2 £2.50
VHSF63 £2.50
VHSTJ1, VHSTJ2, VHSTJ3 £2.50
VHSWJ1, VHSWJ3, VHSXJ3 £2.50

GRUNDIG

BARCELONA, MADRID, MVS500, MVS550, MVS600, MVS620, 660, SE5110, SE5140, SE6100, SE6160, TVR4500, VS500, VS505, VS510, VS520, VS521, VS530, VS540, VS550, VS600, VS610, VS620, VS630, VS640, VS660, VS680, VS5180, VS5480 £2.50
MVS400, MVS440, VS400, VS410, VS440, VS460 £2.50
VS120 £2.50
VS150 £2.50

GOLDSTAR

GHV1221, GHV1232, GHV1240, GHV1241, GHV1242, GHV1243, GHV1244, GHV1245, GHV1246, GHV51, GHV8210, GHV8215, GHVP1240, GHVP1241, GHVP1247, GHVP1248, GHVP1290, GHVP1291, GHVP1295, GHVP1296, VCP4100, GHV51, GHV8000, GHV8200, VCP4000, VCP4130, VCP4200, VCP4300, VCP4301, VCP4305, VCP4306, VCP4310, VCP4311, VCP4315, VCP4316, VCP4320, VCP4321, VCP4325, VCP4326 £2.50

HINARI

V20H, VXL10, VXL11, VXL19, VXL5, VXL6, VXL7, VXL8, VXL9, VXL90 £2.50
VXL2, VXL3 £2.50
VXL4, VXL20, VXL35 £2.50

HITACHI

VT11, VT14, VT16, VT17, VT19, VT33, VT330, VT34, VT35, VT38, VT39, VT52, VT6500, VT680, VT6800, VT7, VT7000, VT8000, VT8500, VT9700, VT9900, VT61, VT62, VT63, VT64, VT65, VT86, VT88, VT110, VT122, VT120, VT128, VT130, VT135, VT138, VT150, VT168, VT220, VM200, VM500, VM600, VT100, VT111, VT113, VT115, VT118, VT125, VT145, VT175, VT225, VT250, VT255, VT258, VT260, VT400, VT405, VT410, VT413, VT414, VT415, VT418, VT420, VT425, VT426, VT428, VT430, VT431, VT435, VT438, VT450, VT498, CT510, VT518, VT520, VT525, VT526, VT530, VT535, VT536, VT540, VT545, VT546, VT548, VT570, VT575, VT576, VT580, VT588, VT640, VT8, VT85, VT86, VT88, VTL30, VTM625, VTM626, VTM630, VTM636, VTM640, VTM645, VTM646 £2.50
VTS80, VTS85 £2.50
VT3,000, 5000, VT8000, VT9300, VT9500 £2.50

ITT

VR3605, VR3905, VR3935, VR3985, VR3986, VR3993, VR3994, VR3826, VR3906, VR3916, VR3926, VR3946, VR3948, VR3976, VR3995, VR3997, VR6948 £2.50
VR3913, VR3914, VR3943, VR3954, VR3963, VR3984 £2.50
VR3907 £2.50
VR3912 £2.50
VR3917, VR3833 £2.50
VR3929, VR3968 (PRESSURE ROLLER ASSEMBLY) £6.25

JVC

HR2000, HR3300, HR3330, HR3360, HR3660, HR4100, HR7700, HR7200, HR7300, HR7350, HR7600, HR7610, HR7650, HR7655, HRD110, HRD111, HRD120, HRD121, HRD140, HRD150, HRD160, HRD225, HRD455, HRD565, HRD725, HRD157, HRD158, HRD170, HRD180, HRD210, HRD230, HRD250, HRD257, HRD300, HRD320, HRD370, HRD400, HRD430, HRD470, HRD530, HRD566, HRD700, HRD750, HRD755, HRD950, HRP50, HRS5000, HRS5500 £2.50

MATSUI

VX850 £2.50

MITSUBISHI

HS200, HS300, HS301, HS302, HS303, HS304, HS310, HS320, HS700, HS330, HS306, HS307, HS337, HS338, HS349, HS400, HS411, HS412, HS421, HS710, HSB10, HSB20, HSB30, HSE10, HSE20, HSE30, HSE70 £2.50

NATIONAL

NV100, NV180, NV300, NV333, NV340, NV366, NV600, NV688, NV777, NV788, AG6010, AG6015, AG6100, AG6200, AG6400, AG6810, NV3321, NV230, NV370, NV430, NV460, NV730, NV810, NV830, NV850, NV870, NV890, NV2000, NV2010, NV3000, NV7000, NV7200, NV7800, NV8600, NV8610, NV8620, NVG14, AG1000, AG1200, AG1500, AG2100, AG2100, AG2200, NV260, NV280, NV380, NV450, NV465, NV470, NV480, NV630, NV650, NV770, NV780, NV8050, NV8150, NV8200, NV8300, NV8400, NVG15, NVG30, NVG400, NVH70, NVG130 £2.50
NVG7, NVG9, NVG12, NVG18, NVG9, NVG10, NVG11, NVG120, NVG16 £2.50
NVG21, NVG25, NVH65, NVG33, NVG46, NVG50, NVG300, NVF65, NVF70, NVFS1, NVFS100, NVH75, NVJ30, NVL20, NVL23, NVL25, NVL28 £2.50
NVD48, NVD80, NVG21, NVG45 £2.50

NEC

N830, N831, N832, N833, N895 £2.50
PVC2300, PVC2400, PVC740, PVC744, PVC746, PVC760, PVC764, PVC766 £2.50

ORION

VH1, VH2 £2.50
VC150, VC180, VH1000, VH200, VH201, VH205, VH212, VH250, VH254, VH288, VH3, VH300, VH303, VH3030, VH312, VH33, VH3312, VH404, VH704, VH708, VH712, VH770, VH780, VR2948 £2.50
VH300, VH3050, VH2308, VH2400, VH2600, VH2700, VH4300, VXL20, VXL25, VXL30 Etc £2.50

PHILIPS

VR6460, VR6920 £2.50
VR2020, VR2021, VR2022, VR2023, VR2024 £3.20
VR6711 £2.50
VR6540 £2.50
DV856, VR6485, VR6585, VR6589, VR6880, VR6948 £2.50
VR445, VR6442, VR6542, VR6843, VR6943 £2.50
DV464, DV2324, VR2300, VR2334, VR2340, VR2350, VR2414, VR2480, VR2486, VR2489, VR2490, VR2498, VR6462, VR6463, VR64664, VR6560, VR6660, VR6860, VR6861, VR6862, VR6863 £2.50

Pressure Roller Assembly

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 £6.25

SANYO

VHR1100, VHR1300, VHR1500, VHR2300, VHR1150, VHR1200, VHR2100, VHR2500, VHR2700 £2.50
VTC5000, VTC5150, VTC5500, VTC9300, VTCM10, VTCM20, VTC5150, VTC5350, VTC5400, VTC6000, VTC6500, VTC9100, VPR5800, VTCM11, VTCM21, VTCM31, VTCM50 £2.50
VHR3100, VHR3300, VHR3310, VHR3700, VHRD500, VHRD700 £2.50
VTC3000 £2.50

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

SEE PREVIOUS PAGES FOR MORE ← GRANDATA BARGAINS

VCR PINCHROLLERS Cont.

SHARP Cont.
VC387, VC481, VC483, VC486, VC496, VC581, VC582, VC583, VC585, VC402, VC471, VC473, VC477, VC500, VC571, VC573, VC584, VC5W20E, VCA1031 £2.50
VC651, VC681, VC685, VC750, VC780, VC781, VC785, VC787, VC793, VCT72, VC600, VC682, VC684, VC693, VC699, VC700, VC772, VC7810, VC782, VC7822, VC7282MK2, VC783, VC786, VC800, VCF3, VCA100, VCA102, VCA104, VCA202, VCA303, VCA211, VCA234, VCA501, VCA602, VCD801, VCD802, VCH852, VCH881 £2.50
VC220 £2.50

SAISHO
VR2000, VR3800 £2.50

SOLARA
SV6500, SV6600 £2.50
SV7300, SV8200, SV8300, SV9200, SV9300 £2.50
SV7400, SV8400, SV8420, SV8500, SV8520, SV8550, SV8600, SV8620, SV8700, SV8710, SV8720, SV8800, SV8830, SV9500, SV9600, SV9810 £2.50
SV8000, SV8100 £2.50

SAMSUNG
SV716, SV717, VB510, VB520, VB610, VB616, VB617, VB619, VB620, VB626, VB627, VB629, VB900, VB910, VI510, VI520, VI611, VI616, VI621, VI626, VI900, VI910, VX510, VX520, VX616, VX617, VX619, VX626, VX627, VX629 £2.50
SVX301, SVX303, SVX305, SVX307, SVX319, SVX322, VB710, VB770, VB8220, VB971, VB8225, VI730, VI770, VI790, VI8220, VI8225, VK8220, VX710, VX712, VX720, VX730, VX750, VX770, VX790, VX8220, VX825, VX970, VX971, 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, SL8080, 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, SLT20ME, SLT30ME, SLT50ME £2.50
BMC100, BMC200, BMC500 £2.50
SLV201, SLV202, SLV301, SLV302, SLV401, SLV402, SLV801, SLV802 £2.50

TOSHIBA
DV80, DV90, DV96, DV97, V200, V200, V202, V205, V207, V300, V309, V500, V509, V55, V57, V61, V63, V65, V66, V67, V700, V71, V73, V74, V75, V77, V81, V83, V85, V86, V93, V94 £2.50
V5470, V5480 £2.50
V91, V951 (Pressure Roller Assembly) £6.25

VCR BELT KITS

AKAI
VP7100, VS9300, VS9500, VS9700, VS9800 £1.30
VS1, VS2, VS4, VS5, VS12, VS15, VS53, VP88, V56, V58, V59 £1.00
VS10 £0.66

AIWA
AV86 £1.25
AV77 £1.40
G700 £1.60
G900 £1.80

ALBA
VCR3000X, VCR4000 £1.30

AMSTRAD
TVR123, VCR4600, VCR4700, VCR5200 £1.60
VCR7000 £0.80
VCR6000, VCR6100 £1.80

AUTHENTIC
N850 £1.20

DECCA
VR8300 £1.20
VRH8945DK £0.80

FERGUSON
3292, 3V00, 3V01, 3V16, 3V22, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922 £1.35
3V23, 8923, 8924, 8929 £0.65
3V29, 3V30, 8930, 8931, 8940 £0.90
3V31, 3V32, 8941, 8942 £0.85
3V35, 3V36, 3V38, 3V39, 3V49, 8943, 8944 £0.70
3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 57, 8945, 8947, 8948, 3V58, 3V59, 3V64, 3V65, 8950, 8951 £0.65
FV10, FV11, FV12, FV13, FV14, FV20, FV21, FV22, FV26, FV30, FV32, FV33 £1.05

FIDELITY
HQS200, VCR600, VCR6100 £1.80
VCR100 £1.60
VTR1000 £1.00

FISHER
VBS7000 £2.45
VBS9000 £1.20
FVHP520, FVHP530, FVHP420 £0.60
FVHP615, FVHP618, FVHP620, FVHP622, FVHP705, FVHP711, FVHP715, FVHF716, FVHP720, FVHP721, FVHP722, FVHF725, FVHP730, FVHP830, FVHP840 £1.00
FVHP905, FVHP906, FVHP907, FVHF908, FVHP910, FVHP911, FVHP915, FVHF916, FVHP918, FVHP5000, FVHP5005, FVHP5050, FVHP5075, FVHP5100 £1.00
VBR330, VBS7500, VBS7600, VBS9900 £1.00
VBS3500 £0.75

FUJITSU
HS760, VX715, VX720D £1.60

FUNAI
V1, V25, VCR4600, VCR4800, VCR5200, VCR5400, VCR5600, VCR6600, VCR4530, VCR5840, VCR5843 £2.10
VCR6800, VCR680 £1.80
VIP3000, VIP5000 £1.60

GEC
4005 £1.50
V4004 £1.00

GOLDSTAR
GHV1221, GHV1232, GHV1241, GHV1242, GHV1243, GHV1244, GHV1245, GHV1246, GHV1248, GHV51, GHV8000, GHV8210, GHV8215, VCP4100, VCP4130 £0.80
GHV1290, GHV1291, GHV1295, GHV1296, VCP4200, VCP4300, VCP4301, VCP4305, VCP4306, VCP4310, VCP4311, VCP4315, VCP4320, VCP4321, VCP4325, VCP4326, VCP4000 £1.20
GHV1247, GHV8200 £1.50

GRUNDIG
MVS400, MVS440, VS400, VS410, VS440, VS450, VS460 £0.55

HINARI
VXL2 £0.80
VXL7, VXL8, VXL9 £1.80
VXL4, VXL35 £0.70
VXL5, VXL6 £1.60
VXL3, VXL20 £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, VT130, VT138, VT145, VT150, VT175, VT220, 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
VR3927, VR3928, VR3977 £1.40
VR3993, VR3994 £0.85
VR3963 £0.65
VR3912 £1.50
VR3917 £1.50
VR3929, VR3968 £0.85
VR3907 £1.00

JVC
HR3300, HR3330, HR3360, HR3660, HR4100 £1.30
HR7200, HR7300 £0.70
HR7350, HR7600, HR7610, HR7650, HR7655 £0.75
HR7700 £0.75
HRD110, HRD111, HRD120, HRD121, HRD225 £0.90
HRD140, HRD150, HRD157, HRD158, HRD160, HRD250, HRD257, HRD455, HRD565, HRD566, HRD725, HRD755, HRP50 £0.80
HRD170, HRD180, HRD210, HRD230, HRD300, HRD320, HRD370, HRD400, HRD430, HRD530, HRD700, HRD750, HRD950, HRS5000, HRS5500 £1.10

MATSUI
VX850 £0.75

MITSUBISHI
HS200, HS318, HS319, HS410 £2.00
HS300, HS301, HS302, HS307, HS310 £1.50
HS303, HS304, HS306, HS320, HS330, HS400, HS700 £1.50

NEC
N830, N831, N832, N833 £1.00
N895 £1.30
PVC2300, 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, NV7800 £0.95
NV8600, NV8610, NV8620 £1.60
NV230, NV250, NV260, NV280, NV370, NV380, NV430, NV450, NV460, NV465, NV630, NV730, NV770, NV780, NV810, NV830, NV850, NV870, NV890, AG1000, AG1200, AG1500 £1.25

PHILIPS
VR6460/VR6920 £1.70
VR6540 £1.00
DV186, DV190, DV286, DV468, DV471, DV562, 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, VR72SB8, VR68SB4, VR86SB1, VR92SB3 £0.85
VR6442, VR6542, VR6843, VR6943, VR44SB9 £0.70

SAISHO
VR2000 £0.90
VR3800 £0.75

SALORA
SV6500 £1.00
SV6600 £1.50
SV8000 £1.20
SV8100 £0.60
SV8500, SV8520, SV9500 £1.50
SV7300, SV7400, SV8400, SV8420, SV9200, SV9300 £1.20

SAMSUNG
SV16, SV717, VI616, VI621, VI626, VX616, VX626, VX627 £0.85
VB520, VB610, VB616, VB617, VB619, VB620, VB626, VB627, VB629, VI510, VI520, VI611, VX510, VX520, VX617, VX619, VX629 £1.00
VB900, VB910, VI900, VI910 £1.10

SANYO
VTC5000, VTC5150, VTC6000, VTC6500, VTCM10, VTCM11, VTCM20, VTCM21, VTCM30, VTCM31, VTCM50 £0.75
VTC5300, VTC5350, VTC5400, VPR5800 £1.00
VTC5500 £0.95
VTC9100, VTC9300 £2.20
VTC1100, VTC1300, VTC1500, VHR1100, VHR1150, VHR1200, VHR1300, VHR1500 £0.90
VHR2100, VHR2300, VHR2500, VHR2700 £1.50

SHARP
VC200, VC381, VC383, VC384, VC386, VC388, VC390, VC393, VC2300, VC8381, VC9100, VC9300, VC9500, VC9700 £1.25
VC6300 £1.50
VC7300, VC7500, VC7700 £1.50
VC8300 £1.50
VC300, VC387, VC471, VC473, VC477, VC481, VC483, VC486, VC488, VC496, VC8481 £1.00
VC402, VC500, VC571, VC573, VC581, VC582, VC583, VC584, VC585, VCSF3 £0.90
VC600, VC651, VC681, VC682, VC684, VC685, VC693, VC699, VC700, VC772, VC781, VC782, VC783, VC785, VC786, VC793, VC800, VC7810, VC7822, VC6F3, VC6V3, VCA100, VCA102, VCA103, VCA104, VCA202 £0.70
VC7750, VC8000 £1.60

SONY
SLC6, SL36ES, SLJ10, SLT6ME £1.40
SLC5, SLC7, SL37E, SLT7ME £1.40
SLC9 £1.65
SL8000, SL8080, SL8200, SL8600 £2.00

TOSHIBA
V55, V57 £0.85
V5250, V5280 £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 CVC 20/30 £7.00
CVC 825 £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:
CTX TYPE £2.50
G11 TYPE £2.50
KT4 TYPE £2.50

VIDEO MOTORS

AMSTRAD
VCR7000 REEL MOTOR £17.00

AIWA
AV77 CAPSTON MOTOR £25.00

AKAI
VP7100, VS 9300, VS9500, VS9800 CAPSTON MOTOR £21.00
VP7100, VS9300, VS9500, VS9800 DRUM MOTOR £19.50

AUTHENTIC
N850 REEL MOTOR £19.00

BLAUNPUNKT
RTV211, RTV214 REEL MOTOR £13.00
RTV325 LOADING MOTOR £8.00

DECCA
VR8300 REEL MOTOR £19.00

FISHER
BVR330, VBS3500, VBS7500, VBS7600, VBS9900 REEL MOTOR £6.30

FERGUSON
PU 45979 CAPSTON MOTOR £21.00
HR3300, HR3660, HR4100, 3V00, 3V01, 3V16, 3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922
PU 55371V CAPSTON MOTOR £19.50
3V35, 3V36, 3V38, 3V39, 8943, 8944, HRD110, HRD111, HRD120, HRD121, HRD225
PU 46414 DRUM MOTOR £19.50
HR3300, HR3320, HR3330, HR3360, HR3600, HR3660, HR4100, 3V00, 3V01, 3V16, 3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922
PU 51381V REEL MOTOR £19.00
3V29, 3V30, 3V31, 3V32, 3V39, 8930, 8931, 8941, 8942, HR7200, HR7300, HR7600, HR7610, HR7650, HR7655

FERGUSON & JVC
PU 58635V CAPSTON MOTOR £29.00
3V58, 3V59, 3V64, 3V65, 8950, 8951, FV10B, FV11R, FV12L, FV13H, FV20B, FV21R, FV22L, HRD170, HRD180, HRD230, HRD370, HRD430
PU 58638W REEL MOTOR £17.00
3V58, 3V59, 3V64, 3V65, 8950, 8951, FV10B, FV11R, FV12L, FV13H, FV14T, FV20B, FV21R, FV22L, HRD170, HRD180, HRD230, HRD370, HRD430, HRD530
LOADING MOTOR £8.00
3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8945, 8947, 8948, HRD140, HRD150, HRD157, HRD158, HRD160, HRD250, HRD257, HRD455, HRD565, HRD566, HRD725, HRD755, HRP50, R73AF
PU60201V CAPSTON MOTOR £34.00
HRD300, HRD330, HRD337, HRD400, HRD520, HRD530, HRD700, HRD750, HRD950, HRS5000
HRD 140, HRD 150 CAPSTON MOTOR £30.00
HRD250, HRD565, HRD566 £30.00
3V29, 3V30 CAPSTON MOTOR 8930, 8931

HINARI
VXL2, VXL4, VXL20, VXL35 LOADING MOTOR £8.00
VXL20 REEL MOTOR £13.50

HITACHI
5578154 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
VR3913, VR3914 REEL MOTOR £19.00
VR3993, VR3994

MITSUBISHI
288P02801 MOTOR REEL SPOOLING £33.50
HS300, 301, 302, 310
288P02806 MOTOR REEL SPOOLING £31.50
HS303, 304, 320, 330, 700
288P03401 MOTOR REEL TAKE UP GEN £21.00
HS303, HS320, HS700

NEC
N830EG, N831EG CAPSTON MOTOR £19.50
N832, N833EG
N895 LOADING MOTOR £8.00

NATIONAL
MYN 135V5L REEL MOTOR £13.00
NV300, NV332, NV333, NV340, NV366
VEM0212 MOTOR REEL GEN £30.00
NV730/NV770
VEM0217 REEL MOTOR £19.00
NV7000
MAX13V9LP CAPSTON MOTOR £30.00
NV300, NV332, NV333, NV340, NV366, NV600

ORION
NEVHL, VC150, VC180 REEL MOTOR £13.50
VH201, VH205, VH212, VH250, VH254, VH288, VH3, VH300, VH303, VH312, VH700, VH704, VH708, VH712, VH770, VH774, VH780, VH820, VH844, VH900, VH974, VH1000, VH1204, VH200, VH2004, VH2204, VH3030, VH3050, VH3060, VH4008, VHF2A, VP200, VH2004, VH2204, VH3030, VH3050, VH3060, VH4008, VHF2A, VP200, VR2948, VR2949, VR2956, VR2957

ORION Cont.
NVHL, NVHM LOADING MOTOR £8.00
VH250, VH254, VH288, VH300, VH404, VH412, VH512, 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, VH4020, VH5010, VH5015, VHF2A, VP220, VR2948, VR2949, VR2956, VR2957, VR2966, VR2980, VXL20, VXL25, VXL30

PHILIPS
VR6540 REEL MOTOR £16.00

SAISHO
VR705, VR805 REEL MOTOR £13.50
VR905, VR2000

SAMSUNG
VB510 REEL MOTOR £11.00

SANYO
4-529V-10800 (RM11) REEL MOTOR £6.30
VTC5000, VTC5150, VTC5300, VTC5400, VTC6000, VTC6500
VTC3000 CAPSTON MOTOR £25.00

SHARP
RMOTV 1008GEZZ REEL MOTOR £13.50
VC200, VC381, VC384, VC385, VC386, VC483, VC3300, VC8381, VC9100, VC9300, VC9500, VC9700
RMOTV 1007GEZZ REEL MOTOR £16.00
VC300, VC402, VC471, VC477, VC481, VC482, VC488, VC496, VC500, VC571, VC573, VC581, VC582, VC583, VC584, VC5F3, VC8481, VC8581
VC7822, VCA102 CAPSTON MOTOR £32.00
VCA202, VCA234, VCA602

SONY
BHF 1100D CAPSTON MOTOR £25.00
SLC5, SLC7, SLC37, SL3000

THOMSON
VK300, VK301 CAPSTON MOTOR £21.00
VK302, VK303, VK305, VK3301
VK300, VK302 DRUM MOTOR £19.50
VK303, VK305, VK308, VK3301

TOSHIBA
V55, V57 CAPSTON MOTOR £19.50
V61, V63 LOADING MOTOR £8.00
V71, V73, V74 REEL MOTOR £10.50
V75, V81, V83, V85, V86, V93, V94, V300, V500, V700, DV90
V71, V73, V74 CAPSTON MOTOR £9.50
V75, V81, V83, V85, V700
V86, V93, V94 CAPSTON MOTOR £15.00

CASSETTE HOUSING

GRANADA
VHSDP1 CASSETTE LIFT ASSEMBLY £15.00
VHSYJ2 £24.00

FERGUSON & JVC
3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, 3V49, HRD110, HRD111, HRD120, HRD121, HRD225 £24.00
3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD140, HRD141, HRD150, HRO157, HRD158, HRD160, HRD250, HRD257, HRD455, HRD565, HRD566, HRD725, HRD755 £24.00
8948, 8950, FV10B, FV12L, FV13H, FV14T, FV20B, FV21R, FV22L, FV26, FV395, HRD230, HRD430, HRD530 £24.00
3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRD370 £24.00

ITT
VR3605, VR3905 £24.00
VR3916, VR3926, VR2946, VR3948, VR3976, VR3986, VR3995, VR3997, VR6948 £24.00

NATIONAL
NV730 £31.00

NEC
N830EG, N831EG, N832, N833EG £24.00
N895 £24.00

PHILIPS
CASSETTE LIFT ASSEMBLY 69120366 £15.00
DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, VR6285, 6290, VR6291, 6293, 6362, 6367, 6393, VR6467, 6468, 6470, 6561, 6670, VR6760, 6761, 6870, 6970 £15.00

TELEFUNKEN
VR2970 £24.00

THOMSON
V320, V321, V323, V326, V4200, V4300 £24.00
V342, V343, V352, V353, V360, V364, V368, V4210, V4230, V4260, V4400, V5500, V6000, V8540 £24.00

TOSHIBA
V55, V57 £24.00
V65, V66 £24.00

PANASONIC MODE SWITCHES

NV2000, 2010, 7000, 7200, 7800 (VSS0048) £4.00
NV230, 260, 430, 810, 870, 2300, 4300 (VSS0110) £2.50
NV830 (VSS0091) £3.00
NV300, 333, 340, 366, 688, 777, 778 (VSS0060) £4.00
NVG21, 25, NVH65, NVD80 (VSS0175A) £2.50

ON/OFF MAIN SWITCHES

GRUNDIG
PART NO : 29703-29102
USED ON : C7500, C7500TT, C8500, C8502, C8712, C8714, C8894, M66 190, M66 190/99, M70-195, P40-345, ST66-1602, T55-340, V7722
PRICE : £3.25

ITT
PART NO : 13/1074
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 : CVC40
PRICE : £3.25

MATSUI/SAISHO
USED ON: MATSUI-2190 SAISHO-FST2130TX
PRICE : £3.50

PHILIPS
USED ON : K30, K35, K40, KT3, KT4
PRICE : £1.50

SONY
PART NO : 155466611 (POWER SWITCH 26mm + REMOTE SWITCH)
USED ON : KV1612 MK1, KV1612 MK2, KV1614, KV2052, KV2056, KV2062, KV2066, KV2212, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV2752PE3, KV2756PE3, KX20PS1, KX20PS2, KX27PS1
PRICE : £3.50
PART NO : 155496511 (POWER SWITCH 21mm + REMOTE SWITCH)
USED ON : KV2022, KV2024
PRICE : £3.50
PART NO : 155482011 (POWER SWITCH)
USED ON : KV1810 MK1, KV1810 MK2, KV1820, KV1822, KV2000 MK1
PRICE : £7.50
PART NO : 155496711 (POWER SWITCH 26mm)
USED ON : KV1400, KV1440, KV2040, KV2060
PRICE : £2.00

SONY
PART NO : 155258800 (POWER SWITCH 21mm + REMOTE SWITCH)
USED ON : KV2020
PRICE : £2.50
PART NO : 155277400-21 (FUNCTION SWITCH)
USED ON : KV1612 MK1, KV1612 MK2, KV2052, KV2056, KV2212, KV2215, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV2752PE3, KV2756PE3
PRICE : £0.60
PART NO : 155336300 (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 5381682 (VT63/64)
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 (VHSTJ2), HITACHI (VT3000), ITT (VR3912/VRP3833), JVC (HR2200/3300/3330 HR3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, VR519/610), THOMSON (VK300/305/306/3301), FERGUSON (3V00/3V16/3V22/3V24/3292/8900/8901/8902/8903/8909/8912/8922/8925) £0.30
(CASSETTE LAMP 9V 80mA 310mm WIRES CODE NO: VL01)
BLAUPUNKT, ORION (VH1 2A), NATIONAL (NV2000, NV2010, NV3000, NV8150, 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 (VHSXJ3), ITT (VR3993, VR3994), JVC (HR2650, HR7600, 7610, HR7650, HR7655), TELEFUNKEN (VR530, VR535, VR539, VR550, VR630, VR650), THOMSON (V309, V316, V357, VK309, VK411, TX8000), FERGUSON (3V31, 8941, 8942) £0.50
(CASSETTE LAMP 9V 80mA 310mm SKEQ CODE NO: VLO6)
AUTHENTIC (N850), DECCA (VR8300), GRANADA (VHSTJ3, VHSWJ1, VHSWJ3), ITT (VR3913, 3914, 3963), JVC (HR7200, 7300, 7350, 7700), TELEFUNKEN (VR450, 520, 529, 540, 549, 620, 640, 920, 1920), THOMSON (V4100, VK308, 309, 312, 410), FERGUSON (3V23, 3V29, 3V30, 8923, 8924, 8929, 8930, 8931, 8940) £0.50
(CASSETTE LAMP 9V 80mA 210mm SKEQ CODE NO: VLO7)
GRANADA (VHSAY3), SHARP (VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700) £0.70
(CASSETTE LAMP 5V 115mA CODE NO: VLO8)

NATIONAL LINE OUTPUT TRANSFORMER

TLF 146-11B £19.00
TLF 15542F £26.00
TLF 14568F £26.00
TLF 14567F £26.00
TLF 14715F £27.00
TLF 14749B £20.00
TLF 6609B £23.00

CASSETTE DC MOTORS

6V MOTOR £2.00
9V MOTOR £2.00
12V CW MOTOR £2.00
12V CCW MOTOR £2.00
13.2V CCW MOTOR £2.90

CASSETTE TAPE HEADS

MONO HEAD £0.90
STEREO HEAD £1.10
MINI HEAD £2.30
AUTO REVERSE HEAD £2.60

GRANDATA LTD
K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY, WEMBLEY, MIDDLESEX, ENGLAND
Tel: 081-900 2329 Fax: 081-903 6126

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
1-439-303-00	KV-2064EC, 20PS1, 2082ME7, 2056EC, 2060SA,	
	KV-2062E(ESP)	£22.75
1-439-311-00	KV-1440AEC, 1440AS MK2, CPS-14CD3, CPV-14CD2	
	KTX-1350NF, KTX-1430UB	£22.00
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, 882EC(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-4-208-002	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-3-084-001	TX100	£14.00
06D-3-088-001	TX100	£14.00

GRUNDIG

29201-019-05		£8.00
29201-024-11		£14.00
29201-024-04		£14.00

PHILIPS

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	£18.00
	CPT 2178	
OUTPUT TV MODULE	HM6251 (REF 2370551)	£5.50
	HM6232	£5.50

IDLERS & PULLEYS REPLACEMENTS

AKAI

VS1-2, VS4-5, VS15	FF-REW IDLER	M1327773	£4.50
VS3, 6, 12, 56, 58, 59			
VS1-2, VS4-5, VS15	T-UP IDLER	BV327815	£6.00
VS3, 6, 12, 58, 59			
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 IDLER	PU46381	£4.00
VS9500, VS9800			
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	BR347731	£5.50
VS15, 58			
VS23, 35, 37, 53, 55	CLUTCH	ML373043	£13.00
VS66, 75, VSA77			
VS9700	FF IDLER	BV321761	£3.20
VS9700	REW IDLER	VV321762	£4.25

AMSTRAD

VCR7000	IDLER	150280	£1.50
TVR1, VCR4500	CLUTCH	150873	£3.75
VCR4600, VC5200, VCR9000			
TVR1, VCR4500	GEAR HOLDER	151284	£3.50
VCR4600, VCR5200, VCR9000			
TVR1, VCR4600	REF CLUTCH		£3.50
VCR5200			
VCR6000, VCR6100	CLUTCH	153202	£3.80
VCR4500, VCR9000	CLUTCH		£4.00
VCR4500, VCR4600	MOD KIT	(TAPE CREASING)	£4.50
VCR4700			
MOD KIT TAPE CREASING FOR AMSTRAD			
VCR4500, 4600, 4700			£4.50

FERGUSON

3V00, 3V01, 3V16	T-UP IDLER	PU47752	£4.50
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
3V32, 3V35, 3V36, 3V38, 3V39, 3V49, 8930, 8931, 8940, 8941, 8942			
3V29, 3V30, 3V31	T-UP CLUTCH	PU51380	£2.25
3V32, 8930, 8931, 8940, 8941, 8942			
3V35, 3V36, 3V38	REEL IDLER	PU55374	£2.85
3V39, 3V49, 8943, 8944			
3V35, 3V36, 3V38	T-UP CLUTCH	PU55373	£2.00
3V39, 3V49, 8943, 8944			
3V58, 3V59, 3V64	IDLER ARM	PU58645	£2.25
3V65, FV10, FV11, FV12, FV13, FV14, FV20, FV21, FV22, FV26			
FV30, FV32, FV33, 8950, VC141L			
3V42, 3V43	CLUTCH ASSY	PU55822	£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
3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948			
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
3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909,			
8912, 8922			
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
FVHP622, 710, 711, FVHP720, 721, 722			
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
FVHP420, 520, 530	IDLER		£2.80
FVHP420, 520, 530	TAKE UP IDLER		£3.60
FVHP990	LOADING GEAR		£2.00
VBS3500	REEL DRIVE PULLEY		£5.20
VBS3500	IDLER		£3.00
VBS7000	REW IDLER		£1.20

GOLDSTAR

GHV1221, 1232, 1240	CLUTCH GEAR	435038A	£2.50
GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000			
GHV8200, 8210, 8215, GHVP51, VCP4100, 4130			
GHV1221, 1232, 1240	IDLER		£1.70
GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000			
GHV8200, 8210, 8215, GHVP51, VCP4100, 4130			

HINARI

VXL3, VXL20	REEL IDLER	40000009	£1.50
VXL2	IDLER		£1.50
VXL4, VXL35	IDLER		£2.75
VXL4, VXL35	CLUTCH		£6.50
VXL4, VXL12, VXL25	LIMITER POST		£1.30
VXL30, VXL35, VTV300			
VXL5, VXL6	CLUTCH		£3.75
VXL5, VXL6	GEAR HOLDER		£3.50
VXL7, VXL8, VXL9	CLUTCH		£3.80

HITACHI

VT11-33, VT63-64	CLUTCH ASSY	6879515	£7.50
VT14, 17, 19, 38, 57, 86, 88, 34, 35, 39, 52, 61,			
62, 65, 85, 330, 640, VT16S			
VT120-220, 100, 110	CLUTCH ASSY	6886824	£7.50
111, 113, 115, 118, 120		6886972	
125, 128, 130, 135, 138, 145, 150, 175, 225, 250,			
255, 258, 260, VTL30			
VT8000-8300, 7000	FF-REW IDLER	6413663	£2.80
VT8500-8700			
VT8000-8300, 7000	PLAY IDLER	6414221	£3.60
VT8500-8700			
VT8000-8300, 7000	FF-REW PULLEY	6383531	£0.80
VT8500-8700			
VT9300-9500, 6500	FF-REW IDLER	6681471	£3.30
VT680, 6800, 9700, 9900			
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
VT11-33, VT63-64	FF-REW IDLER	6886971	£1.50
VT14, 16S, 17, 19, 34, VT35, 38, 39, 52, 61, 62,			
VT65, 85, 86, 88, 330, 640			
VT100, 110, 111, 113	FF-REW ARM	6886792	£2.75
VT115, 118, 118, 120, 125, 128, 130, 135, 138, 145, 150			
VT175, 220, 225, 250, 255, 258, 260, VTL30			
VT400, 405, 410, 413	FF-REW ARM	6897094	£1.30
VT414, 415, 418, 420, 425, 426, 428, 430, 431, 435			
VT438, 450, 498, 510, 518, 520, 525, 526, 530, 535			
VT536, 540, 545, 546, 548, 570, 575, 576, 580, 585			
VT588, VTM625, 626, 630, 635, 636, 640, 645, 646, VTS80, 85			
VT400, 405, 410, 413	CLUTCH BASE	6896951	£3.25
VT414, 415, 418, 420, 425, 426, 428, 430, 431, 435			
VT438, 450, 498, 510, 518, 520, 525, 526, 530, 535			
VT536, 540, 545, 546, 548, 570, 575, 576, 580, 585			
VT588, VTM625, 626, 630, 635, 636, 640, 645, 646, VTS80, 85			
VT3000	T-UP IDLER (LARGE)		£4.50
VT3000	REW IDLER		£6.00
VT680, 6500, 6800	FS-BRAKE	6861505	£3.00
VT9700, 9900			

HITACHI TV

OUTPUT MODULE HM 6251			£5.50
OUTPUT MODULE HM 6232			£5.50

JVC

HR330, 3660, 4100	T-UP IDLER SML	PU49280	£5.50
HR7200, 7600, 7650	T-UP CLUTCH	PU53462A	£2.25
HR7655, 7300, 7350, 7610			
HR7200, 7300, 7350	REEL IDLER	PU48967	£2.50
HR7600, 7610, 7650, 7655, 7700			
HR7600, 7610, 7650	ROLLER ASSY	PU49042A	£4.00
HR7655, 7700			
HR3300, 3660, 4100	T-UP IDLER LRG	PU47752	£4.50
HR7200, 7600, 7650	T-UP IDLER	PU51402A	£1.25
HR7655, HRD110, HRD111, HR7300, 7350, 7610, HRD120-121, 225			
HRD110, HRD120-121	T-UP CLUTCH	PU55373	£2.00
HRD225, HRD111			
HRD110, HRD120-121	IDLER ARM	PU55374-3-8	£2.85
HRD225, HRD111			
HRD170, 180, 210, 230	IDLER ARM	PU58465	£2.25
HRD320, 370, 400, 430, 470, 530, 700, 750, 950, 3000			
HRS5000, HRS5500			
HRD455, HRD725	CLUTCH MECH	PU558822	£13.50
HRD140, 150, 157, 158	CLUTCH MECH	PU57658	£11.50
HRD160, 250, 257, 565, 566, 755, HRP50			
HR3300, HR3330	REW IDLER	PU46380	£6.00
HR3660, HR4100			
HRD140, 150, 157, 158	TAKE UP CLUTCH	PU56043-1-4	£2.80
HRD160, 250, 257, 455, 565, 566, 725, 755, HRP50			
HRD140, 150, 157, 158	TAKE UP CLUTCH	PU56044-1-5	£2.80
HRD160, 250, 257, 455, 565, 566, 725, 755, HRP50			

MATSUI

VX730, 735, 750, 755	CLUTCH	850A00005	£6.50
VX810, 820, 850, 880, 990			
VX730, 735, 750, 755	LIMITER POST LEVER		£1.30
VX770, 800, 810, 880	ASSY		
VX990			
VX800A, VX900	IDLER REEL		£1.50
VX800A, VX820	REEL UNIT CLUTCH		£3.50
VX850, VX900	ASSY IDLER		

MITSUBISHI

HS306, 307, 318, 319	GEAR ASSY	522P00201	£6.25
HS400, 410, 710			
HS337, 338, 347, 349	IDLER	552B01701	£6.50
HS411, 412, 421, HSB10, HSB20, HSB30, HSE10, HSE20, HSE30, HSE70			
HS306, 307, 318, 319	IDLER	641C34301	£2.00
HS400, 410, 710			
HS347, 349, 412	IDLER	522B02002	£3.00
HSB10, HSB20, HSB30, HSE10, HSE20, HSE30, HSE70			

MITSUBISHI Cont.

HS337, 338, 411, 421	IDLER	552B01801	£3.50
HS200	TAKE UP IDLER (LARGE)		£4.50
HS200	UNLOADING IDLER		£4.00
HS200	REWIND IDLER		£6.00
HS306, 307, 318, 319	SUPPLY REEL	522A00101	£3.20
HS400, 410, 710	DISK		
HS306, 307, 318, 319	TAKE UP REEL	522A00102	£3.20
HS400, 410, 710	DISK		
HS320	REEL DISK	522C06301	£3.00
HS337, 338, 411, 421	REEL DISK	522P00601	£5.00
HS300, 301, 302, 310	PULLEY	522CD5201	£2.25
HS306, 307, 318, 319	GEAR WHEEL	641D71101	£1.50
HS400, 410, 710			
HS306, 307, 318, 319	GEAR WHEEL	641D71001	£1.50
HS400, 410, 710			

NEC

N830, N831, N832, N833	TAKE UP CLUTCH		£2.25
N830, N831, N832, N833	TAKE UP IDLER		£1.45
N830, N831, N832, N833	REEL IDLER		£2.85
N895	TAKE UP IDLER SMALL		£6.00
N911, N915, N916, N917	REEL DRIVE PULLEY		£5.50
N9012, 9013, 9014, 9016, 9033, 9034, 9054, 9055, 9066, 9110,			
N9510, 9520, 9530, 9610			

NATIONAL

NV322, NV600, NV688,	IDLER UNIT	VXP0463	£2.75
NV777, NV788, NV332, AG6100, 6200, 6800, 6810			
NV300, NV333, NV340	IDLER ARM	VXL0997	£3.60
NV366			
NV300, NV330, NV333	IDLER UNIT	VXP0401	£0.75
NV340, NV366			
NV300, NV330, NV333	PLAY IDLER	VXP0433	£2.75
NV340, NV366, NV8620			
NV300, NV332, NV333	ACTION GEAR	VDG0016	£0.60
NV340, NV366, NV600, NV777, NV788, NV2000, NV2010, 3000, 7000			
AG6010, AG6015			
NV333, NV688, NV2000	LOADING GEAR	VXP0325	£2.00
NV3000, NV7800			
NV300, NV332, NV333,	INTERMEDIATE GEAR	VXG0017	£0.65
NV340, NV366, NV600, NV777, NV788, NV2000, NV2010, 3000, 7000,			
AG6010, AG6015			
NV330, NV333, NV340	CAM GEAR	VXG0158	£1.00
NV366, NV777, NV788			
NV230, NV250, NV260	IDLER ARM	VXP0521	£1.70
NV280, NV370, NV380, NV430, NV450, NV460, NV465, NV470, NV480,			
NV630, NV650, NV730, NV780, NV810, NV830, NV850, NV870,			
NVG7, NVG9, NVG10, NVG11, NVG12, NVG14, NVG15, NVG16, VG18			
NVG30, NVG400, AG1000, AG1200, 1500, 1810, 2100,			
AG2200, NVH65, NVH70			
NV370, NV430, NV870,	CAM GEAR	VDG0200	£1.20
NV730, NV830, NV850, NVG10, NVG12, NVG18			
NV730, NV770	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	IDLER UNIT	VXP0245	£0.90
NV8400, 8600, 8610, 8620			
NV8200, 8400, 8600	PLAY IDLER	VXP0243	£0.90
NV8610, 8620			
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	IDLER	VXP0523	£3.50
NV780, NV830			
NV370	CLUTCH GEAR	VXP0595	£1.00
NVG7, NVG11, NVG12	WORM WHEEL	VXP0691	£1.50
NVG14, NVG15, NVG18, NVG30, NVG120, NVG130, NVG400, NVH70			
NV2000, 2010, 3000	LOADING GEAR	VDG0035	£0.60
NV7000, 7200, 7800, 8050			
NV230, NV250, NV370	LOADING GEAR	VXP0520	£1.50
NV430, NV450, NV460, NV630, NV730, NV770, NV780, NV810,			
NV830, NV890, NVG7, NVG10, NVG12, NVG15, NVG30, NVG120			
NVG130, NVG400, NVH70, AG1000			
NV230, NV250, NV260	CLUTCH GEAR		£2.50
NV280, NV430, NV450, NV730, NV770, NV810, NV870, NV890,			
NVG7, NVG10, NVG11, NVG12, NVG14, NVG15, NVG18, NVG30,			
NVG120, NVG130, NVG400, NVH70, AG1000			
NV230, NV250, NV260	LIMITER ROLLER		£1.50
NV280, NV300, NV333, NV340, NV366, NV370, NV430, NV450, NV460			
NV465, NV630, NV650, NV777, NV780, NV788, NV810, NV830, NV850			
NV870, NV890, NV2000, NV2010, 7200, 7800, NVG7, NVG10, NVG12,			
NVG14, NVG15, NVG18, NVG30, NVG120, NVG130, NVG400, NVH70, AG1000			

ORION

MULTIPLE MODELS	IDLER	850A200004	£3.50
MULTIPLE MODELS	IDLER	850A200005	£6.50
VH1, VH2A	IDLER		£1.20
VH1, VH2A	IDLER		£1.20
VH1, VH2A	DRIVING GEAR		£0.60
VH1, VH2A	INTERMEDIATE GEAR		£0.65
VC150, VC180, VH200	IDLER		£1.50
VH201, VH205, VH212, VH250, VH254, VH288, VH300, VH303, VH312,			
VH404, VH555, VH700, VH704, VH708, VH712, VH780, VH844, VH900, VH3, VH33			

SAISHO

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	IDLER	143-0-662T-14730	£5.00
VHR1300, 1500			
VTC5000, 5150, 6000	FF-REW IDLER	143-0-741T-20001	£3.00
VTC6500, VTCM10, M11, M20, M21, M30, M31, M50			
VTC9100, VTC9300	IDLER	143-0-551T-01400	£1.20
VTC9300	FF ROLLER ASSY	143-0-547T-00200	£2.20
VTCM10, M11, M20, M21	REEL DRIVE PULLEY	143-0-662T-10350	£5.00
VTCM30, M31, M50			
VHR2100, 2300, 2500	IDLER	6130374899	£5.00
VHR2700			
VTC5000, 5150, 6000	PULLEY	143-0-662T-01201	£5.20
VTC6500			
VTCM10, M11, M20, M21	PULLEY	143-0-662T-10350	£5.50
VTCM30, M31, M50			
VHR3100, 3300, 3310	REEL DRIVE	143-0-662T-15621	£4.25
VHR3400, 3700, 3800	ROLLER		
VHRD500, VHRD700			
VPR5800, VTC5300	LOADING ROLLER	143-0-661T-03800	£1.00
VTC5400			
VTC3000	FWD LIMITER		£3.50
VTC3000	IDLER		£5.00

SHARP

	IDLER	N1DL0005GEZZ	£1.50
	IDLER	NIDL0006GEZZ	£1.50
VC600, 651, 681, 682	IDLER ASSY	NPLYV0107GEZZ	£6.15
VC684, 685, 693, 699, 700, 783, VC6FR, VC6V3			
VC7300, VC7700, 7750	PLAY IDLER KIT	NPLYV0041 + NDA1V1007	£5.00

GRANDATA LTD

K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY, WEMBLEY, MIDDLESEX, ENGLAND

Telephone: 081-900 2329 Telex No: 932 885 (Sunmit)

Fax: 081-903 6126

Access & Visa Card accepted. Open Monday to Saturday.

PLEASE PHONE US FOR TYPE NOT LISTED HERE AS WE ARE HOLDING 5000 ITEMS AND QUOTATIONS ARE GIVEN FOR LARGE QUANTITIES.

Please send £1 P&P and VAT at 17½%. Govt, Colleges, etc. Orders accepted. Quotations given for large quantities. Please allow 7 days for delivery. All brand-new Components. All valves are new and boxed. Prices quoted are subject to stock availability and may be changed without notice.

MATCHLINE D2MAC/PAL SATELLITE RECEIVER

STU 901

£399 INC VAT
TRADE DISCOUNT AVAILABLE
ADD £10 FOR POST & PACKING
LIMITED QUANTITY OFFER
THIS OFFER IS ONLY AVAILABLE THROUGH A
SATELLITE SOLUTIONS AUTHORISED RETAILER
ALSO OPERATES AS D2 MAC DECODER FOR USE WITH
ECHOSTAR, CHAPARRAL, DRAKE, PALCOM Etc

RC | D2-MAC | EURO-CRYPT | 16 : 9 | PAL | STEREO | NOISE REDUCT | 2 DISH INPUTS | POLAR CONTROL | DUAL BAND | PARENT LOCK | AUDIO CINCH | A/V CON | S-VHS

PRODUCT PROFILE

- D2-MAC/PAL satellite receiver.
- 98 preselections.
- Menu control for user-friendly operation.
- Full remote control.
- Parental lock.
- Eurocrypt scrambling/conditional access system.
- Internal Smart Card reader for conditional access.
- Headphone Connection.
- Dual-band LNC Switching.
- D2-MAC processing includes :
  - Digital Hifi sound processing
  - Automatic language selection
  - Digital video processing compatible with future High Definition TV broadcasts (HD-MAC)
  - Wide Screen picture processing
  - TXT reception.
- PAL processing includes :
  - 6 mono sound channels (main and multilingual)
  - 3 stereo sound channels
  - PAL encoding.

Various connection possibilities :

- 2 Euroconnectors for TV and Video.
- S-VHS output.
- 2 Dish antenna inputs.
- Magnetic polarizer control.
- Audio outputs CINCH.
- Terrestrial antenna loop through.
- PAL Baseband output.

Philips Consumer Electronics

PHILIPS

PHILIPS

SATELLITE SOLUTIONS 35 QUARRY PARK CLOSE NORTHANTS 0604 670900

ELC EAST LONDON COMPONENTS
AUDIO TELEVISION VIDEO
COMPONENTS AT VERY KEEN PRICES
TEL: 081-472 4871 FAX: 081-503 5926

REMOTE CONTROLS FROM £9.99

IDLER TYRES 50p

VIDEO HEADS FROM £6.99

Over 200 models at very attractive prices.

AKAI, AMSTRAD, FERGUSON, FISHER, GOLDSTAR, HINARI, HITACHI, LOGI, MATSUI, ORION, PANASONIC, SAISHO, SHARP AND MANY MORE

VIDEO SPARES

3V29 TAKE UP IDLER	£1.00p
3V29 F/F REW IDLER	£2.60p
3V59/65 FV10/14 IDLER	£1.50p
3V23 LOADING ROLLER BAR	£3.99p
SHARP 0005 & 0006	£1.95p
SHARP VC651 ASSEMBLY	£6.99p
VT11/14/17 IDLER	£1.95p
VT11 CLUTCH ASSEMBLY	£6.99p
VT100/225/260 IDLER	£2.75p
NEC 9013 IDLER	£4.99p
SANYD VHR3300 IDLER	£3.99p
AKAI VS105/250 CLUTCH ASSEMBLY	£11.99p
SAISHO VR380 CLUTCH	£4.99p
MITSUBISHI H5337 F/F IDLER	£2.70p
ALBA SENTRA PULLEY	£1.35p
MATSUI LIMITER POST	£1.25p
PANASDNIC NV370 IDLER	£1.95p
FISHER 615 IDLER	£3.50p
FISHER GEAR ASSEMBLY	£4.50p
AMSTRAD PINCH WHEEL MDD KIT	£5.99p
UNIVERSAL TRIPLER	£4.99p
UNIVERSAL TRIPER WITH FDCUS	£7.99p
HITACHI MODULE HM6251	£5.99p
TENSION BAND FOR MOST MOD. FROM	££1.99p
CIRCUIT PROTECTOR ICP	80p
TX10 FOCUS UNIT	£7.99p
PHILIPS BACK-UP BATTERY	£1.50p
ALBA BATTERY .1F 5.5V	£2.50p
TV SWITCHES FOR MOST MODELS FROM	£1.00p
SONY FUNCTION SWITCH	£1.00p
SCART TO SCART LEAO	£3.99p

VIDEO BELT KITS

HITACHI	
VT-11/33	£1.30p
VT-52/65	£1.75p
VT-110/135	£1.80p
FERGUSON	
3V22	£1.80p
3V29/30	£1.00p
3V42/43	85p
3V64.65	£1.00p
FISHER	
FVH 615/725	£1.10p
FVH 905/910	£1.10p
SANYO	
VHR1300	£2.15p
VHR3300	£2.05p
AKAI	
VS2/5FG	£1.00p
VS105/250	£6.99p
GRUNOIG	
VS180	£1.45p
VS300	£1.90p
VS380	£1.75p
HINARI	
VXL3-20	£1.25p
VXL4-35	£1.50p
MITSUBISHI	
HS306/307	£1.75p
SHARP	
VC651/681	£1.25p
VC381	£1.00p
VC9300	£1.50p
TV L.O.P.T.	
TX90 White	£18.99p
TX100 Green	£17.99p
HINARI 4/5	£16.99p
FIDELITY 20"	£12.99p
HITACHI	£19.99p
KV2704/5	£22.99p
KV2752	£22.99p

ELC EAST LONDON COMPONENTS
63 PLASHET GROVE, EAST HAM,
LONDON E6 1AD. TEL: 081-472 4871
FAX: 081-503 5926 **OPEN 9AM TO 7PM.**

two minutes walk from Upton Park Tube Station

PLEASE PHONE US IF WHAT YOU NEED IS NOT LISTED AS WE HOLD THOUSANDS OF ITEMS IN STOCK
ADD £1 P/P ADD 17.5% VAT
ALL GOODS DESPATCHED SAME DAY
PRICE SUBJECT TO CHANGE WITHOUT NOTICE
VISA ACCESS ACCEPTED. MIN ORDER £5.00

VIDEO SERVICE KITS FROM	£4.99p
3V35/3V45 CASSETTE HOUSING	£24.99p
VT33/VT65 CASSETTE HOUSING	£24.99p
VR6467 CASSETTE HOUSING	£17.99p
3V35 CAPSTAN MOTOR	£22.99p
VT11/VT33 CAPSTAN MOTOR	£24.99p

AN3821K	795p
AN3822K	795p
AN5435	250p
AN5900	150p
AN7161	320p
AN7171K	395p
AN7172K	350p
AN7178	275p
BA718	199p
BA6109	180p
BA6208	199p
BA6209	199p
BA6219	250p
BA6222	199p
BA6238	199p
BA6239	250p
BA6229	250p
BA6259	300p
CNX62A	300p
HA1377	199p
HA1392	230p
HA1394	250p
HA1397	250p
HA11225	160p
HA11235	160p
HA11423	210p
HA11711	650p
HA11724	800p
HA13001	199p
HA13108	350p
HA13118	299p
HA13119	299p
HA13403V	550p
LA4270	275p
LA4440	240p
LA4445	250p
LA4460	160p
LA4461	160p
LA4465	299p
LA4466	299p
LA4475	399p
LA4476	399p
LA4495	399p
LA4496	399p
LA4500	230p
LA4505	260p
LA4508	260p
LA4700	399p
LA7520	300p
LA7530	400p
LA7800	180p
LA7801	195p
LA7820	299p
LA7830	225p
M293B1	695p
M490BB1	850p
M491BB1	850p
M54543L	400p
M54544L	400p
M54545L	400p
M54548L	450p
M54549L	450p
M54644L	400p
M54648L	450p
M54649L	400p
MB3730	200p

MB3732	300p
STK441	700p
STK430	500p
STK433	490p
STK459	600p
STK463	780p
STK465	750p
STK0029	400p
STK0040	550p
STK2025	750p
STK2129	699p
STK2250	800p
STK3062	650p
STK4121	699p
STK4131	650p
STK4132	699p
STK4141	650p
STK4142	750p
STK4151	680p
STK4152	900p
STK4161	799p
STK4162	799p
STK4171	850p
STK4172	899p
STK4181	899p
STK4191	999p
STK4192	999p
STK4372	600p
STK5332	350p
STK5333	699p
STK5338	399p
STK5372	399p
STK5211	699p
STK5325	650p
STK5315	650p
STK5434	699p
STK5422	650p
STK5466	850p
STK5476	600p
STK5481	499p
STK5490	550p
STK7226	850p
STK7308	475p
STK7348	450p
STR441	650p
STR451	499p
STR50103	499p
SR2M	80p
STR4211	599p
STR40090	595p
STR44115	750p
STR5412	450p
STR6020	450p
STR50020	650p
STR54041	550p
STR58041	550p
STR59041	650p
STR01806	599p
STR01816	599p
SAA1251	400p
SAA1291	900p
SAA1294	1250p
SAA5000	250p
TA7193	400p
TA7240	260p

TA7241	260p
TA7270	250p
TA7271	250p
TA7272	260p
TA7274	260p
TA7280	299p
TA7281	275p
TA7299	399p
TA8201	350p
TA8205	395p
TA8210	350p
TA8214	350p
TA8215	390p
TA8216	590p
TEA2018A	140p
TDA1044	275p
TDA1170	150p
TDA1515	250p
TDA1908A	100p
TDA2003	100p
TDA2005	130p
TDA2030	130p
TDA2270	340p
TDA2577	200p
TDA2579	250p
TDA2600	575p
TDA3560	350p
TDA3561	350p
TDA3562	350p
TDA3565	300p
TDA3651	200p
TDA3654	199p
TDA4500	395p
TDA4501	450p
TDA4503	400p
TDA4505	395p
TDA4510	375p
TDA4600	200p
TDA8170	300p
TDA8180	500p
TDA8190	300p
UPC1031	180p
UPC1185	400p
UPC1188	399p
UPC1230	210p
UPC1225	220p
UPC1277	240p
UPC1278	240p
UPC1288	250p
UPC1318	350p
UPC1363	199p
UPC1365	299p
UPC1378	210p
UPC1394	190p
UPC1420	525p
TRANSISTORS	
TIPL791A	130p
BUT11AF	120p
BUT11A	85p
BUT56A	120p
BU508AF	100p
BU508DF	130p
S2000AF	150p
S2055AF	150p
SG613	850p
SG264A	550p
2SA473	35p
2SA672	30p
2SA673	20p
2SA677	60p
2SA683	25p
2SA684	40p
2SA697	45p
2SA715	35p
2SA720	20p
2SA722	40p

2SA-726	25p
2SA-733	20p
2SA-748	90p
2SA-765	300p
2SA-769	130p
2SA-771	130p
2SA-7/7	50p
2SA-794	60p
2SA-798	55p
2SA-817	25p
2SA-841	40p
2SA-844	15p
2SA-861	50p
2SA 872	20p
2SA-893	15p
2SA-896	35p
2SA-899	60p
2SA-900	35p
2SA-905	20p
2SA-915	30p
2SA-916	30p
2SA-917	35p
2SA-921	10p
2SA-940	50p
2SA-950	25p
2SA-958	70p
2SA-962	60p
2SA-964	65p
2SA-965	25p
2SA-966	25p
2SA-968	70p
2SA-970	15p
2SA-984	30p
2SA-985	65p
2SA-992	30p
2SA-999	20p
2SA-1015	20p
2SA-1016	20p
2SA-1020	30p
2SA-1048	20p
2SA-1060	90p
2SA-1062	125p
2SA-1094	190p
2SA-1095	275p
2SA-1102	180p
2SA-1104	200p
2SA-1106	200p
2SA-1110	60p
2SA-1123	40p
2SA-1141	200p
2SA-1142	65p
2SA-1145	60p
2SA-1146	190p
2SA-1147	190p
2SA-1156	60p
2SA-1180	200p
2SA-1220	50p
2SA 1232	175p
2SA 1262	65p
2SA-1265	150p
2SA-1282	35p
2SA-1302	299p
2SB-507	100p
2SB-509	100p
2SB-511	100p
2SB-1016	80p
2SB-512	100p
2SB-514	100p
2SB-527	40p
2SB-528	40p
2SB-531	200p
2SB-534	200p
2SB-536	60p
2SB-537	60p
2SB-544	60p
2SB-545	150p
2SB-546	70p

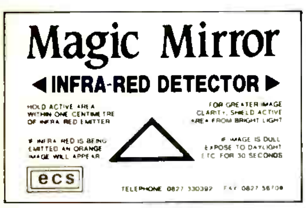
2SB548	40p
2SB-554	350p
2SB-557	300p
2SB-558	300p
2SB-560	35p
2SB-561	20p
2SB-562	35p
2SB-564	70p
2SB-566	110p
2SB-568	40p
2SB-595	80p
2SB-596	75p
2SD1548	550p
2SB 631	40p
2SB-632	40p
2SB-633	50p
2SB 641	20p
2SB-643	20p
2SB-644	25p
2SB 647	30p
2SB 648	55p
2SB0649	40p
2SB-673	80p
2SB0681	250p
2SB-686	120p
2SB-688	130p
2SB-695	325p
2SB 705	200p
2SB-716	30p
2SB-717	70p
2SB-718	70p
2SB-738	25p
2SB-744	60p
2SB-755	310p
2SB-757	350p
2SB-764	25p
2SB-772	45p
2SB-792	45p
2SB-793	35p
2SB-817	200p
2SB 837	60p
2SB-856	60p
2SB 857	60p
2SB 861	60p
2SB-886	55p
2SC-789	50p
2SC-790	80p
2SC 815	15p
2SC 828	25p
2SC-829	20p
2SC-839	25p
2SC-929	20p
2SC 941	25p
2SC 945	20p
2SC-959	65p
2SC-984	40p
2SC 998	300p
2SC-1162	35p
2SC 1172	150p
2SC 1173	45p
2SC-1195	200p
2SC-1212	60p
2SC-1213	60p
2SC-1214	40p
2SC-1222	20p
2SC-1226	75p
2SC-1306	75p
2SC-1317	25p
2SC-1318	25p
2SC-1327	20p
2SC-1328	25p
2SC-1344	30p

2SC-1345	30p
2SC-1359	20p
2SC-1368	40p
2SC-1382	40p
2SC-1383	35p
2SC-1384	35p
2SC-1393	30p
2SC-1398	70p
2SC-1399	60p
2SC-1403	250p
2SC-1413A	240p
2SC-1417	20p
2SC-1445	250p
2SC-1446	60p
2SC-1447	75p
2SC-1454	320p
2SC-1473	30p
2SC-1474	45p
2SC-1475	45p
2SC-1507	50p
2SC-1509	45p
2SC-1514	40p
2SC-1520	85p
2SC-1550	60p
2SC-1567	60p
2SC-1568	60p
2SC-1573	40p
2SC-1577	800p
2SC-1584	600p
2SC-1627	30p
2SC-1667	150p
2SC-1669	85p
2SC-1670	85p
2SC-1675	20p
2SC-1677	80p
2SC-1708	20p
2SC-1722	60p
2SC-1756	40p
2SC-1758	30p
2SC-1760	85p
2SC-1775	20p
2SC-1815	15p
2SC-1819	50p
2SC-1845	20p
2SC-1846	45p
2SC-1848	45p
2SC-1875	260p
2SC-1890	20p
2SC-1906	30p
2SC-1909	250p
2SC-1913	100p
2SC-1914	30p
2SC-1922	275p
2SC-1923	20p
2SC-1941	40p
2SC-1942	190p
2SC-1945	350p
2SC-1969	160p
2SC-1980	25p
2SC-1986	60p
2SC-2003	25p
2SC-2009	60p
2SC-2022	60p
2SC-2026	45p
2SC-2057	25p
2SC-2068	50p
2SC-2073	50p
2SC-2120	15p
2SC-2153	40p
2SC-2229	25p
2SC-2230	30p
2SC-2236	30p

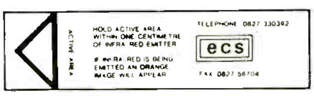
2SC 2238	60p
2SC-2240	25p
2SC-2274	30p
2SC 2275	50p
2SC 2278	75p
2SC-2320	25p
2SC-2335	120p
2SC-2371	45p
2SC 2427	80p
2SC-2440	70p
2SC-2458	30p
2SC-2482	40p
2SC-2500	30p
2SC-2501	85p
2SC-2502	90p
2SC-2537	450p
2SC 2546	20p
2SC-2550	70p
2SC-2555	150p
2SC-2564	230p
2SC-2565	260p
2SC-2570	50p
2SC-2575	25p
2SC-2577	125p
2SC-2579	130p
2SC-2580	175p
2SC-2581	200p
2SC-2582	40p
2SC-2603	20p
2SC-2611	40p
2SC-2631	40p
2SC-2634	40p
2SC-2660	85p
2SC-2688	50p
2SC-2753	50p
2SC-2781	50p
2SC-2785	50p
2SC-2791	325p
2SC-2792	275p
2SC-2944	175p
2SC-3078	40p
2SC-3156	325p
2SC-3179	200p
2SC-3182	250p
2SC-3284	175p
2SC-3298	120p
2SC-3506	250p
2SC-3281	299p
2SD-198	180p
2SD-200	210p
2SD-234	40p
2SD-235	40p
2SD-288	80p
2SD-299	160p
2SD-313	40p
2SD-315	75p
2SD-325	45p
2SD-331	80p
2SD-400	20p
2SD-401	50p
2SD 414	40p
2SD-421	60p
2SD-424	350p
2SD-426	300p
2SD-427	300p
2SD-428	300p
2SD 438	45p
2SD-461	100p
2SD-468	25p
2SD 471	30p
2SD-476	60p
2SD-478	100p

2SD-523	150p
2SD-525	70p
2SD-526	70p
2SD-560	50p
2SD-570	40p
2SD-571	30p
2SD 592	20p
2SD-600	80p
2SD-612	40p
2SD-613	70p
2SD-856	80p
2SD-636	25p
2SD 637	20p
2SD-639	25p
2SD 641	310p
2SD-666	25p
2SD-667	25p
2SD-669	40p
2SD-687	60p
2SD-716	120p
2SD-718	130p
2SD-721	150p
2SD-725	350p
2SD-745	250p
2SD-748	150p
2SD-761	50p
2SD-773	30p
2SD-781	30p
2SD-788	30p
2SD-789	25p
2SD-792	340p
2SD-794	60p
2SD-822	400p
2SD-836	85p
2SD-837	80p
2SD-1047	200p
2SD-845	250p
2SD-850	250p
2SD-859	100p
2SD-863	70p
2SD-869	320p
2SD-870	320p
2SD-871	320p
2SD-880	40p
2SD 882	70p
2SD-898B	260p
2SD-917	180p
2SD-951	175p
2SD-982	80p
2SD-985	80p
2SD-1128	80p
2SD-1134	80p
2SD-1135	90p
2SD-1138	60p
2SD-1153	50p
2SD-1207	50p
2SD-1265	100p
2SD-1267	140p
2SD-1273	100p
2SD-1275	125p
2SD-1276	125p
2SD-1397	200p
2SD-1398	170p
2SD-1426	275p
2SD-1427	275p
2SD-1432	400p
2SD-1439	200p
2SD-1441	200p
2SD-1453	170p
2SD-1497-02	520p
2SD-1497-06	520p
2SJ-50	425p

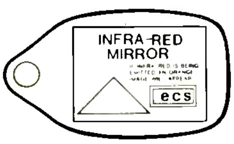
◀INFRA-RED DETECTOR▶



IR 1 STANDARD SIZE MIRROR



IR 2 SPATULA MIRROR



IR 5 CREDIT CARD SIZE

IR 6 KEY FOB

ALL ONE PRICE £9.00 inclusive of VAT FREE POST & PACKING

OR ANY TWO for £16 including VAT OR ANY THREE FOR £20 including VAT

DISCOUNTS CONSIDERED ON OTHER QUANTITIES. RING FOR DETAILS

Electronic Consultant Services

6 NETHERSOLE STREET, POLESWORTH, TAMWORTH. B78 1EE
Phone: (0827) 330392; Fax: (0827) 331041

EXPORT ENQUIRIES INVITED

P.V. TUBES

104 ABBEY STREET
ACCRINGTON, LANCS
BB5 1EE
☎ 0254 236521/232611
FAX 0254 395361
24 Hr Answering Service

SEND LARGE S.A.E. FOR TRADE CATALOGUE

SMILE ITS SUMMER

ONE OF THE **LONGEST ESTABLISHED** MAIL ORDER SUPPLIERS, WE CONTINUE TO GIVE **FAST, FAIR** AND **EFFICIENT SERVICE.** WE HAVE STOCKS OF

- ★ TELEVISION COMPONENTS
- ★ VIDEO COMPONENTS
- ★ REMOTE CONTROLS
- ★ CABLES, LEADS, PLUGS etc
- ★ AERIALS AND ACCESSORIES
- ★ HOME SECURITY PRODUCTS

STOP PRESS:-
NOW IN STOCK
AMSTRAD FX6000AT FAX MACHINE WITH ANSWERPHONE
£485 + VAT

TRUST US!!
(ASK FOR FULL BROCHURE)

BRAND NEW TV'S + VIDEOS

e.g. 14" REMOTE CONTROL TV	£125 + VAT
TWIN SPEED R/C VIDEO REC	£174 + VAT
10" MAINS/BATT CTV R/C	£140 + VAT
21" MULTISYSTEM R/C TV	£222 + VAT

AND NOW SATELLITE SYSTEMS

WE HAVE A FULL RANGE OF FIXED AND MOTORISED SYSTEMS. ASK FOR FULL LIST AT TRADE PRICES — INCLUDES LNB'S, DISHES, MOUNTS, RECEIVERS, ACTUATORS, POLORISERS etc.

e.g. AMSTRAD SRD 600 (D2 MAC)	£319 + VAT
PACE SS920 (D2 MAC)	£245 + VAT
1.2db LNB	£45 + VAT
RG6 CABLE (100M)	£24.95 + VAT

CALLERS WELCOME AT TRADE COUNTER MON-FRI 9-5pm SAT 9-4pm

TELEVISION

A Digital Future

While the European Commission continues with the sorry saga of trying to get agreement over the use of MAC for satellite TV broadcasting in Europe the industry itself seems to be looking and working towards the next generation of TV systems and equipment. The EC effort doesn't seem to be able to make any convincing progress. Apparently some forty major European companies, broadcasters and satellite operators have at last agreed in principle to the wording of a memorandum of understanding. They've got that far after months and months of haggling and discussion. The agreement – to adopt D2-MAC and go on to HDMAC – might be implemented if the Commission is able to provide some £590m of funds to help pay for the cost of installing MAC equipment. Its ability to do so depends on achieving the unanimous approval of the EC governments to this expenditure. This seems unlikely to occur. A majority of finance ministers have attacked the proposal while the UK's technology minister Edward Leigh has commented that the figure is "totally unacceptable". One wonders why the EC persists. The industry is half-hearted, and governments are unwilling to agree to the expenditure. But the EC is one of those lumbering, monolithic entities that once set in motion is hard to control let alone stop.

Meanwhile increasing research effort is being put into digital TV systems. Both the BBC and the ITC are progressing along this path. They are two of twenty five partners in the European digital terrestrial television broadcasting (dTTb) consortium. The BBC recently demonstrated compressed digital HDTV transmission via satellite and is playing a leading role in the development of digital communications technology under the RACE programme. Writing in the latest issue of the ITC's quarterly magazine *Spectrum* Gary Tonge, the ITC's Controller of Engineering, describes the progress being made with the SPECTRE (Special Purpose Extra Channels for Terrestrial Radiocommunications Enhancements) programme. This project is being carried out by National Transcommunications Ltd. under contract to the ITC. It was started by the IBA in 1988 as an investigation into the possibility of using modern modulation methods to increase the usefulness of the u.h.f. TV spectrum. More recently the objective has changed to proving the feasibility of a digital terrestrial TV broadcasting system.

As always, one major problem is how to move from the present broadcasting standard to a future one in a manner that causes the minimum disruption to viewers. The proposal here is to use simulcasting. The four existing TV channels plus Channel 5 if appropriate would be broadcast simultaneously with current transmissions but using a high-quality, widescreen format. Some frequency planning studies already carried out indicate that the u.h.f. frequencies required for the purpose would be available in most, but not all, parts of the UK. Because the average power levels required for the digital transmissions are significantly lower, while such transmissions can have a high immunity to interference, they can be squeezed in where extra PAL transmissions would be impossible. Viewers would be encouraged to buy a digital receiver or a dual-standard one when they renew their sets. It's estimated that the simulcast period would last for about fifteen years, at the end of which time few PAL sets would remain in use. It worked with the 405/625 changeover, it could with digital TV.

In addition to the use of a more efficient technology for terrestrial HDTV transmissions the digital approach offers other advantages. Depending on the resolution required, a u.h.f. frequency slot could be used to carry several channels, while the digital standard could be made compatible with developments in digital VCR and disc technology.

All this remains in the experimental stage at present, but NTL has built and demonstrated modulators and demodulators (this work was completed at the end of last year) and is carrying out field tests of the system at the Stockland Hill and Beacon Hill transmitters. At a conference held in Mexico this April broadcasters from Europe, the USA, Japan and other regions agreed to co-ordinate their studies on digital terrestrial TV with a view to achieving optimum standardisation. The target timescale is for CCIR approval of a standard for the USA in 1995 (the FCC is due to approve a US HDTV standard, which will almost certainly be digital, in 1993 for implementation in 1998) and for Europe in 1998. As Dr. Tong points out, it usually takes five-ten years from the agreement of a standard to its application. Thus European terrestrial digital TV is not likely to be available for a decade or so.

The EC's MAC efforts relate to satellite TV of course, and satellite MAC could coexist with terrestrial digital TV. But since the future obviously lies with digital TV there seems to be little point in investing in MAC. MAC was of course the IBA/ITC's baby: the ITC is now leading the way into the post-MAC era.

EDITOR
John A. Reddihough

EDITORIAL ASSISTANT
Tessa Winford

Please note that the telephone numbers below are for contact with the advertisement departments. Editorial enquiries should be sent to the editor at the address given on page 693 or faxed to 081 652 8956.

ADVERTISEMENT MANAGER
Jan Thorpe
081 652 8114

SALES MANAGER
Shona Finnie
081 652 8115

CLASSIFIED SALES EXECUTIVE
Pat Bunce
081 652 8339
Fax 081 652 8931

ADVERTISING ADMINISTRATION
Kathy Lambart
081 652 8116

ADVERTISING PRODUCTION
Brian Chapman
081 652 8681
Fax 081 652 8917

PUBLISHER
Robert Marcus
081 652 3930

READER HELPLINE
For help if you have difficulty obtaining *Television* phone 081 652 8620

SUBSCRIPTION ENQUIRIES
0444 440 421

SUBSCRIPTION HOTLINE
24-hour subscription ordering with credit card number phone 0789 200 255

COVER PHOTO
This month's cover photograph shows the Finlux 3000 chassis: see servicing article on pages 729-731.

REED BUSINESS PUBLISHING

TV Fault Finding

Reports from Eugene Trundle, J. Armagh, John Edwards, John Hepworth, Brian Storm, Mike Leach, Roger Burchett, Joe Cieszynski and Michael Dranfield

Hitachi C14P216 and C14P218

The following two faults have cropped up several times now. For failure to start up (stuck in the standby mode) check R902 and R903 (both 82kΩ) in the power supply. For loss of on-screen displays check whether R008 (470kΩ) is open-circuit or dry-jointed. **E.T.**

Hitachi G6P Chassis

The on-board controls worked all right but there was no response at all to remote control commands. The handset emitted the right control pulses, and a very convincing pulse train was present at pin 15 of the control microcomputer chip. It took us some time to discover that L1201 in the IR preamplifier circuit was open-circuit. Normal operation was restored when L1201 had been replaced – but there was no discernible difference in the data bursts at pin 15 of the micro! **E.T.**

Sanyo CBP2145

For the first ten minutes there were no signals and only channels 3 and 4 could be selected. During the period of the fault there was ripple on the 5V line. Replacing C395 (100μF, 16V) restored the signals but they were noisy with slight lack of height. The fault again cleared after ten minutes. This time replacement of C397 (100μF, 16V) provided a cure. These sets seem to be becoming noted for the failure of 100μF, 16V capacitors to work from cold. **J.H.**

Hitachi NP8CQ Chassis

As there was no sound I replaced the HA1124A intercarrier sound/audio amplifier chip IC401. But I'd jumped to an over-hasty conclusion – there was still no sound. The cause of the fault was dry-joints at pins 7 and 8 of the chopper transformer T901. Note that this is the chassis fitted in the **Osaki P60G** that E.T. mentioned in the May issue. **J.H.**

Murphy CTV3500 etc

In the May issue M.Dr. mentioned coming across a faulty standby transformer in one of these sets. This is in fact one of the model's most notorious faults. It's actually a **Cathay** chassis, which is also used in the **Osaki** Model P22G, the **Phase** Model PH20567 and the **Susumu** Models FX14S and FX1400R. Spares can be obtained from Headland Electronics, Water Lane, Eggborough, Goole, North Humberside DN14 0PN (0977 661 223). **J.H.**

Bush 2020

The TDA3562A colour decoder chip used in this set has been mentioned in these pages several times recently. It's the Telefunken version. You can fit other makes such as Philips if R513 is changed from 180kΩ to 68kΩ and R515 from 120kΩ to 150kΩ. If you fit a TFK chip later the values of these resistors must be restored to the original ones.

An interesting fault occurs when R419 (470kΩ, 0.5W) goes open-circuit: you get a vertical black line on the screen, two inches from the right-hand side. This resistor is in the line flyback pulse feedback path to the TDA2579 timebase generator chip.

If the set jumps into and out of standby when a channel change or adjustment is being made change the MDA2061 EEPROM chip IC2. **J.H.**

Panasonic TX24A1 (Alpha 2 Chassis)

The allegations against this set were of intermittent flashing and going off. Naturally it worked perfectly until it was returned to the customer's house, whereupon it displayed "speckled" white bands like mains interference, the colour flashed on and off and it finally lapsed into standby. Back at the workshop I removed Q802 to prevent the set switching off. The fault was clearly evident and because of the apparent arcing I changed the line output transformer. This failed to improve matters. Scopes were then hooked up to h.t. lines, l.t. lines and data lines but nothing untoward was detected.

Despair was fast setting in when my workshop colleague came up. Intrigued by the fault he thoughtfully tapped the screen. This cleared the fault. Could the tube be faulty? When the fault next returned I crept up carefully, tapped the screen – and again it cleared! I then had a bit of inspiration. Could one of the tube's fixing bolts be loose? Sure enough the one bolt that held the earthing springs for the tube's Aquadag coating was loose. There were no further problems once it had been tightened. **B.S.**

Salora J Chassis (Ipsalo 2)

We've had several cases where the h.t. supply to the Ipsalo circuit has been present and line frequency pulses have been present at the collector of the "lower" switching transistor TB701 but the set has otherwise been dead. In each case there was a dry-joint or open-circuit between pins 13/14 of the Ipsalo transformer MB500 and the collector of the BU208 line output transistor TB501.

This chassis is also used in the **Hitachi CPT2050/2060**. **J.A.**

Hitachi CPT1476

The problem with this set was teletext lines over the top third of the raster. I decided to check at the field flyback blanking pulse source, which is pin 7 of the field output chip IC601. Sure enough there was a dry-joint here. Pins 6 and 5 also looked as though they could do with attention. Resoldering put matters right.

Field bounce and similar trouble with these sets has been traced to dry-joints around this chip. It appears that the pins push up through the print due to heat expansion. It's best to melt and resolder all seven pins whilst about it. **J.A.**

Hitachi CPT2658

There was a very intermittent fault with this set, loss of the TV picture with the screen going very dark. No amount of kicking, tapping, freezing or frying would bring it on. Luckily it eventually put in an appearance for a decent length of time and I was able to pounce while it wasn't expecting me.

The cause seemed to lie right at the beginning, in the control system, not on the main panel. In the text mode there should be a steady 4V at pin 9 of IC13. In the mixed mode this voltage should pulse and it should be zero in the TV mode. When the TV picture vanished the 4V was present. As the 5V supply was present I suspected the chip and consulted our helpful Hitachi distributor. He pointed out that the chip is expensive and that they'd had a few odd video faults that a new chip didn't cure. He suggested replacing the 17.73MHz crystal XTG2 – and proved to be dead right! **J.A.**

Toshiba 285T8BZ

This Nicam set produced a loud screeching noise from the loudspeakers at switch on. It lasted for about a second then disappeared. We scratched our heads a bit and decided to replace the TDA4601 chopper control chip. This seemed to improve matters but the fault persisted. We isolated various supply lines and used the workshop power supply but were unable to trace the cause of the fault to any particular stage. A check with the circuit then showed that there's a 1,000µF capacitor connected to the Audio B+ rail. It's mounted close to the audio output chip. Fitting a replacement provided a complete cure. The circuit reference is C638 (1,000µF, 25V) **M.L.**

Hitachi CPT2658

The ticket said "stuck in the video mode". Sure enough there was a blank raster and no sound. The set wasn't actually stuck in the video mode however because a video signal fed in via the scart socket produced a good picture on channel 0 only, proving that the video switching stages were working correctly. A quick check on the tuning voltage line suggested that the SAA1293 remote control chip was also probably doing its job correctly. As all the voltages around the CD4053 switching chip ICB102 were in order in the video and TV modes we made our way to the TDA4505 chip which contains the i.f. circuitry. A replacement restored good pictures in the TV and video modes but a new problem was present. There was grossly excessive height and the operation of the height control had become very one-ended.

I consulted Hitachi technical who told me of a modification to carry out when this chip is replaced. It can take a good half hour as it involves fourteen components. The changes are as follows: change RB117 to 1.2MΩ; RB155 to 18kΩ; CB149 to 2.2nF; CB126 to 33nF; RB129 to 1.8kΩ; CB127 to 4.7µF; RB134 to 2.2kΩ; RB135 to 470kΩ; RB122 and RB123 to 220kΩ; RB110 to 1.5MΩ; CB130 to 33pF; and RB128 and RB587 to 3.3kΩ. When this had been done I switched on and found that the field scanning was now o.k. and well within tolerance.

But yet another problem was present. There was no colour and the line timebase was twitching. Very slight adjustment of the line hold control produced colour, but it kept dropping out and was very unstable. I stared at the circuit and noticed that two of the above modifications were in the line hold circuit. The original values for CB126 and RB129 were 68nF and 1kΩ respectively. When these were fitted the set finally performed correctly, with good pictures, colour and field scanning. Has anyone else had trouble when replacing this chip? **M.L.**

Toshiba 217D9B

Recent storms have produced some real problems. This Nicam set had taken a blast and suffered damage to its audio department. There was no sound at all, but the fact that the Nicam indicator was lit suggested that maybe the damage wasn't so bad after all. While carrying out various d.c. voltage checks we found that the mute line at pin 17 of the TA8720AN audio switching chip QV01 was high at 6V. When the mute line was earthed the sound came up loud and clear. Following the line back to source we came to Q609 (BC557A) which was short-circuit base-to-emitter, thus applying some 5V to the mute line and turning QV01 off. Replacing this transistor restored normal sound. **M.L.**

Ferguson TX98 Chassis

This set was dead with the mains fuse FS1 blown. It was no surprise to find that the chopper transistor TR3 was short-circuit. I replaced it along with the TDA4600-2 control chip and all the usual things that can cause this type of chopper circuit to fail. As there didn't seem to be anything else amiss I switched on. The 115V line was now present but there were no 12V and 5V supplies. Circuit protector ICP1 had gone open-circuit.

I applied 17V to the TBA8138 l.t. regulator chip IC11 from the bench power supply, with its outputs disconnected. This proved that the regulator was faulty as the 2A bench supply overloaded. Fitting a new TBA8138 restored the supplies but the set was still dead. Scope checks around the TDA4505E-N1 chip IC2 showed that the line oscillator was working, but there was no line drive output at pin 26 even with the line driver transistor TR7 disconnected. At this point I discovered that TR7 was short-circuit. Replacing IC2 and TR7 restored a stable picture, but the sound didn't appear until the TDA2611A audio output chip IC4 had been replaced. So much for all the overload protection that manufacturers boast about in modern power supplies! **J.C.**

Rank Z718 Chassis

This set was dead although its fuses were intact and the 275V h.t. supply was present – at 300V because it was unloaded. I checked all the usual causes of this symptom – dry-joints on the timebase and line output panels, the start-up capacitor C18 being open-circuit and burn-ups around the 12V regulator transistor VT20 – but they were all o.k. So attention was turned to the trip circuit. The main items here are VT4 and VT5 which are connected between the base of the line driver transistor and chassis to remove the line drive in the event of an overload. Both transistors were o.k., as was the zener diode D7. The cause of the fault was C22 (220µF) which is at the input to the trip and was open-circuit. Even when tested after removal this capacitor didn't appear to be in any way defective. **J.C.**

Philips CTX-E Chassis

The job card said "went bang then dead". Sure enough the mains fuse had blown apart – only the end caps remained in the fuseholder. The bridge rectifier had gone short-circuit, but when this had been replaced and a new fuse had been fitted the set remained lifeless. There was h.t. at the collector of the chopper transistor 7355 but it wasn't being switched on. By chance I noticed that resistor 3317 (100kΩ) was discoloured and when tested it turned out to be open-circuit. It provides the BC548 transistor 7322 in the chopper control circuit with base bias. I decided to check this transistor which also proved to be open-circuit. When these two items had been replaced the set at last came to life. Sound blurted out, the e.h.t. rustled up and the tube's heaters glowed, but there was no picture. Turning up the setting of the first anode control on the tube's base panel showed that the cause of this was field collapse. As the TDA3651A field output chip's 26V supply was present a replacement i.c. was fitted. At last all was well. **J.E.**

JVC 7731R (Ferguson TX9 Chassis)

The complaint was of a very grainy picture on all channels. We eventually found that the cause was the SAW filter on the small plug-in i.f. board. The symptom was very much like that produced by a low-gain tuner. **J.E.**

Goodmans CTV2R

This set was dead. The power supply fuses were intact but the 5.6Ω, 5W surge limiter resistor R81 was open-circuit while the STR5412 power supply regulator IC102 and the R2M protection avalanche diode D141 were short-circuit. No other shorts could be measured with these components out of circuit. Normal operation was restored after replacing them. **J.E.**

Hitachi CPT2658

When this set was switched on it remained dead with no channel indicators alight. There was 300V across C707 but nothing at the collector of the S2000AF line output transistor T701 because R707 (22Ω, 5W) was open-circuit. A check then showed that T701 was short-circuit collector-to-emitter. Replacing R707 and T701 brought the set back to life: check the orientation of T701 when fitting it on the PCB as it's very easy to insert it the wrong way round, with disastrous results. **J.E.**

Ferguson TX10 Chassis

This set would trip every half hour or so. There were two causes: dry-joints on the chopper transformer and internal arcing in the degaussing posistor. **J.E.**

Decca 130 Chassis

There was field collapse because the TDA1670A field timebase chip IC301 was short-circuit while R438 (1.2Ω) which provides its 23V feed was open-circuit. Replacing these items restored normal operation. **J.E.**

Sony KV1400

There was no colour and the picture was very washed out with little contrast. With any set of this age dried out electrolytic capacitors on the various power supply lines are prime suspects, so our first check was on the 12V rail. Bingo! The line was low at 8V. But checks on the relevant capacitors showed that they were all o.k. When the voltages around the 2SD471 12V regulator transistor Q811 were checked we found that its base and collector were at the same voltage while its emitter was low at 8V. Q811 was short-circuit between its base and collector of course. As we didn't have a 2SD471 we fitted the better rated 2SD774. When we switched on we got a picture that would put any modern £150 cheapo CTV to shame. **M.Dr.**

Sharp C2072

This set was suffering from lack of height – about two inches were missing at the top and bottom of the screen. I've had this problem before, so I knew exactly where to look. The 15V line that supplies the height control and the timebase generator chip comes from regulator transistor Q209 on the tuner/i.f. panel. As the 28V input to this transistor is derived from the line output stage a start-up supply is required for the line oscillator. This is provided by R606 (12kΩ). What was happening was that the set was running off the start-up supply, with the result that the 15V rail was low at 11V – given away by the fact that Q209 was cold (it normally runs very hot). Checks in the regulator circuit showed that R237 (15kΩ) was open-circuit. This resistor provides Q209's driver transistor Q210 with base bias.

On a previous occasion one of these sets came in because of poor sync, more noticeable on scene changes as pulling to one side. This set was brought in by another dealer who omitted to tell me that he'd turned the height control to maximum to fill the screen. The basic cause was the same, a low 15V rail, with pin 3 (12V supply) of I501 low at 8V. This time the trouble was due to a dry-joint on Q209.

Another of these sets had no sound. A finger applied to pin 1 of I302 produced a healthy buzz from the speaker, so attention was turned to the intercarrier sound chip I301. Its 12V supply at pin 5 was missing because R319 (270Ω) was open-circuit. **M.Dr.**

Ferguson 20E2 (TX90 Chassis)

This set worked perfectly except that it wouldn't respond to remote control commands. My tester showed that the handset was transmitting all right so attention was turned to the set. As pin 7 of the T9005N remote control decoder chip IC901 was receiving an input at around 8V peak-to-peak the IR receiver and buffer stages were assumed to be o.k. This seemed to suggest that IC901 was responsible for the problem, but chips of this sort rarely fail. So the handset was investigated further. The manual gives setting-up instructions for a preset labelled "factory set freq adj" inside the handset. When this adjustment had been carried out everything worked fine. The handset had probably been dropped, causing the potentiometer to shift slightly. **M.Dr.**

ITT CVC40 Chassis

No results or intermittent no results with this chassis is usually caused by dry-joints on the line output transformer. Pin 14 is the worst offender but resolder them all. This is now a very common fault. **R.B.**

Hitachi NP6 Chassis

There was no sound after the set had received DIY attention. We found that the 12V supply to the intercarrier sound chip was missing. "Butchers" are often defeated by the main PCB where it slides into moulded runners: the left-hand edge, with its narrow 12V track, is easily damaged. In this case a chunk had been taken out. The blue phase control had also been damaged. It seems that the original fault had been a dirty blue background control. **R.B.**

Some Quickies

Philips CTX-S chassis: There was normal operation when the main board was flexed upwards. Otherwise the set was dead because there was no h.t. The chopper transistor's collector leg had sheared off the body.

Rank T22 chassis: There was h.t. but no line scan as the 36V supply didn't reach the timebase panel because of a burnt contact in the socket. With no 36V supply there's no 12V supply and as a result the line oscillator doesn't start up. **R.B.**

Teletopics

MULTIMEDIA DEVICES

As mentioned in last month's leader (page 629) the first of a new generation of multimedia devices that combine computer with other technologies such as video and communications was demonstrated at this year's Chicago Consumer Electronics Show: it's the Apple Newton, which is described as a "digital personal assistant" and has been developed in conjunction with Sharp. Apple has since announced that it's developing a CD-ROM based device in conjunction with Toshiba. The small, portable device will have a display capable of text, graphics and moving video images to interface with the user. Sound will probably also be included. The companies are holding talks with Time Warner, in which Toshiba has a 6.25 per cent stake, about possible CD-ROM programmes. Although the likely market for such a device is far from clear, the companies are talking about annual sales of around five million in three years' time.

Meanwhile further information has been released on the UK-developed microprocessor adopted for use in the Apple Newton. It's a low-power, 32-bit RISC device that Advanced Risc Machines of Cambridge hope to sell to other manufacturers in the consumer electronics, computer games and telecommunications fields. GEC Plessey Semiconductors in the UK and VLSI Technology Incorporated in the USA are at present licensed to manufacture it.

THE MINI DISC

Sony has recently been demonstrating its Mini Disc system worldwide. The European demonstration was held at Salzburg. Of particular interest is the fact that the system's recording capability has now been demonstrated. On previous occasions only the system's playback capability was demonstrated, although it has always been described as a record/playback system. Sony expects to sell a million players worldwide in the first year, a quarter of a million of them in Europe. A catalogue of around 500 titles is promised for the launch towards the end of the year.

According to Sony the MD system now has the support of over 22 consumer electronics companies including Aiwa, GoldStar, Hitachi, JVC, Mitsubishi, Philips, Pioneer, Samsung, Sanyo and Sharp. Ten blank disc manufacturers will include Maxell, Philips, SKC and TDK. Software providers will include Sony Music, JVC and Toshiba EMI. Blank discs are likely to cost about £5 each.

DISPLAY TECHNOLOGY

JVC and the Hughes Aircraft Company have formed a joint venture to design, manufacture and market a new generation of liquid-crystal light valve (LCLV) projection TV systems capable of providing HDTV displays. Use of an LCLV enables a bright, high-resolution image to be projected on to a screen up to 30ft wide in normally lit surroundings. The LCLV technology was invented by Hughes and is currently used by US government agencies such as NASA. Both companies will pool patents and technology. The venture, known as Hughes-JVC Technology, plans to launch its first professional system this autumn. Further models will be introduced next year, when sales are expected to reach 5,000, increasing to 20,000 annually within a few years. The first consumer model will be introduced in 1994.

Thomson is to start producing high-resolution 12in. flat panel displays using gas plasma technology next year. They will conform to the industry-standard VGA specification. Current development work aims at reducing the pixel size from typically 0.8mm to 0.3mm. Matsushita recently demonstrated a 26in. plasma display while Photonics Imaging in the USA has a 19in. display in production.

Toshiba has developed a new type of colour LCD screen with a much faster response than current LC displays – the image can change in about 17msec compared to as long as 60msec with current types. It uses what Toshiba calls level-adjusted operation, and also provides a sharper image. The new display is still in prototype form and development to the production stage is expected to take a further three years.

CD-I

Philips and JVC are to produce a karaoke version of the CD-I system – karaoke CDs should be available by the end of the year. When connected to a TV set words and pictures will be shown on the screen.

The first single-chip decoder for full-motion video decompression to the MPEG standard used by the CD-I system has been introduced by the US firm C-Cube Microsystems. The CL450 processor decodes SIF resolution (352 x 288 pixels at 25Hz) bit streams at input rates between 1.2-3Mbits/sec, providing decoded video outputs in either RGB or YUV form.

SATELLITE TV

Europe's largest satellite TV receiver manufacturer Pace Micro Technology has seen its share of the UK market rise sharply over the past three months. This increase, now heading towards a fifty per cent share of the market, is due mainly to supply agreements signed with Comet, Colourvision, Clydesdale, Granada, Visionhire, Tandy and selected John Lewis stores. Further agreements are being negotiated.

The latest *Financial Times* satellite monitor figures indicate that some 68,000 dish installations were carried out in May. This is the second monthly decline since a peak of 94,000 was reached in March.

In a recent issue of *Electrical and Radio Trading* Graham Knight mentioned a new use for BSB receivers. A different EPROM can be fitted, replacing the soon to be obsolete BSB D-MAC software with D2-MAC software. This simple modification makes it possible to receive quite a number of European satellite TV channels once the aerial has been realigned.

BUSINESS NEWS

BREMA's final figures for 1991 show that camcorders, CD players and Nicam-equipped goods provided what growth there was in the UK consumer electronics market during this flat year. Trade delivery figures were as follows:

Product	*1990*	*1991*
Large-screen CTVs	1,787,000	1,719,000
Small-screen CTVs	1,780,000	1,791,000
VCRs	2,210,000	2,110,000
Camcorders	372,000	555,000
CD systems	1,876,000	2,075,000

Camcorder deliveries rose 49 per cent year on year, with household penetration approaching ten per cent. Deliveries of Nicam-equipped large-screen CTV sets increased by 46 per cent. Overall, some 33 per cent of CTV sets were Nicam-

next month in

TELEVISION

FREE COVER-MOUNTED GIFT

Watch out for next month's issue of *Television* which has a cover-mounted gift.

● SERVICING THE FERGUSON TX90 CHASSIS
The TX90 chassis started as a small-screen set driving a 14in. tube and was developed to include remote control versions with various tuning systems and models with screen sizes up to 20in. Large numbers of these sets were produced. The design is clever, with a unique power supply regulation system. Nick Beer reports on the set and its fault history.

● SATELLITE TV POLARISATION SYSTEMS
Using vertical/horizontal linear or right-/left-hand circular polarisation enables each satellite channel at a particular location to be used twice. Thus a vital part of the head unit is the polariser that enables differently polarised signals to be selected. Various polarisation techniques are in use. Derek Stephenson describes the theory and the different types of polariser, concluding with some quick and simple filed servicing checks on the polariser circuit.

● DEALING WITH SURFACE-MOUNTED ICs
A major problem in servicing the latest generation of consumer electronic products is surface-mounted chip replacement without board damage. Various techniques have been advocated. P.J. Roberts reviews them and describes his preferred method. With hints on learning how to use a hot-air soldering iron.

● ELECTRICAL SAFETY REQUIREMENTS
Legislation introduced in recent years has laid down various requirements on electrical safety in the workshop and the condition of electrical products when they are handed over to the customer. We have been asked for clarification on these requirements, which can difficult to interpret. Nick Beer provides guidance on the current situation. A workshop update led to a thorough investigation of the subject.

PLUS ALL THE REGULAR FEATURES

ORDER YOUR COPY ON THE FORM BELOW

TO ....
(Name of Newsagent)

Please reserve/deliver the September issue of TELEVISION (£1·95), on sale August 19th, and continue every month until further notice.

NAME ....

ADDRESS ....

....

....

equipped, an increase from 28 per cent in 1990. Some 15 per cent of VCRs were fitted with Nicam, an increase from 10 per cent.

Samsung is to start CTV manufacture in the UK at the company's Billingham, Cleveland plant. An investment of £9m is being made.

Following a highly successful test during 1991 EMI UK Rental is to offer Sony brand products in its Radio Rentals and Focus branches.

SPARES INFO

We have to apologise for a misleading entry in our 1992 Spares Guide. Zanussi spares are available from METS, 37 Padgetts Lane, South Moons Moat, Redditch, Worcs B98 0RB (0527 510 785). This firm is listed under Dansai who do not deal with Zanussi products.

HRS Electronics, Garretts Green Lane, Birmingham B33 0UE has been appointed exclusive UK distributor for Vogels' comprehensive range of video and audio mounting brackets. This Dutch company's wide variety of ceiling- and wall-mounted brackets enable TV/video screens to be turned to any position. HRS has added genuine Akai video spares to its range and now offers free carriage on all orders and free fax ordering (freefax order line 0800 212 179).

NEW PRODUCTS

Toshiba's latest CTV launch in the UK, Model 2927DB, a 29in. receiver with a recommended price tag of £850, is the first set to feature a built-in digital sound processor (DSP) as well as Nicam stereo and Dolby Surround sound. The DSP unit introduces digital delay and reverberation in its hall, stadium, disco and theatre modes to create the right acoustic "feel". There is also a pseudo-surround mode. On the vision side the set has a dynamic scan modulation unit for finer picture detail and contrast, dynamic colour accutance improvement circuitry for better colour quality and an Invar-coated shadowmask. The dynamic scene control unit has three preset picture settings for different room conditions. Similar sound arrangements will be used in a 25in. model and a 33in. model to be added to the range: the video specification will vary with tube size.

SAI Technologies, Unit 2, P & O Centre, PO Box 14, Rockware Avenue, Greenford, Middx UB6 0AD has introduced a teletext tuner/decoder module for adding to PCs to enable teletext to be displayed in various forms.

Vision 21, 12 Thorkhill Road, Thames Ditton, Surrey KT7 0UE (081 398 3404) has introduced two remote control AV selectors. The VSW42R at £199 is an infra-red unit with four video inputs and two outputs; the VSW41 at £116.50 has a single video output.

TRANSMISSION TECHNOLOGY

British Telecom engineers have demonstrated that it's technically feasible to transmit a single TV channel via an ordinary telephone cable. Though the system has only single-channel transmission capability it's likely that customers could be given a choice of channels through the use of computer-controlled switching. The commercial aspects of offering such a service are being assessed by BT.

On June 13th the Austrian broadcasting organisation ORF recorded a performance by the Vienna State Opera in the HD-MAC 1,250-line format then down-converted it to 625-line PAL. It was the first time that an HDTV production had been used for PAL transmission. The performance was transmitted live by satellite in HD-MAC form and seventy-five minutes later was broadcast in PAL form throughout Austria and other European countries.

At an exhibition last month the BBC demonstrated the transmission of compressed digital HDTV pictures encoded at 140Mbits/sec via a satellite TV link.

The USA's first national two-way TV system, pioneered by TV Answer Inc., is expected to become operational in early 1993. It will enable viewers to turn their TV sets into interactive communications tools. The heart of the system will be a Sequoia Series 400 UNIX fault-tolerant computer system which is to be installed at TV Answer's National Switching Centre. It will register viewer responses as they pass through the Answer System, recording data such as length, point of origin and destination. The system will also enable viewers to carry out operations such as banking, teleshopping and organising TV programming information. Viewers' TV Answer home units, which are to be made and distributed nationally by Hewlett-Packard, will transmit requests, data etc. to local sites. These will be linked to TV Answer's hub site via satellite.

Letters

PICTURE GENERATION AND ASPECT RATIOS

I would like to comment on the letters from Geoff Darby and John Dagg in the June issue.

I have a lot of sympathy with what Geoff Darby says. Electronically generated pictures do have an "artificial look" that can detract from the viewing experience. I remember in particular "A Perfect Hero", shown on ITV about a year ago. It would have looked so much better had it been shot on film. Many people in the TV production industry, particularly in the USA, also feel this way, which is why a lot of TV drama is still shot on 35mm film. It would be a mistake however to assume that a digital section in an otherwise analogue transmission path will lead to the picture having a "digital look". The broadcast chain already has large numbers of digital boxes, such as timebase correctors and synchronisers, in addition to the well-known digital effects units. It's a rare TV programme that hasn't been through at least one digital process.

When (if?) we get HDTV I suspect that the visual difference between 35mm film and electronically originated pictures will be even more pronounced. It will make no difference however whether the transmission medium is analogue or digital. Digital signal processing is in any case a fundamental part of all HDTV proposals. It seems somewhat pointless to link the digital signal processor in the studio with that in the receiver via an analogue link. The advantages of digital transmission will be greater robustness in the face of noise and interference, and the ability to cram more channels into a given bandwidth.

I like John Dagg's idea that films should always be transmitted in their original aspect ratio, with the viewer given the choice of whether to view in a letterbox or pan-and-scan mode. Digital transmission will facilitate this without waste of bandwidth. This idea does however require the hang-on-the-wall screen: 16:9 c.r.t.s are bad enough, 2.35:1 or even 2:1 c.r.t.s would be horrendous. I'm well aware of state-of-the-art LCD screens, but in my view they have a long way to go before they can match the "photographic quality" available from a well set-up c.r.t.

The choice of a new TV standard is a major opportunity that doesn't happen very often. We should not be stampeded into making a premature decision for the sake of short-term commercial interest.

John Dagg's cinema experience seems to be somewhat out-of-date, which is probably why he's unaware that use of the 2.35:1 Cinemascope format has declined significantly since the Sixties. According to the Society of Motion Picture and Television Engineers' study group on aspect ratios, by 1985 only 12 per cent of cinema feature films were made using the 2.35:1 aspect ratio. In that year 70 per cent were shot and released in 1.85:1. The study group also noted that use of the 2.35:1 ratio was continuing to decline, that virtually all releases to continental Europe were in the 1.67:1 ratio and that most cinematographers shoot and protect to permit both 1.85:1 and 1.67:1 theatrical release and 1.33:1 TV and video release. This last point means that most films are actually shot in the 1.33:1 (4:3) ratio, with the action confined to a 1.85:1 slice across the centre. During cinema projection the top and bottom of the film are masked off to produce a 1.85:1 or 1.67:1 picture. It's in this masked-off area that extraneous objects such as microphones and lighting cables sometimes appear – "Dirty Dancing" even included the sound recordist in one shot! He wouldn't have been seen on the cinema screen of course provided the picture was correctly framed.

I still feel that Cinemascope films look right only on really large screens. I've been involved with the running of the "Electric Palace" cinema in Harwich for the last ten years. We have a 20 x 12ft (1.67:1) screen and we show most modern films with this ratio, filling the entire screen. We used to show Cinemascope films in the 2.35:1 ratio, using the full screen width but only 71 per cent of its height. The resulting letterbox picture looked so bad that we now crop the 2.35:1 down to 2:1. We still use the full screen width but can now use 84 per cent of its height. This looks a lot better, but the visual impact of Cinemascope films is still poor compared to that of other films.

Very wide aspect ratios have always had their enthusiastic supporters, but the general public has not been won over. It's interesting to note that the current "super cinema" system, IMAX, uses a 1.67:1 aspect ratio.

David Looser,
Ipswich.

THE GOLDEN RATIO

Geoff Darby (letters, June) mentions a pleasing and natural way of looking at things. The most pleasing and natural aspect ratio known to mankind is based on a series of numbers known as the Fibonacci series, which runs as follows: 1 + 2 = 3; 2 + 3 = 5; 3 + 5 = 8; 5 + 8 = 13; 8 + 13 = 21; 13 + 21 = 34; 21 + 34 = 55 etc., i.e. the number produced by each addition equals the sum of the numbers produced by the two previous additions. Now if one divides any number by the previous one, e.g. 21 divided by 13, the answer is 1.61538. It is this number, expressed as a ratio to one, that offers the most rewarding vista to the human eye.

This is no coincidence – it occurs throughout nature. Here are just a couple of examples. First the daisy. Its golden pincushion consists of two sets of curved lines that spiral out from the centre: 21 of them spiral in a clockwise direction, the other 34 in an anticlockwise direction. 21 into 34 = 1.619. Secondly pine cones. Five scales run clockwise, eight anticlockwise. 5 into 8 = 1.6. And so it goes on.

In architecture, the Parthenon's facade fits into a "golden rectangle" whose sides have a ratio of approximately 1.6:1. The same proportions are found in 13th century Cistercian abbeys.

Obviously the higher you go with the sequence the nearer you get to the golden ratio. But it's always approximately 1.6:1.

So why isn't the TV aspect ratio 3:4.8? Am I correct in thinking that it's 3:4 to fit in with the film industry and is historical? If so, why weren't films originally shot on frames that have an aspect ratio that complies with the golden ratio of 1.6:1? Nature had the answer all the time!
Russell W. Barnes,
Penrith, Cumbria.

PATTERN SPARES

A recent letter referred to the use of pattern spares. In my experience pattern parts seem to be o.k. with some makes but not with others. In particular Sharp idlers must be genuine: pattern ones are usually so bad that they won't run from the moment they are fitted, and if you do get one that runs the machine will soon be back for either the idler not running or runningly lumpily. I feel that the same applies to Panasonic types.

I recently fitted some heads, obtained for only a few pounds, in a Ferguson 3V35. To cut a long story short, three sets of heads failed in only a few hours' use. After paying more for Konig heads the machine didn't come back.

My business also services domestic appliances. Our experience here is that most pattern parts for washing machines are pure rubbish, though some are perfectly all right and in a couple of cases are preferable to the genuine originals. The pattern spares supplied by one maker don't even fit the applianced for which they are intended.

For TV and VCR servicing genuine spares are usually the only things to use – the exception in our experience being Konig branded parts – if you want your work to stay at the owner's house rather than coming back to the workshop to roost. You should adopt the same policy with your vehicles. Non-genuine spares can vary from poor to dangerous. Poor points give bad starting while poor brake and steering parts could kill you.
John Hepworth,
Peterlee, C. Durham.

COST OF SPARES

Whether to use genuine spare parts or pattern spares is a subject that's been discussed in these pages on several occasions. As the cost of replacement parts constantly rises I've been looking at the prices of some of the more run-of-the-mill items that we use daily, such as resistors, capacitors and semiconductor devices. I estimate that the sums we spend could be cut by half if we spent just a few hours going through the plethora of advertisements in this magazine.

Here are a couple of examples. We recently had an Hitachi set fitted with the Salora J chassis in for repair. It required two BUW41B chopper transistors. These were ordered, at £5.20 each, along with some other items to make the order of sufficient value not to incur post and packing charges. When they arrived two days later we found that MJE13005s had been supplied. No matter, we assumed that they were equivalents and fitted them. The set then worked perfectly and the job was finished. Quite my chance when I was ordering some semiconductor devices from another firm a few days later I noticed that they listed the MJE13005 – at 49p! I was so surprised that I rang the supplier to check and yes the price was correct. So for my £10.40 (first order) I could have had twenty one of the transistors and still got some change. The second example is the HEF4053 switch chip. In one glossy catalogue the price is shown as £6. Amongst the advertisers in this magazine I've seen 19p and 30p quoted.

Another point is that whereas the larger supply companies insist on minimum orders, anything from £15 to £30, otherwise levying a small order charge of up to £3, most of the small-ad companies charge about £1 whatever the order, from single items to large orders. I'm sure that the components they supply are in no way sub-standard as we've used many of them for quite some time.

I don't mind paying a little extra for fast service, but twenty times as much seems to be pushing it a bit too far and the service provided by the small firms is usually just as good if you use a credit card or simply write your card number on the back of the cheque.
Chris Watton,
Boston, Lincs.

TANDY SATELLITE TV RECEIVER

Nick Beer mentioned the Tandy satellite TV receiver in his July issue Notebook. It's actually a rebadged AB Wolsey Starlet which can easily be hooked up to a VideoCrypt decoder. The inputs and outputs are all present at an 8-pin DIN socket, marked Baseband, at the rear. For stand-alone use a linking socket joins the audio and video connections. Feed the baseband output to the decoder and connect the latter's output to the receiver's video input. The audio output and input are linked at the plug as this signal isn't encoded. Connection details are shown below – they may be of help to readers as they are not shown in the receiver's manual. My thanks to AB Wolsey's technical department which kindly supplied them.

Pin 1: Video output.
Pin 2: Common earth.
Pin 3: Audio input (link to pin 7).
Pin 4: Video output.
Pin 5: Baseband output to a VideoCrypt decoder.
Pin 6: Video input (VideoCrypt decoder's output).
Pin 7: Audio output.
Pin 8: Remote control.

Paul D. Robertson,
Pontardawe, West Glamorgan.

THE TDA3562 PAL DECODER CHIP

With regard to the Philips and Telefunken versions of this chip, the Philips one can be used to replace the Telefunken version if the 4.7μF capacitor connected to pin 19 is changed to 1μF and the 120kΩ resistor connected to pin 18 is changed to 82kΩ. This applies to the Matsui Model 1580, the Saisho CM159 and GoldStar colour TV sets or any sets that use this particular circuit. We've been carrying out this modification for a number of years.
A.M. Archer,
Lincoln.

COMMENTS

Thank you for Steve Cannon's interesting article on field faults (June). It reminded me of when I was temporarily teaching at a local college earlier this year. A young member of the staff asked me to look at a hybrid monochrome set (Thorn 1500 chassis) that was suffering from "lack of height". After making the usual quick checks I scoped the h.t. line where a 50Hz ripple was present. The result was incorrect field frequency and a small picture. These young high-flyers can talk about satellite TV, Nicam etc. but when it comes down to the basics they ask us old codgers to sort things out for them!

Incidentally I agree with Geoff Darby on pure sound being unreal. You only need to listen to an electronic organ set to saxophone, trumpet or flute. It sounds exactly like the instrument – but after a couple of minutes you think that the person "playing" it doesn't breathe. It sounds as if the instrument is being blown by a vacuum cleaner!

As for Mr. Snide (Donald Bullock's column), we take the bill to the door first – all repairs are COD.

Jim Littler,
Wigan, Lancs.

MICROCOMPUTER POWER SUPPLIES

I must reply to Geoff R. Darby who commented (Microcomputer Notes, June) on my earlier remarks about microcomputer power supplies. When three-terminal linear regulators go short-circuit, which they often do in certain types of home computer system, they dump the full unregulated transformer power into the equipment (assuming that the transformer or rectifier doesn't burn out first) regardless of having "short-circuit, thermal overload and safe operating area protection".

As for the 30A unit I mentioned, I thought I'd made it clear that it was for my own use and that anyone interested in adopting this approach when faced with the problem of dealing with possibly obsolete equipment might be able to select something smaller and better suited to the requirements of the equipment concerned. In any case even if the foldback current control that's provided as part of the core saturation elimination scheme in all such switch-mode power supplies I've come across sets in at too high a current there's nothing to prevent anyone attempting such an upgrade from including suitably rated fuses.

Apart from this you've only to look through a couple of PC type magazines to see the range of upgrade switch-mode power supplies (SMPSUs) that are available off the shelf. The original IBM PC was equipped with a SMPSU rated at about 90W. With subsequent hardware upgrades and additional disc drives this proved to be woefully inadequate (my PC has a 135W PSU and I use it to the full). Upgrades are now available for PSUs rated at 300W and more. I've yet to hear of one catching fire.

Incidentally my 30A SMPSU will fold back with one strand from 7/0.2 equipment wire across the terminals – this is thinner than the leadout wires of a typical decoupling capacitor or any of the tracks feeding supplies to the PC let alone ground.

As mentioned above, short-circuit failure of three-terminal regulators is not uncommon though it does seem to be peculiar to some computer systems. One in particular is the Sinclair series which has a well-documented trail of regulator problems. Early versions had a heatsink of inadequate size (this virtually ensures short-circuit failure of the regulator). A modification was to fit a larger heatsink, but this tended to work loose and thus failed to make adequate thermal contact, giving rise to similar consequences. A very common cause of failure is when the user connects or disconnects peripherals with the system powered up. This often destroys the ULA chip which then usually acts like a one-shot crowbar. As a result the regulator goes short-circuit. You will then almost certainly find that the mains transformer fuse has gone open-circuit. Since these units are usually sealed, repair should not be attempted unless it's your own system and you are aware of the dangers and willing to accept the risk!

I'm well aware that many of the larger SMPSUs use three-terminal linear regulators for auxiliary rails. Many of the smaller units are tightly designed with low-impedance windings and tight inductive coupling: the turns ratios are cleverly arranged so that when the 5V supply is correct so are all the other rails. Many TV sets provide an example of this – those that use a TDA4600 series chopper control chip and an off-the-shelf Siemens chopper transformer. Use of a three-terminal regulator in such a system gives the designer some extra lattitude: the windings needn't be so tightly coupled or so accurately wound. Within specified limits this makes relative loading per rail a less important consideration. I've no objection to the use of three-terminal regulators in this type of circuit: when they go short-circuit (which in this application is rare) they generally activate foldback limiting.

The point about h.f. noise with an incorrectly loaded SMPSU is noted. But I've used a wide range of such units in a wide range of systems and have not had a problem so far. Fortunately the higher the frequency of the supply ripple the more easily it's filtered.

Television is no kiddies comic, so one would expect readers of my original comments to be able to select a suitable SMPSU and carry out the modification in a safe and responsible manner. I described how I overcame a particular problem. So far the score is: manufacturers two potentially dangerous burnouts, my SMPSU modification nil. I rest my case.

I. Field,
Letchworth, Herts.

VALVE RADIO RECEIVERS

I have been following with interest recent correspondence on servicing valve radio receivers. There's an ever-increasing number of valve radio devotees whose interests are catered for by my own magazine, *The Radiophile*. In addition to providing our subscribers with lively and informative articles we maintain a very large library of technical information and can supply service data for thousands of receivers from the Twenties to the Sixties at sensible prices. We sell radio books too, among them the *Newnes' Radio and Television Servicing* volumes referred to by Eric Kempshall (May). We also organise regular meetings of valve radio enthusiasts throughout the year.

I wonder how long ago were the "old days" when Eric Kempshall practised the empirical trimming techniques he described? I started professional radio servicing in 1948 but even in those far-off days the various workshops in which I was employed all had a signal generator of sorts! But I agree that unless there was unmistakeable evidence to the contrary we tended to assume that the i.f.s would be pretty well on tune, while using actual stations for the r.f. alignment was likely to result in far more accurate dial readings than the use of a not-too-clever generator. Athlone provided the test frequency for the low end of the MW band and the local Third Programme relays for the top end. Bandpass tuning systems were brought into line with the aid of the 261m Light Programme transmitter. On the LW band we used Paris International at the low end and either Luxembourg (1,293m) or Airmet (800m) at the top end. Incidentally only last week I repaired a war-time Utility set made by Cossor. It needed replacement of the smoothing and several other capacitors. When this had been done it performed extraordinarily well, so much so that it easily beat the opposition at a competition for best electrical performance at our recent Shifnal, Shropshire meeting. Yet the trimmers had never been altered from the day the set had been made back in 1944, as shown by the original paint seals remaining undisturbed. Not bad for 48 years!

The Radiophile magazine also holds "workshops" at which enthusiasts at all levels from absolute beginners are given practical help in repairing receivers they bring along. Anyone wanting further details of our magazine and activities should write to me at the address below. A subscription currently costs £15 for six issues (UK), or £21 abroad (surface mail). Specimen copies are available at £2.50 and £3.50 respectively.

Chas E. Miller, Editor, The Radiophile,
Larkhill, Newport Road, Woodseaves,
Stafford ST20 0NP.

POLARISER MODIFICATION

I decided to purchase from Sendz Components one of their professional satellite TV receivers plus a dish and an LNB with feedhorn. A Luxor 9570 with remote control and handbook duly arrived and with the help of articles in past magazines I mounted the dish and LNB without any difficulty.

No doubt others who have purchased this unit will have encountered the following problem. It will happily receive all the even, vertical channels but the feedhorn a requires 5V, 80mA supply to switch to the odd, horizontal channels. Now although there are many outputs at the rear of the unit there isn't a switched 5V output. There is however a 5V output that will power the feedhorn to enable the odd channels to be received, so I decided to fit a switch that would operate via the remote control.

On removing the cover I found that the polar switch (yellow feed wire from the junction of RA182 and the collector of TA12) switches between 0-5V when the odd/even button on the remote control unit is operated. But it won't pass the required 80mA, so a simple transistor switch was required, see Fig. 1 used a BC441 transistor connected as follows.

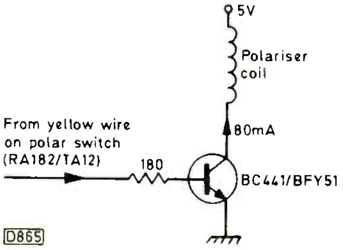


Fig. 1: Adding a transistor polariser supply switch to the Luxor 9570 satellite TV receiver.

Remove the wire from the screw terminal that has a positive-going pulsed output marking. Connect the transistor's collector to this terminal, its emitter to chassis and its base via a 180Ω resistor to the yellow wire on the polar switch. The feedhorn is now connected between 5V and the old positive-going pulse terminal. The circuit works well and has been used for several weeks with no problems.

K.D. Bunting,
Hartford, Cambs.

SERVICING VINTAGE RADIOS

Stanley Jackson's article on servicing vintage radios (March) was very welcome. I'd like to add a few points. First I can't recall ever coming across an open-circuit mains transformer of the drop-through 6.3V, 250-0-250V variety. Was this luck or is it bad memory on my part, or were they really that reliable? Secondly I'm finding that distortion is often caused by a loudspeaker cone's fixing collar having come unstuck from the frame when a radio receiver has been stored in a cold or damp place. If you're lucky the collar can, with extreme care, be reglued. Sometimes however the speech-coil former will have become distorted. The loudspeaker is then usually a write-off. I've been known to hide a miniature modern speaker inside the original one but this isn't really satisfactory.

Changing a valve base when the correct valve isn't available tends to destroy the equipment's historical value and will need to be changed back should the correct valve come along or the diagnosis prove to be incorrect. Valves are extremely adaptable creatures. Humble audio output bottles for example would often be found used as r.f. output devices! It would seem to be far better to make up an adaptor from old valve bases etc. to enable other valves to be used. This was common practice, by me anyway, due to shortages, obsolescence or the sheer price of some valves.

Finally anyone who puts resin or varnish on Bakelite will have an almighty mess after a while when it starts to flake off. I read once in *Television* that T-cut is the thing to use and, along with some elbow grease, have found that there's nothing better to bring the shine back to Bakelite, leaving no residue whatsoever.

David C.J. Tilley,
Ashthomas, Devon.

HELP WANTED

I'm trying to obtain a down-converter, from u.h.f. to v.h.f. Several companies I've tried say that they are no longer available. Can anyone help? J.E. West, 302 Drumbeg North, Craigavon, Co. Armagh BT65 5AF.

Can anyone supply a circuit diagram for a Saba C67 S77 colour set and/or the PC layout in the vicinity of the line scan coil socket near the LOPT – about two square inches of the PCB around this socket are totally burnt out? D.A. Ferriday, Rowlands Radio, 56 Redhill Road, Rowlands Castle, Hants PO9 6DF (0705 412 464).

Can anyone supply, new or secondhand, an MC1305 stereo decoder chip? An equivalent would do (LM1305, SN76105, ULM2122). Paul Hardy, 43 Sheridan Avenue, Caversham, Reading, Berks RG4 7QB (0734 475 869).

Can anyone tell me what the DIN sockets on the back of a Granada Finlandia TV rental receiver are for? I presume they're for AV but I need pin details. I've no model number but the set is a 21in. (approximately) model with teletext and stereo sound. A free bag of mixed components to all replies! Also can anyone explain how to use the timer record function on the Osume VCR3000 without employing the remote control system? Same incentive. S. Yousaf, 137 The Crescent, Slough, Berks SL1 2LF.

Wanted – workshop manual covering the early Ferguson/Akai/JVC VCRs in the 3V22/9800/3V16 etc. series – the piano-key models with the small clutch. These models have extra idlers, one driving the take-up reel (part no. PU49281) and the other the rewind reel (part no. PU49283). Good price paid. David H. Syddall, Set Gate Farm, 1070 Bury Road, Breightmet, Bolton, Lancs BL2 6QA (061 234 4036).

I'm anxious to borrow for copying the circuit and any other data for the following amplifiers: Armstrong 401; Trio KA2000; Rotel RA350; Leak Stereo 30 Plus. As a retired technician I still have quite a lot of valve information and some valves. On receipt of an s.a.e. I'll be pleased to pass on information or my regrets as the case may be. J. Gibson, 4 Cotswold Drive, Garforth, Leeds, W. Yorkshire LS25 2DA.

Servicing the Microvitec Cub Series 3

Arthur Rumbelow, G3KKC

The Microvitec Cub, Model 1431, is a popular UK-manufactured linear/TTL RGB compatible computer monitor. Its RGB inputs are link selectable for either positive- or negative-going video at 1.5kΩ. The following notes are also applicable to Models 1432, 1441, 1442, 2031 and 2032. There's a good circuit description in the service manual, which is still available from Microvitec at the address given later, and also a general fault-finding guide. The present article, which is based on the author's workshop experience, lists specific faults and their cures.

Circuit Notes

The circuitry is straightforward. A Siemens discrete-component chopper power supply (see Fig. 1) provides a 200V line for the RGB output stages, a 124V line which is used mainly by the line output stage and an 18V output which feeds a 78M12 voltage regulator. There's also a 78L05 regulator which takes its feed from the 12V line. The RGB output stages are of the class AB type using BF787 (later BF869)/BF392 pairs of transistors, with a common chassis return via the 7.5V zener diode D907 and transistor TR907 (2N4123) which is used for flyback blanking. The field timebase consists of a TDA1170S chip (IC301) while sync processing and the line generator are within a TDA1180P chip (IC201). There are conventional line driver (TR201, BF460) and line output (TR202, BU500) stages, with an e.h.t. tripler. The line output transformer provides the 24V supply for the field timebase. A transductor (T202) is used for EW correction: it's driven by TR301 (BC337), see Fig. 2.

Many readers may be unfamiliar with the Siemens self-oscillating chopper circuit. Its basic operation, see Fig. 1, is as follows. The mains bridge rectifier D1-4 produces about 340V across its reservoir capacitor C11. D5, R8 and C10 provide a start-up drive for the BUW81A chopper transistor TR2. Once the circuit is brought into operation, feedback from winding 3-4 on the transformer switches the chopper transistor on. It's switched off when thyristor TY1 switches on, placing a short across TR2's base-emitter circuit. The gate of TY1 is biased by the circuit consisting of TR1, D18 and the associated components which receive the feedback supply generated by D6 and C12 from winding 2-3 on the transformer. This is the regulating action, set by VR4. TY1 is triggered on when the sawtooth waveform at its gate reaches sufficient amplitude. This sawtooth waveform is produced across R15, which is in series with the chopper transistor and transformer. The link to TY1's gate is via D12-14 and R14. Over-voltage protection is provided by D20 and TY2. Should the voltage developed across C23 by D21 rise sufficiently zener diode D20 will conduct, firing TY2. This removes the drive to TR2. The chopper transformer also provides mains isolation. Later versions of these sets used a different chopper transistor and this calls for certain modifications. Most of these monitors have probably been updated in this respect by now.

Access

When installed in the casing the underside of the main PCB is not accessible. Workshops use a wire-frame jig which consists of a c.r.t. assembly and user controls to which a faulty panel can be taken for testing. An alternative approach is to cut a large hatch in the underside of the casing and use an aluminium plate held in position with self-tapping screws to cover the hatch.

Power Supply Modification

The chopper transistor in early versions of these monitors was a BUW81A, which is a Darlington device. Because supplies became scarce, a TIPL753A or R3213 was adopted as a replacement. This calls for the use of a different chopper transformer, type PC5287 or PC5307, and the following component value changes: R8 3.3kΩ, 1W; R11 22Ω; R16 470Ω, 11W; C10 56nF, 400V; L2 10μH.

Fault Finding

A useful cold check on the power supply is to take resistance readings from the cathodes of the output supply rectifiers D22, D23 and D24 to chassis. You should get a reading of approximately 1kΩ in each case.

It's worth noting that when a monitor is operating normally the emitter and base of the R3213 chopper transistor sit at between approximately –125V and –130V d.c. High peak voltages which are not measurable are present at its collector. If the emitter and base voltages are about right but the collector voltage is low, say around 200V, suspect a fault on the secondary side of T2. D22 going short-circuit is the most likely event.

If the 1A d.c. fuse F3 has blown check the chopper transistor, also TY1 and TY2, for shorts. Note that R15 goes open-circuit when the chopper transistor fails. It's also worth checking C18 (1μF, 25V), especially in older monitors. If this capacitor is faulty the power supply can become unstable. The result is ripple on the outputs and destruction of the chopper transistor. Whilst carrying out tests in this area the 3.3kΩ wirewound resistor R16 should be checked for dry-joints as these can lead to other component failures. This is the tall resistor which is easily disturbed when the PCB is removed or replaced – it catches the c.r.t.

If the d.c. outputs tend to creep up, turn the set-h.t. potentiometer VR4 to minimum and monitor them. If the voltages still creep up check D18, TR1 and D20: also check C12 and C23. If the fault persists the chopper transformer T2 could be faulty.

Manufacturers of BR103 thyristors have been making them switch faster. This can result in the over-voltage protection circuit being too sensitive. The symptom is a display that shrinks in size: switching the monitor off and on again can clear the problem for hours. One's suspicion is that the symptoms are being produced by mains-borne spikes. Where a fast version of the BR103 has been fitted in the TY2 position ensure that R23 has been changed from 10kΩ to 4.7kΩ.

Failure of the mains fuses should lead to a check on D1-4, also the 470pF protection capacitors C5 and C7. The dual-posistor Th1 in the degaussing circuit can also be responsible however – disconnect the degaussing coils to prove the point.

The following symptoms are caused by power supply faults:

F3 blows intermittently – can take several hours. T2 has a faulty primary winding.

No raster, very low e.h.t., the 124V rail low at 60V: D7 short-circuit.

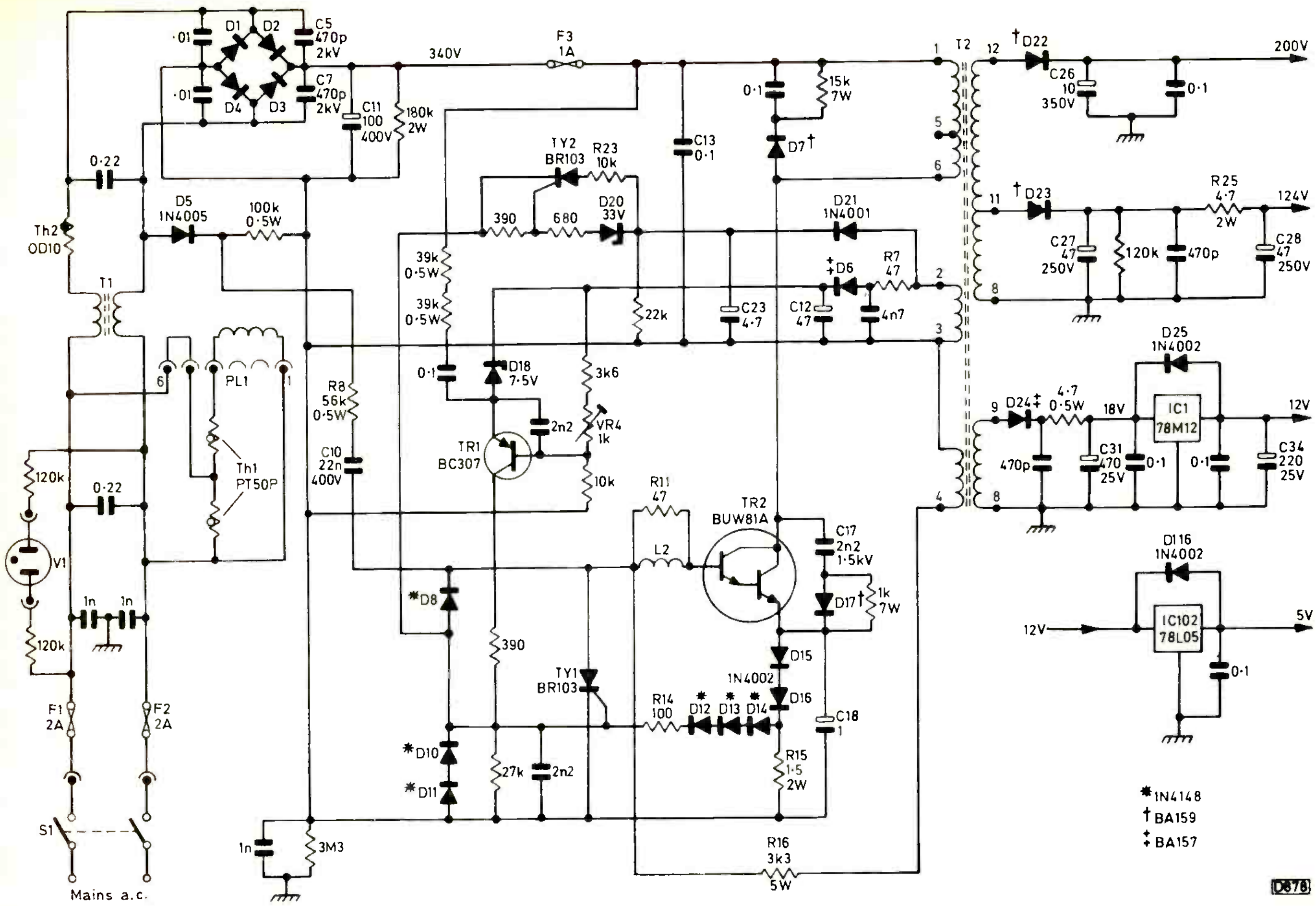


Fig. 1: The self-oscillating switch-mode power supply circuit

Non-linear field scan with the 124V line sitting at 100V: D6 short-circuit with R7 burnt up. This can also cause line instability.

A fault that looked just like line instability, with some field bounce present, was caused by the 78L05 5V regulator IC102 being leaky. Switching the monitor off then on would clear the fault for some time. With the set in the fault condition we found that there was a high ripple, about 5V peak-to-peak, at pin 14 of the sync chip IC201.

Brightness/Contrast Faults

Several brightness and contrast faults have been experienced with these sets.

For uncontrollable brightness, first disconnect link TL901 on the c.r.t. panel to remove the c.r.t.'s heater supply then measure the c.r.t.'s cathode voltages (pin 6 green, pin 8 red, pin 11 blue). A low voltage reading at one of these pins indicates that the relevant gun is hard on. Check the output transistors as appropriate.

The cause of the brightness pulsing when the monitor had warmed up was traced to the 7.5V zener diode D907. Several cases of varying brightness levels have been caused by poor soldering on the c.r.t. base socket: remove the old solder and clean the pins before resoldering. Monitors that have a c.r.t. base socket marked with a black paint blob are prone to corrosion – later types are marked with a red paint blob. Varying brightness faults can be caused by the following resistors which tend to increase in value: R933 (150kΩ, 1W), R934 (180k) and R236 (150kΩ, 1W). They are all in the first anode supply network.

No raster was traced to the blanking transistor TR907 being short-circuit. Intermittent loss of green was traced to a dry-joint on TR104 (2N4125) in the green input circuit.

The cause of varying contrast was traced to the 12V zener diode D117 in the beam-limiter circuit (see Fig. 3) being leaky. With this fault present the beam limiter comes into action via the emitter of TR106, biasing back the RGB input transistors TR103, TR104 and TR105. If the voltage at the junction of D117-8 is negative the beam limiter is in operation.

The signals at the RGB inputs on the c.r.t. base panel should be at 4V peak-to-peak, sitting on a 6.2V d.c. level, when the contrast control is set to maximum.

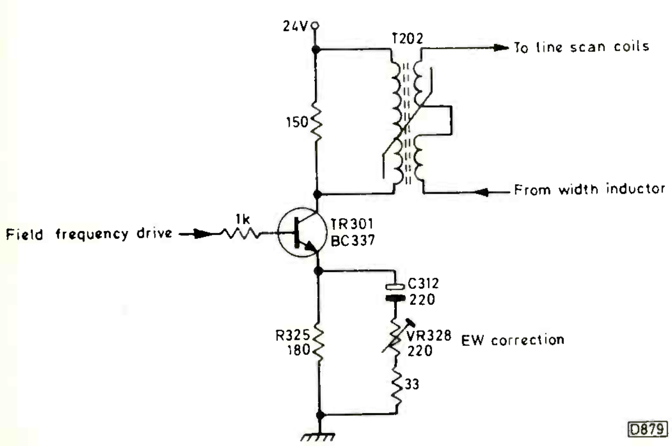


Fig. 2: The transductor EW correction circuit.

Fault Miscellany

For no field scan check the 24V supply rectifier diode D201 (BA157) which goes short-circuit. The associated surge

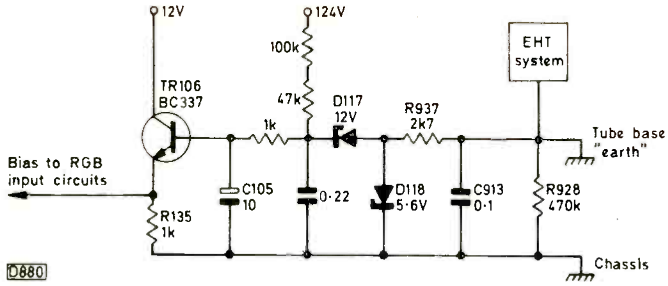


Fig. 3: The beam limiter circuit. TR106 is normally forward biased from the 124V line, producing across its emitter resistor R135 a 12V supply that's applied to the video input circuitry (see fig. 4). Beam current is sensed across C913/R928. With excessive beam current the voltage at the junction of R937 and R928 swings negatively. This negative voltage is applied to the base of TR106 via D117, cutting it off and thus removing the 12V supply to the video input circuitry.

limiter resistor R235 (10Ω, 0.5W) fails at the same time. If the fault persists, the TDA1170S i.c. is faulty.

Poor line lock – looks like line instability – occurs when C204 (220nF) goes open-circuit. If the TDA1180P sync/line generator chip IC201 keeps failing replace C210 (4.7nF).

Intermittent pincushioning – the sides of the raster coming in half an inch or so – has been experienced on occasion. The fault tends to clear after a time – in one case this took an hour. The cure is to replace the EW transductor driver transistor TR301 (BC337). Also check C312 (220μF, 25V) and R325 (180Ω, 1W) in its emitter circuit.

Line Noise

There are often complaints of excessive "line" noise with these monitors. It can be most annoying to users and can be intermittent – moving the cabinet will quite often stop it. The cause is that the width (L202) and line linearity (L203) coils tend to take off at a sub-harmonic of the line frequency because of inadequate tension. The cure is to remove the coils and coat the windings with quick-set Araldite (epoxy adhesive).

The Tripler

The e.h.t. tripler is reliable but the focus potentiometer mounted on it is prone to failure – the track burns up.

Spares

Spares can be obtained from Microvitec PLC, Service Department, Futures Way, Bolling Road, Bradford, West Yorkshire B04 7TU (0274 390 011).

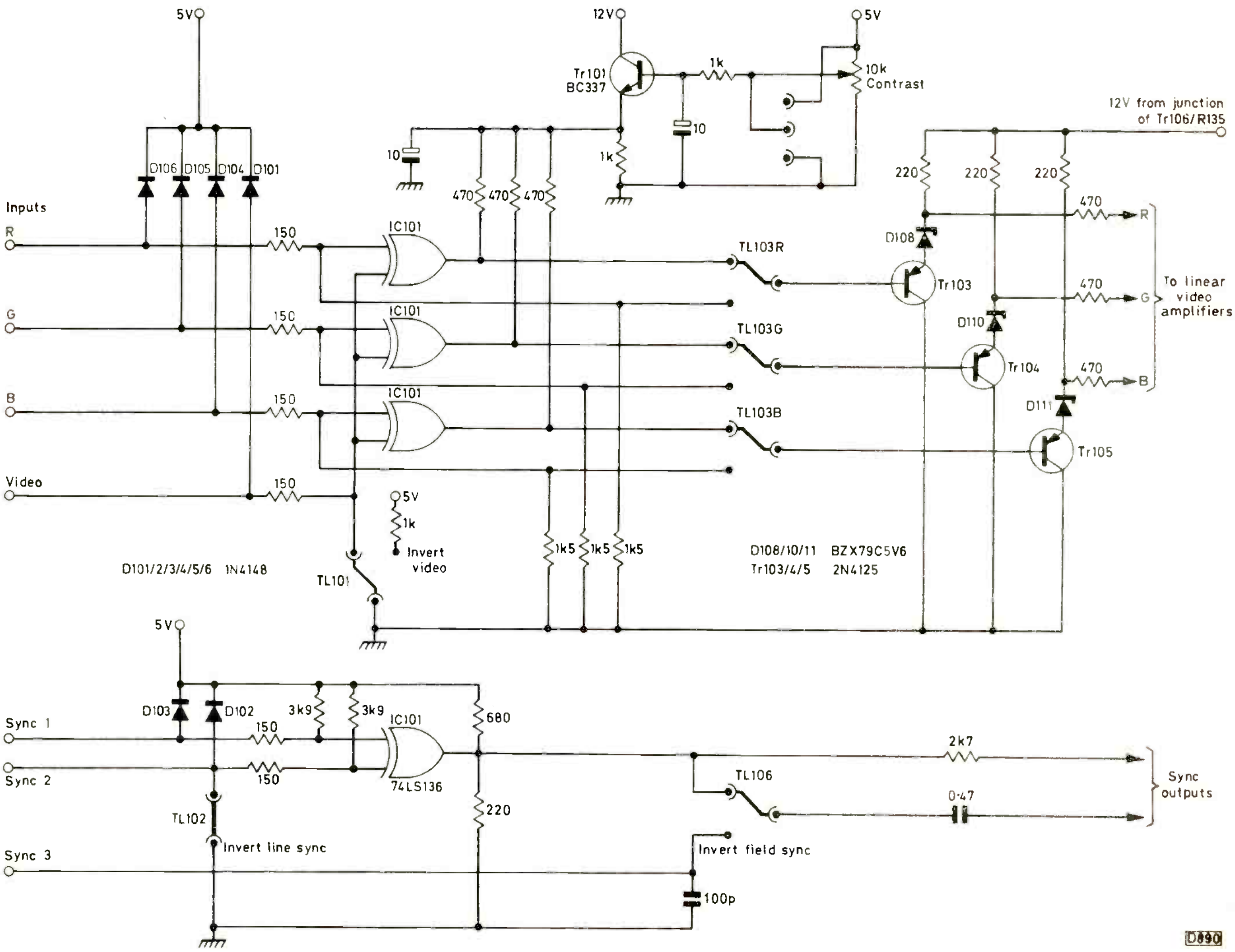


Fig. 4: The video/sync input circuitry. Links TL103R/G/B, shown in the TTL position, provide selection for either linear or TTL RGB inputs. Link TL101 provides inversion to cater for either positive- or negative-going TTL inputs. The contrast control operates in the TTL mode. TL102 and TL106 provide sync pulse inversion. Tr103/4/5 and zener diodes D108/10/11 provide level-shifting and temperature compensation. Their 12V supply is controlled by the beam limiter circuit – see Fig. 3.

Test Report: TestLab TL07 Probe

Eugene Trundle

A logic probe is the digital equivalent of the old-style signal tracer. Touched on any point in a circuit it indicates, by light and sound, the status there: high, low, intermediate/open or pulse train present. It thus provides a quick and simple method of digital circuit trouble-shooting in computers, the control systems of domestic audio/video/TV equipment, and items such as CD players and Nicam decoders where there are high-speed data streams.

Description

The TestLab Model TL07 that's the subject of this report is a typical modern logic probe. It's about the size of the very largest cigar – and not necessarily more expensive! There's a 3cm probe at the front for contact with the point, usually an i.c. pin, where the test is being carried out while three LEDs mounted on the body provide visual indication of the conditions at the test point: red means high, green low, yellow indicates pulse activity and is brought into operation by means of a push-button. Fig. 1 shows the threshold points for these indications. Each one is accompanied by its own characteristic sound output – a squeal for high, a squawk for low and a warble for pulsed data.

The probe is powered from the equipment under test via a flying lead with red- and black-sleeved crocodile clips. It will work with supplies between 4V and 16V, which takes in all systems in current use. All logic families – TTL, LS, CMOS, etc. – can be tested without the need for any switching. The probe draws 7mA from a 5V supply in the quiescent state and 21mA when it's flashing and squawking. Operation is up to 20MHz and pulses down to 25nsec width can be detected. The input impedance is 1MΩ and there's overload protection up to +250V. Inside I found a long, thin SRBP board that had over fifty components, including eleven transistors, mounted on it.

On Test

I started off by carrying out tests in various types of VCRs, old and new. One of the first things that I discovered – I don't need to use a logic probe every day – is the convenience of being able to use the instrument to trace the continuity to earth and the supply lines, and its readiness to show such things as a microcontroller chip's reset pulse at the moment of switch on and the presence of the clock oscillator signal at the connections to a crystal or a ceramic resonator.

The fact that the probe is powered from the gear under test is a mixed blessing. It usually involves finding a 5V, 12V line or whatever then soldering little connection stubs to the PCB. Having done this you're ready to go hunting amongst the pulses, ports and processors. The instrument showed me clearly what was going on in the system control section of all the VCRs I tried, also in the servo section of modern VCRs that use digital techniques here. The best sound-and-light show was obtained at pin 38 of the syscon chip in a JVC HR7300/Ferguson 3V30 where there are pulses from the PWM reel sensor!

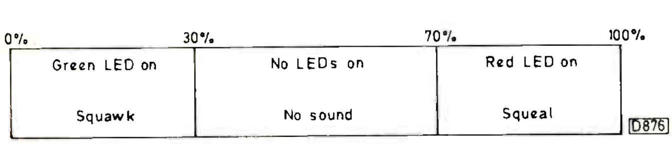


Fig. 1: Threshold levels for the LED and sound indicators of the TestLab TL07 probe. Supply voltage range is 4-16V d.c.

The relative brightness of the red and green LEDs gives an idea of the duty-cycle (pulse width) of the waveform under investigation. With a 50:50 pulse train such as a head flip-flop or a CD player L/R word select pulse waveform both LEDs give the same brightness output. With very short duty-cycles ("needle pulses") it's best to switch to the pulse mode which gives reliable indication of 25nsec pulses one second apart. I found that the address and data lines to and from port-expansion chips and in operation-keyscan systems could all be easily checked with the TL07, though care is sometimes called for in interpreting the results. It was whilst playing with VCRs that I made some accidental then intentional reverse-polarity tests at up to 15V. These did the instrument no harm.

I next tried a CD player, probing amongst its decoder and DA converter chips. Here I found that, especially with a sixty-pin, surface-mounted flatpack decoder chip, the rather large probe tip can too easily short between adjacent pins: if the probe was mine I'd file the tip to a sharp point and sleeve it. Apart from this the instrument performed well, showing EFM data, memory address data, input/output data, syscon pulses and fluorescent tube drive pulses with equal ease.

Several TV chassis were next investigated. One had a Nicam decoder whose busy little chip produced results as good as those obtained from the CD player's decoder. I found most satisfactory 1.5sec bursts of data on the SDA and SCL bus lines of a computer-controlled set when a remote command was keyed, and even traced line and field drive pulses, though it wouldn't do to get too close to the line output stage for fear of damaging the probe – this is not its purpose, after all.

With TV sets however this particular design of probe has what I feel is a considerable disadvantage: whenever it's within a few inches of the line output stage it picks up pulse radiation. As a result it squawks, squeals and flashes at random. This limits its usefulness in TV servicing, to say the least. Another make of logic probe was hastily tried and proved to be quite immune to the radiation fields around line output and chopper transformers.

Conclusion

Apart from the TV radiation problem I was impressed with the performance of this inexpensive test instrument. The at-a-glance or eyes-off (tone) status indication is much more convenient than the use of a scope, and though the latter can show much more – hash, jitter, stuck-together data lines and poor pulse shape for example – for most diagnostic work the probe is far quicker and more convenient. Particularly convenient when you're working in a jungle of data lines is the pulse setting, which ignores static levels and perks up only if pulse activity is present.

If your work doesn't include TV sets buy this probe without hesitation. If you want to go probing in TV sets however you'd do better to audition another type that has less sensitivity to line pulse radiation.

The TestLab TL07 costs £10.50 plus £2.25 post and packing from Marco Trading, The Maltings, High Street, Wem, Shropshire SY4 5EN (0939 232 763).

CD-I Update

George Cole

The third Compact Disc Interactive (CD-I) conference was held in London at the end of April. Now that the system has been launched in the USA and the UK the slogan for this year's meeting was "CD-I, a market reality".

UK Launch

The official UK launch of CD-I was on April 27th, the day before the conference. CD-I's co-developer Philips showed its CDI205 player and explained that CD-I was going on sale at 25 retail outlets across London, including Harrods, Selfridges, Covent Garden Records and selected Dixons and Comet branches. The aim is to introduce CD-I at around a hundred new outlets a month with the players in 500 shops across Britain by the autumn. The CDI205 has a recommended price of £599 and there were 32 CD-I titles at the launch, including childrens' programmes, games, music and special interest discs, at prices ranging from £14.95 to £39.95. Philips is also selling a roller controller for children at £50.

The CDI205 Player

The CDI205 player is the same model that was introduced in the USA in October 1991. It plays CD-I, audio CD, Photo CD and CD plus graphics discs. The front panel has a headphone socket and an 8-pin DIN-type input socket for a pointing device such as a mouse, a joystick or a tracker ball. Rear connections include another 8-pin socket for a pointing device, CD-I keyboard or other RS232 standard (computer) connection. Other sockets include an aerial input, r.f. output, phono video (CVBS) output, scart video and RGB, phono audio output and a jack for a wired remote control unit. There's also a large space for an extension socket known as the 22ER9141 digital audio/video module.

The first CD-I machines can display partial motion video (also referred to as base case video). Later this year CD-I will be upgraded to full-motion video (FMV). Existing player owners will be able to buy an upgrade cartridge for around £10.

CD-I Chip Technology

Fig. 1 shows a block diagram of the initial CD-I player. A brief description of the chip set was given in the August 1991 issue of Television. The CD-I chips have been developed by Philips and Motorola. Ray Burgess, Motorola's business segment director, gave news of the latest developments.

The two companies have produced two CMOS VLSI chips to provide the CD-I base case video and full-motion video. A video decoder/system controller (VDSC) chip will replace three chips previously used, saving board space and power and reducing the cost. It provides a 24-bit digital RGB output with sync and control pulses. It's also capable of providing four times the current CD-I screen resolution and will thus be suitable for HDTV software when this finally appears. The VDSC chip also generates 50Hz and 60Hz scan rates for PAL and NTSC displays and has two independent video channels for displaying various video files such as delta YUV (used for high-quality photographic images) or Colour Look-up Table (CLUT – a highly compressed graphics file).

The FMV chip will expand "MPEG" video. MPEG stands for the Moving Pictures Expert Group of the International Standards Organisation (ISO), which has established a world standard for compressing and expanding digital video. It uses a system called discrete cosine transform (DCT). The compression ratio is 30:1: two types of compression are used to achieve this. Intra-frame compression reduces spatial redundancy within the frames: there's no need for example to encode all the information denoting a large expanse of blue sky. Motion compensation uses inter-frame compression and is concerned with temporal redundancy between frames – in many cases there are only small differences between a series of frames, thus only these differences need to be encoded.

MPEG-1 video generates 1.5Mbits/sec and gives VHS picture quality. At the conference Philips showed a short video clip taken from a CD-I disc. The sound and picture quality were good. Up to 72 minutes of FMV with stereo sound can be stored on a CD-I disc. The MPEG committee is working on an upgraded system called, naturally, MPEG-2 which will have a bit rate of 6Mbits/sec, giving much enhanced picture quality. The first CD-I FMV software is expected in late 1992/early 1993.

Philips points out that it's five times cheaper to press a CD

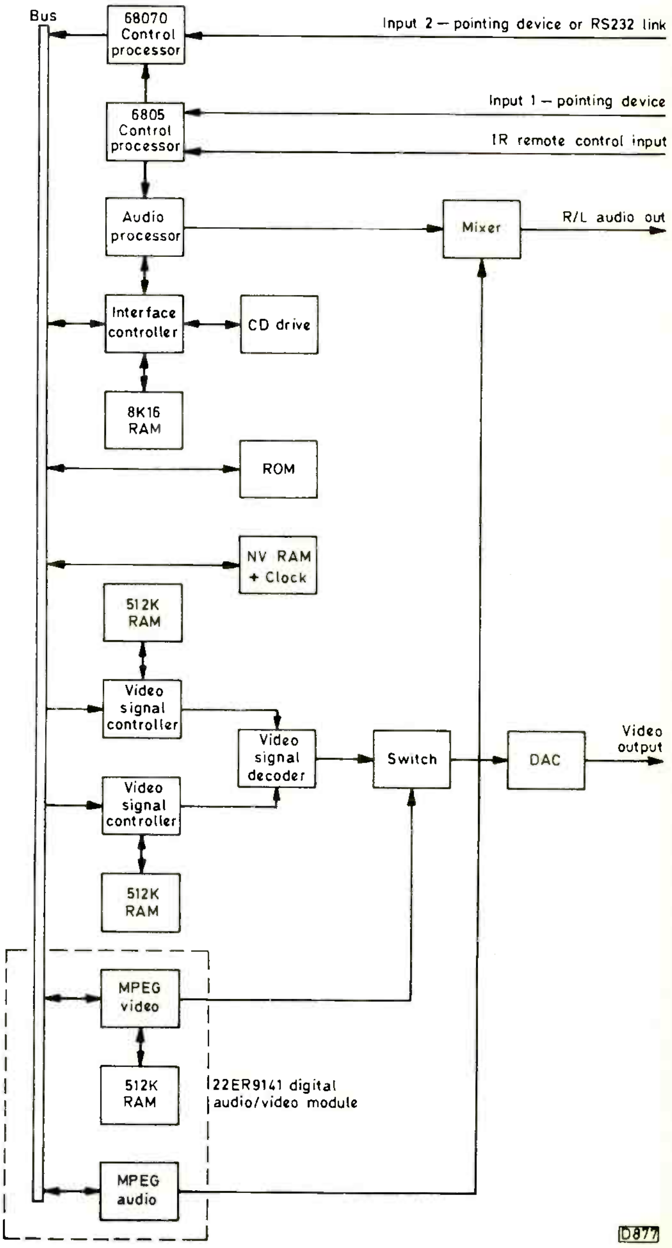


Fig. 1: CD-I player block diagram, early version.

than to duplicate a VHS tape – the company clearly sees CD-I movies as a potentially large market. The sticking point at present is CD-I's short video playing time (you'd need two or three discs for a full-length movie). Playing time could be increased by the use of better compression techniques or a new generation of blue lasers that would have a shorter light wavelength and thus be able to read smaller pits on the disc.

Motorola has produced the CD-I Development System, a board-based system that allows developers to produce CD-I systems in a modular form. This means that boards can be developed for specific CD-I functions, such as base case video, MPEG video or the central control system. During his talk Ray Burgess revealed some possible future CD-I developments, including a microphone input for Karaoke software and a video input for recording pictures from a camcorder. There's no doubt that Philips' long-term plan is to attack the VCR market with CD-I discs that will play FMV video software and record video signals.

Interactive TV

Philips and GTE ImagiTrek revealed another future CD-I development, Interactive TV. This is an "intelligent teletext" system that includes a CD-I player. A demonstration tape showed how the system might work in practice. Someone watching a live baseball match could at any time call up the latest score on their TV screen or pull information off a CD-I disc. The disc might be able to provide information such as the players' biographical details or the team's score record. Users could also play games or quizzes while the match was being shown in a small portion of the screen.

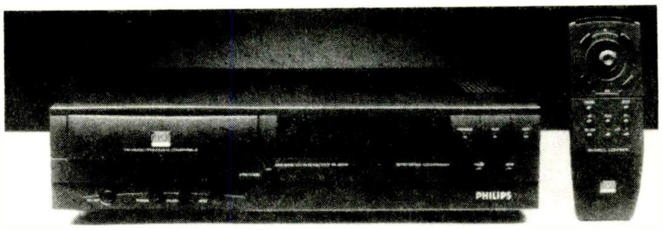
Neither company gave much technical information, but it seems that data is inserted into the video signal. The data bits trigger parts of the CD-I disc and the information from the disc is displayed on the screen. A trial of the system is to be undertaken later this year in the USA, involving around 50-100 homes. Philips and GTE ImagiTrek say that Interactive TV can be used with terrestrial, satellite or cable TV systems. In addition both companies are working on a system that uses telephone lines.

The Japanese Connection

It's easy to overlook that fact that Sony and Matsushita are co-developers of CD-I since both companies have maintained a low CD-I profile in Europe. But both companies have been busy in Japan, as Koji Yada of the Japanese CD-I Consortium revealed. CD-I was launched in Japan in April. Sony, Matsushita (Panasonic/Technics), Kyocera, JVC, Yamaha and Pioneer are all producing players. The consortium has developed a CD-I test disc and agreed on a standardised disc packaging that uses the familiar CD jewel case.

Mr. Yada revealed some future CD-I software including Artifical Intelligence Karaoke which works by converting the digital music into a MIDI (musical instrument digital interface) signal, enabling over 3,000 pieces of music to be stored on a CD-I disc. The disc is also designed to help users who can't sing, adjusting the pitch of the music to suit the user's voice. Another system generates applause when you sing well – Mr. Yada didn't reveal what happens if you sing badly.

A number of CD-I players were present in the "Japan Corner" of the exhibition. Several of these were portable units. Kyocera's prototype portable weighed 1kg and had composite video, Y/C and RS232 interfacing sockets. The unit is controlled by a wired handset. Sanyo's CDX1 looked like a small lap-top computer, with a 4in. colour LCD screen. Yamaha showed a table-top unit while Matsushita displayed



Philips' CDI205 compact disc interactive system.

a midi-sized player.

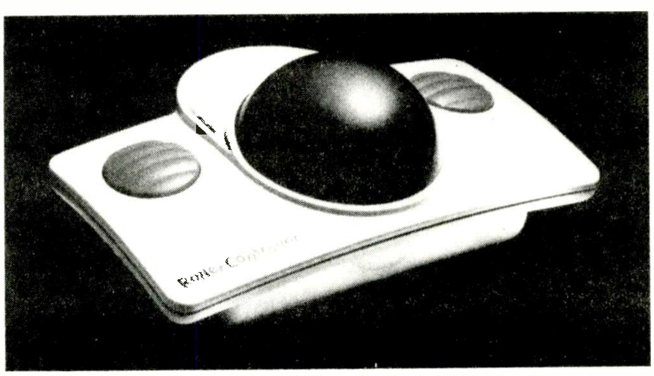
Sony showed its Intelligent Discman, which looks like the company's portable CD player. The intelligent Discman has a 4in. LCD screen, weighs 1.2kg and has a continuous playing time of around 90 minutes with battery operation. A video output socket enables its pictures to be displayed on a large screen. Sony's deputy president Nobuo Kanoi surprised many people by saying that Sony plans to launch CD-I in the business market – this is because Sony already sells its Data Discman, a portable player that uses 8cm CD-ROM discs, in this market. Some people wondered how two similar products could survive in the same market, but Sony is already making plans to integrate Data Discman with CD-I. At present the software required to search for information on a Data Discman disc is stored in the player – CD-I's search software is stored on the disc. To overcome the problem Sony is developing a bridge disc that will contain Data Discman data and CD-I software and can thus be used with both types of player.

Summary

The final conference speech was given by Gaston Bastiaens, director of Philips Consumer Electronics Interactive Media. It was upbeat, and Philips is clearly convinced that the system will be a success.

During the question and answer session Mr. Bastiaens was asked how CD-I titles could be protected from piracy, a timely point now that recordable CD (CD-R) systems are appearing in professional markets. It appears that the standards manual for recordable discs and players (the Orange Book) has provision for an anti-copy flag to be inserted in the TOC. A CD-R player would see this flag and refuse to record. This sounds like a sensible move until you realise that the audio CD system has a similar provision, though few if any disc manufacturers bother to insert the flag during production. It would be interesting to know if anyone from Philips can confirm that existing CD-I titles have this anti-copy flag.

Finally Mr. Bastiaens revealed that interactive movies – films that allow you to control how the plot develops – will be available in the USA towards the end of the year. He also hinted that there were many more CD-I developments in the pipeline.



Philips' CD-I roller controller for the young at heart.

What a Life!

Donald Bullock

Quiet Norman Glutton hauled himself in the other day with a JVC video (an HRD230E) and an Amstrad TVR3 TV-VCR combination.

"The recorder's from Clarence, governor of The Horsefly" he said. "Do you know that he charges nearly a pound for his home-made pasties?" Out came a pastie and a pocket knife and the demolition began.

"And who's the Amstrad from, Norman?" I asked.

"Ah, that's mine" he said. "The colour goes, but not for hours and hours. Expensive these pasties, but good."

Initial Checks

I plugged the Amstrad in and threw a blanket over it before getting on with the recorder, which was dead. After perusing the manual and checking around I eventually found that the M50965-628 microcomputer control chip was at fault. Meanwhile all that remained of the pastie was a few crumbs. Fitting a replacement chip restored the HRD230E to normal operation and, glancing at the price of it, I thought of the pies that Clarence would have to sell to pay for the repair. Quiet Norman would help him there.

The Amstrad TVR3

The Amstrad was temperamental, but after some hours the colour faded away. So I took it from under its blanket and opened it up. When I switched it on again the colour was all right. The obvious thing to do was to reach for the hairdryer and direct the heat on the area of the 48-pin UPC1420CA colour processor chip IC10. After a while the colour faded away, so I gave it a blast of freezer. The colour returned at once. The chances were that the chip was the cause of the trouble, but to make certain I masked off everything else with a thick duster and tried again. This proved the point. A new chip put matters right and after cruelly twisting its legs I consigned the old one to the bin.

How did we cope with such faults before the advent of freezer? Not so badly, I suppose, because we didn't have i.c.s for all that long before before freezer came on to the scene. A case of necessity being the mother of invention no doubt.

More HRD230E Problems

I pulled the HRD230E on to the bench again. Its clock was alight but there were no channel numbers on nor was there any sign of a beacon light. I moved over to the power supply circuit and found that there were no 5V and 12V outputs from the STK5481 chip. Replacing this restored the voltages, but there were still no results – and the M50965-628 micro was running hot. As its voltages were wrong I took it out and made some comparison tests with a new one. It was dud all right, but another replacement made no difference. So I pulled the machine towards me and settled down to it.

Before removing the chip I examined each of its pins through my giant magnifier. When I got to pins 27 and 28 I thought I saw the finest imaginable silver strand between them. By moving the light around and examining the chip from different angles I was able to confirm that the pins were indeed shorted. Use of a small, fine iron enabled me to isolate the strand: it was almost too tiny to see. Once it had been removed the machine burst into life. I was never more relieved to get a job off the bench.

Shortly after, Quiet Norman called in again. This time he was tackling a pickled egg.

"Glad they were both quick and easy" he said. "Easy means cheap, and there are other calls on my money."

"You'll have to uncurl a few browns, Norman. Pay up. They'll do me more good than they will you."

The Sony KV1442

The next set was a 14in. Sony colour portable, Model KV1442, with excellent sound but no brightness. I'd had one in with the same symptoms a few months back and sure enough this one was suffering from the same trouble – the 800V first anode supply was missing. The rectifier for this supply is D852. It takes its feed from the collector of the line output transistor via a 1kΩ, 1W resistor (R852). As in the previous set it seemed that the diode had tracked along its length on the underside, close to the panel. The result was that R852 had blown open. It's wise to fit the replacement diode well clear of the panel. After carrying out the repair I was rewarded with a really excellent picture.

Walter's Ferguson TX90

Then nervous Walter called in with his 20in. Ferguson set (TX90 chassis). After the usual trying interview he departed. I plugged the set into the mains and switched it on. Everything seemed to be all right but after a few minutes the set started to whine loudly and the picture frilled. Turning up the brightness made matters worse. I checked the h.t. and found that it was at 115V instead of 120V. In addition the set-h.t. potentiometer RV224 would only reduce the voltage, and it would do this by only about 2V. The voltages around the BD839 transistor TR107 in the regulator circuit were haywire, but the transistor tested o.k. I then found that its driver TR108 (BC338C) was open-circuit. A replacement failed to restore normal conditions and after making a few more tests I found that R267 (12kΩ, 1W) had gone very high in value. A new one enabled the circuit to be set up correctly, clearing the fault symptoms.

An Odd Visitor

My next visitor was a decidedly odd, wild-looking character.

"I'm speaking to you with the name of O'Sharp" he announced, "and I'm asking you to look at my Akai."

"Certainly" I said, wishing he'd called at Snoddies, "if you'd care to bring it in." I didn't like the look of him at all.

"You get it out of the car" he continued, "I've got a bad back."

He looked to me to be in the prime of life. The people that pull this one on me! Anyway I struggled in with it and picked up a pen.

"It's the on-off switch" he barked. "This will be the third time it's failed. I want you to take it out, examine it and write me a report on it, saying why it failed. Then I want you to examine the set and say what you think of the servicing so far, what damage it suffered at the hands of the last engineer and how much its value has fallen as a result. I'll pay you well for your trouble."

"No can do" I replied, wishing the set would run back into his car. "I can check the on-off switch and if necessary replace it. That would cost you £25."

"Twenty five pounds!" he screamed. "You're no better than the others." Then, bad back or not, he seized the set and flew.

Mr Blunt's Panasonic

The last set of the day was brought in by a real rustic. It was a Panasonic TC2061. The problem was sound but no brightness. I removed the back and turned up the first anode preset on the line output transformer. This produced chroma but no luminance. Looking around I saw a TDA3562A colour decoder chip. It seemed sensible to change it, but I didn't have any stock left.

I looked around the workshop which was getting full. People don't seem to collect their sets so quickly these days. If I could get this one done quickly, I thought, he'd probably take it away. These country people like to get their sets back. So I popped into town and bought a chip retail. The price frightened me, but once it was fitted I had a good picture. I gave Mr. Blunt a ring.

"Is it better now?" he asked.

"Sure is" I replied, "now when would you like to collect it?"

"Oh, anytimes like. I comes your way twice a year, sometimes three times. The year before last I came to town four times in all. But that was when I wanted another horse. I'll be along, don't you worry."

Satellite Notebook

Nick Beer

An impending visit to Pace at its Shipley, West Yorkshire headquarters should be interesting: the company is reputed to be the largest manufacturer of satellite receivers in Europe. The invitation came from Service Manager Bill Marshall who was able, during a recent telephone conversation, to answer several questions I had about Ferguson badged equipment – questions about which I'd not been able to get a satisfactory answer from Ferguson.

VideoCrypt Connector

One question related to the VideoCrypt connector used in the SRV1/SS9000 and the problems with this. Bill explained that a metallurgic reaction between the connector and the pins could result in poor contact. To get to the bottom of the problem Pace consulted independent metallurgists. The outcome of this is the use of a different socket, grey/white in colour instead of red/brown, in the latest Model 9200. Pace retrofit this socket in any receivers that come into their workshop suffering from the problem.

The success of this change is evident. We've sold and rented out many 9200 IRDs and have not had the trouble with this model. In the past we've tried cleaning faulty connectors but the problem has returned. We now remove the old type of connector and link over.

We informed Ferguson of the problem many months ago and have submitted many guarantee claims for cleaning. Initially this type of failure was disputed. Subsequently the only solution that has been offered is cleaning. It seems that Ferguson is unaware of the modified connector.

Pace Spares

I encountered a bit of a problem recently when I attempted to order Pace spares from HRS. Many of you will no doubt recall having seen in the trade press some months ago that HRS Electronics of Birmingham had been appointed trade distributor of spares for Pace MicroTechnology Ltd. We required a remote control handset for a 9200 IRD – during a burglary at a customer's home the TV set, VCR and satellite receiver handsets had been stolen but not the actual equipment! A look in the HRS catalogue showed Pace models detailed up to the SS9000 but not the 9200. This didn't surprise me as the 9200 is the current model and the catalogue was a few months old. What did surprise me was the outcome when I phoned HRS for details of the handset's price and availability.

The lady who answered the phone first suggested that there was no such make as Pace then, on being assured that there was, came back with the reply that they didn't do it. I contacted Pace direct and was immediately told by the gentleman in the spares department what the price and availability were. I took the opportunity to check whether HRS was still the spares distributor and was assured that this was so. Back to HRS to see what was going on. The lady I spoke to this time seemed unsure as to whether they were Pace distributors but eventually confirmed that they were. Ordering the required handset seemed to be a bit of a problem however – 10-14 days I was told. I decided to order direct.

Correction

Well, we all make mistakes, don't we? Wouldn't be human otherwise. Right at the end of the April 1992 Satellite Notebook I referred to the Pace SS9000/Ferguson SRA1. The Ferguson equivalent should have been given as the SRV1 – the SRA1 is not an IRD.

Communal Distribution

You may recall my mention in the June issue of a local hotel which has an industrial satellite TV system I tentatively agreed to look after – the one where the orthomode transducer sprang a leak. They've recently had a VideoCrypt decoder (Thomson SVA1) installed but the decoded channel, Sky Movies +, was not too hot. This is where I came in once more.

The scenes were fine if they were dark, but anything approaching a highlight just whited out the screen. It seemed that the video level from the unnamed receiver, one of four in a rack, was too high for the decoder's input. I attenuated it by adding a 100Ω, 0.25W resistor in the scart plug. This seems to have cured the problem.

New Channels

I note that CNN has made a low-key launch on Astra 1B. It doesn't seem to be the same service as that via the Intelsat craft at 27.5° W and was initially on the amateurish side – crash edits etc. Many customers still don't know that it's there – most of those who do discover it by flicking through the spare, pretuned channels on their receivers.

One recent discovery of mine, as yet unexplained, is the duplication of MTV via an Astra 1B vertical transponder. It's still at 11.421GHz via 1A, but maybe a change is being considered for single-polarisation Sky SMATV systems. The offset with this transponder is much wider than the very narrow angle at 11.421GHz, which is traditionally used along with Screensport for i.f. offset adjustment.

Long-distance Television

Roger Bunney

May is traditionally the start of the Sporadic E season. This year has proved to be no exception, with many openings logged and reported by our readers. Spice was added by enhanced tropospheric conditions during the middle of the month. One unusual logging occurred on May 6th when Roger Fussell (Torpoint) received a ch. E21/R21 TVP (Poland) test card for nearly five seconds. It's likely that the transmitter was Katowice at 400kW e.r.p. while the propagation mode was probably aircraft scatter. It was an extremely unusual catch.

An extensive aurora during the afternoon of the 10th produced the usual garbled and distorted pictures. Signals were present in Band I through to Band III but no definite identifications were possible.

The weather in the UK during much of May was excellent, with long hot days and clear skies. These are the classic signs of good tropospheric propagation and there were openings from the 13th through to the 21st and from the 25th to the 28th. The earlier opening produced the usual Band III/u.h.f. signals from Germany, France and the Benelux countries during the evenings/early mornings. A peak was reached on the 16/17th when signals were received across an arc extending from France in the south to Denmark, Norway and Sweden in the north. The 17th was perhaps the best day when AFRTS ch. E70 and several 435MHz amateur TV operators including G4YTU and PE1HXD (Holland) were received. For those in good positions Band III and the u.h.f. channels were jammed with signals while evidence of Scandinavian Band I stations provided a bonus. Further inland, Band III/u.h.f. signals from RTE (Ireland) were received. Spanish Band III/u.h.f. signals predominated on the 19th-22nd (check on ch. E35 if conditions seem to be favourable). The opening on the 25-28th was less significant, featuring the usual Band III/u.h.f. German/Danish/Benelux transmitters.

But in May young men's thoughts turn to SpE. There was some reception on most days, though few exotic signals put in an appearance. We shall have to keep our fingers crossed. Anyway, this is the SpE log for the month:

5/5/92	SVT (Sweden) chs. E2, 3; NRK (Norway) E2; RAI (Italy) IA; TVE (Spain) E2, 3, 4; RTP (Portugal) E2, 3, 4 (the latter is from Madeira); C+ (France) L3; DR (Denmark) E2, 3; ARD (Germany) E4.
6/5/92	RAI IA; TVE E2, 3; JRT/HTV (Yugoslavia) E3; NRK E2; YLE (Finland) E3.
7/5/92	TVE E2, 3; RTP E2, 3; RAI IA; TVA (Italy) IA; ORF (Austria) E2a.
9/5/92	SVT E2, 3, 4; NRK E2, 3; CIS (formerly the USSR) R1-4 including Estonia R2 and Latvia R3; CST (Czechoslovakia) R1, 2, 3; HTV E4; YLE E3.
10/5/92	RAI IA; RTP E2; CIS R1, 2; NRK E3; DR E3; RTB (Belgium) E3.
11/5/92	ORF E2a; CST R1, 2; TVR (Romania) R2; HTV E3.
12/5/92	CIS R1-4; CST R1; RAI IA, B; TVE E3; C+ L4.
14/5/92	RAI IA, B; TVE E3, 4.
15/5/92	RAI IA; TVA IA; HTV E3; TVR R2; DR E3; C+ L2; MTV-1 (Hungary) R1.
16/5/92	+PTT (Switzerland) E2, 3; DR E3.
18/5/92	YLE E3, 4; NRK E2-4; SVT E2-4; DR E3, 4; CIS R1, 2; RTP E2; TVE E2-4; RAI IA, B; RUV (Iceland) E4.
19/5/92	TVE E3.
20/5/92	TVE E3, 4.
21/5/92	RAI IA, B; HTV E3; TVE E2-4.
22/5/92	RAI IA; TVE E2, 3.
23/5/92	TVE E2-4; RTP E2; RAI IA, B; ARD E2; +PTT E2, 3; C+ L2-4; DR E3; NRK E2-4; SVT E2, 3; CIS R1, 2; ORF E2a, CST R1; HTV E3.
24/5/92	NRK E2, 3; SVT E2, 3; DR E3, 4; TVP (Poland) R2; +PTT E2, 3; MTV-1 R1; RAI IB; C+ L3; TVE E3.
25/5/92	CIS R1, 2, 4; CST R2; TVP R2; ARD E2, TVE E2-4; RTP E2, 3; DR E3; MTV-1 R1; RAI IA, B; ARD E2.
26/5/92	SVT E2-4; NRK E2, 4; TVR R2; CST R1; TVE E2, 3.
27/5/92	TVE E3; SVT E3.
29/5/92	RTT (Tunisia) E4; RAI IA, B; TVA IA; C+ L2-4; TVE E2- 4; RTP E3.
30/5/92	RUV E4; RAI IA, B; TVA IA; RTP E2, 3; TVE E2-4; HTV E3.
31/5/92	TVE E2-4; RAI IA, B; C+ L2-4; +PTT E2,3; CIS R1, 2; ARD E2, 4; HTV E3.
1/6/92	HTV E3, 4; RAI IA; C+ L3; unidentified Arabic E3 signal.
2/6/92	RAI IA; TVE E2-4.
3/6/92	TVE E2-4; C+ L3, 4.

On the 29th at 1850 Cyril Willis logged a suspected late-season TE (transequatorial skip) signal on ch. E2, a smeary test card that faded and returned at 2005 with programme material and large white letters or a logo at the lower left corner. The signal is unidentified to date.

Tim Anderson reports that the sea air at St. Leonards is now full of 49MHz baby alarms and other radio devices, making reception of ch. R1 impossible despite the use of various filtering devices. He's constructing a new five-element Band I array based on a Tonna design and hopes that its very sharp polar response will combat the 49MHz menace. Unfortunately phase-cancelling systems just don't work when there are several sources of 49MHz interference in the vicinity.

More information has come to hand on identification of signals received from Equatorial Guinea: the station uses Spanish and has a carrier at 48.245/48.250MHz, with VITS, closing down at around 2250 GMT. There's a problem with the main RTP Lisbon ch. E6 transmitter, a ghost on the output caused by feeder/aerial problems at the site. All local relays that take the signal suffer from the problem. Teletext is not used.

My thanks to the following for sending in reception reports and logs: Tim Anderson (St. Leonards), Roger Fussell (Torpoint), David Oliver (Birmingham), David Glenday (Arbroath), Simon Hamer (Powys), Peter Schubert (Rainham), Brian Williams (Penarth) and Cyril Willis (King's Lynn).

News Items

USSR/CIS: DXers will be familiar with the Tablica 0249 monochrome test card used for many years and still seen occasionally. A new card, Tablica 0286, was introduced in 1986. We've been sent a photocopy of the design, which has not been seen via SpE – yet!

Sri Lanka: The independent company MTV has started broacasting on ch. E25, covering the country's Western Province. Transmissions are mainly in English and the PM5544 test pattern is used.

India: Russia has leased to PTI-TV a transponder on the

Ekran satellite at 99°E for u.h.f. TV broadcasting to India and the surrounding countries. It's understood that the service, scheduled to start in August, will be on ch. 54 (754MHz).
Iceland: A new station, "SYN", is operating at Reykjavik on ch. E6. Transmissions are at present restricted to the weekends.
USA: At last autumn's Las Vegas COMDEX computer trade fair the FCC issued over a hundred summonses to firms offering computer equipment that wasn't suppressed to statutory emission levels. The FCC has a policy of dealing firmly with those who don't comply with its suppression standards.
Tunisia: Canal Plus is to start a terrestrial service later this year called Canal Horizon.
In brief: Zuid Holland TV (ZHTV) is to start broadcasting shortly in the Rotterdam area, probably on ch. E37... MDR-Germany has started a teletext service of its own. The BFBS is slowly closing down its radio/TV network: final closure is expected in 1995... The Petrin Hill Prague City TV transmitter that used chs. R7/24 has been replaced by a new transmitter at Zizkov. The R10 company that runs the R10 f.m. radio service on 87.8MHz hopes to be allocated the vacated ch. R24.

Obituary

It is with deep regret that we heard of Chandra de Silva's death from a heart condition. He was a true enthusiast and despite the shortage of components and equipment in Sri Lanka enjoyed TV-DXing to the full. Chandra designed and built a 714MHz helical aerial, featured in the *TV-DXer's Handbook*, for reception of the 714MHz transmissions from the Ekran satellite. The news came from a colleague, Bandula Gunasekeva, who is continuing with DX work and experimentation at Colombo.

Satellite TV

Intelsat VI F3, saved by the shuttle Endeavour, has been moved to its correct orbital position at 34.5° W in time for the summer Olympics traffic. Transponders on the Intelsat craft at 27.5° W, 18° W, 57° E, 63° E and 66° E have been leased for the games. Launch of Intelsat K, an all Ku band satellite which will cover North and South America and Europe from 21.5° W, has been delayed.

A new earth station, Malmoe International Teleport, has just opened in south Sweden. In an attempt to reduce communication costs and the problems of high-speed data flow in non-X25 terrestrial networks the EBU is installing a series of VSATs (very small aperture terminals) for its members across Europe. Data will be passed to broadcasting members via a leased facility using Eutelsat I F4 at 7° E.

Mercury Paging has launched a new satellite paging service. The uplink is from Mercury's London station to a Eutelsat satellite, the downlink being received at over 200 VSAT terminals around the UK adjacent to the company's v.h.f. paging bases.

The Indonesian government is to provide up to four small satellites in a series called Indostar. Each will have two analogue and eight digitally compressed TV channels in the S band (2.5-2.6GHz) and up to eight broadcast digital audio (DAB) channels in the L band (1.45-1.49GHz). Indostar-1's orbital position will be at 105-115° E: it should be operational by the spring of 1995. The analogue TV services are intended for inexpensive receiving systems throughout Indonesia. Two types of receiver are being developed, a low-cost one for the analogue transmissions and a second to resolve the digitallly compressed TV transmissions. It's thought that such Broadcast Satellite Services (BSS) will revolutionise international broadcasting and could result in a dramatic decrease in shortwave broadcasting within the next decade.

RTP (Portugal) has started transmitting via Eutelsat II F3 at 16° E, on 11.56GHz.

The French "Satellite TV Club" has invited membership from French-speaking UK enthusiasts. The cost is 120 francs a year. For further details write to the Satellite TV Club, Place de Mons, 33360 Cenac, France.

Book Note

A third, updated edition of John Breeds' *Satellite Television Installation Guide* (ISBN 1 872567 03 7) has just been published at £12 plus £1 post in the UK, £2 in Europe or £8 by air to the rest of the world. This very popular book provides a clear guide to installation work from fixed to tracking systems. It's all there, from satellite orbital theory, footprints, how each component part of the receiving system works (with large clear drawings and photographs) to elevations, sighting lines and site surveys, polar mounts, planning permission, the radio/TV transmissions from each satellite, the scart connector and much more. The CAI has adopted the book as the approved study guide for City and Guilds satellite courses. It's available from Swift Television Publications, 17 Pittsfield, Cricklade, Swindon SN6 6AN (telephone/fax 0793 750 620).

Test Report: HS D400 DX Tuner

The use of an outboard tuning system for DX-TV reception has several advantages. As well as flexibility and improved signal working, the tuner used in an outboard system is likely to have better performance and coverage than one fitted in a standard TV set. For DX-TV purposes we need to cover Bands I, II, III and the u.h.f. spectrum, while reduced i.f. bandwidth working is a considerable advantage with weak signals or where there's a high level of interference. An outboard system consists of a wideband tuner, i.f. processing and an upconverter which provides an output for feeding to a conventional receiver.

Some years ago HS Publications introduced the D100 DX-TV tuning system which is still extremely popular. It has switched selectivity, down to 2MHz in three steps, and facilities for tuning in the audio subcarrier despite reduced bandwidth video working. Building on this success, Keith Hamer and Garry Smith have introduced the HS D400 budget TV tuning system. One of the units was supplied to us for testing and its performance has proved to be very interesting.

The D400 package in fact consists of two units, the tuner proper and a 13V power supply. The latter is a modified Sinclair ZX computer unit with a 20m fuse, a mains lead and a 1.7m d.c. lead for connection to the tuner via a 3.5mm mono plug. Unlike so many Taiwanese offerings that run hot with even minimal loading this one runs cold.

The tuner is housed in a gloss black ABS box measuring 120 x 100 x 45mm excluding knob projections. There are three controls, a Band I/III/u.h.f. selector at the top left, a large tuning knob marked 1-10 to the right and, at bottom centre, the variable bandwidth/gain control. Two large dots, blue and yellow, are stuck at the top around the perimeter of the tuning knob. These are channel calibration markers, blue for Band I and yellow for Band III. They correspond with the numbers around the edge of the knob as CCIR channels. A small chart in the instruction leaflet indicates the Band I/II calibration reference points (coverage extends to ch. R4).

The clever adjustment is the variable bandwidth/gain control. When this is turned clockwise the i.f. bandwidth is progressively reduced while anticlockwise rotation increases the bandwidth. The range is from 3MHz narrow to 6MHz wide. When the bandwidth is increased the gain falls: this is a feature of the tuner.

A bright red LED indicates that the tuner is powered. The 3.5mm supply socket, a standard (recessed) Belling-Lee aerial input socket and a 90cm u.h.f. output lead with coaxial plug termination are all located at the back of the unit.

Band I coverage is 45-87MHz, Band III 170-230MHz. The u.h.f. coverage is less than the full TV spectrum at 455-710MHz (chs. E21-51). I suspect that the tuner was designed primarily for v.h.f. The output is on ch. E35, though this can be varied over chs. E30-40 (there's an access hole for this adjustment).

Setting up is simple. Connect the unit to your u.h.f. receiver, switch it on and select the reduced bandwidth. Tune the receiver upwards progressively from ch. 30. There will be several peaks of noise and blanked screens. Look for the lowest noise peak and tune the receiver to this peak, probably around ch. 35/6. Now switch the D400 to u.h.f. Tune around for evidence of local signals. If nothing is seen you're on the wrong peak. Try again! Once the correct peak has been found DX hunting can commence.

On Test

On test I found that weak Band III signals (Belgium chs. E8/10) could be located in the reduced bandwidth mode. Tests at u.h.f. with non-local signals proved that the performance was satisfactory. Band I SpE signals romped in. It's when your receiver is confronted with several strong adjacent-channel SpE signals, e.g. chs. E3/IA, that the value of the i.f. bandwidth selectivity can be seen. This is also the case with weak tropospheric signals in Band III. No more floating E3/IA pictures: each channel can be tuned in separately.

The overall performance is impressive, particularly the action of the continuously variable bandwidth control. In a fast-moving SpE opening you'd leave the control set for reduced bandwidth to save repeated adjustment. My only negative comments are that I'd have preferred to see legends relating to each knob and perhaps smaller channel calibration marker dots – they are one channel wide!

This is an interesting and practical unit for the DX-TV enthusiast. It costs £49.95 including UK postage and is available from HS Publications, 7 Epping Close, Mackworth Estate, Derby DE3 4FS (0332 38 169). If you write for information or a leaflet, please include a stamped, addressed envelope.

Servicing the Finlux 3000 Chassis

Steve Cannon

The innards of TV sets are becoming quite different as the technology advances. Some things such as the c.r.t. and the line output transformer are unlikely to change much in the immediate future, but signal processing has altered dramatically over the last ten years. Some modern chassis use digital processing, with digital techniques employed for everything from remote control to field deflection. Many adjustments can nowadays be carried out using the remote-control handset rather than having to remove the back and turn the relevant preset. Now I know that there's nothing like a good twiddle, but it does look as though this will become a thing of the past. As electronic integration has increased and more and more custom-made chips are being used, it's as easy and cheap to have each stage controlled as a slave under the overall control of a master microcomputer chip. One thing is for sure: noisy presets will and in fact are becoming extinct.

Which brings us to Finlux's all-singing, all-dancing 3000 series chassis that has, as you may have guessed by now, a digital data bus (I2C bus) as its central nervous system. It controls programme memory, tuning, signal processing and deflection waveform processing. The set is also a multistandard one, with automatic selection between NTSC, PAL or SECAM colour decoding, 50 or 60Hz field scanning and 525 or 625 lines. There are two tuners, one for u.h.f. and one for v.h.f. The set will work almost anywhere, probably everywhere in Europe.

Internal Layout

After removing the back cover you are greeted by two side panels rather than the flat panel for the power supply and deflection circuits as in the 1000 series chassis. The left-hand panel houses the signal processing and field deflection departments while the right-hand pannel is for the power stages. In between the two there's the connector board, which differs depending on whether the set has one or two scart sockets.

The Power Panel

The right-hand panel contains the power supply and the line output stage, which are not all that different from those in the 1000 series chassis. The chopper circuit is controlled by the ever-popular TDA4601 chip. On the output side the rectifier diodes, mostly BY299s, suffer from the same affliction as in the previous chassis – they go short-circuit, usually shutting down the power supply. The chopper transformer is quite hefty and the connections to its pins can suffer, so it's worth checking these.

There's an official modification for the line output stage relating, as in the 1000/2000 chassis, to the scan coil connections. It involves soldering two rivets to the copper side of the line scan coil PCB connections to prevent the solder from cracking and arcing. A detailed modification sheet is available from Finlux.

Four supplies are produced on the secondary side of the chopper transformer as follows: 138V for the line output stage; 25V for the audio output stages; a 17V feed that goes to the 12V regulators whose outputs supply the l.t. circuitry; and a 7V feed for the 5V regulator that supplies the microcomputer control chip and the teletext department. Secondary windings on the line output transformer provide the following supplies: the usual 200V for the RGB output stages; 26V for the field output stage; and various supplies for the c.r.t.

The Signal Panel

The signal panel has a few plug-in boards, some of which are options. The sound and colour decoder boards are obviously standard: the optional ones are for Nicam and teletext.

There are different audio panels that depend on the country for which the set is intended: the DD311 panel is the one for UK use. A TBA120U chip, ICd6, demodulates the f.m. sound, which leaves the panel via the buffer transistor Td1. When it reaches the motherboard it's fed to identical left and right channels. There are a couple of links that have to be cut when a Nicam panel is fitted. The mono "left" and "right" signals then return to the audio board, going to the TDA8420 chip ICd1 and the connector board. ICd1 controls the scart audio switching, the pseudo stereo sound switching (panorama effect), balance, volume, bass and treble. It also has separate volume and balance controls for headphones. These functions are all controlled by the microcomputer chip via the I2C bus.

The audio signals for the headphones go to the headphone audio output amplifier chip ICd3. The other audio signal feeds go to the TDA4935 speaker audio output chip ICp1 on the motherboard. This delivers about 15W per channel into a 4Ω load.

Adding Nicam is easy. The panel is inserted into the sockets (usually fitted) on the signals panel then a couple of links on the analogue audio board are snipped, also the previously mentioned links.

Colour Signal Processing

The colour decoder panel has been tried and tested in the 1000 and 2000 series CTI chassis. CTI stands for colour transient improvement: what it does basically is to reduce the time taken to get from one colour-difference voltage to another, e.g. from green to magenta on colour bars – colour smearing is most noticeable between these two colours. The transition time is reduced from about 800nsec to about 150nsec.

The actual colour decoder chip is ICb1, type TDA4555, which can process PAL, SECAM or NTSC 4.43/3.58MHz colour signals. Composite video is fed to the colour decoder panel where the PAL chroma signal is selected by the acceptor circuit Lb6/Cb28. It's then fed via the BC557B emitter-follower Tb1 to pin 15 of ICb1 which processes the information and determines which colour standard is being used. The crystal reference oscillator runs at 8.86MHz. It can be adjusted by earthing pin 17 of IC1b. The reference oscillator will then free-run and its frequency can be set by adjusting Cb36. Demodulated colour-difference signals leave ICb1 at pins 1 and 3, passing to pins 1 and 2 of the TDA4565 CTI chip ICb2 which also delays the luminance signal so that it coincides with the sharpened colour-difference signals. The luminance and colour-difference signals then leave the colour decoder panel and pass to the TDA8443A chip ICe1 on the motherboard.

Now this is a curious chip. It switches, under the control of the I2C bus, between the Y/B – Y/R – Y signals and RGB inputs coming via the scart socket. Passage of the Y/B – Y/R – Y signals is straightforward: they enter at pins 11, 12 and 10 respectively and leave at pins 20, 19 and 21. The chip has a clamp pulse generator which is used to clamp the inputs to the black level: timing information for this operation is obtained from the sandcastle pulses which enter the chip at pin 24. Things are rather more complicated when it comes to the RGB signals which enter at pins 4, 5 and 6. These are clamped then matrixed to obtain Y, B – Y and R – Y signals. Colour-difference and luminance signals can be fed in via the scart socket and when this is done the matrixing within ICe1 can be bypassed. If this is required, external Y is connected via pin 11 (green) of the scart socket, external B – Y via pin 7 (blue) and external R – Y via pin 15 (red).

ICe1's Y, B – Y and R – Y outputs pass to pins 15, 18 and 17 respectively of the TDA3505 chip ICe3. This is the RGB processor: it carries out matrixing, colour etc. control, beam limiting, black-level stabilisation and switches between the inputs just mentioned and teletext RGB inputs at pins 14, 13 and 12 respectively, with pin 4 for blanking/switching. The text signals are switched through when the voltage at this pin rises above 0.9V: below 0.4V the inputs from ICe1 are selected. As ICe3 doesn't incorporate an I2C bus interface a TDA8444 digital-to-analogue converter chip ICe2 has to be used to enable it to receive the control potentials for hue (not applicable with UK sets), contrast, saturation, brightness and, lastly, red and green gain. ICe2 also provides a switching output to control the 4053 chip ICa1 that switches between internal and external (scart) composite video and sync inputs. ICe3's control pins are 19 for contrast, 16 for saturation, 20 for brightness and beam limiting, 22 for green gain and 23 for red gain. Its RGB outputs appear at pins 1, 3 and 5 respectively and are then fed to the c.r.t. base board.

Timebase Circuitry

The left-hand signals panel also houses some of the timebase circuitry. A TDA2579 chip, ICh1, contains the sync circuitry and the timebase generators while a TDA3654 chip, ICk1, provides the field output. Between these two chips there's a TDA8432 chip, ICh2, which contains the field drive and EW correction circuitry. It's connected to the I2C bus and as a result there's a distinct lack of potentiometers in the EW correction and field output stages. The adjustments are all carried out via the remote control system.

The Microcomputer Control System

The set's brain is the 40-pin SDA2080 microcomputer chip ICf2. The I2C bus lines are connected to pins 21 (SDA – serial data) and 22 (SCL – serial clock). These provide links to a number of slave devices, one of which is the SDA2526 non-volatile memory chip ICf1. This stores channel information, customer control settings and the I2C bus programming parameter values – more on the latter shortly. Up to 39 channels can be preset and there's the facility for connecting up to three external devices via scart connectors. On two-scart socket sets the scart-1 socket has just a composite video input while the scart-2 socket accepts RGB and composite video inputs. There's also a copy facility that enables the scart-2 composite video input to be looped through to the scart-1 composite video output. Stereo audio signals are looped through in the same way. This facility does away with the need for the usual snake pit of wires when copying tapes. You can monitor on the screen if you want to, but this isn't compulsory.

The SDA and SCL lines from the control panel go to many slave devices, as follows:

ICl1 on the one-scart connector panel
ICl1 and ICl2 on the two-scart connector panel
ICi1 the tuner PLL/prescaler chip
ICd1 the audio control chip
ICe1 the RGB switching chip
ICe2 the DAC for brightness, contrast etc. control
ICh2 for deflection control

In addition the I2C bus controls the Nicam and teletext panels. Thus via these two lines the microcomputer control chip monitors and controls much of the processing carried out in the set.

I2C stands for inter integrated circuit: it's a two-lead (data and clock lines) system that enables the slave devices connected to the lines to be controlled by the master device, in this case ICf2. In addition to controlling the slave devices the microcomputer chip can give the user, or service engineer, an indication as to which if any of the items connected to the bus has developed a fault. What a good do!

The service mode has to be entered to gain access to these facilities. To do this you press one of the normal buttons (N1, N2 or N3) on the set. The service switch, which is located in the hole next to button N3, then has to be pressed within eight seconds. A strong piece of wire will usually do to operate this switch. Once the service mode has been entered the LED display will be blank apart from one dot which will be lit. Press the service switch again to get back to the TV mode.

Keying 04 on the remote control handset when in the service mode will result in ICf2 checking all the chips connected to the I2C bus. The operation is as follows. ICf2 sends out address data that corresponds with one of the slave chips. The latter responds by acknowledging its presence, and an appropriate hexadecimal number is then displayed by the LEDs. Each slave chip/section of the receiver has a separate number, as follows (the display codes are listed in the order in which ICf2 carries out its checks):

06	satellite processor
04	teletext processor (high feature)
22	CCT basic teletext (ICt2)
d2	RGB switch (ICe1)
94	extra video switch (in monitor only)
92	copy switch (ICl2)
90	scart switch (ICl1)
80	audio adjustment (ICd1)
84	stereo identification (ICd2)
48	colour decoder DAC (ICe2)
8C	geometry control (ICh2)
C2	tuning PLL (ICi1)
A2	teletext NVM (ICt5)
A0	control NVM (ICf1)
Pn	picture memory n Kbyte
An	Antiope (French teletext).

Thus if a set has CCT text and a single-scart panel and no obvious fault is apparent the following sequence of numbers will appear: 22, d2, 90, 80, 48, 8C, C2, A2, A0. If a code that was expected is missing, e.g. the CCT text code 22, this means that ICf2 didn't get a reply from the device concerned. In this particular example if the teletext panel is fitted correctly there is obviously either a fault on it or a break in the links back to ICf2. Use this procedure when adding satellite TV, removing or changing the teletext panel or changing the scart panel. This will reconfigure the system and the codes will be modified depending on what's been added or removed. The set's configuration is stored in the NVM by pressing -/- - on the handset. Then switch the set off at the mains to reset ICf2.

Adjustment Codes

Many adjustments are carried out by entering the service mode then using the relevant two-digit code with the handset. These codes are as follows:

25	line frequency
30	vertical shift at 50Hz
38	vertical shift at 60Hz
27	height
31	vertical compensation
28	vertical linearity
26	horizontl phase shift
32	width
36	horizontal compensation
35	trapezium correction
29	S-correction
34	EW corner correction
33	EW raster correction
22	red gain
23	green gain.

After entering the required code you carry out adjustment by pressing STEP + or STEP – on the handset. The LED display number will alter, either incrementing or decrementing depanding on which button is pressed. The range of each function is 00-31 for the vertical and horizontal adjustments, 00-63 for the rest. If a new value is to be stored, press the -/- - button as before. Each adjusted value must be stored before another code is selected for adjustment. No dramatic value changes should be necessary, but as a set ages and component tolerances drift it's a real boon to be able to leave the set in place and do the tweaking via the handset. But beware: there's no normalisation setting for the service mode adjustments. Once a value has been stored there's no way of getting back to the previous setting unless you can remember its displayed value.

Bus System Fault Finding

It can be difficult to pin down the exact location of a suspected fault on the I2C bus: the data changes so quickly that checks can't be made with normal servicing equipment to see whether the data is correct and that the microcomputer chip and its slaves are talking to each other. As a general rule of thumb if data can be seen on a scope on both the data and clock lines and can be seen to be altering things are o.k. Check the amplitude of the pulse trains, which must be 5V peak-to-peak.

If no clock or data information is apparent check the d.c. voltage on the relevant line(s). Because of the presence of pull-up resistors the lines should be at 5V d.c. when no data is being transmitted. Thus if one or both of the lines is at 5V no information is present. This usually means that there's a fault at the microcomputer end of the bus. If no pulse train is present and the d.c. voltage is at 0V or very low, there's a short or low resistance on the line. In this event the cause of the fault could be literally anywhere on the bus. The only thing to do is to check the SDA and SCK lines and see which of the two, at which chip, reads low-resistance to chassis. If no shorts can be found, disconnect the line in turn at each chip until the d.c. voltage returns to the correct level and the data and clock information are restored. If you are still in trouble the microcomputer chip is probably defective. Remember however that for the I2C bus to operate the microcomputer chip must be working correctly. Carry out the usual checks – supply, presence of the 8.8MHz clock signal, reset pulse etc. – before replacing any chips.

Remote Control

The RC3010 remote control system used with these sets will operate a VCR. What some people don't seem to know is that the handset can be programmed for use with many different kinds of VCRs. It can be in any of nine modes. The following list shows which mode corresponds with which model/manufacturer:

Mode	*Model/manufacturer*
0	Finlux VR2008, Schneider 266.
1	Finlux VR1010/1012/1030/2010/2030/2040; Asa VR2019,VR6000; Philips VR6443/6543/6462/6467/6660/6760/6862.
2	Sharp VC100/102/501/781/783/785/801/851.
3	Sharp VC682/683/684/685/693/6F3.
4	JVC HRD120/170/180/210/230/300/310/530EH/470/755.
5	DER models.
6	Finlux VR3400, Hitachi models.
7	Blaupunkt RTV320, Panasonic models.
8	Asa VR2017.

If you can't find a particular model select the most suitable mode and try. For example a Sharp model not listed above will probably work in mode 2 or 3.

To programme the handset, use the point of a pencil to press the programming switch at the bottom back then key in the number of the required mode. Note that the VCR setting will have to be re-entered when the batteries are replaced.

Fault List

(1) If the set is dead check the four rectifiers Du16/18/21 (BY299) and Du17 (BY399) connected to the chopper transformer's secondary winding. No doubt one or other will be short-circuit. If Du18 or DU21 is faulty its associated feed resistor Ru38 or Ru39 will have popped. Replace it with a 2A PCB fuse as recommended by Finlux.

(2) No picture with no e.h.t. This is usually caused by the resistor in the h.t. feed to the line output stage, Rz28 (1.5Ω), having burnt out. Fit a 1Ω 0.5W replacement. Also replace the associated 470nF, 250V capacitors Cz14 and Cz16.

(3) Horizontal black lines and line pairing across the picture. Replace Ck8 (100nF, 63V) in the field output stage.

(4) Blank picture and no sound, may be intermittent. If the text button is pressed only the text page number appears but the sound comes back. Suspect the BC557 composite video buffer transistor Ta3.

(5) Snowy picture. Remove the v.h.f. tuner as it develops a fault. Pin 11 where the tuner was must now be shorted to chassis.

(6) A 750Hz tone is audible during Nicam reception. Remove the screening can from ICr9. Connect pin 2 of this chip to the chassis print at the top of the Nicam module. Refit the can and connect the negative side of Cr54 on the Nicam board to the same chassis point.

ECONOMIC DEVICES 32 TEMPLE STREET, WOLVERHAMPTON, WV2 4AN

15/80H	3.63	2SC1573Q	0.25	2SD669	0.53	BC141	0.25	BD201	0.38	BFR79	0.37	CD4052	0.21	M5218L	0.36	SL1431	1.65	TA7214P	3.63	TDA1470P	0.00	TEA1009	1.20
15/85R	3.72	2SC1675	0.08	2SD669A	0.52	BC147A	0.05	BD203	0.45	BFR90	0.59	CD4053	0.19	M5231L	0.53	SL1432	1.53	TA7217AP	1.40	TDA1506	4.45	TEA1014	1.81
17052	3.10	2SC1685	0.13	2SD716	1.39	BC148	0.05	BD232	0.27	BFR90A	0.59	CD4066	0.29	M53216P	1.28	SL471	1.65	TA7222	1.24	TDA1510	1.38	TEA1039	1.88
17053	2.31	2SC1740	0.11	2SD718	1.14	BC148A	0.05	BD234	0.24	BFR91	0.58	CD4069	0.17	M54532	1.24	SL490	2.31	TA7222AP	1.23	TDA1512	2.29	TEA2018A	1.46
17088	2.31	2SC1741	0.16	2SD734	0.23	BC148B	0.03	BD237	0.29	BFR96	0.47	CD4070	0.13	M54543L	1.21	SN29764AN	1.77	TA7227P	1.50	TDA1515A	2.47	TEA2164	2.40
17089	3.28	2SC1815	0.13	2SD762	0.62	BC149	0.03	BD238	0.10	BFW92A	0.84	CNX62A	0.84	M54544L	1.46	SN7474N	0.36	TA7230P	1.30	TDA1516Q	3.23	TEA2165	4.66
17127	1.71	2SC1826	0.69	2SD774	0.23	BC149C	0.03	BD239	0.28	BFX85	0.31	CR3CM	2.54	M54548L	2.45	SN76013ND		TA7233P	1.72	TDA1518Q	3.05	TIC106D	0.53
1N4001	0.03	2SC1827	0.74	2SD787E	0.25	BC157	0.12	BD241	0.39	BFY50	0.31	CRO2AM	1.69	M54644BL	1.96		7.75	TA7240AP	0.00	TDA1670A	2.02	TIC106M	0.67
1N4002	0.06	2SC1845	0.20	2SD837	0.90	BC159	0.05	BD243	0.37	BFY51	0.33	CV12E	2.44	M54648L	5.04	SN76227N	1.03	TA7240P	2.15	TDA1701	4.71	TIC45	0.57
1N4003	0.03	2SC1846	0.28	2SD841	1.24	BC160	0.40	BD243A	0.41	BR100	0.13	CX109	6.84	M54898AP	14.69	SN76666N	1.20	TA7241	2.23	TDA1770	2.49	TIL100	0.50
1N4004	0.06	2SC1923	0.13	2SD856	0.64	BC161	0.26	BD243C	0.31	BR101	0.95	DTA124EF	0.12	M58485P	5.78	SN76705AN	1.65	TA7243P	2.71	TDA1870	2.64	TIP110	0.33
1N4005	0.05	2SC1942	2.31	2SD869	2.47	BC167	0.40	BD244A	0.33	BR103	0.37	DTA144EF	0.41	MB3730	1.89	SR2M	0.66	TA7250	3.28	TDA1904	1.17	TIP112	0.00
N4006	0.05	2SC1959	0.10	2SD870	2.60	BC171B	0.13	BD244C	0.20	BR303	1.20	ER1400	2.08	MB3731	1.98	STA341M	2.31	TA7267P	1.96	TDA1905	0.91	TIP112H	0.33
N4007	0.05	2SC1969	1.80	2SD871	4.95	BC177	0.13	BD245C	0.68	BRX44	0.99	HA11235	1.73	MB3732	2.22	STA401	2.23	TA7270	1.50	TDA1908A	1.10	TIP120	0.55
N4148	0.03	2SC1983	0.99	2SD880	0.33	BC178	0.10	BD246C	0.75	BRY56	0.41	HA11244	3.71	MC13002	3.71	STA441C	2.39	TA7270P	1.50	TDA1940	3.89	TIP121	0.40
N4448	0.05	2SC2001	0.13	2SD882	0.29	BC182	0.05	BD278A	0.54	BSS38	0.17	HA1124A	0.70	MC13002P	4.65	STK0029	5.70	TA7271P	1.90	TDA1950	2.01	TIP126	0.51
N5061	0.25	2SC2029	0.33	2SD898B	2.39	BC182A	0.12	BD317	1.40	BT120	1.24	HA11423	1.96	MC1310P	0.82	STK0039	5.52	TA7273	3.43	TDA2002	0.82	TIP132	0.44
N5402	0.05	2SC2073	0.49	2SD904	6.07	BC182L	0.05	BD318	1.12	BT129	3.16	HA11440	2.83	MC1327AP	1.57	STK0040	7.18	TA7274P	2.15	TDA2003V	0.63	TIP137	0.46
N5404	0.07	2SC2078	0.58	2SD973	0.36	BC182LB	0.05	BD380	0.39	BT139600	1.01	HA1166X	6.73	MC1330AIP	1.22	STK0059	9.46	TA7280	2.11	TDA2004	1.23	TIP2955	0.79
5406	0.11	2SC2141	1.43	74LS00	0.20	BC183	0.05	BD433	0.26	BT151/500R		HA11713	1.31	MC1350P	1.76	STK025	9.37	TA7281	2.09	TDA2005	1.24	TIP29C	0.29
5408	0.10	2SC2166	0.92	7805	0.23	BC184	0.08	BD434	0.28		0.78	HA11741	6.86	MC1352P	1.40	STK043	0.00	TA7299	1.93	TDA2006	1.02	TIP29E	0.39
914	0.03	2SC2168	0.87	7805T022	0.23	BC184L	0.03	BD435	0.36	BT151800	1.11	HA11745	5.25	MC1358P	1.23	STK3042	4.82	TA7313AP	0.60	TDA2009	2.23	TIP3055	0.69
1555	0.21	2SC2236	0.25	7808	0.24	BC184LC	0.09	BD436	0.31	BU205	1.03	HA13001	1.30	MC14493P	3.79	STK3062	8.62	TA7317P	0.77	TDA2020	2.29	TIP30C	0.16
2076	0.28	2SC2271	0.21	7812	0.35	BC204	0.35	BD437	0.31	BU208A	0.92	HA13108	2.67	MC14528BCP		STK4131	7.56	TA7325P	1.63	TDA2030	0.00	TIP31	0.00
2219A	0.26	2SC2274	0.21	7815	0.24	BC207B	0.22	BD438	0.16	BU208D	0.85	HA13118	1.85		2.15	STK4141	8.00	TA7343AP	0.69	TDA2030H	0.71	TIP31A	0.25
2222	0.16	2SC2274K	0.13	7818	0.39	BC212	0.04	BD441	0.69	BU326A	0.50	HA13119	1.63	MDA2062	2.14	STK4142	7.97	TA7358P	0.75	TDA2030V	0.66	TIP31B	0.29
2905	0.20	2SC2314	0.28	7905	0.41	BC212B	0.05	BD442	0.40	BU406	0.43	HA13403	3.96	MJ2955	0.94	STK4162M	9.22	TA75358P	0.66	TDA2040	1.63	TIP31C	0.28
2926G	0.35	2SC2335	1.07	7912	0.33	BC212L	0.05	BD510	1.30	BU406D	0.33	HA1374A	2.89	MJ802	2.60	STK4171	10.56	TA7607AP	1.89	TDA2170	2.47	TIP32A	0.35
3053	0.34	2SC2458	0.08	AA119	0.34	BC213	0.10	BD529	0.93	BU407	0.51	HA1377	1.36	MJE13005	0.79	STK4181 II	12.47	TA7609P	1.90	TDA2270	3.91	TIP32C	0.36
3054	0.95	2SC2482	0.25	AA143	0.12	BC214	0.05	BD530	1.01	BU407D	0.94	HA1388	1.87	MJE2955	0.66	STK4181A	12.09	TA7630	0.00	TDA2525	3.54	TIP33	0.57
3055	0.42	2SC2547E	0.23	AC127	0.10	BC214L	0.08	BD535	0.41	BU426A	0.64	HA1389	2.44	MJE3055	0.49	STK4332	5.38	TA7630P	1.81	TDA2530	0.41	TIP33A	0.89
3442	1.12	2SC2565	3.67	AC141K	0.44	BC237	0.04	BD536	0.46	BU426E	2.06	HA1392	1.56	MJE340	0.38	STK4352	1.65	TA7640AP	1.04	TDA2540	0.36	TIP33C	0.95
3702	0.10	2SC2570A	0.28	AC176K	0.29	BC237A	0.07	BD675	0.29	BU500	1.06	HA1397	2.56	ML237B	1.23	STK437	7.96	TA7676P	4.13	TDA2541	1.46	TIP34	1.15
3704	0.13	2SC2577	1.50	AC187	0.15	BC237B	0.04	BD677	0.29	BU508A	0.90	HA1398	2.56	ML923	3.82	STK4392	5.31	TA7680AP	4.39	TDA2560	2.47	TIP34C	0.86
3773	1.23	2SC2581	2.38	AC187K	0.31	BC238	0.10	BD707	0.49	BU508AF	1.10	HA1452	0.95	MN1405VKF		STK441	9.73	TA7698AP	5.77	TDA2576A	4.65	TIP41A	0.29
3819	0.33	2SC2632	0.28	AC188	0.29	BC238B	0.05	BD839	0.49	BU508D	0.85	HM6232	5.77		11.41	STK459	7.73	TA7705P	1.38	TDA2577	4.71	TIP41B	0.30
3904	0.10	2SC2655	0.24	AC188K	0.65	BC239	0.03	BD901	0.45	BU508DF	1.36	HM6251	5.69	MN1435VX	12.75	STK461	8.99	TA7769P	1.39	TDA2577A	2.76	TIP41C	0.35
4444	2.60	2SC2671	0.19	AD149	0.50	BC252B	0.16	BD902	0.58	BU508V	1.13	HM7103	13.66	MN1435VXB		STK4843	11.19	TA8205	3.18	TDA2578A	2.47	TIP42A	0.29
6292	0.60	2SC2688	0.29	AD161	0.99	BC300	0.38	BD911	0.63	BU526	1.36	ICH28I	1.20		9.98	STK5211	12.63	TA8210H	3.96	TDA2579	2.85	TIP42C	0.35
A1015	0.08	2SC2785	0.16	AD162	0.92	BC301	0.23	BD912	0.68	BU536	1.59	KA2101	0.58	MN650	2.27	STK5322	6.58	TA8215	3.46	TDA2581	2.14	TIP47	0.49
SA1016	0.17	2SC2791	4.25	AF124	0.74	BC302	0.35	BDV65B	1.12	BU608	1.54	KBL08	0.45	MPSA42	0.22	STK5325	4.12	TA8691N	5.47	TDA2581Q	2.44	TIPL791A	1.35
SA1020	0.30	2SC3150	1.06	AF127	0.58	BC303	0.26	BDW84C	0.94	BU705	1.56	KSR1004	0.08	MPSA56	0.11	STK5326	10.31	TAA550	0.25	TDA2582	1.61		
SA1020Y	0.30	2SC3153	2.21	AF139	0.28	BC307	0.05	BDW93C	1.06	BU806	0.79	L200CV	1.09	MPSA93	0.08	STK5331	3.51	TAG626	1.34	TDA2591	1.15		
SA1095	5.71	2SC3156	3.61	AF239	0.41	BC307A	0.05	BDW94C	0.45	BU806A	0.78	LA1201	0.54	MPSU10	2.54	STK5332	2.97	TBA120	0.51	TDA2593	0.72		
SA1102	1.73	2SC3182	3.13	AF279	0.33	BC307B	0.05	BDX32	1.65	BU807	0.49	LA1230	1.86	MR854	0.13	STK5333	3.21	TBA120AS	0.85	TDA2594	2.14		
SA1143	0.17	2SC3225	0.33	AL102	2.48	BC308	0.05	BDY20	2.06	BU826A	1.53	LA1385	1.40	MSM5840H	14.91	STK5372	3.71	TBA120S	0.86	TDA2595	2.06		
2SA1175	0.49	2SC3795	1.27	AN245	5.78	BC308A	0.11	BF115	0.39	BU908	1.13	LA3161	0.37	MVS240	0.51	STK5421	2.52	TBA120T	0.57	TDA2600	3.79		
2SA1186	3.42	2SC380	0.12	AN3821K	7.01	BC308C	0.05	BF179	0.30	BUK444	2.04	LA4140	0.35	NE545B	3.10	STK5422	4.93	TBA120U	0.46	TDA2611A	0.62		

SPECIAL OFFERS – ENDS 31/08/92 OR WHILE STOCKS LAST

BD 139	0.20	TDA 3654	1.30
BU 208A	0.82	TDA 2579A	2.50
BU 508AF	1.00	TDA 3653B	1.56
CO AXIAL AERIAL PLUG X25	3.75	TEA 1014	1.32
LM 317T	0.21	TIP 110	0.25
TDA 4503	3.70	TV FAULT FINDING GUIDE	8.99

25X 'F' CONNECTOR (SCREWTYPE) £3.00

2SA1208	0.25	2SC388A	0.57	AN5265	1.30	BC327	0.09	BF184	0.40	BUT11	0.87	LA4182	0.75	NE555	0.21	STK5451	4.78	TBA2800	0.66	TDA2611AQ		TIS43	0.64
2SA1265	1.89	2SC458	0.08	AN5435	1.24	BC327B	0.17	BF185	0.28	BUT11A	0.69	LA4192	1.10	NE555N	0.23	STK5466	5.82	TBA395	0.66		1.68	TL011CP	1.32
2SA1286	0.33	2SC536	0.05	AN5512	1.82	BC328	0.06	BF194	0.14	BUT11AF	0.82	LA4220	1.25	NE592	1.85	STK5471	4.64	TBA520	0.82	TDA2640	3.71	TL071CP	0.36
2SA473	0.49	2SC710	0.12	AN5515	2.06	BC337	0.09	BF196	0.14	BUT12A	0.82	LA4261	1.60	NE646N	2.10	STK5476	5.28	TBA540	0.00	TDA2652	12.09	TL494	1.12
2SA562	0.16	2SC867A	5.11	AN5521	1.60	BC337L	0.21	BF197	0.24	BUT56A	0.55	LA4270	2.04	NP1106	11.51	STK5481	5.36	TBA540Q	0.74	TDA2653A	2.47	TMP47C432AP	
2SA634	0.52	2SC945	0.08	AN5612	2.26	BC338	0.05	BF198	0.08	BUW11	1.00	LA4282	2.06	OA47	0.24	STK5482	3.87	TBA560C	0.66	TDA2680	4.95		11.24
2SA639S	0.00	2SD1051	0.46	AN5900	1.23	BC368	0.11	BF199	0.03	BUW11A	0.84	LA4422	1.07	OA90	0.09	STK6962	2.22	TBA570A	1.71	TDA3190	0.82	TMP47C434N-	
2SA673	0.08	2SD1128	0.99	AN6310	4.55	BC369	0.13	BF200	0.37	BUW41B	0.81	LA4440	1.52	OA91	0.14	STK7216	5.36	TBA651	0.98	TDA3190P	1.08	3555	11.89
2SA684	0.20	2SD1138	0.71	AN6326	3.50	BC372	0.31	BF240	0.10	BUW81A	1.28	LA4445	1.30	R2540	1.00	STK7226	7.94	TBA750Q	4.95	TDA3300B	5.96	UC3844	1.78
2SA733	0.16	2SD1207	0.21	AN6341	2.23	BC546	0.00	BF244	0.29	BUW84	0.99	LA4460	1.30	R2540X	1.86	STK7308	5.92	TBA800	0.49	TDA3330	4.09	UPA81C	0.69
2SA769	0.99	2SD1265	0.74	AN6610	0.74	BC546A	0.05	BF245A	0.18	BUX84	0.33	LA4461	1.25	R2M	0.66	STK7348	4.49	TBA810P	1.61	TDA3541	0.92	UPC1181H	0.86
2SA798	0.36	2SD1273	0.79	AN6671K	5.19	BC547	0.10	BF245B	0.37	BUX85	0.74	LA4475	2.04	R3297	4.27	STK7356	5.42	TBA810S	0.41	TDA3560	4.50	UPC1182H	5.77
2SA872	0.13	2SD1275	0.66	AN7158	2.66	BC547A	0.03	BF255	0.10	BUZ71	0.50	LA4476	2.57	R4050	2.80	STK7358	5.30	TBA820	0.53	TDA3561A	3.21	UPC1185H	4.13
2SA872A	0.19	2SD1276	0.82	AN7161	2.48	BC547B	0.10	BF256	0.23	BY127	0.09	LA4500	1.68	R4051	2.22	STR1096	3.94	TBA820L	0.53	TDA3562A	3.21	UPC1188	3.71
2SA940	0.64	2SD1279	4.74	AN7171K	3.74	BC547C	0.06	BF256LC	0.45	BY133	0.05	LA4505	1.73	RB156	1.65	STR40090	6.63	TBA820M	0.33	TDA3565	2.14	UPC1212C	0.80
2SA952	0.13	2SD1292	0.33	BA145	0.10	BC548	0.10	BF257	0.34	BY164	0.52	LA4507	2.23	RGP10	0.27	STR4090	0.00	TBA920	0.49	TDA3566	3.30	UPC1225H	2.47
2SA958	0.42	2SD1308	0.69	BA156	0.05	BC548A	0.28	BF258	0.03	BY179	0.69	LA4508	2.05	RGP15	0.41	STR4211	4.20	TBA950	1.63	TDA3571B	2.99	UPC1228HA	
2SA966Y	0.28	2SD1397	1.55	BA157	0.10	BC548B	0.17	BF259	0.30	BY184	0.29	LA4520	1.04	RGP15J	0.34	STR440	6.19	TBA970	4.00	TDA3576	11.55		0.54
2SA970	0.13	2SD1398	1.63	BA158	0.07	BC548C	0.11	BF324	0.10	BY20320	0.20	LA4700	3.42	RGP30M	0.29	STR441	5.77	TCA270S	1.00	TDA3640	4.77	UPC1230	2.14
2SA984	0.20	2SD1426	2.31	BA159	0.29	BC549	0.05	BF337	0.32	BY206	0.12	LA5112	3.30	RM11C	0.29	STR451	5.78	TCA440	1.89	TDA3650	9.00	UPC1230H	2.15
2SB1010	0.33	2SD1427	2.81	BA317	0.05	BC556	0.05	BF338	0.38	BY207	0.17	LA5512	0.46	S2000AF	1.15	STR50020	3.71	TCA660B	0.41	TDA3651A	1.81	UPC1278H	2.06
2SB546	0.51	2SD1432	4.74	BA318	0.03	BC556B	0.05	BF355	0.46	BY210400	0.18	LA7223	2.46	S2055AF	1.65	STR50103	4.50	TCA800Q	1.60	TDA3653AQ	2.14	UPC1318	2.48
2SB633	0.91	2SD1439	2.18	BA5102A	1.23	BC557	0.05	BF392	0.15	BY224600	4.95	LA7520	2.00	S2530A	2.20	STR54041	6.58	TCA910	1.17	TDA3653B	2.97	UPC1335V	2.72
2SB643	0.20	2SD1453	1.49	BA536	1.52	BC557B	0.05	BF393	0.17	BY226	0.15	LA7800	1.24	SAA1004	1.10	STR5412	5.06	TCA940	3.30	TDA3654	1.48	UPC1351C	1.65
2SB643S	0.20	2SD1497-02		BA5406	3.13	BC557C	0.10	BF419	0.63	BY227	0.12	LA7801	1.24	SAA1121	7.13	STR58041	5.67	TD3F900H	6.37	TDA3810	2.47	UPC1353	1.30
2SB644	0.21		6.85	BA6109	1.38	BC558	0.04	BF422	0.13	BY228	0.36	LA7820	1.52	SAA1174	4.95	STR6020	5.07	TDA1004A	3.30	TDA4420	1.23	UPC1363C	1.02
2SB688	1.24	2SD1497-06		BA6209	1.27	BC558A	0.10	BF423	0.09	BY229	1.64	LA7830	0.99	SAA1250	1.45	STR6020KIT		TDA1010	1.04	TDA4427	1.99	UPC1363CA	
2SB772	0.33		6.85	BA6219	1.40	BC558B	0.05	BF435	2.61	BY229600	1.23	LM1303N	0.85	SAA1251	3.20		5.77	TDA1011	0.96	TDA4442	3.19		2.06
2SB772Q	0.41	2SD1541	3.30	BA6222	1.16	BC559	0.10	BF450	0.18	BY229800	0.94	LM1877	1.40	SAA1293	6.50	T6064V	2.55	TDA1011A	1.28	TDA4500	3.67	UPC1365C	1.65
2SB793	0.30	2SD1555	2.39	BA656N	0.81	BC560C	0.20	BF458	0.30	BY238	0.30	LM317T	0.46	SAA1351	7.99	T6076V	2.82	TDA1013A	1.40	TDA4501	2.67	UPC1378H	1.07
2SB819	0.46	2SD1577	3.25	BA718	0.74	BC635	0.22	BF459	0.28	BY255	0.13	LM324N	0.29	SAA3027P	6.19	T9013V	4.87	TDA1015	0.96	TDA4503	4.12	UPC1391H	0.50
2SB861	0.79	2SD1649	1.75	BAS11	0.28	BC637	0.14	BF469	0.33	BY298	0.12	LM339N	0.14	SAA5010	3.02	T9034V	1.40	TDA1020	1.23	TDA4505E	4.50	UPC1394	1.23
2SB891	0.31	2SD1650	2.22	BAV18	0.07	BC639	0.12	BF470	0.28	BY299	0.12	LM358	0.21	SAA5012	3.21	T9035V	1.38	TDA1035SB	4.02	TDA4600	1.65	UPC1420CA	5.13
2SC1008	0.17	2SD1876	4.47	BAV20	0.25	BC640	0.05	BF480	0.62	BY476A	0.66	LM358N	0.21	SAA5030	6.23	T9038V	5.91	TDA1035T	2.19	TDA4600/2	1.92	UPC1488H	0.99
2SC1061	0.36	2SD1877	1.89	BAV21	0.11	BC879	0.37	BF493S	0.33	BYD14J	0.43	LM380N	0.79	SAA5050	4.54	T9053V	1.15	TDA1037	3.64	TDA46002D	2.88	UPC2002	1.09
2SC1096	0.48	2SD1911	0.00	BAW62	0.06	BC880	0.36	BF597	0.15	BYD33G	0.61	LM386	0.45	SAB3013	5.28	T9054V	0.85	TDA1044	1.51	TDA4600F	1.65	UPC324C	0.42
2SC1114	1.12	2SD234	0.91	BAX14	0.27	BCY70	0.07	BF757	1.03	BYD33J	0.15	LM393N	0.25	SAB3021	10.19	T9064	0.82	TDA1060	2.39	TDA4601	1.56	UPC4558C	0.41
2SC1162	0.30	2SD313	0.41	BB105B	0.23	BD131	0.26	BF758	0.31	BYV10-40	1.74	M192B1	2.47	SAB3035	6.23	T9065V	4.12	TDA1082	4.12	TDA4601D	2.34	UPC574	0.54
2SC1213	0.13	2SD350A	1.19	BC107	0.13	BD132	0.20	BF759	0.33	BYV95C	1.13	M21C	1.20	SAF1032P	3.87	TA7063P	1.10	TDA1083	1.15	TDA4605	2.92	UPC580C	2.47
2SC124	0.42	2SD401	0.94	BC107B	0.19	BD135	0.21	BF760	0.23	BYV96D	0.21	M293	14.63	SAF1039	2.29	TA7122BP	0.61	TDA1151	0.49	TDA4950	1.17	UPD1937C	2.42
2SC1306	1.12	2SD438	0.25	BC108	0.14	BD136	0.19	BF762	0.33	BYW56	0.16	M490	14.92	SDA2112	12.96	TA7146P	5.44	TDA1170	0.96	TDA7240A	1.48	X0065CE	1.65
2SC1318	0.09	2SD468C	0.19	BC109	0.11	BD137	0.43	BF869	0.24	BYX55600	0.20	M491	7.70	SG264A	9.48	TA7176P	1.25	TDA1170N	1.19	TDA7270S	6.60	X2402	4.93
2SC1364	0.28	2SD476	0.94	BC109A	0.12	BD139	0.28	BF870	0.22	CA1310E	0.75	M494	8.57	SG613	18.24	TA7193AP	3.26	TDA1170S	0.85	TDA8140	2.31	ZPY120	8.46
2SC1384	0.84	2SD525	0.74	BC109B	0.14	BD140	0.23	BF959	0.18	CA3094	2.97	M50115AP	2.43	SGSIF344	5.04	TA7193P	3.26	TDA1180	1.24	TDA8153	4.95		
2SC1398	0.77	2SD551	4.34	BC109C	0.19	BD168	0.73	BF960	0.26	CD4001	0.13	M51102L	1.72	SKE2G202	0.63	TA7205	1.06	TDA1190Z	3.96	TDA8170	2.55		
2SC1413A	1.96	2SD613	0.61	BC117	0.13	BD175	0.28	BF966	0.56	CD4011	0.20	M51231P	1.40	SKE4F104	0.23	TA7205AP	0.91	TDA1200	0.88	TDA8180	5.19		
2SC1509	0.37	2SD636	0.13	BC119	0.36	BD179	0.33	BF970	0.68	CD4013	0.33	M51393AP	4.50	SKE4F210	0.89	TA7205P	0.91	TDA1270	1.73	TDA8190	2.78		
2SC1520	0.52	2SD637	0.12	BC139	0.31	BD189	0.39	BFR39	0.35	CD4016	0.13	M51515L	1.95	SKE5F310	1.63	TA7207P	1.63	TDA1412	0.74	TDA9503	1.56		
2SC1573	0.25	2SD667	0.25	BC140	0.20	BD190	0.29	BFR41	0.42	CD4021	0.41	M51521L	0.54	SL1430	1.36	TA7210P	1.45	TDA1470	0.00	TEA1002	5.14		

IF YOU DON'T SEE IT LISTED ASK FOR QUOTE. GIVE MAKE, MODEL. LOCATION. REMEMBER TO ADD £1.00 POST & HANDLING U.K. MAINLAND ONLY. HANDLING CHARGE TO ALL EXPORT ORDERS AT COST. ADD 17½% VAT TO TOTAL

USE YOUR ACCESS OR VISA ☎ TEL 0902 712083/773122 (24 HOURS)

AIWA	Part No.	Price
AV-66		
Video Head	VID 2546	£15.29
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	£0.99
CTL Unit	VID 2637	£59.75
AV-77		
Video Head	VID 2546	£15.29
Pinch Roller	VID 1755	£3.87
Belt Kit	VID 7509	£1.40
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	£3.05
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	£0.23
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	£23.74
Pinch Roller	VID 1787	£3.63
Belt Kit	VID 7596	£3.63
Idler	VID 1049	£3.05
Cassette LED	VID 1981	£1.48
Tension Band	VID 1399	£2.64
AMSTRAD		
VCR-4600		
Video Head	VID 2676	£14.25
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7593	£1.86
Clutch	VID 1226	£4.62
Gear Holder	VID 1227	£14.02
RF Clutch	VID 1231	£7.17
Cassette LED	VID 1981	£1.48
VCR-9000		
Video Head	VID 2502	£15.45
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	£14.02
Cassette LED	VID 1981	£1.48
BANG & OLUFSEN		
VHS-65		
Video Head	VID 2506	£16.08
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF/REW Idler Arm	VID 1020	£1.48
Clutch Plate	VID 1211	£9.81
Capstan Motor	VID 2147	£18.02
Cassette LED	VID 1981	£1.48
DECCA		
VRH-8300		
Video Head	VID 2511	£9.81
Pinch Roller	VID 1814	£3.05
Belt Kit	VID 7812	£1.07
Reel Idler	VID 1036	£2.55
Take Up Clutch	VID 1037	£2.31
Take Up Idler	VID 1038	£1.32
Brake Pad	VID 1361	£0.39
Reel Motor	VID 2169	£28.12
Capstan Motor	VID 2164	£37.18
Loading Motor	VID 2168	£10.23
Cassette Lamp	VID 1947	£0.42
Tension Band	VID 1389	£1.73
Repair Kit	VID 7913	£18.95
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	£9.81
Pinch Roller	VID 1814	£3.05
Belt Kit	VID 7812	£1.07
Reel Idler	VID 1036	£2.55
Take Up Clutch	VID 1037	£2.31
Take Up Idler	VID 1038	£1.32
Brake Pad	VID 1361	£0.39
Reel Motor	VID 2169	£28.12
Capstan Motor	VID 2164	£37.18
Loading Motor	VID 2168	£10.23
Cassette Lamp	VID 1947	£0.42
Tension Band	VID 1389	£1.73
Repair Kit	VID 7913	£18.95
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	£9.81
Pinch Roller	VID 1813	£3.05
Belt Kit	VID 7543	£0.99
Take Up Clutch	VID 1031	£2.04
Take Up Idler	VID 1038	£1.32
Reel Idler	VID 1039	£3.30
Brake Pad	VID 1361	£0.39
Capstan Motor	VID 2165	£20.95
Loading Motor	VID 2168	£10.23
Front Loading Motor	VID 2168	£10.23
Cassette LED	VID 1981	£1.48
Tension Band	VID 1389	£1.73
Remote Control	IR 9100	£11.92
Repair Kit	VID 7918	£18.95
Mains Transformer	VID 2223	£21.61
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	£10.23
Cassette LED	VID 1981	£1.48
Tension Band	VID 1388	£2.06
Repair Kit	VID 7920	£18.42
Cassette Housing	VID 1315	£20.61

3-V-57	Part No.	Price
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	£10.23
Cassette LED	VID 1981	£1.48
Tension Band	VID 1388	£2.06
Repair Kit	VID 7920	£18.42
Cassette Housing	VID 1315	£20.61
FV-10B		
Video Head	VID 2580	£19.15
Pinch Roller	VID 1817	£11.25
Belt Kit	VID 7564	£2.72
Idler Arm	VID 1091	£2.31
Reel Motor	VID 2193	£15.76
Capstan Motor	VID 2190	£25.53
Loading Motor	VID 2412	£6.18
Front Loading Motor	VID 2412	£6.18
Cassette LED	VID 1981	£1.48
Tension Band	VID 1386	£1.81
Repair Kit	VID 7921	£14.82
FV-12L		
Video Head	VID 2581	£28.31
Pinch Roller	VID 1817	£11.25
Belt Kit	VID 7564	£2.72
Idler Arm	VID 1091	£2.31
Reel Motor	VID 2193	£15.76
Capstan Motor	VID 2190	£25.53
Loading Motor	VID 2412	£6.18
Front Loading Motor	VID 2412	£6.18
Cassette LED	VID 1981	£1.48
Tension Band	VID 1386	£1.81
Repair Kit	VID 7921	£14.82
FIDELITY		
VCR-100		
Video Head	VID 2502	£15.45
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7593	£1.86
Clutch	VID 1226	£4.62
Gear Holder	VID 1227	£14.02
RF Clutch	VID 1231	£7.17
Cassette LED	VID 1981	£1.48
FINLUX		
VR-1030		
Video Head	VID 2558	£43.75
Pinch Roller	VID 1803	£4.12
Idler	VID 1006	£2.80
Tension Band	VID 1432	£5.69
Remote Control	IR 9034	£14.07
Repair Kit	VID 7930	£15.07
VR-2010		
Video Head	VID 2578	£56.31
Pinch Roller	VID 1827	£4.39
Belt Kit	VID 7588	£1.56
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	£21.21
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7532	£1.89
Take Up Idler	VID 1015	£5.36
FF/REW Pulley	VID 1016	£0.85
Idler	VID 1023	£2.88
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	£21.21
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7532	£1.89
Take Up Idler	VID 1015	£5.36
FF/REW Pulley	VID 1016	£0.74
Idler	VID 1023	£2.47
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-P720/720K/721		
Video Head	VID 2500	£21.21
Pinch Roller	VID 1810	£3.63
Belt Kit	VID 7532	£1.89
Gear Idler	VID 1013	£4.37
Idler	VID 1014	£2.80
Loading Gear Set	VID 1230	£1.65
Cassette LED	VID 1981	£1.48
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	£3.63
Belt Kit	VID 7813	£1.15
Gear Idler	VID 1013	£4.37
Idler	VID 1014	£2.80
Loading Gear Set	VID 1230	£1.65

3-V-57	Part No.	Price
Cassette LED	VID 1981	£1.48
Tension Band	VID 1376	£2.31
Take Up Reel Table	VID 1295	£7.83
Supply Reel Table	VID 1294	£6.34
FVH-P980K KV		
Video Head	VID 2501	£24.43
Pinch Roller	VID 1818	£3.05
Belt Kit	VID 7568	£2.65
Idler	VID 1093	£4.62
Clutch	VID 1094	£14.16
Cassette LED	VID 1981	£1.48
Tension Band	VID 1377	£2.31
Supply Reel Table	VID 1296	£10.97
FUNAI		
VCR-4600		
Video Head	VID 2676	£14.25
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7593	£1.86
Clutch	VID 1226	£4.62
Gear Holder	VID 1227	£14.02
RF Clutch	VID 1231	£7.17
Cassette LED	VID 1981	£1.48
VCR-5843		
Video Head	VID 2708	£24.31
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7615	£1.56
Idler	VID 1364	£2.47
Cassette LED	VID 1981	£1.48
GEC		
V-4004		
Video Head	VID 2506	£16.08
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF/REW Arm	VID 1020	£1.48
Clutch Plate	VID 1211	£9.81
Capstan Motor	VID 2148	£18.02
Cassette LED	VID 1981	£1.48
Tension Band	VID 1379	£2.31
Repair Kit	VID 7922	£17.22
GOLDSTAR		
GHV-8000/8200/8210/8215		
Pinch Roller	VID 1815	£5.19
Belt Kit	VID 7585	£1.32
Idler	VID 1052	£1.98
Bracket Centre	VID 1223	£13.11
Clutch Gear	VID 1228	£2.22
Limiter Roller	VID 1440	£1.32
Cassette LED	VID 1981	£1.48
Tension Band	VID 1399	£2.64
VCP-4100/4130		
Video Head	VID 2645	£20.61
Pinch Roller	VID 1815	£5.19
Belt Kit	VID 7585	£1.32
Idler	VID 1052	£1.98
Bracket Centre	VID 1223	£13.11
Clutch Gear	VID 1228	£2.22
Limiter Roller	VID 1440	£1.32
Cassette LED	VID 1981	£1.48
Tension Band	VID 1399	£2.64
VCP-4200/4326		
Video Head	VID 2645	£20.61
Pinch Roller	VID 1815	£5.19
REW Belt	VID 7234	£0.41
Cassette LED	VID 1981	£1.48
GRANADA		
VHS-EY1/EY2		
Video Head	VID 2539	£16.35
Pinch Roller	VID 1822	£3.21
Belt Kit	VID 7605	£2.47
Reel Drive Unit	VID 1255	£6.18
Loading Gear A	VID 1268	£1.89
Loading Gear B	VID 1271	£1.32
Capstan Motor	VID 2404	£39.37
Cassette LED	VID 1981	£1.48
Tension Band	VID 1414	£6.18
GRUNDIG		
MVS-400		
Video Head	VID 2596	£16.62
Pinch Roller	VID 1757	£3.21
Belt Kit	VID 7567	£2.06
Idler	VID 1052	£1.98
Loading Gear	VID 1222	£2.47
Clutch Gear	VID 1228	£2.22
Limiter Roller	VID 1440	£1.32
Cassette LED	VID 1981	£1.48
Tension Band	VID 1400	£2.55
Remote Control	IR 8965	£21.87
VS-520 GB		
Video Head	VID 2595	£26.75
Pinch Roller	VID 1821	£8.49
Timing Belt	VID 1482	£7.92
Centre Pulley	VID 1482	£7.92
Cassette LED	VID 1981	£1.48
Tension Band	VID 1401	£3.71
HINARI		
VXL-30/35/4		
Video Head	VID 2518	£21.21
Pinch Roller	VID 1815	£5.19
Belt Kit	VID 7566	£2.31
Clutch	VID 1316	£6.02
Idler	VID 1317	£3.54
Loading Motor	VID 2167	£13.69
Cassette LED	VID 1981	£1.48

HITACHI	Part No.	Price
VT-11		
Video Head	VID 2504	£14.03
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF/REW Idler Arm	VID 1020	£1.48
Clutch Plate	VID 1211	£9.81
Capstan Motor	VID 2147	£18.02
Cassette LED	VID 1981	£1.48
Tension Band	VID 1379	£2.31
Repair Kit	VID 7922	£17.22
VT-16 S		
Video Head	VID 2505	£23.18
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF/REW Idler Arm	VID 1020	£1.48
Clutch Plate	VID 1211	£9.81
Capstan Motor	VID 2147	£18.02
Cassette LED	VID 1981	£1.48
Tension Band	VID 1379	£2.31
Repair Kit	VID 7922	£17.22
VT-33/330		
Video Head	VID 2504	£14.03
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7538	£1.23
FF/REW Idler Arm	VID 1020	£1.48
Clutch Plate	VID 1211	£9.81
Capstan Motor	VID 2148	£18.02
Cassette LED	VID 1981	£1.48
Tension Band	VID 1379	£2.31
Repair Kit	VID 7922	£17.22
VT-61/62/63/64		
Video Head	VID 2628	£24.25
Pinch Roller	VID 1818	£3.05
Belt Kit	VID 7583	£1.56
FF/REW Idler Arm	VID 1020	£1.48
Clutch Plate	VID 1211	£9.81
Capstan Motor	VID 2154	£18.02
Cassette LED	VID 1981	£1.48
Tension Band	VID 1379	£2.31
Repair Kit	VID 7924	£16.55
VT-8000/8500		
Video Head	VID 2509	£15.96
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7803	£0.90
Take Up Idler	VID 1015	£5.36
Wind Roller	VID 1016	£0.74
FF/REW Idler	VID 1023	£2.47
Capstan Motor	VID 2155	£50.50
Tension Band	VID 1381	£1.98
Remote Control	IR 9097	£16.41
Repair Kit	VID 7928	£15.49
Take up Reel Table	VID 1302	£12.62
Supply Reel Rubber Tyre	VID 1300	£0.74
VT-9300/9500/9700		
Video Head	VID 2509	£15.96
Pinch Roller	VID 1788	£3.05
Belt Kit	VID 7802	£0.90
FF/REW Idler Arm	VID 1019	£2.88
Play Idler	VID 1075	£3.79
FS Brake	VID 1212	£1.73
Capstan Motor	VID 2156	£57.81
Cassette Lamp	VID 1951	£0.99
Tension Band	VID 1382	£1.98
Remote Control	IR 9096	£16.45
Repair Kit	VID 7927	£15.49
Take Up Reel Table	VID 1303	£9.15
ITT		
VR-3913		
Video Head	VID 2511	£9.81
Pinch Roller	VID 1814	£3.05
Belt Kit	VID 7812	£1.07
Reel Idler	VID 1036	£2.55
Take Up Clutch	VID 1037	£2.31
Take Up Idler	VID 1038	£1.32
Brake Pad	VID 1361	£0.39
Reel Motor	VID 2169	£28.12
Capstan Motor	VID 2164	£37.18
Loading Motor	VID 2168	£10.23
Cassette Lamp	VID 1947	£0.42
Tension Band	VID 1389	£1.73
Repair Kit	VID 7913	£18.95
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	£9.81
Pinch Roller	VID 1814	£3.05
Belt Kit	VID 7523	£1.32
Reel Idler	VID 1036	£2.55
Take Up Clutch	VID 1037	£2.31
Take Up Idler	VID 1038	£1.32
Roller Bar	VID 1363	£4.52
Brake Pad	VID 1361	£0.39
Reel Motor	VID 2169	£28.12
Capstan Motor	VID 2187	£46.18
Loading Motor	VID 2168	£10.23
Front Loading Motor	VID 2168	£10.23
Cassette Lamp	VID 1946	£0.49
Tension Band	VID 1389	£1.73
Repair Kit	VID 7914	£20.34
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	£3.05
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	£0.82
Unloading Idler Rubber Tyre	VID 1207	£0.90
Capstan Motor	VID 2119	£24.60
Drum Motor	VID 2120	£19.61
Cassette Lamp	VID 1943	£0.23
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	£9.81
Pinch Roller	VID 1813	£3.05
Belt Kit	VID 7543	£0.99
Take Up Clutch	VID 1031	£2.04
Take Up Idler	VID 1038	£1.32
Reel Idler	VID 1039	£3.30
Brake Pad	VID 1361	£0.39
Capstan Motor	VID 2165	£20.95
Loading Motor	VID 2168	£10.23
Front Loading Motor	VID 2168	£10.23
Cassette LED	VID 1981	£1.48
Tension Band	VID 1389	£1.73
Repair Kit	VID 7918	£18.95
Mains Transformer	VID 2223	£21.61
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
MATSUI		
VX-850		
Pinch Roller	VID 1815	£5.19
Belt Kit	VID 7566	£2.31
Clutch	VID 1316	£6.02
Idler	VID 1317	£3.54
Cassette LED	VID 1981	£1.48
MITSUBISHI		
HS-307		
Video Head	VID 2606	£32.97
Pinch Roller	VID 1808	£3.05
Belt Kit	VID 7542	£1.48
Reel Idler Unit	VID 1040	£9.32
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	£1.48
Tension Band	VID 1393	£2.80
Take Up Reel Table	VID 1307	£3.21
Supply Reel Table	VID 1299	£2.97
HS-318		
Video Head	VID 2607	£42.37
Pinch Roller	VID 1808	£3.05
Belt Kit	VID 7559	£3.13
Reel Idler Unit	VID 1040	£9.32
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	£1.48
Tension Band	VID 1393	£2.80
Take Up Reel Table	VID 1307	£3.21
Supply Reel Table	VID 1299	£2.97
NEC		
N-830 EG/831/832/833		
Video Head	VID 2647	£9.81
Pinch Roller	VID 1813	£3.05
Belt Kit	VID 7543	£0.99
Take Up Clutch	VID 1031	£2.04
Take Up Idler	VID 1038	£1.32
Reel Idler	VID 1039	£3.30
Brake Pad	VID 1361	£0.39
Capstan Motor	VID 2165	£20.95
Loading Motor	VID 2168	£10.23
Front Loading Motor	VID 2168	£10.23
Cassette LED	VID 1981	£1.48
Tension Band	VID 1389	£1.73
Repair Kit	VID 7918	£18.95
Mains Transformer	VID 2223	£21.61
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	£10.23
Cassette LED	VID 1981	£1.48
Tension Band	VID 1387	£2.47

	Part No.	Price
Remote Control	IR 8947	£15.75
Repair Kit	VID 7919	£23.60
Cassette Housing	VID 1315	£20.61
N-9013/9014/9033/9034/9053/9054/9055		
Video Head	VID 2695	£21.34
Pinch Roller	VID 1828	£8.00
Belt Kit	VID 7601	£3.13
Reel Drive Pulley	VID 1265	£7.09
Cassette LED	VID 1981	£1.48
PANASONIC		
NV-2000/2010		
Video Head	VID 2520	£9.81
Pinch Roller	VID 1757	£3.21
Belt Kit	VID 7800	£1.73
Idler	VID 1054	£0.85
Idler	VID 1055	£0.85
Cam Gear	VID 1221	£1.23
Intermediate Gear	VID 1216	£1.23
Driving Gear	VID 1217	£0.57
Cassette Lamp	VID 1948	£0.24
Tension Band	VID 1397	£3.38
Repair Kit	VID 7901	£19.35
Take Up Reel Table	VID 1312	£11.13
Supply Reel Table	VID 1310	£7.34
NV-300/333		
Video Head	VID 2520	£9.81
Pinch Roller	VID 1787	£3.63
Belt Kit	VID 7521	£1.48
Play Idler	VID 1048	£2.58
Idler	VID 1057	£0.85
Idler Arm	VID 1220	£2.62
Cam Gear	VID 1215	£1.08
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	£2.64
Repair Kit	VID 7903	£10.42
Take Up Reel Table	VID 1312	£11.13
PHILIPS		
Video Head	VID 2526	£10.47
Pinch Roller	VID 1757	£3.21
Belt Kit	VID 7530	£1.32
Idler	VID 1052	£1.98
Loading Gear	VID 1222	£2.47
Idler	VID 1370	£1.98
Idler	VID 1371	£5.94
Limiter Roller	VID 1440	£1.32
Cassette LED	VID 1981	£1.48
Tension Band	VID 1400	£2.55
Repair Kit	VID 7906	£9.81
VR-6540		
Video Head	VID 2537	£19.61
Pinch Roller	VID 1815	£5.19
Belt Kit	VID 7547	£0.99
Idler	VID 1060	£1.89
Master Cam	VID 1265	£7.09
Reel Motor	VID 2127	£26.06
Loading Motor	VID 2142	£15.02
Cassette LED	VID 1981	£1.48
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	£1.56
Idler	VID 1252	£4.37
Loading Gear	VID 1253	£7.01
Modification Set	VID 1254	£11.38
Tension Band	VID 1431	£4.70
SAISHO		
VR-2000/3800		
Pinch Roller	VID 1815	£5.19
Belt Kit	VID 7565	£1.07
Idler	VID 1060	£1.89
Reel Motor	VID 2121	£14.59
Cassette LED	VID 1981	£1.48
SALORA		
SV-8620		
Pinch Roller	VID 1808	£3.05
Belt Kit	VID 7600	£3.13
FF/REW Idler Arm	VID 1233	£2.97
FF/REW Idler Arm	VID 1234	£3.13
FF/REW Idler	VID 1235	£1.23
Cassette LED	VID 1981	£1.48
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	£23.80
Pinch Roller	VID 1815	£5.19
Belt Kit	VID 7598	£1.73
Idler	VID 1232	£1.48
Idler	VID 1346	£3.44
Reel Motor	VID 2407	£15.40
Capstan Motor	VID 2409	£25.06
Loading Motor	VID 2142	£15.02
Cassette LED	VID 1981	£1.48
VX-710/720/730		
Video Head	VID 2648	£23.80
Pinch Roller	VID 1759	£3.05
Belt Kit	VID 7608	£4.12
Cassette LED	VID 1981	£1.48
SANYO		
VHR-1100 EX/EE/G		
Video Head	VID 2583	£22.01
Pinch Roller	VID 1787	£3.63
Belt Kit	VID 7558	£2.39
Reel Drive Roller	VID 1076	£6.27
Reel Motor	VID 2198	£15.40
Cassette LED	VID 1981	£1.48
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	£2.39
Reel Drive Roller	VID 1076	£6.27
Reel Motor	VID 2198	£15.40
Cassette LED	VID 1981	£1.48
Tension Band	VID 1411	£2.64
VTC-M10/11/20/21		
Video Head	VID 2530	£23.75
Pinch Roller	VID 1758	£3.05
Belt Kit	VID 7809	£0.49
Reel Drive Pulley	VID 1079	£6.84
Idler	VID 1219	£1.90
Reel Motor	VID 2179	£18.22
Tension Band	VID 1408	£2.06
Supply Reel Table	VID 1319	£9.48
SENTRA		
VX-5000/8000		
Video Head	VID 2713	£23.74
Pinch Roller	VID 1787	£3.63
Belt Kit	VID 7596	£3.63
Idler	VID 1049	£3.05
Cassette LED	VID 1981	£1.48
Tension Band	VID 1399	£2.64

WE GUARANTEE THAT ALL VIDEO SPARES SUPPLIED BY US ARE OF THE FINEST QUALITY AND THAT ALL STOCKED ITEMS WILL BE DISPATCHED THE SAME DAY.

10,000 Line Catalogue available with order, or by request. SAE please (9 × 4").

Prices quoted are subject to stock availability and may be changed without notice.

Please ask for special quote. Orders from Govt. Institutions, Schools, Nationals etc., accepted with official order.

TRADE COUNTER OPEN DAILY 9am-5pm — FAX NUMBER: 0902-29052

VCR Clinic

Reports from Philip Blundell, AMIEIE, Brian Storm, Stephen Leatherbarrow, Bob McClenning, Ronnie Boag, Nick Beer, Mick Dutton and Ed. Rowland.

Toshiba V110B

There was no E-to-E output, just a blank raster in play and the clock display showed wrong characters. An initial check around the power supplies revealed that the U8 (5V) line was high at 8.8V. We found that the ZPD2.7V zener diode DT53 was open-circuit. When a replacement was fitted the U8 supply was back at 5V (check it at the collector of TT53) and the faults had cleared. **P.B.**

ITT VR3918

I expected this machine to be a JVC clone but as soon as I removed the covers I saw that I was wrong (I found out later that it's of Sanyo manufacture). There was a cassette lift fault – the machine was reluctant to accept a cassette. It could take four attempts before a cassette would be taken in, and would only partly eject the cassette once it had been taken down. The cassette lift is operated by a gear off the capstan flywheel, so I wound a cassette in manually and pressed play. The machine threaded up but the capstan didn't turn. Luckily I was able to obtain a manual: then battle commenced!

The capstan motor wasn't being turned on in the play mode, and on the rare occasions when the capstan did turn to operate the lift the syscon didn't seem to be able to read the lift's position, even though the limit switches were all o.k. and the signals were reaching the syscon chip. A study of the block diagram showed that a signal should go to the syscon chip from the capstan FG. It was missing. A new LC7412-8017 chip brought it back and restored normal operation. **P.B.**

Philips VR203

This machine had unlocked servos in play – the symptom was a noise bar running across the screen. The audio/control/erase head was clean but there was no control signal at pin 16 of IC7040. The supplies and control signals to this chip were all found to be o.k. A new SAA1310 chip put matters right. **P.B.**

Panasonic NVL25

A sullen refusal to power up and the legend "write erase" displayed above the flashing timer display were new symptoms to me. The machine would accept a cassette but wouldn't return it. In fact the only control that operated was the timer on/off button. This persuaded me that the systems and servo chip IC2001 and the operation and timer chip IC7501 were working. Checks on the serial data line showed that the amplitude of the serial data was low at about 1V. Even with all the serial data ports disconnected and only a pull-up resistor and a 270pF decoupling capacitor left in circuit the data line sat at about 1.5V. Sure enough the capacitor (C6012) which is a surface-mounted type was leaky, a replacement providing a complete cure. **B.S.**

Panasonic NVG21

This machine buzzed and hummed alarmingly when it played back a good tape. The dealer concerned had replaced the audio/control head and the audio chip (IC4001). Nothing was revealed by carrying out careful voltage checks, but the audio input to IC4001 seemed to be abnormally sensitive. There's a fairly severe input filter between the audio head and IC4001. Resistor R4021, which is a 47Ω surface-mounted device, is part of this filter and was open-circuit. An ordinary 0.25W 47Ω resistor fitted neatly on the board and cured the trouble. **B.S.**

Panasonic NVMS95

We've had a few of these top-of-the-range camcorders in with no titling or ability to set the clock. In every case the surface-mounted connector P6502 on the operations PCB was dry-jointed. In later versions the plug is glued in place, presumably to stop this happening! **B.S.**

Panasonic NV850

There were no signals in the E-E mode. The 30V tuning supply is derived from Q7507/8, feeding pin 4 of the AN5033 chip IC7505. The voltage at this point was very low due to leakage: the cause was C7524 (0.01μF disc) which read 8kΩ. **S.L.**

Fisher FVHP710

Although rewind and fast forward were normal, when play was tried the loading arms began to move forwards then stopped, returning almost at once to rest. A check on the supply lines showed that the 5V rail to the micro/syscon departments was high at 8V. This supply comes from the STK5431ST multiregulator chip in the PSU. As the other sections of the chip were clearly all right I decided to carry out a modification. Pin 1 of the chip was disconnected from the print and taken to the input of a standard three-pin 5V regulator whose output was connected to pin 1 of PV904, the 5V line. The regulator was then screwed to the flat pad at the top of the power supply heatsink. This course was adopted because the customer required the machine in a hurry. I recall being told in my training days that "a bodge is only a bodge if it can be considered unreliable and/or unsafe – otherwise it becomes a modification"! **S.L.**

Philips VR6460

This machine came in dead and we found that the 10.2V supply was missing. It comes from the L4811 regulator 7110. As this device had no 12V input we moved back to the LM317 regulator 7105 which proved to be open-circuit. Do others find these Philips manuals almost impossible to follow or is it just me?! **S.L.**

Samsung VI710

No rewind or fast forward was found to be due to absence of the 15V supply at pin 8 of IC206. R244 (3.3Ω, 1W) which feeds this supply to the BA6209 capstan drive chip was open-circuit. After replacing this resistor the machine went into permanent search when play was selected. An open-circuit between the print and pin 3 of CN204 was the cause. This is the "cap drive" input and the fault could conceivably have occurred during the earlier replacement. A final check showed that normal deck operation had been restored but the

E-E signal suffered from a.g.c. overload. The cause of this final fault was a defective tuner. **S.L.**

Akai VS5

This machine was in good condition despite its age. But on switching from channel to channel a popping on sound, bars over the picture and loss of colour indicated that the a.f.c. was hopping about. When the sweep tuning was tried we found that it wouldn't rest on located programmes but swept on. The cause of the fault was tracked down to the AN6362 chip IC8, whose output is evidence to the tuning microcomputer chip that a legitimate signal has been found. **B.McC.**

Sharp VCA105HM

If you find that the back-tension arm has jammed the mechanism it's probably because the arm has missed the tape when loading, due to slackness. There's no underlying problem. But remember that if you load a transparent service cassette without tape you'll jam the machine as it depends on the tape to control the position of the back-tension arm. **B.McC.**

Fisher FVHP5000/5100

There was no playback picture with the machine's own recordings, E-E and playback of prerecorded tapes being o.k. Replacing IC201 cured the fault. **R.B.**

Philips VR6462/Finlux VR1010

No functions and no clock were cured by replacing the MAB8420 chip IC7091 on the back panel. **R.B.**

Salora SV6800

This machine is a Sanyo clone that uses the P90 mechanism. The original complaint was of intermittent operation and poor compatibility with prerecorded tapes. We removed the cassette lift to examine the brakes and the back-tension assembly, but when we'd reassembled the machine it wouldn't accept a cassette. After a lot of mechanical hassle we discovered that it's necessary to pull the toothed slide bar that operates the cassette lift until the last tooth engages in the white nylon cog. If this isn't done the mechanism goes out of sequence. Unfortunately the explanation in the manual is not at all clear. Back to the original fault. We found that the brakes didn't always release correctly because the "act brake lever" tended to stick. A modified part is supplied. **M.D.**

Philips VR6520/Panasonic NV370

This machine came in because of no functions or clock display. On many occasions we've had problems with the small safety resistors on the power supply panel going open-circuit for no apparent reason, but this time the power supply was working normally. A look at the circuit showed that there's a further regulator on the main panel. Checks here revealed that the fusible resistor R1001 was open-circuit, hence no regulated 5V supply. **M.D.**

NEC N9033K

This machine came in because it chewed tapes. Rewind was very poor, and on investigation we found that the idler rubber was well worn. The idler and the clutch assembly were both replaced but both wind and rewind were still weak. Closer inspection revealed that the brakes were not being released properly because the brake solenoid didn't operate fully. Its driver transistor TR102 had been overheating badly, the board was scorched and the solenoid's coil had become distorted through overheating. We ordered a new solenoid and fitted it along with three new transistors, TR101/2/3, in the driver circuit. A note came with the solenoid recommending a modification to prevent a recurrence of the problem: this consists of fitting a 1SS133 diode between pins 12 and 55 of IC101, with its anode to pin 55. **M.D.**

NordMende V1021

This machine wouldn't accept a tape, the reason for this being the absence of the 17V unregulated supply. The cause was immediately apparent when we removed the power supply panel. At some time the machine had suffered from liquid spillage, as a result of which wire links B30 and B31 had rotted through. Fortunately there was no other damage. **M.D.**

Sanyo VHR1300

We'd only recently fitted a new set of heads in this machine, so we were somewhat put out to receive a call from the customer who said that the machine was still not right. When he made recordings the pictures were very poor. What in fact was happening was that the tuner was drifting. As we had a tuner in stock we fitted it. But the problem persisted. The cause was eventually traced to the LA7913 tuner control chip IC3, a replacement restoring normal quality recordings. The repair was not quite as difficult as trying to extract more money from the customer, who was under the impression that having had new heads fitted entitled him to a life-time guarantee of everything! **E.R.**

Ferguson FV43/4/5/6

A noise best described as a squeal in rewind is caused by incorrect meshing of the drive gears. This can be cured by adding spacer PQX45716. The idler can also jam, causing no drive. I've also experienced this problem in the later FV51. **N.B.**

Panasonic G Mechanism

A problem that's becoming very common with earlier versions of this mechanism is noisy rewind/fast forward and a tape loop being left when ejecting from the half-lace, stop-1 position. The cause is wear of the VXL1490 play gear's teeth. It's beneath the centre pulley. Removing the latter and undoing the screw that secures the kick/limit arm assembly allows the arm/gear to be replaced. **N.B.**

Akai VS427

This VCR was dead. Checks in the power supply revealed that the safety fusible resistor FR1 was open-circuit while the associated 1N4007 rectifier diode was short-circuit. Replacing these components, using a new resistor obtained from Akai, completed the repair. This power supply circuit looks a lot more friendly than that in the VS22 series. **N.B.**

Samsung SI7220

Calls to a completely dead machine – no clock or anything – are becoming common with this model. The cause is a locked-up microcomputer chip. Remove the mains supply for a few seconds then reconnect it and all will be well. **N.B.**

The Operation of AD Converter Circuits

David Botto

The function of an analogue-to-digital converter (ADC) circuit is to produce from an analogue input waveform a corresponding digital pulse output. This has to be done continuously of course: as the analogue signal waveform changes, so the digital signal changes. ADC circuits are nowadays widely used in TV sets, video equipment, computers and test gear. The long-suffering service engineer is expected to understand and be able to repair them – usually without the benefit of any extra pay! This article is intended as an introduction to the basics for those who are not too sure how an ADC circuit works.

A typical application is the use of ADCs in digital multimeters. From an analogue d.c. input voltage the ADC produces a pulse output that can be counted to give a readout on the display. The ADC circuitry replaces the moving-coil meter movement used in the older analogue type of multimeter. Almost all modern DMMs use a dual-slope ADC. Earlier relatively low-cost meters often used a single-slope ADC however. So to make things easy we'll start by analysing the working principles of single-slope ADCs, from which the dual-slope type was developed.

The Single-slope ADC

The basic principle of the single-slope DMM ADC is simplicity itself. If the unknown input voltage is converted into a ramp, the time taken for the ramp to reach its maximum amplitude will be proportional to the input voltage. A clock oscillator and a digital counter can be used to check the time taken, the count being used to produce a digital readout.

Converting voltage to time is not difficult. The unknown voltage can be used to charge a capacitor via a resistor. Fig. 1(a) shows capacitor C1 being charged via resistor R1 from an accurately regulated d.c. voltage source. Fig. 1(b) shows the curve produced when a precision voltage source is used in this way. The voltage across the capacitor increases with time until its charge is equal to the applied charging voltage. Unfortunately this charging rate is exponential rather than linear. To overcome this problem the capacitor can be charged by a constant-current source, see Fig. 2. The voltage then rises linearly and time is proportional to the input.

Fig. 3, which has been greatly simplified for ease of explanation, shows the basic elements of a single-slope ADC DMM system. Charging capacitor C1 is connected between the inverting input of an operational amplifier and chassis. The voltage to be measured is applied to the operational amplifier's non-inverting (+) input. The operational amplifier is being used as a comparator, i.e. its output depends on the difference between the two inputs. An advantage of using an operational amplifier here is its high input impedance, which is usually in excess of 1MΩ (its output impedance is quite low, perhaps 100Ω or less). C1 must be discharged and the counter circuit set to zero before a measurement is made.

When a voltage measurement is made, C1 starts to charge. Thus a positive-going ramp is present at the operational amplifier's inverting input. When the ramp voltage exceeds the voltage at the operational amplifier's non-inverting input, i.e. the voltage being measured, the operational amplifier's output changes state – it falls to zero since the variable (ramp) input is applied to the inverting input. Thus the amplifier's output starts high and falls to zero after a period of time depending on the voltage being measured. Voltage has been converted to time in a linear manner.

Fig. 4 shows the relevant waveforms. At time t1 C1 starts to charge. At time t2, which depends on the voltage being measured, the output from the operational amplifier falls to zero. The duration of the squarewave output from the operational amplifier depends on the voltage being measured: the higher the unknown voltage, the longer the duration of the positive-going squarewave output.

The following and gate receives positive-going clock pulses at one input and the operational amplifier's output at the other. When the operational amplifier's output is high, at the beginning of the voltage measurement, the clock pulses pass through the and gate to the counter. When the operational amplifier's output falls to zero the and gate can no longer pass on clock pulses. Thus the number of clock pulses received by the counter depends on the voltage being measured. This simple arrangement has converted a d.c. input to a series of pulses whose total is directly proportional to the measured input. The clock oscillator has to be a close-tolerance device of course: its frequency is in the kilohertz range.

To keep the reading updated, the count is reset at the completion of each measurement cycle. At the same time a reset pulse is applied to Tr1, switching it on to discharge C1. The measurement process is then repeated. If the input voltage has changed, the display will show a different figure.

This simple circuit might be used to measure voltages in the range 0-200mV. By adding buffer amplifiers, series resistors, switches, shunts and additional circuitry it's possible to use the arrangement for a wide range of a.c./d.c. voltage, current, resistance and other measurements. How this can be accomplished was shown in my earlier article on choosing a digital multimeter (October 1991). There are of course many variations on this type of circuit, but the basic principle remains the same.

Unfortunately the single-slope ADC has a number of drawbacks. It is badly affected by clock oscillator frequency drift and noise at its input. The long-term stability of C1 is critical to accuracy. And the slightest leakage in the DMM's PCB will upset its performance – for this reason an expensive glass-epoxy PCB is generally used in a DMM that employs a single-slope ADC.

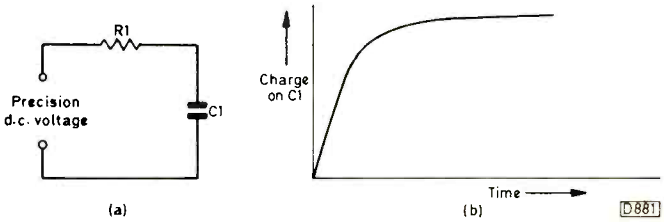


Fig. 1: Charging a capacitor via a resistor (a) produces an exponential ramp (b)

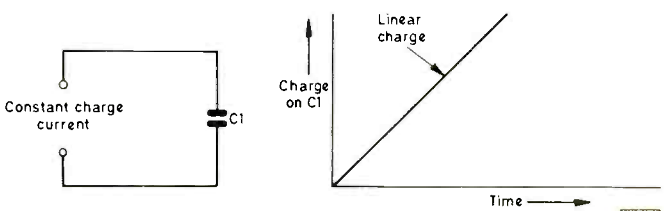


Fig. 2: Charging a capacitor from a constant-current source (a) produces a linear ramp (b).

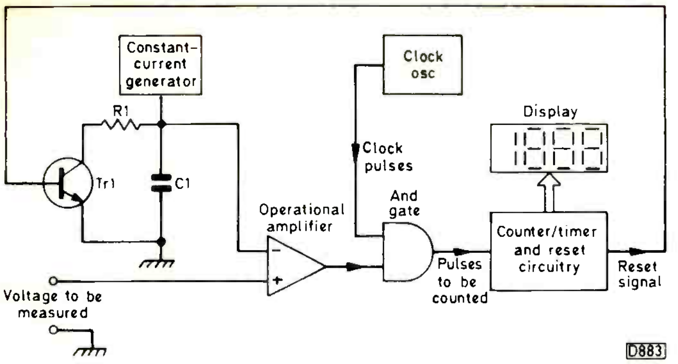


Fig. 3: Digital multimeter arrangement using a single-slope analogue-to-digital converter.

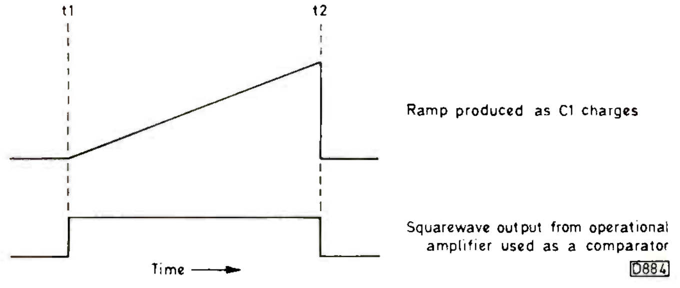


Fig. 4: Waveforms relating to Fig. 3.

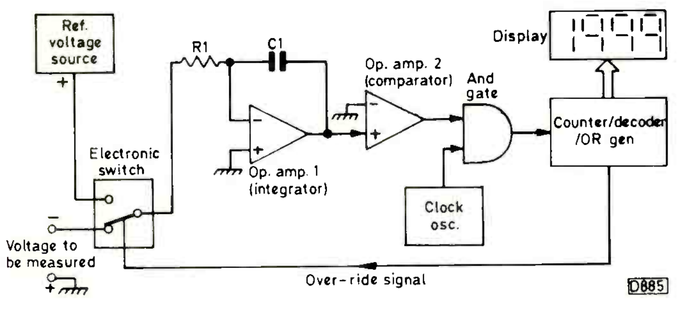


Fig. 5: Simple digital multimeter arrangement using a dual-slope analogue-to-digital converter.

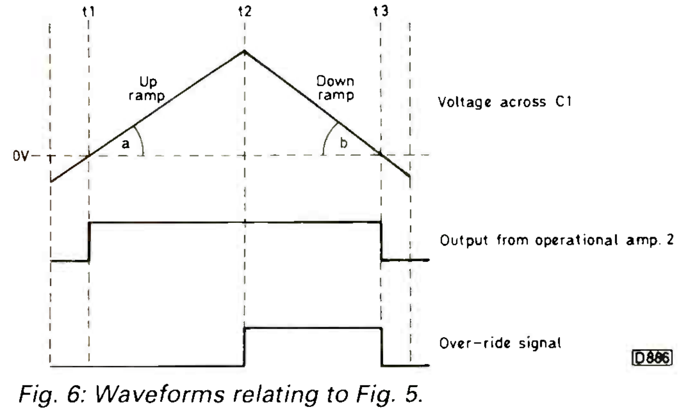


Fig. 6: Waveforms relating to Fig. 5.

Nevertheless a number of earlier DMMs used this arrangement. An example is my Heathkit Model IM-1202 which still works well. The simplicity of the single-slope system made it ideal for use with the two and a half and three digit readouts found in earlier DMMs.

Dual-slope ADC DMMs

The need for greater accuracy led to the development of the dual-slope converter. As with the single-slope system, it's based on a capacitor being linearly charged by a constant-current source. The improved dual-slope design provides an accuracy of 0.05-0.1 per cent or better however.

Dual-slope ADCs do not call for the same critical accuracy and stability of components and parts as in a single-slope design because such circuits are, to a certain degree, self-compensating. Nevertheless good-quality components remain a prime requirement.

Fig. 5 shows the basic dual-slope system. It's called a dual-slope arrangement because the capacitor (C1) first charges (the up ramp) and then gradually discharges (the down ramp) at a controlled rate during the course of each measurement cycle. It largely eliminates the problem of accuracy deterioration due to tiny changes in the electrical characteristics of components over a period of time. Fig. 6 shows relevant waveforms.

The voltage to be measured is fed to the first operational amplifier which is connected as an integrator. The values of C1 and R1 must be carefully selected. At the beginning of each measurement cycle the first operational amplifier's output is negative with respect to chassis. This is the non-inverting input to the second operational amplifier, which is connected as a comparator. Thus at this point in the cycle its output is at zero.

A negative input voltage applied to the first operational amplifier's inverting input means that C1 will have a negative voltage at one terminal with respect to its other terminal. It begins to charge. This circuit arrangement, with the charging capacitor connected in a negative-feedback loop, acts as a linear integrator and thus functions as a constant-current charging source for C1. At the beginning of the measurement the comparator's non-inverting input moves positively. Its output switches to the positive state and the and gate allows clock pulses through to the counter.

When C1 has charged, all the flip-flops in the counter will have been set or reset. The counter is said to be full. At this point the counter produces an over-range signal which is used to operate the electronic switch. This applies a positive reference voltage to the integrating circuit's inverting input. The reference voltage is usually obtained from a temperature-compensated zener diode of a type that will not easily change its characteristics over a long period of time. C1 now begins to discharge, producing the down ramp at the integrating circuit's output. At the end of the discharge period the circuit

SOME ADC TERMS

Accuracy: A figure stating the percentage accuracy with which the ADC's digital output relates to its analogue input.
ADC conversion time: Length of time needed to convert the analogue input value to a digital word or value.
Autopolarity: DMM ADC arrangement that can handle plus and minus d.c. voltage inputs.
Counter/decoder/display circuitry: Circuit which counts the number of digital bits fed to it, decodes them and supplies the result to a readout that displays a decimal number.
Least significant bit (LSB): The digital bit with the least binary significance in a digital word.
Most significant bit (MSB): The digital bit with the greatest binary significance in a digital word.
Quantising error: A quantising error that may cause a small loss of accuracy occurs if the analogue input changes during the AD conversion cycle. Usually expressed as a percentage.
Resolution: The greater the number of digital bits used the higher the resolution.

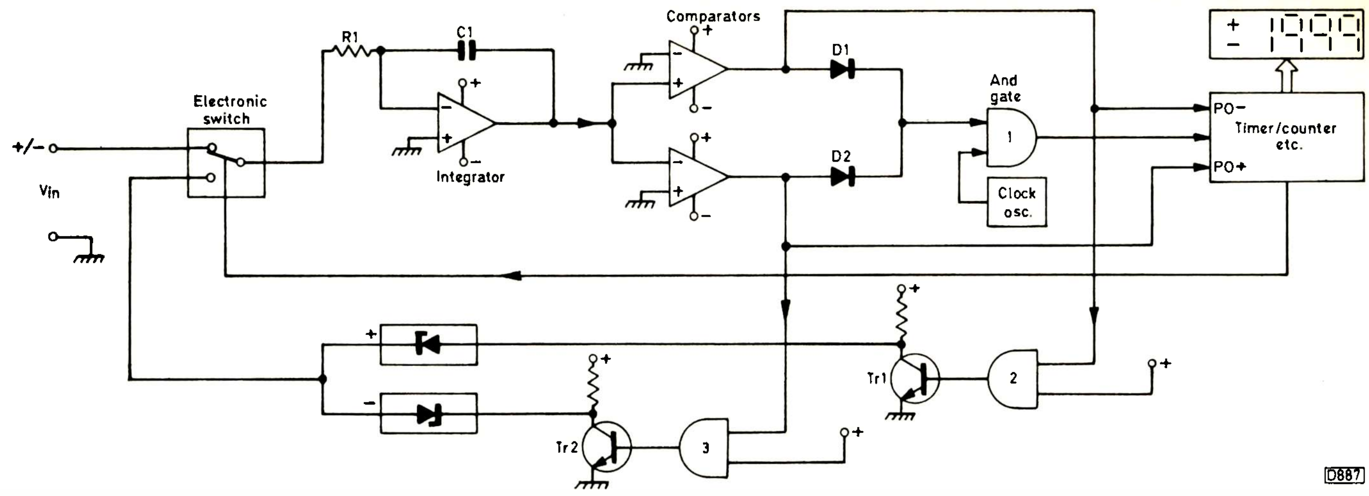


Fig. 7: Dual-slope ADC DMM catering for positive and negative d.c. voltage inputs, with autopolarity selection.

reverts to its initial state. The higher the voltage to be measured, the greater the angles a and b in Fig. 6 and the longer the length of the up and down ramp waveforms.

Dual-polarity Version

The circuit we've been considering is hardly practical since it responds to only negative d.c. voltages. What we require is autopolarity, that is the measurement of both positive and negative d.c. voltages with the display readout of the DMM indicating both the amplitude and the polarity of the measured voltage.

Fig. 7 shows a much simplified dual-slope ADC circuit that does this. It requires positive and negative 9V supplies with respect to chassis. The integrator circuit is identical to that shown in Fig. 5 but its output is fed to the non-inverting input of one comparator operational amplifier and the inverting input of the other one. Diodes D1 and D2 provide isolation between the outputs of the two comparators. And gates two and three along with transistors Tr1 and Tr2 control the switching of the discharge supplies. The outputs from the two comparators also go to the PO– and PO+ inputs of the timer/counter section where they trigger as appropriate a latch flip-flop to switch the minus/plus voltage indicator on.

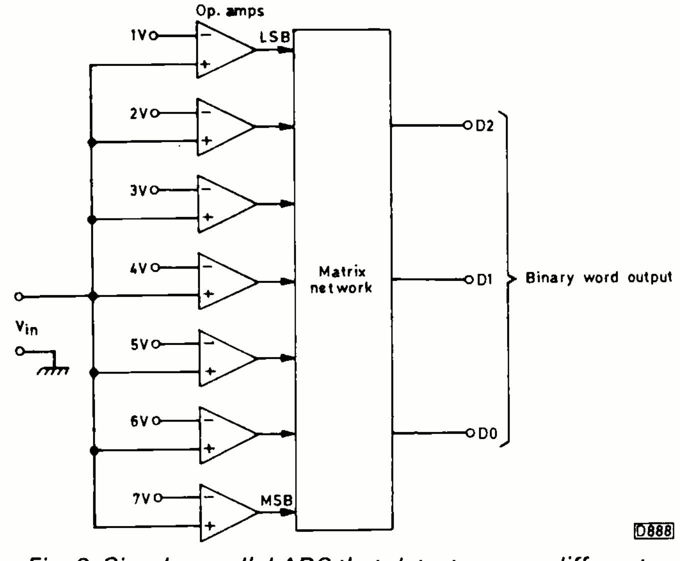


Fig. 8: Simple parallel ADC that detects seven different input voltage states and converts these into a three-bit word (000, 001 etc. to 111). The lowest input voltage produces the least significant bit (LSB), the highest input voltage the most significant bit (MSB).

When there's zero input voltage the outputs from the two comparators are at zero and the counter readout consists of zeros. In practice preset balance adjustments may be provided for the comparator operational amplifiers, also offset voltages to provide greater accuracy with very low input voltages.

Most of the circuitry in a modern DMM, including the counter/decoder/over-range circuits, reference voltage generators and electronic switching, is usually contained within one or two i.c.s.

The dual-slope ADC DMM has the advantage of excellent conversion stability, but this is at the expense of conversion speed due to the time taken to charge/discharge C1 and i.c. propagation delay. This is hardly a problem however since by the time the engineer's test prod has been connected to a test point and he turns to look at the readout the measured value will already be displayed.

Other ADC Techniques

For the sake of completeness a couple of other ADC methods are worth mentioning. They are not commonly used in DMMs but are employed in TV/VCR/computer circuitry.

The sample-and-hold converter samples the analogue input signal at regular intervals then converts the samples to digital form. The higher the sampling frequency the greater the accuracy of the conversion. This is the technique used with CD discs etc.

The parallel converter, also known as the flash converter, uses simple circuitry and has the advantages of reliability and high-speed operation (measured in microseconds). Its main disadvantage is the number of operational amplifiers required to achieve a high degree of resolution. Fig. 8 shows a simple flash converter circuit in which seven operational amplifiers are connected as parallel comparators. Each operational amplifier compares the input to a separate, fixed reference level. When the input to one of the operational amplifiers exceeds its fixed input its output changes state. These changes are fed to a matrix network that produces a binary word output.

Summary

The ADC circuitry we've been looking at in this article is in practice contained in just a few chips. This could be the reason why so little detailed information on its operation is available, at least so far as I've been able to find. Some of the circuitry described had to be breadboarded in order to check and analyse its mode of operation.

New Publications

How TV/video technology advances. The first edition of *Newnes Television and Video Engineer's Pocket Book*, which superseded the *Television Engineer's Pocket Book*, appeared in 1987. The new second edition, which is to be published on July 31st, has called for substantial revision and addition. Separate chapters have had to be added on satellite television and Nicam stereo sound. There's also a new chapter on components and assemblies. All the other sections have been updated.

This is a helpful reference book that's designed to cater for the needs of practising service engineers. There's much that one wants to be able to refer to or look up on occasion when dealing with something that takes one just a little away from routine matters. It's unlikely that you'll find this book wanting as a reference guide. In addition to much data there are helpful descriptions of the basic systems and circuits used in the domestic TV/video field.

The latest edition is in a slightly different format, bringing it into line with other Newnes Pocket Books (Computer, Electronics, Radio and Electronics). Paul Richards Books has a special pre-publication offer of £2 off the official published price of £12.95: it applies to orders received before July 31st – see advertisement elesewhere in this issue. Recommended as a useful, practical handbook for the service department.

Steve Beeching is to introduce a series of "Technical Information Modules" which will cover various aspects of video recording and playback. The idea is that each one will provide a technical explanation that can be kept as a reference source. As Steve points out, early VCR manuals used to contain technical descriptions of the circuitry and systems used. Modern ones don't, so where do you go? You get a Beeching Module! Each will consist of 30 or so A4 sheets, printed on both sides, with diagrams included in the text. The first one, covering colour recording and playback systems (VHS, Betamax and 8mm), is now available at £6.95 including post and packing in the UK from Newark Video Services, Grove Farm, Long Lane, Barnby in the Willows, Newark, Notts NG24 2SG.

CD Player Casebook

Reports from Mike Leach, P.J. Roberts and Philip Blundell, AMIEIE

Crown CDK2300

Should you come across one of these midi systems that's suffering from possible laser trouble it's worth carrying out a few initial checks. The cause could be a poor printed circuit or dry-joints on the main board. I've had cases recently where the cause of skipping or failure to read a disc has been due to dry-joints around the two regulator transistors. A good solder up and some print tidying cured the problem. **M.L.**

Sharp WQCD15

Failure to read the TOC was the symptom with this player. The disc would spin backwards very fast and not shut down – we had to disconnect the power supply to remove the disc without damaging it. After stripping the player down (the usual pain – leads not long enough etc.) I found that the safety resistors R835 and R836 in the plus and minus 9V supplies to the focus and tracking driver transistors were open-circuit. I replaced them and carried out a good solder up in the power supply. The player then performed normally. When it was tried the following day however nothing happened – there was no display and no TOC reading. Checks in the power supply produced some rather abnormal results then, suddenly, the machine sprang to life and worked all right. The d.c.-d.c. converter in the power supply was suspected and after further checks replaced. There were no further problems after doing this. **M.L.**

Pioneer PDM70

This player wouldn't read discs, not even the TOC. As you probably know the spindle motor is a common cause of this problem, but not with the type used in this machine. After checking the power supplies and finding everything in order I engaged the test mode and ran through the test sequence. When track forward was pressed disc one was loaded but focus wasn't found. After removing the pick-up I found that the objective lens was badly soiled – to the extent that I couldn't see any laser light when I pressed the track forward key, though the lens moved up and down (note that the pick-up must be held lens down).

I cleaned the lens and refitted the pickup. When track forward was pressed disc one loaded, focus was found, the tracking servo closed and sound was present at the phono sockets. But the machine wouldn't play tracks 8 and 15 of the test disc without skipping and jumping. A full mechanical and electronic alignment failed to cure the problem so the pick-up (PWY006) was replaced and alignment was carried out. The machine now played tracks 8 and 15 without difficulty. **P.J.R.**

Pioneer CLD1080

A customer brought this CDV player into the shop, placed it on the counter and explained that he had broken off the modulator's output sockets. Thus a new modulator would be required. Whilst I was taking down the repair details I noticed that it was a US model, for NTSC video, and that the modulator was a v.h.f. type. As we didn't have the manual I gave Pioneer spares a ring, in particular to see if a modulator could be supplied. It could, but would take about a month because it had to come from the states. The customer needed his unit in three days' time, not a month! So I had to devise a way of setting up his equipment so that he could carry on using it while we waited for the spares to arrive.

Use of a Sharp VC681 VCR enabled this to be achieved. We fed the CDV player's video output (CVBS) into the VCR's video input. With the VCR switched to the aux input the NTSC signal was modulated on to a u.h.f. carrier. This was fed to the customer's TV sets. When all three sets had been retuned to u.h.f. (they are multistandard models) each one displayed a crisp (for NTSC) clear picture. Being satisfied with this I gave the customer a call. He took his equipment away and said he'd bring it back when the spares came in.

Subsequently the modulator arrived (well done, Pioneer!). It was fitted and the unit was given a short test before being returned to the customer. A few days later he came back and complained that only two of his TV sets would work at one time. He wanted to use all three.

The customer brought in all his equipment and we set it up in the workshop. As the customer had said, only two sets would work at one time. The other one would tune up the band, find the v.h.f. signal then instead of memorising the frequency would carry on tuning. It worked all right at u.h.f., but apparently not on v.h.f. channel 4. I was about to give up for the day but thought that I would try one more thing – retune the output from the modulator and retune the TV sets. It worked. I reset the modulator's output to v.h.f. channel 3 and, once they had been retuned, all three TV receivers then worked perfectly. Could the problem have been caused by standing waves in the coax? After a short test during which it worked without difficulty the customer's equipment was sent back. **P.J.R.**

Binatone 01/7270

The compact disc player in this midi hi-fi system was faulty. It would read the TOC but wouldn't play. When play was tried the radial arm skated across the track then ERR was displayed. As the player read the TOC it seemed unlikely that the CDM unit was faulty – the dealer had already tried fitting another one. Substitution proved that the MAB8441P-T107 microcontroller chip was the culprit. **P.B.**

Test Case 356

"It's got like curtains down the side of the picture" puffed the man who staggered into the workshop with a 25in. TV set in his arms. Our receptionist Pam thought, but didn't say, that judging by his purple face it would be curtains for him if he went on like that. She made out the job card, relieved the gasping man of our £15 initial charge, and suggested to him that we would deliver the set when it had been repaired – a bargain at £6 extra.

The set was a Tatung Model TYV9821M, which uses the 180 chassis. It was soon on the bench in the charge of Roger, a temporary stand-in who helps us out when we're busy. His name has a certain unfortunate rhyming connotation, which is not wholly true of him... Anyway he hooked up the set, tuned a spare button to the local transmitter and looked for the curtains. There weren't any. He next tried the set on the raw mains supply. Still no curtains. So he rang the customer for clarification as he couldn't see them. "Ah no, you won't" the man told our bemused locum. It emerged that the curtains were visible only on low-key scenes, night shots and when the screen was momentarily blank between programmes. They were also confined to the left-hand side of the screen.

Roger fed a plain grey raster from a pattern generator to the set. He then saw the symptom. There were striations down the left-hand side of the display, alternate light and dark stripes. They faded out about a third of the way across the screen. Use of the brightness and contrast controls enabled the curtains to be seen quite clearly and, hopefully, their cause diagnosed.

The symptom was common in the sets of yesteryear. In fact two decades or more ago it was a feature of some of the cheaper models. Design of the line output stage has remained basically the same over all these years and in earlier times a common cause of vertical striations at the left-hand side was poor damping of the line linearity coil. Not all modern sets use this time-honoured arrangement, but the Tatung 180 chassis does. The line linearity coil is L408: it's damped by two series-connected 470Ω resistors, R434 and R439. Roger confidently disconnected their junction point and measured their resistances. Each read 430Ω, a change that was likely to increase the damping rather than reduce it.

Our valiant temp, seeing no other obvious possible causes for the symptom when he studied the circuit diagram, next went hunting with his oscilloscope to ascertain whether the striations were being produced by velocity- or intensity-modulation of the electron beam. He examined the waveforms at the tube's cathodes and grid, using a.c. coupling and a high-gain scope setting, but could detect no significant oscillation at the beginning of each line. Whatever there might have been was lost in the noise, minimal though this was. His conclusion was that the electron beam was not being intensity-modulated. So it was back to the line deflection circuit.

Things went steadily downhill after this sensible and scientific start. All sorts of components in the line output/scanning department were checked by substitution in an increasingly desparate and irrational attempt to get to the bottom of the problem – the efficiency and EW modulator diodes, the scan-correction and yoke-coupling network components, the line flyback tuning capacitor and goodness knows what else. All this while the real culprit, up on the tube base panel, remained unsuspected and inviolable. On the tube base panel? That's where it was as Television Ted, brought in for consultation, found. So what was it? For the solution and another item in the test case series, see next month's issue.

ANSWER TO TEST CASE 355
– page 664 last month –

Last month we related the sorry tale of Easthurst School's Hitachi VT410. It had come in for attention because of physical problems in the cassette loading department, then stayed in because of a strange recording fault – only one head was operational in the record mode. During playback of its own recordings only alternate fields appeared. Between them were noisy 20msec gaps. As a result the playback picture flickered badly and was overlaid with white spots and interference.

The cause of the problem lay in the head switching. There are two sorts of head switching in a two-head VCR. During playback each head is selected in turn. This switching is controlled by the drum flip-flop waveform. In the record mode the outer ends of the head windings are earthed alternately while the inner ends receive the record current. Each head has its own earthing switch which consists of a transistor, in either discrete component or i.c. form. If one of these switches fails to close there's no earth return path for the recording current, so a magnetic field isn't generated.

In the VT410 the switching is done by Q1 and Q3 which are on the preamplifier PCB. Investigation here showed that Q1 had an open-circuit collector. There was no effect in the playback mode because the transistor is then off anyway. The repair was carried out by using Q4 as a replacement for Q1. Q4 is present on the PCB but isn't used in the two-head version of these machines.

Published on the third Wednesday of each month by Reed Business Publishing Ltd. Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Filmsetting by Trutape Setting Systems, 220-228 Northdown Road, Margate, Kent. Printed in England by the Riverside Press Ltd., St Ives plc. Distributed by IPC Marketforce, Kings Reach Tower, Stamford Street, London SE1 9LS (071 261 5000). Sole Agents for Australia and New Zealand – Gordon and Gotch (Asia) Ltd,; South Africa – Central News Agency Ltd. "Television" is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed of by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. ISSN 0032-647X.

AZ ELECTRICS

INTEGRATED CIRCUITS	
AN103	£1.60
AN214Q	£2.50
AN240P	£1.30
AN253P	£1.80
AN3821K	£6.75
AN3822	£7.50
AN5015	£3.30
AN5033	£5.00
AN5132	£3.95
AN5265	£1.35
AN5510	£4.50
AN5512	£1.95
AN5521	£5.50
AN5730	£3.20
AN5750	£2.50
AN5760	£2.00
AN5900	£1.50
AN6326	£4.00
AN6332	£4.40
AN6341	£2.75
AN6344	£6.50
AN6346	£4.50
AN6356	£4.50
AN6359	£5.50
AN6360	£3.75
AN6362	£4.25
AN6387	£5.50
AN6612	£2.20
AN6651	£0.60
AN6671K	£5.50
AN6677	£5.25
AN6884	£2.75
AN6912	£2.00
AN7111	£1.50
AN7112	£3.00
AN7116	£1.20
AN7143	£1.65
AN7148	£1.70
AN7158	£4.00
AN7160	£6.00
AN7169	£3.50
AN7171K	£8.00
AN7205	£1.95
AN7213	£1.10
AN7218	£1.20
AN7220	£1.60
AN7222	£2.10
AN7223	£7.60
AN7224	£1.40
AN7225	£1.90
AN7273	£2.00
AN7310	£1.10
AN7311	£1.75
AN7315	£1.75
AN7324	£4.50
AN7410	£2.10
AN7415	£1.40
AN7420	£3.20
AN7818F	£1.60
B1403	£1.00
BA1320	£1.50
BA1332	£1.00
BA301B	£1.50

BA318	£2.50
BA328	£1.10
BA3308	£2.10
BA333	£1.40
BA3416L	£2.75
BA343	£1.20
BA3505F	£2.75
BA3704	£2.75
BA4210	£2.50
BA4220	£2.00
BA4236	£2.75
BA4402	£1.90
BA4403	£2.75
BA5102	£2.45
BA5204	£2.75
BA524	£3.00
BA5402	£2.40
BA5406	£2.50
BA6104	£2.50
BA6109	£1.80
BA614	£2.75
BA6154	£2.50
BA6208	£2.75
BA6209	£3.20
BA6219	£1.95
BA6222	£3.10
BA6229	£1.85
BA6238A	£1.95
BA6239	£3.75
BA6259	£3.00
BA6301	£2.00
BA6302A	£1.80
BA6304	£1.70
BA6305	£1.75
BA681	£0.90
BA7001	£1.90
BA718	£1.80
BA728	£1.10
BA7767S	£5.00
BTT6018	£3.50
CNX62A	£4.50
HA11215A	£3.50
HA11223	£3.75
HA11225	£2.10
HA11226	£3.75
HA11235	£3.10
HA1124A	£1.75
HA11414	£2.50
HA11701	£3.10
HA11713	£8.90
HA11714	£3.50
HA11715	£3.20
HA11747A	£12.75
HA11749	£7.00
HA11750	£3.50
HA12005	£3.80
HA12017	£2.00
HA12026	£2.00
HA2413	£1.20
HA13001	£1.80
HA13402	£8.20
HA13403	£4.00
HA1350	£9.00
HA1368R	£2.55
HA1374	£6.00

HA1377	£2.00
HA1388	£4.00
HA1392	£3.00
HA1394	£4.00
HA1397	£5.40
HA1398	£3.50
HA1406	£2.00
HA1457	£2.10
HA4219	£2.70
HD14081	£0.25
HD4539	£0.70
KA2210	£2.30
L7805	£0.80
L7806	£0.80
L7808	£0.80
L7812	£1.00
L7815	£0.80
L7818	£0.80
L7824	£0.95
L7905	£0.80
L7912	£0.80
L7915	£0.80
L7918	£0.80
L7924	£0.80
LA1180	£2.60
LA1185	£2.60
LA1201	£0.95
LA1235	£2.50
LA1260	£1.75
LA1403	£3.75
LA3160	£1.90
LA3210	£1.90
LA3220	£1.00
LA3350	£1.50
LA3361	£1.50
LA3600	£1.50
LA3700	£2.50
LA4100	£1.90
LA4102	£1.20
LA4125	£2.00
LA4140	£0.70
LA4160	£1.25
LA4182	£2.10
LA4183	£2.75
LA4192	£1.70
LA4422	£1.30
LA4440	£2.70
LA4445	£2.50
LA4460	£1.70
LA4461	£1.80
LA4500	£2.70
LA4570	£2.20
LA5522	£2.20
LA5527	£1.95
LA6358	£5.00
LA7016	£2.50
LA7096	£4.00
LA7210	£3.10
LA7305	£6.90
LA7309	£3.75
LA7507	£4.00
LA7520	£3.25
LA7800	£1.50
LA7801	£1.25
LA7820	£1.90

LA7830	£2.50
LA7913	£1.30
LM1011N	£3.00
LM1017/M192B1	£2.30
LM1035	£5.75
LM1036N	£3.70
LM1112CN	£3.30
LM13600	£5.00
LM1868N	£1.50
LM1894N	£5.75
LM317T	£1.00
LM324	£0.80
LM339	£0.80
LM339N	£0.75
LM384	£1.20
LM386N	£0.80
LM556CN8	£2.50
LM6402G-2003	£10.00
LM614	£1.80
LM748CN 8 PIN	£1.25
LM748N	£2.00
M104	£7.00
M29381	£11.00
M490BB1	£12.50
M491B/BB1	£11.50
M50127AP	£6.00
M50431-101SP	£6.50
M50453-012P	£6.20
M50560-01P	£2.70
M51014L	£1.95
M51164	£1.40
M51356P	£5.00
M51381P	£1.50
M51393	£4.25
M51513	£10.00
M51515L	£3.10
M51516	£4.00
M51903L	£3.50
M5213L	£3.10
M52184	£1.00
M52314	£1.10
M54519P	£1.00
M54543	£1.75
M54544L	£1.85
M54548L	£4.50
M58478P	£4.75
M58655P	£6.50
M58839	£8.00
M708	£5.50
M709	£4.75
MA150-E	£2.20
MB3106	£1.00
MB3730	£2.75
MB3731	£3.25
MC13002P	£5.00
MC1310	£1.25
MC1330P	£2.95
MC14001BCP	£1.10
MC14093B	£1.50
MC14426P	£2.20
MC14429P	£2.20

MC14497P	£5.50
MC14511BCP	£2.00
MC14516BCP	£2.00
MC1458/UPC1458	£1.95
MC3359	£1.10
MCU2632	£1.90
MEA2050	£4.60
MEA2901	£3.00
MH27316	£3.00
ML232B	£4.50
ML237 (BTT6018)	£3.50
ML238B	£7.50
M293	£4.00
ML923	£4.50
ML923DP	£4.50
ML926	£4.20
MM314APL	£1.75
MM53108N	£1.25
MM5387	£2.90
MM5402	£1.50
MM5405N	£3.50
MM5456	£2.25
MM5457N	£2.50
MM5458N	£2.50
MM55108	£2.65
MM7317	£3.75
MM74C901	£1.10
MPD4011C	£2.00
MPD4069C	£1.10
MPD4081	£1.10
MPD45148C	£5.00
MPD5521066	£11.00
MSL9378RS	£3.50
MSM5840H-84RS	£14.50
SAA1006	£2.50
SAA1025	£5.80
SAA1124	£3.95
SAA1174	£6.50
SAA1250	£2.60
SAA1251	£8.50
SAA1276	£4.50
SAA1290-02	£10.70
SAA1293-02	£14.00
SAA3027	£6.00
SAA5000	£3.00
SAA5010	£5.80
SAA5012	£6.60
SAA5020	£5.80
SAA5030	£9.00
SAA5040A	£5.00
SAA5040B	£9.90
SAA5041	£9.50
SAA5050	£7.00
SAA5231	£9.00
SAB3013	£4.50
SAB3037	£11.00
SAF1032P	£6.00
SAF1039P	£2.00
SAS560	£3.50

SAS570	£3.00
SAS580	£3.50
SAS590	£3.50
SL1430	£2.80
SL1431	£1.60
SL1432	£1.10
SL471DP	£2.20
SL480	£3.30
SL490	£3.00
SL901B	£3.00
SL917B	£4.00
SN76670N	£1.25
SSA1075	£5.90
SSA1250	£3.50
ST082	£12.00
ST1195	£5.50
STA401A	£3.75
STA441C	£3.00
STK0029	£4.30
STK082	£12.00
STK2029	£8.50
STK2125	£12.00
STK2250	£9.20
STK3041	£5.70
STK40090	£8.00
STK4121 II	£8.75
STK4141 II	£6.90
STK4142 II	£10.00
STK4151	£11.50
STK4171 II	£9.00
STK430	£6.00
STK4311	£10.20
STK433	£7.50
STK435	£8.00
STK4352	£5.80
STK437	£10.00
STK4392	£7.00
STK441	£10.50
STK459	£11.00
STK461	£10.50
STK463	£14.50
STK465	£12.00
STK5315	£6.50
STK5322	£6.50
STK5325	£5.50
STK5331	£6.00
STK5332	£3.50
STK5333	£4.00
STK5338	£6.00
STK5339	£4.00
STK5361	£6.25
STK5421	£6.50
STK5422	£5.00
STK5434	£6.50
STK5451	£5.30
STK5471	£5.25
STK5476	£6.00
STK5481	£5.00
STK5482	£5.20
STK5720	£7.00
STK5730	£5.25
STK6962	£3.20
STK6972	£6.00
STK7216	£6.10
STK7308	£5.75

STK7309	£7.00
STK7348	£5.00
STK7356	£6.50
STK7358	£6.50
STK772B	£4.75
STR1096	£3.60
STR3125	£5.50
STR40090	£8.00
STR4211	£5.95
STR440	£5.00
STR451	£4.95
STR454	£4.85
STR50020	£7.90
STR50103A	£5.50
STR5412	£5.95
STR58041	£6.75
STR6020	£4.90
STR8050	£14.15
SVM993C	£2.00
TA4180	£3.00
TA4193	£5.00
TA4194	£5.50
TA4301	£4.50
TA4345	£3.40
TA4350	£6.00
TA7120	£1.25
TA7137	£1.25
TA7176	£2.50
TA7176AP	£2.50
TA7193AP	£4.00
TA7193P	£6.00
TA7205	£1.75
TA7205AP	£1.25
TA7222	£2.25
TA7223	£2.50
TA7227P	£2.30
TA7230P	£1.65
TA7232P	£1.50
TA7233P	£2.10
TA7240	£2.50
TA7241	£2.50
TA7241AP	£3.00
TA7243	£3.30
TA7245	£4.50
TA7267P	£2.80
TA7270P	£2.50
TA7271P	£3.25
TA7274	£2.60
TA7280	£3.00
TA7280P	£3.00
TA7281	£2.75
TA7281P	£2.75
TA7299P	£3.00
TA7302	£1.30
TA7303	£1.10
TA7310	£1.75
TA7312	£1.75
TA7313	£0.90
TA7313AP	£1.40
TA7314	£2.00
TA7323	£3.25
TA7325	£2.00
TA7325P	£1.50
TA7328	£2.00
TA7335	£1.50

TA7335P	£4.20
TA7342	£2.10
TA7343	£1.75
TA7350	£2.10
TA7358	£1.50
TA7607	£3.50
TA7607AP	£2.40
TA7609P	£2.70
TA7614	£2.50
TA7628P	£2.40
TA7629	£4.00
TA7629P	£2.75
TA7630P	£2.00
TA7640	£2.00
TA7658	£2.00
TA7668	£2.00
TA7680	£4.80
TA7681AP	£5.75
TA7687	£2.00
TA7698A	£6.85
TA7698AP	£7.50
TA7705P	£1.50
TA7709	£2.50
TA7738	£2.50
TA78L010P	£1.75
TA8101N	£4.25
TA8102P	£4.25
TA8644	£5.50
TAA310A	£2.00
TAA550	£2.10
TBA120S	£0.50
TBA530	£1.00
TBA560	£1.00
TBA750Q	£4.20
TBA800	£0.85
TBA820M	£0.45
TBA920S	£1.00
TCA640	£3.75
TCA650	£3.95
TCA660B	£3.50
TDA1005	£2.50
TDA1010A	£1.10
TDA1011	£1.20
TDA1013	£2.75
TDA1013A	£1.90
TDA1015	£1.20
TDA1020	£2.50
TDA1022P	£4.50
TDA1035	£1.90
TDA1035T	£1.90
TDA1037	£2.90
TDA1044	£2.50
TDA1044U	£1.50
TDA1057	£2.00
TDA1082	£3.50
TDA1083	£1.70
TDA1151	£1.50
TDA1154	£2.70
TDA1170S	£1.20
TDA1180	£1.80
TDA1180P	£3.00
TDA1190	£1.90
TDA1270M	£4.10
TDA1365	£4.90
TDA1412	£1.00

TDA1470	£5.00
TDA1501A	£3.20
TDA1506	£8.50
TDA1510	£3.20
TDA1510A	£3.20
TDA1512	£2.75
TDA1515A	£2.50
TDA1520	£3.95
TDA1522	£1.50
TDA1670A	£3.00
TDA1701	£3.00
TDA1770A	£3.00
TDA1870A	£2.60
TDA1905	£1.40
TDA1908A	£1.75
TDA1940	£1.80
TDA1950	£2.50
TDA2002	£1.40
TDA2003	£1.30
TDA2004	£1.70
TDA2005	£1.70
TDA2005S	£2.95
TDA2006V	£1.95
TDA2020	£3.50
TDA2030	£1.10
TDA2030H	£2.00
TDA2030V	£1.75
TDA2040	£2.00
TDA2151	£3.00
TDA2161	£1.75
TDA2170	£3.00
TDA2270	£2.20
TDA2320	£0.90
TDA2510	£4.30
TDA2521/3	£9.75
TDA2522Q	£10.75
TDA2530Q	£4.25
TDA2532	£3.00
TDA2532Q	£3.00
TDA2540	£2.75
TDA2541	£2.00
TDA2543	£5.25
TDA2560	£3.75
TDA2600	£6.80
TDA2576A	£6.00
TDA2578	£3.00
TDA2578A	£2.80
TDA2579	£3.50
TDA2581Q	£2.40
TDA2581	£2.00
TDA2582	£2.95
TDA2590	£2.00
TDA2591	£2.70
TDA2593	£1.50
TDA2594	£3.00
TDA2611A	£1.00
TDA2640Q	£3.50
TDA2653A	£2.75
TDA2822	£2.00
TDA3190	£0.95
TDA3303	£15.00
TDA3330	£5.50
TDA3540	£4.00
TDA3541	£2.25
TDA3560	£3.40

TDA3561A	£5.00
TDA3562A	£5.00
TDA3565	£3.00
TDA3571BQ	£5.50
TDA3590	£3.00
TDA3651	£3.00
TDA3651AQ	£6.50
TDA3653	£4.00
TDA3654	£2.80
TDA3810	£2.90
TDA3950	£3.00
TDA440	£2.00
TDA4420	£2.45
TDA4422	£3.95
TDA4500	£3.80
TDA4501	£4.00
TDA4503	£4.50
TDA4505	£6.75
TDA4510	£4.40
TDA4600	£2.60
TDA4600-2	£2.60
TDA4601	£2.10
TDA4610	£4.50
TDA5101	£2.00
TDA7250	£5.50
TDA7607AP	£2.40
TDA8180	£6.00
TDA8190	£3.80
TDA8341	£3.00
TDA9503	£2.55
TDA9513	£2.95
TEA1009	£2.00
TEA1014	£2.00
TEA1039	£2.00
TEA2018	£2.10
TEA2018A	£2.10
TEA5101	£6.00
TLD11CP	£2.00
TLD72CP	£2.00
TMM 2114AP	£5.75
TMS1944AN2L	£2.00
TMS1952	£2.50
TMS1956	£2.30
TMS1965NL	£2.00
TMS3450	£2.10
TMS3615	£1.75
U410B	£1.60
U416B	£1.60
UA767PC	£1.20
UA78/10	£2.00
UA78M15	£2.00
UAA1008DP	£2.00
UC38445	£5.00
UPC1185H2	£5.00
UPC1225H	£2.75
UPC1230	£3.00
UPC1238V	£2.10
UPC1263	£2.20
UPC1288V	£2.95
UPC1361C	£3.90
UPC1362C	£4.50
UPC1363	£1.90
UPC1365	£3.50
UPC1377C	£2.20
UPC1378H	£2.00

UPC1379	£2.20
UPC1382	£1.50
UPC1394	£1.70
UPC1420A	£7.00
UPC1458	£1.95
UPC1513HA	£2.00
UPC1520CA	£2.48
UPC339C	£0.70
UPD4011	£1.75
UPD4066	£1.95
TRANSISTORS	
2N3773	£1.90
2SA1095	£5.50
2SA1102	£1.90
2SA1112	£0.95
2SA1124	£0.35
2SA1220	£1.10
2SA1386	£4.70
2SA564	£0.40
2SA673	£0.20
2SA942	£0.35
2SA985	£0.95
2SB1016	£1.50
2SB772	£0.40
2SB775	£1.60
2SB819	£0.55
2SB965	£2.30
2SC1413A	£2.50
2SC1826	£1.80
2SC1942	£2.10
2SC1983	£1.30
2SC2003	£0.25
2SC2027	£4.50
2SC2230	£0.50
2SC2238	£0.75
2SC2331	£1.00
2SC2335	£1.50
2SC2531	£0.26
2SC2564	£3.04
2SC2570	£0.55
2SC2577	£1.50
2SC2592	£0.95
2SC2621	£1.25
2SC2631	£0.30
2SC2632	£0.30
2SC2655	£0.60
2SC2958	£2.50
2SC2979	£3.00
2SC3153	£3.40
2SC3402	£0.40
2SC3519	£4.60
2SC3678	£1.25
2SC3715	£4.80
2SC458	£0.20
2SC789	£2.50
2SD1047	£2.75
2SD1051	£0.85
2SD1128	£1.50
2SD1138	£0.85
2SD1159	£0.75
2SD1207	£0.75
2SD1273	£1.00
2SD1275	£1.30
2SD1288	£1.70
2SD138	£0.85

WE HAVE THE WIDEST CHOICE OF USED OSCILLOSCOPES IN THE COUNTRY

TEKTRONIX 2445B Four Channel 150MHZ Delay Sweep ... £1750
TEKTRONIX 2445A Four Channel 150MHZ Delay Sweep ... £1300
IWATSU SS5711 Four Channel 100MHZ Delay Sweep ... £700
TEKTRONIX 2235 Dual Trace 100MHZ Delay Sweep ... £800
TEKTRONIX 7603 Dual Trace 100MHZ Delay Sweep with Cursors ... £500
HITACHI V1050F Dual Trace 100MHZ with 4 Channel Mode ... £550
TEKTRONIX 475 Dual Trace 200MHZ Delay Sweep ... £550
TEKTRONIX 465 Dual Trace 100MHZ Delay Sweep ... £450
TEKTRONIX 7403 Dual Trace 60MHZ Delay Sweep ... £400
HUNG CHANG OS650 Dual Trace 50MHZ Delay Sweep Unused ... £375
PHILIPS PM3217 Dual Trace 50MHZ Delay Sweep ... £400
TEKTRONIX 2225 Dual Trace 50MHZ Alternate TB Magnification ... £500
HAMEG 605 Dual Trace 60MHZ Delay Sweep ... £400
GOULD OS3000A Dual Trace 40MHZ Delay Sweep ... £250
TEKTRONIX T935 Dual Trace 35MHZ Delay Sweep ... £250
GOULD OS1100 Dual Trace 30MHZ ... £180
IWATSU CS5070 Dual Trace 20MHZ ... £225
GOULD OS300 Dual Trace 20MHZ ... £200
GOULD OS250B Dual Trace 15MHZ ... £150
FARNELL DT12-5 Dual Trace 12MHZ ... £125
HITACHI V209 Dual Trace 20MHZ Portable AC/DC Operation ... £400
TELEQUIPMENT D32 Dual Trace 10MHZPortable Mains/Battery ... £175
TEKTRONIX 7633 Dual Trace 100MHZ Storage ... £500

THIS IS JUST A SAMPLE — MANY OTHERS AVAILABLE

ELECTRON MICROSCOPES

A.E.I. Corinth 500 – Transmission
I.S.I. Super 111A – Scanning

MARCONI 2440 20GHz Microwave Counter ... £1500
MARCONI 2610 True RMS Voltmeter ... £800
FARNELL SSG1000 Sig Gen 10MHz–1GHz Synthesised ... £1750
MARCONI 2019 Sig Gen 80kHz–1040MHz ... £1800
MARCONI 2022A Sig Gen 10kHz–1GHz ... £1500
FARNELL Synthesized Oscillator DSG1 – 0.0001Hz–99.99kHz ... £275
MARCONI TF2015 AM/FM 10–520MHz Sig Gen with TF2171 ... £400
MARCONI TF2015 without Synchroniser TF2171 ... £250
MARCONI TF2016 AM/FM 10kHz–120MHz with TF2173 £350
MARCONI TF2016 without Synchroniser TF2173 ... £175
MARCONI TF2356/2357 Level Osc/Meter 20MHz the pair £950
MARCONI SANDERS Sig Sources. Various models. Covering 400MHz–8.5GHz ... from £300
RACAL 9009 Mod Meter 10MHz–1.5GHz ... £350
RACAL Instrumentation Recorders Store 4D and Store 7D ... from £500
KEITHLEY 224 Programmable Current Source ... £1000
FERROGRAPH RTS2 Recorder Test Set ... from £150

FARNELL SSG520 Synthesised Sig Gen 10–520MHz ... £600
FARNELL TTS520 Transmitter Test Set. Consisting of RF/AF Counter; RF Mod Meter; RF Power Meter; AF Voltmeter; AF Distortion Meter; AF Synthesiser ... £600
SOLD as a pair for **ONLY** ... £1000

SPECTRUM ANALYSERS

ANRITSU MS68B 10kHz–4.4GHz ... £4000
ANRITSU MS62B 10kHz–1700MHz ... £2000
HP 141T with 8555A & IF Plug-in 10MHz–18GHz ... £2500
HP 141T with 8554B & 8552B 500kHz–1250MHz ... £1500
HP 140T with 8554L & 8552A 500kHz–1250MHz ... £1200
HP 141T with 8556A & 8552B 20Hz–300kHz ... £1250

PHILLIPS PM2525 Multi Function DMM 4.5–5.5-digit with GPIB/IEEE-488 ... Only £300
THURLBY PL320T-GP Bench PSU. 0–30V 2-Amp Twice with GPIB ... £350
HAND-HELD MULTIMETERS – 3.5-digit DM105 – 14 Ranges DC–2Amp ... Only £18
M2355 – 32 ranges AC/DC 10 Amps, Diode/Transistor Tester, Freq counter etc ... Only £32.50

RACAL/DANA Syn Sig Gen 9084 0.01–104MHz ... £500
RACAL/DANA RF Power Meter 9104 ... £800
RACAL/DANA 202 Logic State Analyser with 68000 Disassembler ... £500
WAYNE KERR LCR Meter 4210. Accuracy 0.1% ... £600
WAYNE KERR LCR Meter 4225. Accuracy 0.25% ... £500
AVO AC/DC Breakdown Leakage & Ionisation Tester RM215L/2 ... £600

MARCONI DIGITAL FREQUENCY METERS

Type 2430A	10HZ-80MHz	£125
Type 2431A	10HZ-200MHz	£130

MARCONI UNIVERSAL COUNTER TIMERS

Type 2437	DC-100MHz	£175
Type 2438	DC-520MHz	£225

THORN PSU 0–40V; 0–50Amps Metered ... £300
FARNELL PSU H60/25 0–60V; 0–25Amps Metered ... £400
FARNELL PSU L30E 0–30V; 0–5Amps Metered ... £80
TELEQUIPMENT CT71 Curve Tracer ... £250
MARCONI TF2700 Universal LCR Bridge. Battery ... from £125
MARCONI TF2337A Auto Distort Meter 400Hz/1kHz 0.01% ... £175
RACAL 9915 Freq Counter 10Hz–520MHz (Crystal Oven) £150
MANNESMAN TALLY Pixy 3 XY Plotter. RS232 ... £100

AVO MULTIMETERS

MODEL 8 or 9 (what's available) ... £40 each
Test Set No 1; 8X; 9SX ... from £45
8 Mk5 with Carrying Case ... £90
8 Mk6 with Carrying Case ... £120
All Meters Supplied with Batteries & Leads

NEW EQUIPMENT

HAMEG OSCILLOSCOPE HM1005 Triple Trace 100MHz Delay Timebase ... £792
HAMEG OSCILLOSCOPE HM604 Dual Trace 60MHz Delay Sweep ... £610
HAMEG OSCILLOSCOPE HM203. 7 Dual Trace 20MHz Component Tester ... £338
HAMEG OSCILLOSCOPE HM205. 3 Dual Trace 20MHz Digital Storage ... £610
All other models available – all oscilloscopes supplied with 2 probes

BLACK STAR EQUIPMENT (P&P all units £5)
APOLLO 10 – 100MHz Counter Timer Ratio/Period/Time interval etc ... £222
APOLLO 100 – 100MHz (As above with more functions) ... £325
METEOR 100 FREQUENCY COUNTER 100MHz ... £109
METEOR 600 FREQUENCY COUNTER 600MHz ... £135
METEOR 1000 FREQUENCY COUNTER 1GHz ... £178
JUPITOR 500 FUNCTION GEN 0.1Hz-500kHz Sine/Sq/Tri ... £110
ORION COLOUR BAR GENERATOR Pal/TV/Video ... £229
All other Black Star Equipment available
OSCILLOSCOPE PROBES Switchable ×1 ×10 (P&P £3) £11

Used Equipment – With 30 days guarantee. Manuals supplied if possible.
This is a VERY SMALL SAMPLE OF STOCK. SAE or Telephone for lists. Please check availability before ordering.
CARRIAGE all units £16. VAT to be added to Total of Goods and Carriage.

STEWART of READING

110 WYKEHAM ROAD, READING, BERKS RG6 1PL
Telephone: (0734) 268041. Fax: (0734) 351696. Callers Welcome 9am–5.30pm Mon–Fri (until 8pm Thurs).

VISA

COMPONENTS For TV ★ Video Audio ★ Computer

THIS IS JUST A SMALL SAMPLE OF STOCK
We can supply spares for many makes of equipment. WRITE (Encl. s.a.e. please) or PHONE FOR A 'PRICE & AVAILABILITY' on your requirements.

0452 526883

TRANSISTORS & DIODES

2SA564	£1.14	2SC2274	£0.48
2SA608	£0.98	2SC2331	£1.59
2SA673	£0.33	2SC2621	£1.57
2SA683	£0.83	2SC3039	£2.29
2SA715	£1.01	2SC3150	£2.93
2SA844	£0.41	2SC3175	£3.24
2SA984	£0.49	2SD313	£0.49
2SA1011	£1.51	2SD325	£0.71
2SA1015GR	£0.74	2SD389	£1.09
2SA1706	£1.69	2SD468C	£0.76
2SB507	£1.23	2SD571	£0.94
2SB772	£1.49	2SD667	£1.18
2SC388A	£1.49	2SD787	£0.94
2SC1096	£0.71	2SD788	£1.18
2SC1383	£0.93	2SD917	£3.52
2SC1384	£0.83	2SD1159	£1.57
2SC1740	£0.68	2SD1266	£2.11
2SC1741	£0.53	2SD1667	£1.58
2SC1756	£1.49	2SD1668	£1.87
2SC1815Y	£0.28	BA157	£0.29
2SC1907	£0.89	BU508A	£1.18
2SC2060	£0.97	RD9.1EB2	£1.43
2SC2271	£1.10	RB156	£2.29

IC SELECTION

CA741E	£0.26	TA7607	£4.75
CXA1019S	£2.99	TA7668BP	£1.99
HA1137W	£3.61	TBA530	£1.74
HA11235	£3.55	TBA800	£1.17
HA12006	£6.09	TBA810P	£1.16
HA12413	£5.05	TBA810S	£1.62
LA1385	£3.85	TBA820L	£1.67
LA3160	£2.28	TCA240	£3.49
LA3361	£1.79	TCA940	£3.33
LA4480	£3.86	TDA1001B	£2.86
LA4500	£3.69	TDA1020	£2.93
LA7851	£3.95	TDA1044	£3.45
LM733CN	£2.27	TDA1180P	£3.49
M54548L	£5.29	TDA1908A	£2.06
MC7805	£0.78	TDA2003	£2.84
MC14502BCP	£0.78	TDA2541	£2.52
NE555CDP	£0.25	TDA2593	£3.45
SAA1124	£3.88	TDA3330	£6.49
STK0029	£6.69	TDA3651	£3.49
STK2129	£10.99	TDA4420	£2.85
STK4141II	£8.79	TDA4505E	£7.99
STK4332	£6.29	TDA4600-1	£3.35
STK5333	£7.99	TDA4601	£2.49
STK5451	£6.29	TDA4950	£2.15
STK5481	£6.99	TDA8170	£3.53
TA7240AP	£2.96	UPC1277	£4.70
TA7273P	£5.35	UPC1378H	£2.45
TA7280P	£6.92	UPC1397C	£4.34
TA7324	£3.21	14DN476	£19.29

ICP-F/ICP-N Ranges each £0.84

TOOLS & BATTERY ACCS.

UNIROSS Plug-In 'Fast' Charger for AAA/AA Ni-CAD's (Also PP3 at slower rate) £5.49
UNIROSS 'C' Ni-Cad Battery £2.09
Crimping Tool £2.45 Junior Hacksaw £0.85

COMPUTER SPARES

AMSTRAD

IC 40010 G Array	£18.86
IC AY38912A	£7.06
IC HD6845SP	£15.18
IC LA4140	£1.70
IC LA6324	£4.90
IC PEGA1A (PC1640)	£30.85
IC SE09420CAC	£14.93
Joystick (CPC range)	£6.71
Printer Armature (PCW 9512)	£4.20
Cement Resistor 5.6R/5W	£1.69
Service Manual (CPC464 early)	£8.67
Service Manual (PCW8256/8512)	£13.89
Serv. Manual (PCW9512)	£14.49

ATARI

IC C025913 DMA (ST)	£33.24
IC C014806 (XE/L)	£11.40
IC C024947 (XE/L)	£4.58
THERMISTOR (ST-PSU)	£1.37
CNY65 (ST-PSU)	£4.42
PC101 (ST-PSU)	£4.73
PC713V (STE-PSU)	£2.99
User Manual (STFM)	£10.00

PHILIPS

Serv. Manual BM7513	£2.99
Serv. Manual CM8833 (Mk 1)	£3.80

EPSON

C78010BD031 CPU	£30.24
HA13007 T Array	£4.66

SINCLAIR

IC 40056 ULA (+2)	£16.72
IC 40054 ROM (+2)	£16.69
IC ROM (48K/+)	£7.99
IC TEA2000	£4.49
IC TMS4532-15NL4	£1.72
IC ULA6C001E7	£17.61
IC ZX8302 (QL)	£10.48
IC ZX8401 (Spec.)	£7.94
ZTX650 Transistor	£0.49
UM1233 Modulator	£7.36
Membrane (Spec. 48K)	£4.73
Membrane (+/128K)	£8.39
Speaker (48K/+)	£1.74
PCB Power Skt. (Spec.)	£0.89
Power Plug (Spec.)	£0.29

COMMODORE

IC 6569 VIC (Sp. Offer)	£19.95
IC 8520 CIA	£11.25
IC 8565 VIC	£23.96
IC 251641-02 PLA	£4.06
IC 901225-01 ROM	£6.55
IC 906114-01 PLA	£9.24
Modulator 251916-02	£18.76
User Manual (C64)	£4.25
User Manual (C64C)	£4.39

All above are manufacturers original spares

OTHER COMPUTER CHIPS

AM26LS31PC	£1.63	74LS00 TTL	£0.18
6502 CPU	£5.05	74LS157 TTL	£0.35
6818 R.T. Clock	£7.24	75154PC 4×line driver	£1.85
8255A PPI	£2.82	64K×1 DRAM (150ns)	£1.69

AUDIO, TV & VIDEO SPARES

AMSTRAD VCR4500, 4600, 4700, TVR1-3 BELT KIT	£2.45
FISHER FVH-P420, 520, 530 REEL/SPOOL TYRE	£1.79
FERGUSON/JVC 3V29, 30/HR7200, 7300 REEL IDLER	£3.55
GRUNDIG CUC220 (B6500/B7500) SERVICE MANUAL	£4.75
PANASONIC NV230, 430, 465, 630 TENSION BAND	£3.67
PANASONIC NV370 etc. IDLER (VXP0521) Genuine	each £4.31
PHILIPS KT4/K40 SERVICE MANUAL	£10.00
SHARP IDLERS (005 or 006) Genuine	each £4.31
SHARP RGF278, 281, 284 MAIN BELT	£1.40
TOSHIBA STU2/L MAINS TRANSFORMER	£9.99
TRIUMPH VR9511S CAPSTAN MOTOR	£34.99

TELEPHONE ACCESSORIES

BT Plug-in Tone Ringer	£6.95	5m Extension Lead	£3.95
LJU2 Secondary Skt. & Box	£2.58	LJU3 Secondary Skt. (Flush)	£2.48
4 Core Cable per/m	£0.15	Cable Clips per/10	£0.20

We are pleased to serve both the Trade and End User.
SEND LARGE 36p S.A.E. FOR CATALOGUE*
* Supplement available to Bona fide traders – on request.
All items subject to availability – Prices can change without notice. Please add £1.20 P&P — but not VAT.

ORDER BY POST OR PHONE

VISA

We accept payment by VISA, Access, DELTA, SWITCH, Cheque or P.O.

Access

MARAPET (TVH)
1 HORNBEAM MEWS
GLOUCESTER GL2 0UE

18 BROOKWOOD ROAD, SOUTHFIELDS, LONDON SW18 5BP.

TEL: 081-877 3492/877 3518 FAX: 081-877 3518

AZ ELECTRICS

TRANSISTORS Cont.

2SD1391	£4.20	2SD868	£3.50
SDC1397	£3.75	2SD869	£3.00
2SD1398	£2.25	2SD870	£3.50
2SD1426	£4.50	2SD871	£4.50
2SD1453	£1.60	2SD895	£2.00
2SD1455/2SD1730	£3.10	2SD898	£2.75
2SD1496	£4.00	2SD898B	£2.75
2SD1497	£2.60	2SD900B	£4.00
2SD1497-02	£5.95	BC107B	£0.10
2SD1497-06	£5.95	BC108	£0.10
2SD1650	£3.50	BC108B	£0.10
2SD1877	£2.30	BC115	£0.16
2SD639	£0.35	BC118	£0.12
2SD667	£1.00	BC147A	£0.07
2SD725	£3.70	BC159	£0.09
2SD787E	£0.30	BC171	£0.09
2SD811	£2.95	BC172	£0.09
2SD836	£1.10	BC172C	£0.07
2SD837	£0.80	BC182L	£0.09
2SD845	£2.70	BC183	£0.09

TDA8180 ORIGINAL £9.50

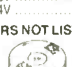
TRANSISTORS		BF422	£0.50
BC184	£0.09	BF458	£0.22
BC212	£0.09	BF459	£0.22
BC213	£0.09	BF469/BF471	
BC214A	£0.07		£0.25
BC214B	£0.07	BF471	£0.25
BC214L	£0.09	BF472	£0.25
BC237	£0.07	BF870/BF472	
BC23B	£0.07		£0.25
BC307	£0.12	BU108	£0.75
BC308B	£0.07	BU126	£0.70
BC327-25	£0.07	BU208	£1.00
BC328-40	£0.05	BU208A	£1.00
BC337	£0.07	BU208D	£1.15
BC372	£0.95	BU208T	£1.00
BC392	£1.50	BU326A	£1.00
BC441	£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
BD131	£0.50	BU807	£0.75
BD132	£0.40	BUT11	£0.95
BD137	£0.35	BUT11AF	£1.95
BD237	£0.22	BUW84	£1.65
BD238	£0.22	BUX84	£0.60
BD243B	£0.30	SD12659	£0.75
BD243C	£0.40	T9064V	£2.28
BD244	£0.30	TIP110	£0.45
BD244C	£0.30	TIP112	£0.45
BD278A	£0.80	TIP29	£0.30
BD434	£0.80	TIP30	£0.45
BD508	£0.90	TIP31	£0.30
BF195	£0.07	TIP32	£0.30
BF196	£0.15	TIP41	£0.27
BF197	£0.15	TIP42C	£0.40
BF198	£0.07	TIP47	£0.98
BF199	£0.14	TIPL791A	£1.20
BF244	£0.40	ZTR604	£0.55
BF259	£0.22	ZTX650	£0.70

DIODES AND THYRISTORS

BA157	£0.07	FB2506	£1.50
BR100	£0.20	IN4001	£0.06
BR101	£1.40	IN4002	£0.06
BR103	£0.75	IN4004	£0.10
BR303	£1.50	IN4005	£0.10
BRY56	£0.75	IN4006	£0.08
BT116	£2.50	IN4007	£0.08
BT128P	£4.50	IN4148	£0.10
BT129P	£4.50	IN5408	£0.25
BT151/800R	£1.75	KBL08	£1.95
BY126	£0.20	DA91	£0.20
BY127	£0.08	DT112	£2.20
BY133	£0.20	RGP15G	£0.45
BY164	£0.90	RGP15J	£0.55
BY164/SKB2/02	£0.90	RGP15K	£0.35
BY179	£1.10	RGP30K	£0.70
BY179/SK2/08	£1.10	RHI	£1.30
BY184	£0.65	RM11C	£0.45
BY189	£2.00	SG264	£8.50
BY190	£2.00	SG613	£12.00
BY223	£2.00	SKB/02	£0.60
BY206 (BYB96R)	£0.55	SKB/08	£1.20
BY210/800/BYV96		SKB2/02	£0.90
	£0.55	SKB2/08	£1.10
BY227	£0.20	SKE1/02	£0.60
BY228	£0.50	SKE1M15	£0.65
BY229	£1.15	SKE2G2/02	£0.75
BY299	£0.50	SKE2G3/04	£1.30
BY96D	£0.30	SKE4F1/04	£0.45
BYV96D	£0.55	SKE4F1/06	£0.45
BYW56	£0.50	SKE5F3/10	£2.20
BYW96E	£0.50	SR2M	£0.75
BYX10	£0.50	T9053V	£1.40
BYX55/600	£0.55	T9064V	£2.28

ASK FOR SEMICONDUCTORS NOT LISTED

VIDEO HEADS



AMSTRAD
3HSSR-VCR7000 (Saisho/Orion) £16.00
PSF1-VCR4500,5200,9000 .... £15.00
PSF2-VCR4600,4700 .... £14.00
PSF3-VCR6000 .... £17.00

FERGUSON
3HSSV-2 Head universal £7.50
3HSSVA-3V42,44,45,46 etc. £20.00
3HSS4VB-3V32/HR7655 .... £25.00
3HSS4VC-3V48/HRD565 .... £26.00
3V48,58,59,65,FV10,11,12,13,14,20,21,26
And most other Fergusons .... POA

HITACHI
3HSSHA-VT8000,9000 series £15.00
3HSSHB-VT11,33 etc £15.00
10082-VT120,220 .... £22.00
10081-VT130,135 .... £25.00

PANASONIC
3HSSN-2 Head universal £7.50
3HSSU1N-NV100,370,380/ Philips VR6460 .... £9.00
3HSSU2N-NV230,470,480,G9,10,11,15PX £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 .... £32.00

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 .... £20.00
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.

LINE OUTPUT TRANSFORMERS

LOPT Hitachi CPT1476 .... £18.00
LOPT Hitachi CPT2276 etc £19.00
LOPT Matsui 1440 .... £18.00
Trip Grundig CUC2401 etc £17.00
OTHER GRUNDIG TRIPLERS IN STOCK

Decca 100 .... 9.50
ITT CVC20 .... 12.50
ITT CVC25/30/32 .... 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 CVC800/1/3 .... 21.50
ITT CVC1100 .... 16.50
ITT CVC1150/1175 .... 20.00
ITT 6325 .... 18.50
ITT 3546 .... 18.50
ITT 1200/1 .... 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 CT4/5 & TVA1 .... 14.75
Philips KT3 .... 12.95
Rank Bush T20A 11.50
Thorn TX100 Green Spot 110 .... 16.75
Ferguson TX90 LOPT specify size/screen 17.75
Ferguson 3V35/36 Mains Transformer 23.00
Ferguson 3V44/44/45 Mains Transformer 18.85
Sony – Please state model for price
Universal Tripler 4.75
Universal Tripler with focus unit 9.50
Decca 120/130 series tripler 8.50
Thorn TX10 Focus Unit Kit 9.00
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.

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 .... £14.00
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

PHILIPS
VR6460,6920 Idler Arm (Original) £3.00
DV464,6462,6463,650 etc. Idler Mod. Kit £4.50
VR6542,6843 Reel Idler £6.50
VR6542 Reel Drive Pulley £7.75
VR6843 Reel Drive Pulley £9.50

PANASONIC (All Original)
NV370 Idler Arm Unit VXP0521 Gen. £3.00
NV8600,8610 Play Idler VXP0243 .... £0.95
NV332,777,788 Idler Unit VXP0463 .... £3.00
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 VXP0331-
NV2000,3000 Idler Unit VXP0329 .... £1.10
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.

New Additions
Universal Remote Control £25.00
Sony type RC670, RM670, RM673 .... from £15.50
Sony type RC661, RM652, RM654, RM657, RM663, RM664, RM651 .... from £15.50
Panasonic Models TC2110, 2255, 2655, 2680, TX1752, 2251, 2656, 5500 .... from £14.50
Panasonic Models TC1632, 1642, 2232, TX2034, 2044, 2200, 2234, 2244, 2636, 3300 .... from £14.50

TV ON/OFF SWITCHES

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

PINCH ROLLERS

A range of Pinch Rollers is in stock, most of them @ **£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 .... £5.00

BACK-UP BATTERIES

Philips 1.2V Back up Battery £1.75
Philips 2.4V Back up Battery £2.80
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 .... £5.50
Hitachi TV Frame Module HM6232 .... £5.50
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 £3.00
Degaussing Positor White £1.30
Cassette Housing Assembly Hitachi VT11 .... £19.50
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
Push Button Unit Thorn TX90 .... £12.75
Matsui/Saisho Limiter Post £1.75
Cassette Housing Modification Kit for Sharp VCA113HM Series. Includes cassette switch and star sensor PCB. Fault symptom No eject & intermittent load/unload £6.50
Video Idlers Spring Kit £5.95
Video Washer & E Clip Kit £5.50
Universal Video head Puller £16.00

MODE SELECT SWITCHES

MANY OTHER VIDEO AND TV SPARES IN STOCK

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

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.

☆ ☆ ☆
SEND FOR PRICE LIST.
☆ ☆ ☆

Trade Counter now open Monday-Friday 9.00-5.30. Saturday 9.00-1.00. Nearest Underground Station – Southfields District Line.

Prices subject to change without notice.
Please add £1.00 per order for p&p and then add 17.5% VAT.

AMSTRAD PORTABLE PC'S FROM £149 (PPC1512SD). £179 (PPC1512DD). £179 (PPC1640SD). £209 (PPC1640DD). MODEMS £30 EXTRA.NO MANUALS OR PSU.

HIGH POWER CAR SPEAKERS. Stereo pair output 100w each. 4ohm impedance and consisting of 6 1/2" woofer 2" mid range and 1" tweeter. Ideal to work with the amplifier described above. Price per pair £30.00 Order ref 30P7R.
2KV 500 WATT TRANSFORMERS Suitable for high voltage experiments or as a spare for a microwave oven etc. 250v AC input. Now only £4.00 ref 4P157
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.
FIBRE OPTIC CABLE. Stranded optical fibres sheathed in black PVC. Five metre length £7.00 ref 7P29R
12V SOLAR CELL. 200mA output ideal for trickle charging etc. 300 mm square. Our price £15.00 ref 15P42R

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 override 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
FM TRANSMITTER housed in a standard working 13A adapter (bug is mains driven). £26.00 ref 26P2R
MINATURE RADIO TRANSCEIVERS A pair of walkie talkies with a range of up to 2 kilometres. Units measure 22x52x155mm. Complete with cases. £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 NOW ONLY £19.00!! REF 19P14R.

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. £19.00 ref 19P30
LOW COST WALKIE TALKIES. Pair of battery operated units with a range of about 200'. Our price £8.00 a pair ref 8P50R

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
TOWERS INTERNATIONAL TRANSISTOR SELECTOR GUIDE. The ultimate equivalents book. Latest edition £20.00 ref 20P32R
CABLE TIES. 142mm x 3.2mm white nylon pack of 100 £3.00 ref 3P104R Bumper pack of 1,000 ties £14.00 ref 14P6R

GOT A CARAVAN OR BOAT?

NEW 80 PAGE FULL COLOUR LEISURE CATALOGUE

2,500 NEW LINES FREE WITH ORDER ON REQUEST

OR SEND £1.00

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
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.
As above but with fitted 4 to 1 inline reduction box (800rpm) and toothed nylon belt drive cog £40.00 ref 40P8R.
SINCLAIR C5 WHEELS 13" or 16" dia including treaded tyre and inner tube. Wheels are black, spoked one piece poly carbonate. 13" wheel £6.00 ref 6P20R, 16" wheel £6.00 ref 6P21R.
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.
SOLAR POWERED NICAD CHARGER. Charges 4 AA nicads in 8 hours. Brand new and cased £6.00 ref 6P3R.

12 VOLT BRUSHLESS FAN 4 1/2" square brand new ideal for boat, car, caravan etc. £5.00 ref 5P206
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 5 tapes New low price £8.00 ref 8P161
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 KIT As supplied it will handle up to about 15 w 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
HIGH RESOLUTION 12" AMBER MONITOR 12v 1.5A Hercules compatible (TTL input) new and cased £22.00 ref 22P2R

VGA PAPER WHITE MONO monitors new and cased 240v AC. £59.00 ref 59P4R
25 WATT STEREO AMPLIFIER c. 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.
ALARM TRANSMITTERS. No data avaliable but nicely made complex radio transmitters 9v operation. £4.00 each ref 4P81R.
12V 19A TRANSFORMER. Ex equipment but otherwise ok. Our price £20.00
GX4000 COMPUTERS. Customer returned games machines complete with plug in game, joysticks and power supply. Retail price is almost £100. Ours is £12.00 ref B12P1
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 £25.00 ref B25P1 additional detectors £11.00 ref B11P1
IBM XT KEYBOARDS. Brand new 86 key keyboards £5.00 ref 5P612
IBM AT KEYBOARDS Brand new 86 key keyboards £15.00 ref 15P612
386 MOTHER BOARDS. Customer returned units without a cpu fitted. £22.00 ref A22P1

BSB SATELLITE SYSTEMS
BRAND NEW
REMOTE CONTROL
£49.00 REF F49P1

286 MOTHER BOARDS. Brand new but customer returns so may need attention. Complete with technical manual £20.00 ref A20P2
286 MOTHER BOARDS. Brand new and tested complete with technical manual. £49.00 ref A49P1
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.

MIRACOM WS4000 MODEMS
V21/23
AT COMAND SET
AUTODIAL/AUTOANSWER
FULL SOFTWARE CONTROL
TONE AND PULSE DIALLING
£29

IBM PRINTER LEAD. (D25 to centronics plug) 2 metre parallel £5.00 ref 5P186R
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.
50 METRES OF MAINS CABLE £3.00 2 core black precut in convenient 2 m lengths. Ideal for repairs and projects. ref 3P91R
4 CORE SCREENED AUDIO CABLE 24 METRES £2.00 Precut into convenient 1.2 m lengths. Ref 2P365R
TWEETERS 2 1/4" DIA 8 ohm mounted on a smart metal plate for easy fixing £2.00 ref 2P366R
COMPUTER MICE Originally made for Future PC's but can be adapted for other machines. Swiss made £8.00 ref 8P57R. Atari ST conversion kit £2.00 ref 2P362R.
6 1/2" 20 WATT SPEAKER Built in tweeter 4 ohm £5.00 ref 5P205R
WINDUP SOLAR POWERED RADIO! FM/AM radio takes rechargeable batteries complete with hand charger and solar panel 14P200R

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 flyleads. £15.00 ref F15P4
ALARM PIR SENSORS Standard 12v alarm type sensor will interface to most alarm panels. £16.00 ref 16P200
ALARM PANELS 2 zone cased keypad entry, entry exit time delay

etc. £18.00 ref 18P200
MODEMS FOR THREE POUNDS!! Fully cased UK modems designed for dial up system (PSTN) no data or info but only £3.00 ref 3P145R
TELEPHONE HANDSETS Bargain pack of 10 brand new handsets with mic and speaker only £3.00 ref 3P146R
BARGAIN STRIPPERS Computer keyboards. Loads of switches and components excellent value at £1.00 ref CD40R
DATA RECORDERS Customer returned mains battery units built in mic ideal for Computer or general purpose audio use. Price is £4.00 ref 4P100R
SPECTRUM JOYSTICK INTERFACE Plugs into 48K Spectrum to provide a standard Atari type joystick port. Our price £4.00 ref 4P101R
ATARI JOYSTICKS Ok for use with the above interface, our price £4.00 ref 4P102R
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
MAINS FANS Brand new 5" x 3" complete with mounting plate quite powerfull and quite. Our price £1.00 ref CD41R
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)
HEX KEYBOARDS Brand new units approx 5" x 3" only £1.00 each ref CD42R
PROJECT BOX 51/2" x 31/2" x 1" black ABS with screw on lid. £1.00 ref CD43R
SCART TO SCART LEADS Bargain price leads at 2 for £3.00 ref 3P147R
SCART TO D TYPE LEADS Standard Scart on one end, Hi density D type 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
QUICK SHOTS Standard Atari compatible hand controller (same as joysticks) our price is 2 for £2.00 ref 2P380R
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
AC STEPDOWN CONVERTOR Cased units that convert 240v to 110v 3" x 2" with mains input lead and 2 pin American output socket (suitable for resistive loads only) our price £2.00 ref 2P381R
SPECTRUM +2 LIGHT GUN PACK complete with software and instructions £8.00 ref 8P58R/2
CURLY CABLE Extends from 8" to 6 feet! D connector on one end, spade connectors on the other ideal for joysticks etc (6 core) £1.00 each ref CD44R
COMPUTER JOYSTICK BARGAIN Pack of 2 joysticks only £2.00 ref 2P382R
BUGGING TAPE RECORDER Small hand held cassette recorders that only operate when there is sound then turn off 6 seconds after so you could leave it in a room all day and just record any thing that was said. Price is £20.00 ref 20P3R
IEC MAINS LEADS Complete with 13A plug our price is only £3.00 for TWO! ref 3P148R
NEW SOLAR ENERGY KIT Contains 8 solar cells, motor, tools, fan etc plus educational booklet. Ideal for the budding enthusiast! Price is £12.00 ref 12P2R

286 AT PC
286 MOTHER BOARD WITH 640K RAM FULL SIZE METAL CASE, TECHNICAL MANUAL, KEYBOARD AND POWER SUPPLY £139 REF 139P1 (no i/o cards or drives included) Some metal work req'd phone for details.

35MM CAMERAS Customer returned units with built in flash and 28mm lens 2 for £8.00 ref 8P200
STEAM ENGINE Standard Mamod 1332 engine complete with boiler piston etc £30 ref 30P200

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 dialing tones. Ideal for the remote control of answer machines. £5.00 ref 5P209R
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
ATARI 2600 GAMES COMPUTER Brand new with joystick and 32 game cartridge (plugs into TV) £29.00 ref F29P1 also some with 1 game at £19.00 ref F19P2.
BEER PUMPS Mains operated with fluid detector and electronic timer standard connections. Ex equipment. £18.00 ref F18P1
90 WATT MAINS MOTORS Ex equipment but ok (as fitted to above pump) 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.
VIDEO TAPES E180 FIFTY TAPES FOR £70.00 REF F70P1
360K 5 1/4" Brand new drives white front. £20.00 Ref F20P1

IN SUSSEX? CALL IN AND SEE US!

BULL ELECTRICAL

250 PORTLAND ROAD HOVE SUSSEX
BN3 5QT TELEPHONE 0273 203500
MAIL ORDER TERMS: CASH PO OR CHEQUE WITH ORDER PLUS £3.00 POST PLUS VAT.
PLEASE ALLOW 7 - 10 DAYS FOR DELIVERY
NEXT DAY DELIVERY £8.00
FAX 0273 23077
VISA

SOME OF OUR PRODUCTS MAY BE UNLICENSABLE IN THE UK

AVAILABLE FROM ALL GOOD NEWSAGENTS

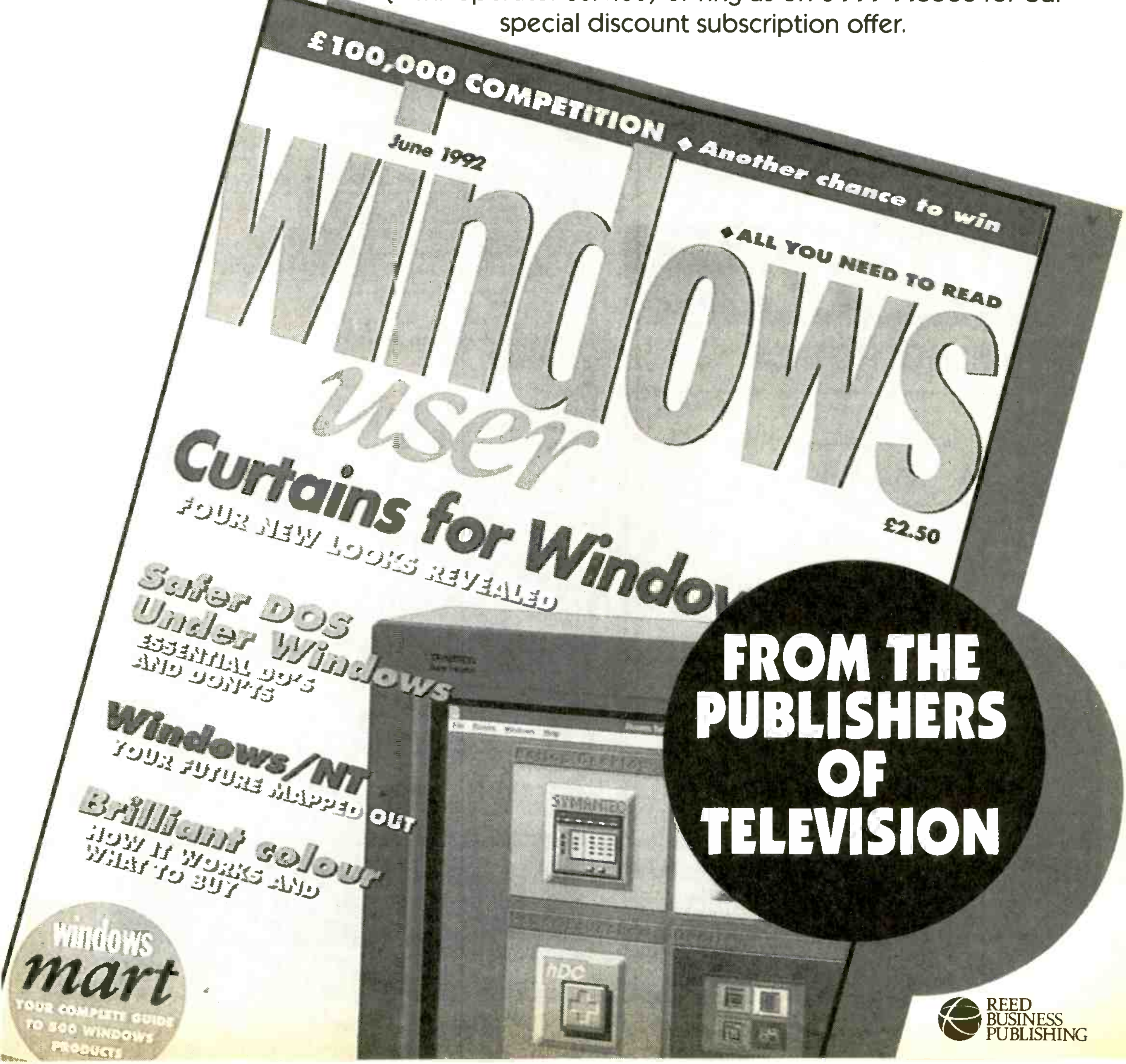
A new menu for Windows Users

Windows User is the new practical magazine to help you get the most out of your Windows environment.

Every month you'll enjoy a varied menu of news updates, features and reviews, making Windows User the essential reference for the computing environment of the 90's.

Make sure of your copy by ordering from your local newsagent ***NOW***.

To subscribe call our **Credit Card Hotline** on **0789 200 255** (24hr operator service) or ring us on **0444 445566** for our special discount subscription offer.



FROM THE PUBLISHERS OF TELEVISION

REED BUSINESS PUBLISHING

VINASONIC DISTRIBUTORS

SONIC HOUSE
UNIT 4A ABBERLEY STREET
SMETHWICK
BIRMINGHAM
B66 2QU ENGLAND
Tel: 021-565 1727
Fax: 021-555 5367

THIS MONTH'S SPECIAL OFFERS

WORKING STOCK

- REDIFFUSION MK IV £25
- TRIMLINE BASIC £25
- JAP BASIC £25
- TX TEXT £35
- TOP LOADERS £35
- FRONT LOADERS £50

EXPORT ENQUIRIES WELCOMED

MAKE YOUR INTERESTS PAY!

Train at home for one of these Career Opportunities

Over the past 100 years more than 10 million students throughout the world have found it worth their while! An ICS home-study course can help you get a better job, make more money and have more fun out of life! ICS has over 100 years experience in home-study courses and is the largest correspondence school in the world. You learn at your own pace, when and where you want under the guidance of expert 'personal' tutors. Find out how we can help YOU. Post or phone today for **FREE INFORMATION** on the course of your choice. (Tick one box only!)

Electronics	☐	TV, Video & Hi-Fi Servicing	☐
Basic Electronic Engineering (City & Guilds)	☐	Refrigeration & Air Conditioning	☐
Electrical Engineering	☐	Car Mechanics	☐
Elec. Contracting/ Installation	☐	Computer Programming	☐
GCSE/GCE/SCE over 40 examination subjects to choose from	☐		

Name: __________

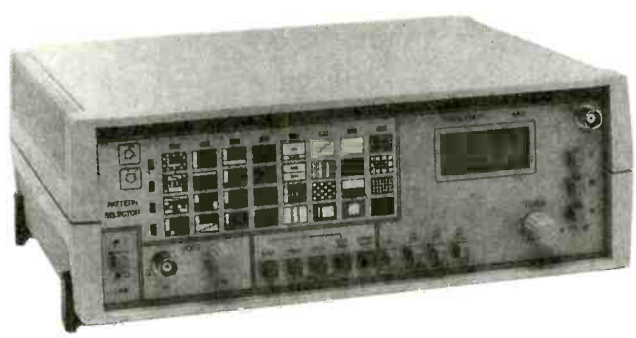
Address: __________

P. Code ______

ICS International Correspondence Schools, Dept.EGS82 312/314 High Street, Sutton, Surrey SM1 1PR. or 041-221 7373 (24 hours).

PROMAX — ELECTRONIC TEST EQUIPMENT

TV PATTERN GENERATORS GV-310 / GV-498



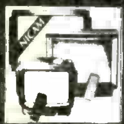
- Up to 32 selectable patterns
- Video and RF output. Tunable from 37 to 860 MHz
- 3 1/2 digits frequency counter
- Text and logotypes (only GV-498)
- SCART connector

For television signal engineers

ALBAN ELECTRONICS LIMITED
4U St Albans Enterprise Centre, Long Spring
Porters Wood, St Albans, Herts., AL3 6EN
Tel: 0727 832266 - Fax: 0727 810546

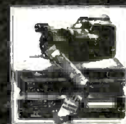
NIKKAI MULTISYSTEM TV IN STOCK

20", 21" FST (VHF/UHF) PAL, SECAM, NTSC



NEW (B) GRADED

PORTABLES ★ LATE FST
TOP BRANDS ALL BOXED
IN STOCK – TOO MANY TO LIST



EXCELLENT RANGE OF
EX-RENTAL TVs & VCRs THORN

REPAIR TAKEN ON SATELLITE RECEIVERS – ANY MAKE – TRADE OR RETAIL WELCOME

WHY TRAVEL THE WHOLE COUNTRY?

RING AFF OR AMIN NOW ON DIRECT LINE TO TV WAREHOUSE

LEEDS (0532) 444200 FAX: (0532) 425777
MOBILE PHONE — 0850 326866 — 24HRS

EXPORT ENQUIRIES WELCOME

SUPERVISION

UNIT 16, TOWER WORKS, 2 GLOBE ROAD, LEEDS LS11 5QG
OFF WATER LANE, NEAR HILTON HOTEL. EASY ACCESS FROM M1 & M62 (2 Mins)

COLOUR TRADE

ESTABLISHED 1973 – WHOLESALE ONLY

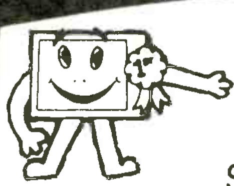
NEW 'B' GRADE

ONLY
LATEST
NICAM
FASTEXT
F.S.T.

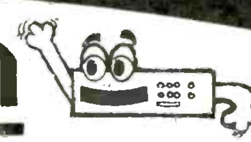
MAJOR BRANDS
TV – VIDEO – HIFI
SATELLITE

COMPLETE BOXED – WITH STAND – HANDSET – BOOK – ETC – MINT

Phone 021-359 7020
FAX 021-359 6344
221-222 BRIDGE ST WEST, HOCKLEY,
BIRMINGHAM B19 2HU



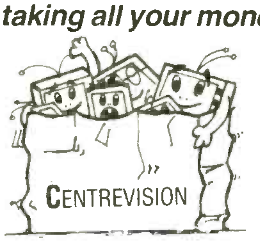
CentreVision



Suppliers of Surplus TVs & Videos to the Trade

CENTREVISION HOUSE · SLOPER ROAD · LECKWITH · CARDIFF · CF1 8AB

***Centrevision** is shining through this summer with unbeatable deals, we will endeavour to make your visit as pleasant as possible.*
All wallet emptying will be performed with great precision with caffeine at hand and should be pain free.
We have excellent bench facilities so you may test all working stock before you buy, and if you have any problems ask our engineers who have a limited number of FREE fix it magic wands (only just past the sell-buy date).
Why waste your profits on new spares when we have plenty of second-hand spares available, Thrifty spares our mail order company can always save you money (that's if they get it right!).
If you're a professional then deal with the professionals with over 20 years experience of taking all your money in style.

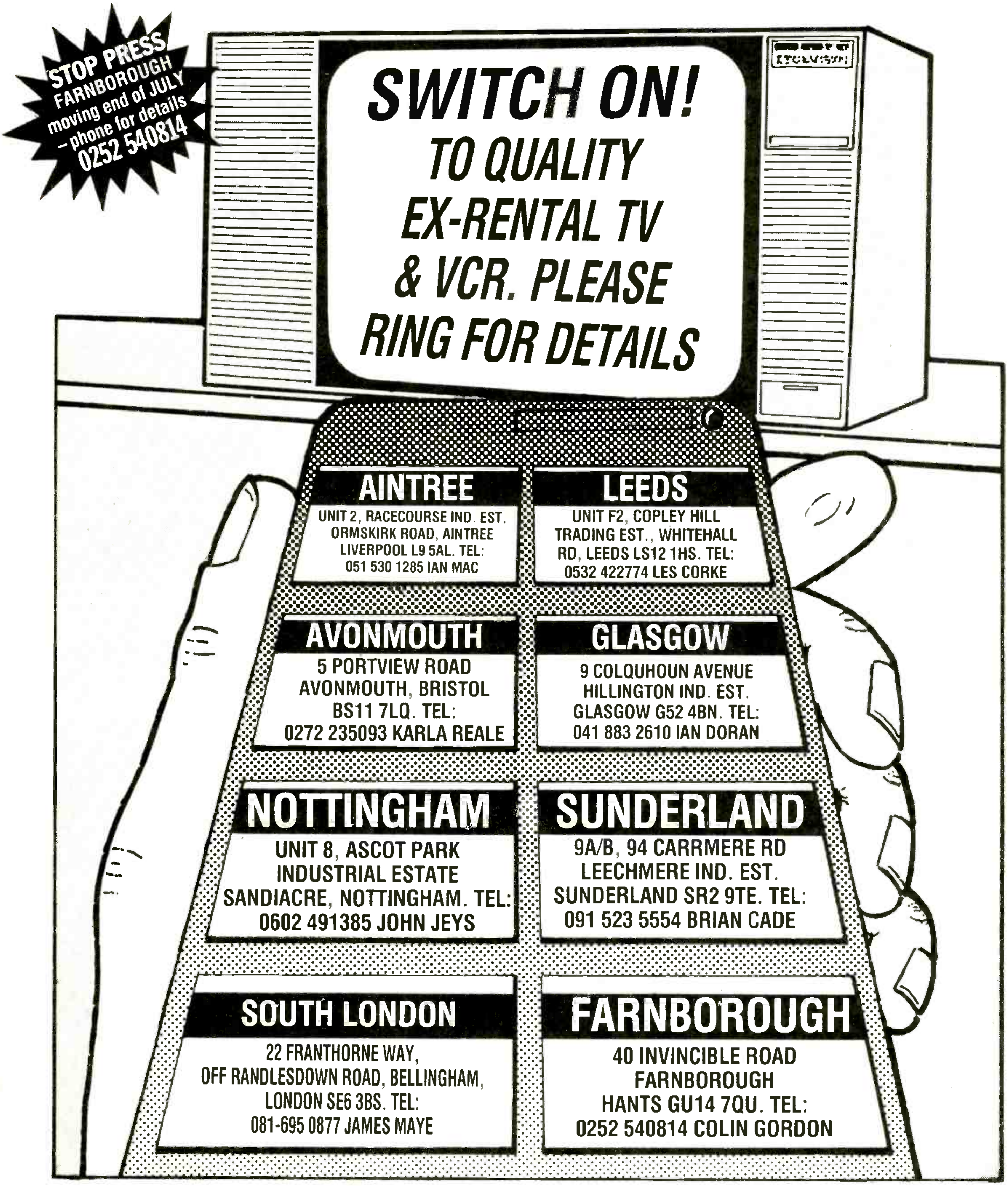


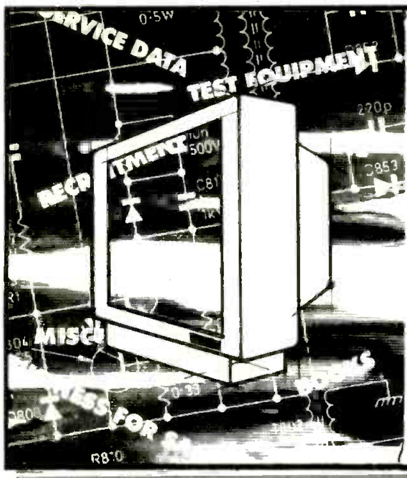
Call in today and make a shining example
PHONE OUR WARMLINE NUMBER 0222 344754
PRICE LIST AVAILABLE ON REQUEST
LARGE AMOUNTS OF FST JUST ARRIVED
FRONT LOADER HITACHI VIDEO £35.00 + VAT

THE LARGEST WHOLESALER IN WALES

EXPORT ENQUIRIES WELCOME — ALL PRICES + VAT

TELEPRICE
LIMITED





TELEVISION CLASSIFIED

No other consumer magazine in the country can reach so effectively those readers who are wholly engaged in the television and affiliated electronic industries. They have a need to know of your products and services.

The prepaid rate for semi display setting is £12.00 per single column centimetre (minimum 3 cm). Classified advertisements £12.00 per line, box number £22.00 extra. All prices plus 17½% VAT. All cheques, postal orders etc., to be made payable to Reed Business Publishing. Advertisements, together with remittance, should be sent to the Television Classified Room L327, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Access BARCLAYCARD VISA

PHONE 081-652 8339 FAX 081-652 8931

SPARES & COMPONENTS

INTEGRATED CIRCUITS

PRICES INCLUDE VAT, Add £1.18 POSTAGE

TV & VIDEO I.C.s			
AN262	1.12	LA7033	3.29
AN304	2.96	LA7210	1.47
AN5015K	2.94	LA7505	2.06
AN5612	1.81	LA7910	1.23
AN5620X	3.11	LU11417A	4.23
AN6306	6.46	LU52511A	4.23
AN6320N	2.47	LVA508	1.65
AN6326N	2.88	LM1889N	3.29
AN6328	2.88	M51393AP	2.94
AN6346N	3.08	MC1408P8	1.18
AN6347	2.47	MN15823FVG	12.69
AN6350	5.02	OEC0001B	5.23
AN6360	2.14	OEC0005	5.23
AN6362	3.47	OEC2001	3.35
AN6881	2.70	SONY CX134A	4.99
BA618	1.35	TD62105P	1.18
BA6301	1.65	ULA1H035E2	1.82
BA7001	1.23	UPA53C	4.05
BA7004	1.65	UPC1382C	.90
BA8500	11.69	UPC1397C	3.70
HA17458PS	.82	14DN156	5.29
LA7031	2.06	14DN157	5.29
LA7032	2.42	14DN244C	5.70

HANDSETS

VCR4600/4600MkII	£11.75
VCR4700	£17.63
VCR5200	£11.75
VCR6100 Barcode	£29.38
TS90/99 Tower System	£11.75
VCR9000 (Old Type) Handset	£11.75

L.O.P.T.

CTV1000	FB182K	£11.75
CTV1400	FB165KA	£11.75
CTV2000	FB171	£9.40
CTV2000	FB171K	£9.40
TVR2	1810951	£13.51
TVR3	181297	£13.51
PC12-HRCD/D	MSH1FCT31	£14.10

CONVERTERS

4700 RF CONVERTER	£5.88
5200 RF CONVERTER	£7.05

SATELLITE EQUIPMENT

DISHES, FEEDS, LNB's ETC. AVAILABLE. PHONE FOR LIST.

AMSTRAD

PRICES INCLUDE VAT, POST AND PACKING EXTRA.

P.C.B's

4600 Video and Audio PCB	£17.63
4600 Systems Control/Servo PCB, Display and Control PCBs	£29.38
4600 MkII Video and Audio/Timer/Control PCB Assy.	£40.82
4700 Video and Audio/ Timer/Control PCB Assy.	£40.82
VCR100 Video and Audio/Timer/ Control PCB Assy.	£40.82
5200 Timer and Channel Display PCB Assy.	£17.63
5200 Audio Tuner PCB	£15.28
5200 Video PCB	£14.10
5200 Syscon. Servo Power PCB	£23.50
4600 Mk II/4700 Power Supply	£4.70
CTV1400 Main PCB	£29.38
CTV2200 PCB No:3 (Part 270087)	£3.53
CTV2200 PCB No:4 (Part 270088)	£4.70
TVR1 Control Panel/Preset PCB	£7.05
TVR2 Main TV PCB	£37.60
TVR3 Main TV PCB	£43.48

MECHANISMS

4600 Video Cassette complete mechanism (no drum or video heads)	£29.38
4600 Video Cassette complete mechanism (with drum no video heads)	£35.25
9000 Cassette Housing Assy.	£15.28

MOTORS

4600/4700 Capstan Motor	£11.75
7000 Loading Motor MCB2B01	£3.53
9000 Loading Motor MCB9B02	£3.53

TUNERS

5200 Varicap Tuner Type 1810829	£7.05
7000 Tuner ENV87358C2	£7.05
CTV1400 Tuner ENV87509F2	£5.88
CTV2200 Tuner UE2-B31F	£5.88

PARTS OFF PCB's AND MECHANISM. PHONE FOR PRICING

ALL ITEMS ARE BRAND NEW AND GUARANTEED
★ ★ SAME DAY DESPATCH ★ ★

Write or Phone for FULL catalogue.

Harrison Electronics

CENTURY WAY, MARCH, CAMBS PE15 8QW.
FAX: (0354) 51416. TEL: (0354) 51289

VISA Access

OPENING HOURS: 9 a.m. 6 p.m.
MINIMUM ORDER £10.00
All orders add £2.00 post/packing + VAT 21% (export VAT free)

FMS Video & T.V. Ltd.

Please check availability before ordering. We accept VISA only.

3 ARRAN QUAY, DUBLIN 7. TELEPHONE AND FAX: 710055/724722

SAMSUNG MICROWAVE SPARES

CS-7SA Thermal Fuse Magnatron	2.00
Z42/43 Thermal Fuse Magnatron 10/250V	2.00
HV Capacitor Microwave 2100WV AC 0.91UF	10.00
Microwave Bulb 240v 20w 15mm Screw In	1.00
Microwave Bulb 240v 20w 12mm Screw In	1.00
Microwave Bulb 240v 15w 15mm Screw In	1.00
Microwave Bulb 240v 15w 5mm Push On Tags	1.00
Microwave Timer Unit SE-35MF-2401	10.00
Microwave Power Level Control, DF 30V24A	5.00
Microwave Rotisary Motor GM-6 24LI	12.00
Microwave Rotisary Motor GM-6 24L	12.00

SAMSUNG/REYNOLDS/ FERGUSON B/W PORTABLE SPARES

200K Vert Hold Pot PCB Mount	0.20
Rotary On/Off Volume Control 5K Double Pole	2.00
Rotary On/Off Vol 5K Single Pole	1.00
500K Brightness Pot B/W Samsung	0.50
500 Ohm Brightness Pot 24mm Diameter 8mm Nut	0.50
100K Pot as above	0.50
1K Pot as above	0.50
500K Pot as above	0.50
On/Off Knobs 6mm	0.10
500k Preset 10mm Vertical Mounting	0.10
VHF Fine Tuning Knobs Samsung/Reynolds B/W	0.50
Rotary VHF Tuner VBM 5720AL	10.00
B/W Line Output Transformer FBA 1245 CL	10.00
B/W Line Output Transformer 334P006A1	5.00

SAMSUNG VIDEO SPARES

Drum Motor with IC M517215L	15.00
Drum Motor IC BA6411	15.00

AMSTRAD SATELLITE SPARES

SRD-400 Mains Transformers 240 Volt (UK)	13.00
SRD-400 Mains Transformers 220 Volt (Ireland & Europe)	15.00

TRANSISTORS/DIODE

BC 313	0.10
2N3055 BCA Type	0.60
MJ10011 Motorola	2.00
2SC 940 NEC	0.50
2SC1507 Transistor	0.50
2SD 73 Samsung	0.50
2SD 382 NEC	1.00
2SD 401A	0.50
2SA 614 Samsung	0.50
BY 213A 700R Stud Diode	0.40

I.C.s

AN 5512	2.00
BA 5102A	2.00
D 8039 Microcomputer IC NEC	10.00
D 8243 Multiplexer NEC	8.00
DTS02P-A4 Servo IC DAEWOO	5.00
GL 3201	5.00
GL 3401	5.00
K 1005 IC Sony	6.00
LM 7000	2.00
LA 7520 IC Sanyo	2.00
LM 709 CN 14 pcb	1.00
LA 1261	1.00
M 491 BB1	5.00
M 708 LB1 Remote Control IC	2.00
CAA 1290-02 ITT	8.00
STR 30125 Samsung	8.00
TA 8611	4.00
TA 8605 AN	5.00
TA 8644 N	10.00
TA 8606 N	4.00
TA 7256	4.00
TA 7681 AP	5.00
TA 8607	4.00
TBA 2800	2.00
TDA 1054 M	2.00
UAA 2001	4.00
UPD 1937C NEC	4.00
UPC 1366 C	4.00

THRIFTY SPARES (WALES)

C/O CENTREVISION, SLOPER ROAD, LECKWITH, CARDIFF CF1 8AB

WE KNOW YOUR MONEY DOESN'T GROW ON TREES SO LET SECOND-HAND SPARES HELP YOUR BUSINESS BLOSSOM

AMSTRAD, FERGUSON, HITACHI, ITT, PANASONIC, SHARP, TOSHIBA ETC.

0222 344218

EXAMPLE VIDEO PRICES

MIXED BOOSTER	£12.80
SERVO PANEL	£15.50
LOADING MOTOR ASS	£10.50
BOTTOM BOARD	£20.50
MODULATOR	£15.50
MECH COM	£15.50
DRUM ASS	£12.80
CAPSTAN MOTOR	£15.50
POWER PANEL	£15.50
TUNING BOARD	£18.00

DORIC SPARES

MK3A LINE SCAN (STATE TUBE)	£10.00
MK3A POWER PANEL	£10.00
MK3A IF VIDEO ETC	£8.00
MK4 LINE SCAN	£22.50
MK4 POWER PANEL 90 OR 110	£15.50
MK4 IF PANEL	£12.50
MK4 VIDEO	£7.50
MK4 MANUAL TUNER HEAD ASS	£5.00
MK4 REMOTE BOARD	£12.50
MK4 TEXT BOARDS	£10.00
MK4 FRONT ASSEMBLY	£10.00
MK4 TRIPLERS	£5.50
MK4 CRT TUBE CALLERS ONLY	£23.00

ALL ABOVE PRICES VAT INC

MANY MAKES OF TV USED — SPARES ALSO IN STOCK — OPENING HOURS 9am-1pm – 2pm-5 30pm
POSTAGE & PACKING £2.50 ORDERS OVER £50 P&P FREE

DON'T DELAY PHONE 0222 344218 TODAY — 24 HOUR

SURPLUS/REDUNDANT ELECTRONIC COMPONENTS WANTED

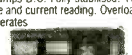
I/Cs – Tuners – Transistors – Valves – Diodes etc. any quantity considered – immediate payment.

ADM Electronic Supplies

Tel. 0827 873311. Fax 0827 874835

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY

1 to 24 volts up to ½ amp. 1 to 20 volts up to 1 amp. 1 to 16 volts up to 1½ amps D.C. Fully stabilised. Twin panel meters for instant voltage and current reading. Overload protection. Fully variable. Operates from 240V A C Compact Unit: size 9×5½×3ins.



£45 inc. VAT + Post & Ins. £4

NEW MODEL. Up to 38 volts DC at 6 amp. 10 amps peak. Fully variable. Twin panel meters. Size 14½"×11"×4½". **£96** inc VAT. Carr £6.

RADIO COMPONENT SPECIALISTS

337 WHITEHORSE ROAD, CROYDON
SURREY, U.K. Tel: 081 684 1665
List, Large SAE. Delivery 7 days. Callers Welcome Closed Wed.

ALLPARTS DISTRIBUTORS

TV & VIDEO SPARES FOR THE TRADE AND PUBLIC

BELT KITS, TRANSISTORS, ICs, REMOTES, FERGUSON, PANASONIC, SHARP, GRUNDIG, SONY, KONIG, PHILEX, AMSTRAD

ALLPARTS DISTRIBUTORS
101 ROCKY LANE, TUEBROOK, LIVERPOOL 6 4BB

051-260 4825

For further information on classified contact PAT on 081-652 8339

WIZARD DISTRIBUTORS MANCHESTER

TV, VIDEO & SATELLITE SPARES

LOEWE, SCHNEIDER, FERGUSON, HITACHI

and many other always in stock—

Video Heads for over 500 models
Service Manuals for over 200 models
Handsets for over 200 models
Spares for over 20 manufacturers

Plus huge range of IC's, Semiconductors and Service Aids, etc. etc.

WIZARD OFFER A GREAT DEAL

Counter open Monday-Friday 9am-4.45pm
Mail Order-Access/Visa

TRADE ONLY

EMPRESS STREET WORKS, EMPRESS STREET, MANCHESTER M16 9EN.
Tel: 061-872 5438; 061-848 0060.

ADMIN TELEVISION

PHILIPS KT3/K30, ITT, MK4, GEC, TX 9/10, TOSHIBA, HITACHI, PANASONIC BASICS £15 + VAT *(IN TENS)*

MK3, GEC 21/10, DECCA 80/100 BASICS £10 + VAT *(IN TENS)*

GII BASIC £12 TEXT £20 + VAT

ALL REMOTES £25 + VAT

ALL TEXT £35 + VAT

VIDEOS £20 AND £25 + VAT

ALL REMOTES WORKING £35
ALL TEXT WORKING £45
ALL BASICS WORKING £25

PHONE: 051-548 4414
UNIT 'J', ADMIN BUILDINGS, KIRKBY, LIVERPOOL L33 7JX

FOR SALE

MICRO-LAB
PORTABLE INSTRUMENTS

Don't waste time hunting down shorts. Our SHORT LOCATOR will lead you right to it in seconds! Easy to use with meter display and tone to guide you. Send just £99.95 + £3 p&p + VAT: Total £120.96 each, quoting P28, to

COLEBOURN ELECTRONICS
Dept TV, 20 Folly Lane, St Albans, AL3 5JT
Telephone 0727 44785

VIDEO RECORDERS
LOWEST PRICES EVER
Phone for Details
Bill Eades
081-543-5437

SERVICE DATA

GERMAN SERVICE SHEET SPECIALISTS

Our connections are world-wide. We furnish any kind of German, European and Japanese service sheet or manual. Thousands of different sheets and manuals in stock. For any enquiries:

DÖNBERG ELECTRONICS
Schoolmasters House, Rannafast, Co. Donegal, Republic of Ireland.
Phone: 075 48275

SATELLITE TV RECEPTION

DRAKE Receiver/Positioners from £299
Wideband Magnetic Polarisers from £29
60cm to 3m Antennas, polar mounts
11/12/4Ghz LNBs - feeds, accessories
SAE for Leaflets

KESH ELECTRICS LTD
Main Street, Kesh, Co Fermanagh BT93 1TF
Tel. 03656 31449 Fax. 39250 Tlx 747412

E.C.S. INDEXES!

THOUSANDS SOLD WORLDWIDE

Edition 8 of the complete indexes now published containing approx 7,500 Faults listed in 12 Years of Television magazine.

Indexes are alphabetically listed by Make, Model, Fault, Ref and are now available for just:

£8.00 For Television & Satellite Faults
£8.00 For Video, Camcorder & CD Faults

Or £15.00 for both sets complete with chassis & similar model guides. *Please add £1.50 (UK), £3.00 (Overseas) to total order to cover post & packing.*

A LOW COST UPDATE SERVICE IS ALSO AVAILABLE. FULL DETAILS DESPATCHED WITH ORDER.

To secure your copy/s please make Cheques/Postal Orders payable to:

E.C.S.

31 Prenton Road West, Prenton, Birkenhead, Merseyside L42 9PY

MISC

CAR RADIO CASSETTES

Do you turn away work on car radio cassettes because they have security codes.

Most radio cassettes can be decoded just by replacing the eeprom (memory IC) with that of a known code, or sending the original for re-coding.

All popular makes including Philips, Ford, Pioneer, Clarion, Grundig, Blaupunkt, Fisher, JVC, Alpine, Volvo, etc.

Send now for introductory offer, one of each of most popular eeproms + comprehensive eeprom/radio decoding list. Offer includes Philips X2402P: Ford MN010: Blaupunkt Boston CC20 9346: **£17.63**

Original eeprom re-coding service **£10.00**

Radio's sent for decoding from **£20.00**

Inc. of VAT and p&p

25% Discount to all account holders (conditional)

RADIO DECODING EQUIPMENT

We will beat any genuine written quotation for supplying a computer or software to decode radio cassettes, ring us first.

For technical or general information phone 0543 572 523 or 0831 806 574.

C.D.H. ELECTRONICS
3 Common Walk, Huntington, Cannock, Staffs WS12 4NB

C.D.H. ELECTRONICS

INFOTECH

BARCLAYCARD VISA · Access

76 CHURCH STREET, LARKHALL, LANARKSHIRE, ML9 1HE
Tel. (0698) 884585 Mon-Fri 8.30am-5.00pm
Tel. (0698) 883334 Outwith business hours
FAX available all day, Mon-Sat, on either line
Send a large SAE for your FREE catalogue of our other publications
Please add £1.50 on all orders under £25.00. Post FREE on all orders over 25.00

Now the sole MO distributors for the complete PCP range of inexpensive books, GUARANTEED – More than Value for Money

ELECTRONIC TEST EQUIPMENT HANDBOOK *by Steve Money £8.95*
Inc. analog/digital meters, bridges, scopes, sig'l gen's, counters, timers, freq meas.

ELECTRONIC POWER SUPPLY HANDBOOK *by Ian R Sinclair £7.95*
Very modern, covers switch mode, DC-DC and all invert/convert

INTRODUCING DIGITAL AUDIO, 2nd edition *by Ian R Sinclair £6.95*
Fabulous cover, with DCC, Mini-Disc, CD, DAT, Bitstream, oversampling, etc.

PRACTICAL DIGITAL ELECTRONICS HANDBOOK *by Mike Tooley £6.95*
Over 200pp of ref data and pract instruction – Brilliant on chips, logic gates, etc.

DIGITAL ELECTRONIC PROJECTS FOR BEGINNERS *by O Bishop £5.95*
12 battery, 1 power, plus variations; from instrumentation to home security

DIGITAL LOGIC GATES AND FLIP-FLOPS *by Ian R Sinclair £8.95*
What they do, How they work, Simplified Troubleshooting, Full theory and practice

ELECTRONIC PROJECTS FOR HOME SECURITY *by O Bishop £6.95*
Full instructions – 25 projects; simple alarm to various multi-channel systems

ELECTRONICS BUILD AND LEARN, 2nd edition *by R A Penfold £5.95*
Essential practical construction for oscillators, multivibrators, bistables, logic circuits

PC MUSIC HANDBOOK *by Heywood & Evan £8.95*
IBM & Compatibles; From basics through sequencing, sampling and notation

ADVANCED MIDI – USER'S GUIDE *by R A Penfold £9.95*
Explains messages, timecodes, non-MIDI sync. Signal routing, Troubleshooting

WANTED

WANTED
Regular Supply of Ex-Rental Colour TVs and Videos
Cash on Collection – Quick Service
Tel. 0742 312832

NEW EDITION OF TELEVISION SERVICING 1991-92

ISBN 0 951 3897 7 7

£85.00 3.5Kg Book

Akai CT 2569, CT 2579N, CT 2869, CT 2870N, CT 2879N, CT 2158, CT 2160
Alba CTV 52, CTV 56, CTV 57, CTV 703, CTV 704T, CTV 711, CTV 712, CTV 713, CTV 741, CTV 743, CTV 744, CTV 746, CTV 747, CTV 748, CTV 752
Baird RR6890N
Boots CTV1414, 1414R, 1010
Beon 1412
Bush 2214, 2514, 2514T, 2515, 2515T, 2520, 2520T, 2512, 2521T, 2620, 2714, 2720, 2721, 2814T, 2820T, 2821T, 2914
Bush 2921, 2921T, 3014, 3114, 3114T, 3214S, 4414, CTV 100
De Graaf C36JS2, C51HS4, C14HSB, C59JZ5, D41HS4, D51HS4, D51HZ5, D59HS4
Ferguson 41 P3, A 51F, 66 M3, 78 M5, J59 P8A, Repair Hints
Fidelity CTV 920
Finlandia C51HZE, D59HZ5, D66HZ5
Finlux 3815, 3821
Goldstar CIT 2168, CIT 2168F, CIT 2190F, CIT 2191F, CIT 4902, CIT 9902F
Goodmans 145 TT, 2032, CTV 2R
Granada C 51GV2/4
Grundig CUC 3840
Grundig CUC 4400, CUC 4401, CUC 4410, CUC 4500, CUC 4511, CUC 5300, CUC 5820, CUC 5835, CUC 5836, CUC 5860, CUC 5880, CUC 5891
Harwood 9014R
Hinari HIT 10R, HIT 14, HIT 14S, HIT 14T, HIT 14RS, HIT 14R, HIT 20R, HIT 51T
Hitachi C14 P216
Hitachi C 14 P218, C 1709, C 2118R, C 2118T, C 2519TG, CPT 2196, CPT 2198, CPT 2578, CPT 2596, CPT 2598A
Indianna & MKII
ITT/Nokia 26, 29, 2560, 2860, 3570, 5551, 5581, 5581 UK, 6351, 6361, 6387
ITT/Nokia 6856, 6887, 7161
JVC AV 21F1EK, AV 25FIEK, AV N280EKT
Logic 4698
Luxor 6392
Matsui 219R, 219T, 1420, 1420B, 1435, 1435B, 1435C, 1440, 1440B, 1445, 1455, 1480B, 1481
Matsui 1481B, 2180, 2180TTA, 2185, 2899N
NEI 1451R, 1451TX, 1551TX, 2131R, 2131TX
Nikkal NT 14, NT 20, TLG 200, TLG 601, TLG 2121, TLG 2122, TLG 2800, 2155, 2156T
Orion 14ARX, 14ARXS
Orion 14ARXG, 14AT, 14VR
Osaki 3214S
Osume CTV 1474R
Panasonic TC 21R1, TX 21T1, TX 21V1, TX 24A1, TX 25W2, TX 28W2, TX 28A1, TX 33A1G, TX 1100G, TX 1485, TX 1785, TX 1786
Perdio P1408, P2004, P2005
Perdio P2101, P2102, STX 400
Philips 2070, 2080, 1021, 1220, 2331, 2341, 2554, 2752, 5560, 5664, 5668, 5762, 5764, 5772, 8840, 8841, 9666, 9762, 9763, 9765, 9768
Philips 9637, 9763, 9765, 9768, 9772
Pioneer SD 21AVI, SD 25AVI, SD 28AVI
Pye 1240, 1242, 1528, 2425, 2525, 2529
Saisho CM 215TS, CM 2080T, CT 141, CT 141B, CT 143, CT 144B, CT 144R
Saisho CT 146TX, CT 149TXA, FST 212TA
Samsung C 1210R, C 1212R, C 13312Z, C 15012Z, C 15013T, C 15332T, C 15322Z
Salora 21 D 61, 21 D 81, 25 D 61, 26 A 42, 28 D 81
Sanyo CBP 2572, CBP 2573, CBP 2872, CBP 2873, CBP 2558, CBP 2559, CBP 2162
Sharp C 1430H, C 1431H, C 3720, DV 51083H, DV 59083H, DV 66083H, SV 2588H
Sony KV D2512, KV D2912, KV X2132, KV X2532, KV X2932, KV A2112, KV A2112U, KV A2512, KV 2522, KV 2922, KV D3412U
Ssang Yong 0014
Tatung A Series
Toshiba 216 R9B, 216 R9B2, 216 T9B, 216 T9B2, 217 D9B, 217 D9B2, 218 D9B, 219 R9B, 219 T9B, 256 T9B, 329 T7B, 1400 RBT, 1400 RBW, 1400 TBT, 1400 TBW, 2100 RBT, 2100 TBT, 2500 TBT, 2501 TBZ, 2505 DBT, 2805 DBT

VIDEO SERVICING 1989-90

Improved Layout, Larger Circuits & Colour Index

TWO 336 Page Volumes. ISBN 0 951 3897 2 6

£138.00

Aiwa HVG-55
Akai VS-422, VS-425, VS-427, VS-467, VS-485, VS-765, VS-767
Alba VCR-4000 x1, VCR-7000, VCR-8000
Amstrad VCR 8600, VCR 8700
Baird VC141L
Bush VCR 3401, VCR 3451
De Graaf WHS-FS4
Ferguson FV 20B, FV 21R, FV 22L, FV 26D, FV 30R, FV 31R, FV 32L, FV 33H, FV 37H, VC 141L
Fidelity VR900
Finlux VR 3300, VR 3400
Goldstar GHV 1290i, GHV 1296i, GHSE 1296i, VCP 4300i
Goodmans VTV 300, VCP 500, VCP 550, TX 1101, PX 1101, PX 2200, PX 2201, VCR 2500, DX 3300
Granada VHS-FY1, VHS-GY2, VHS-GY4, VHS-FS4
Grundig VS-500, VS-520, VS-540, VS-550, TVR-4500, TVR-4510, TVR-5510
Hinari VXL-8,9,11,18
Hinari VXL-10, VXL-12, VXL-90, VCR-34H, VTV-100, VTV-200, VTV-300
Hitachi F70, VT-S80E, VT-522E, VT-530E, VT-580, VT-M622, VT-M630, VT-M640E
Ingersol VR965, VR995
ITT VR-3619, VR-3719, VR-3749, VR-3769, VR-3908, VR-3929, VR-5720, VR-5730, VR-5740, VR-5760
JVC HR-D320, HR-D700EK, HR-D750, HR-D830
Logik VR945, VR950, VR955, VR960, VR960A
Matsui VCP 100, VX 730, VX 735, VX 735A, VX 750, VX 755, VX 765, VX 770, VX 850, VX 866, VX 877, VX 888, VX 3000, VX 6000, VX 6000A, VX 6600
Mitsubishi HS-B11, HS-B21
Murphy VCR-7101
NEC PX-1200K, DX-1800K
Nikkai J1
Nordmende V1005M
Nordmende VR-6182, V1005MI, V1405U, V1805K, V1805U, V1905K, V4000 UNIC
Orion VCR-LA1, VCR-L1, VR-MDTT1, VCR-X1, VCR-M2, VCR-L2, VR-MDTTST2, VCR-LADST2, VR-LDST2, VR-LD2, VR-LD3, VCR-M3, VCR-LD3, VCR-MD3, VXL 12, VTV 300, D 1200
Osaki VCR-34H
Panasonic NV-L20, NV-L28, NV-J30, NV-J34
Philips VR-6182, VR-6185, VR-6285, VR-6470, VR-6490, VR-6548, VR-6648, VR-6670, VR-6870
Pioneer VR-525, VR-727
Pye DV186, DV190, DV 286, DC 571
Saba VR-6420, VR-6640
Saisho VXL 12, VXL 12X, VP 3000, VRS 3200, VR 3300X, VR 3400, VR 3500, VR 3650, VR 3700, VR 3800, VRS 4000, VRS 4200
Saisho VRS 4400, VRS 5000, VRS 5000X, VRS 5500
Salora SV-6800, SV-6900, SV-6910, SV-9900
Samsung VI-710, VI-711, VI-730, VI-750, VI-770, VI-790, VI-970
Sanyo VHR-4150, VHR-4350, VHR-D4410, VHR-D4610, VHR-5200, VHR-5240, VHR-5350, VHR-D5450
Sentra VX 8500LP, VX 8600LP
Sharp VC-A100, VC-A105, VC-A111
Sharp VC-A131, VC-A140, VC-A170, VC-T310, VC-A510, VC-A501, VC-A502, VC-T510, VC-793, VC-D801, VC-A5011, D 805
Sony SLV 201, SLV 301, SLV 401
Tatung TVP1311
Telefunken VR-4935, VR-4945
Thompson V-610, V-630
Toshiba V-109B, V-209B, V-300B, V-309B, V-500B, V-509B, V-700B, V-700H

£20.00 off

Video Servicing 1989-90

With this Voucher

While Stocks Last

or

Satellite Servicing at HALF PRICE

When ordered with Video Servicing 1989-90

Save £27.50

Cut out and return coupon with order.

One voucher per set.

tv0792

VIDEO SERVICING 1987-88

* Only 25 left * £65.00

TELEVISION SERVICING 1989-90

Covers 749 Models £65.00

SATELLITE SERVICING 1987-90

Covers 127 Models. ISBN 0 9513897 6 9 £55.00

All Books Contain:

CIRCUIT DIAGRAMS. SCOPE READINGS. VOLTAGE TABLES. ESSENTIAL PART NUMBERS. ALIGNMENTS & ADJUSTMENTS. TROUBLE SHOOTING GUIDES

If ordering several books please ring for credit details

POST, PACKING & INSURANCE

1 Book	£4.00
2 or more Books	£7.00

Note: Video Servicing 1989-90 is a TWO volume set and is therefore £7.00 delivery.

Television Servicing 1987-88 If you would like a copy of this edition please contact us as we are considering a reprint.

Professionally Produced with the Manufacturers Full Co-operation

U-VIEW

29 Warmsworth Road, Doncaster, South Yorkshire, England. DN4 0RP
Tel: 0302 855017 Fax: 0302 855267

Technical Information Services

76 CHURCH STREET, LARKHALL, LANARKSHIRE, ML9 1HE
Tel. (0698) 884585 Mon-Fri 8.30am - 5.00pm or (0698) 883334 Outwith business hours
FAX facility available all day on both lines
Write now with an SAE for your FREE QUOTE, FREE CATALOGUE & FREE NEWSLETTERS

ALL TRADE ADDRESSES GIVEN !FREE! JUST PHONE TO FIND THE NUMBER/ADDRESS YOU NEED

All orders under £25.00 please add £1.50 p&p. All orders over £25.00 post free.

Some selected titles (Taken from over 150)

Practical TV Repairs 2nd Ed.	£16.95	S. Beeching's VCR Servicing	£30.00	Refrigeration Pocket Book	£14.95
CTV Servicing by G.King	£16.95	Servicing Mono TVs	£17.95	Spectrum Repair Guide	£5.00
The PAL System	£8.50	VHS Common Faults	£3.50	Spectrum Complete (+, 128k, etc)	£35.00
TV & Video Technology	£14.95	Microwave Servicing	£9.95	European Scrambling Sys's *New Sections	£29.00
TV & Video Engineers P/Book	£14.95	Hi-Fi Servicing Guide	£9.95	Data Reference Manual	£5.95
Practical Radio Service & Repair	£12.95	Servicing Audio & Hi-Fi	£25.00	Set of 6 Thorn's own Guides	£9.50

Order by phone with Access/Visa

NOW, not only do we have EVERY service sheet ever produced, and
THE WORLD'S LARGEST COLLECTION OF

SERVICE MANUALS

but, we will supply circuits for any VCR we have for only £8.50 inc. p&p
& WE ARE SOLE SUPPLIERS OF VARIOUS FAULT-FINDING GUIDES, REPAIR MANUALS & TECHNICAL MANUALS

Fast Delivery

INTEGRATED SYSTEMS from TIS

10 Giant binders of CTV Circuits, Schematics, PCB's, Waveforms, etc.	*£265.00*
7 Giant binders of VCR Circuits, Schematics, PCB's, Waveforms, etc. (Vol. 7 New)	*£190.00*
All 7 VCR binders PLUS 35 Fault-Finding Guides for ALL models covered (5 New F.F. Guides)	*£230.00*
The 10 CTV Binders PLUS over 20 CTV Repair Guides & lots, lots more	*£399.00*
All the CTV & Repair Guides PLUS VCR binders PLUS fault-finding, etc.	*£599.00*
TVAR complete, Two books & two binders of Giant diagrams (up to A2)	*£89.45*

SERVICE MANUALS

Available for most equipment, TV, Video, Audio, Test, Amateur Radio, Kitchen, Computers etc etc. We have probably the largest range of Service information available anywhere. If you need a manual give us a call. Originals or photostats supplied as available.

MAURITRON SERVICES (TV)

8 Cherry Tree Road, Chinnor, Oxfordshire, OX9 4QY.
Tel:- (0844) 351694. Fax:- (0844) 352554.

TV & VIDEO TRADE REFERENCE MANUALS

VIDEO RECORDER EQUIVALENTS.

Lists all known models & their alternatives.
Fully Cross referenced for fast and easy use. Order MP143.

TELEVISION CHASSIS GUIDE

Listing thousands of Models (Colour & Mono) & their Chassis Designations.
Enables you to identify any chassis for any TV from the model number. Order MP18.

ONLY £5.00 each

The above 2 books contain the most COMPREHENSIVE REFERENCE DATA available anywhere for the TV & Video Trade. Order yours today.

Hundreds of other Technical and Repair books available. Send A5 size SAE for your FREE catalogue today.

All orders please add £3.25 post & packing.

All prices shown now are RETAIL including V.A.T.

Pick & Match - and deduct 10% Discount

Choose a complete system of receiver, dish and LNB from the list below – add together and deduct your 10% discount.

STEREO SATELLITE RECEIVERS

PACE SS 9200 IRD
90 chnls., Videocrypt, 1 input, tunable sound .... £175.00 + pp
PACE SS 9210
90 chnls., Videocrypt, 2 inputs, tunable sound .... £216.00 + pp
PACE MRD 920
90 chnls., Eurocrypt, D2 Mac, tunable sound .... £352.00 + pp
PACE PRD 800
99 chnls., Videocrypt, full band UHF synthesized modulator .... P O A
PACE PRD 900
199 chnls., Videocrypt, full band UHF synthesized modulator .... P.O.A
PALCOM SL 650 IRD
189 chnls., Videocrypt, 2 inputs, tunable sound .... £365.00 + pp
AMSTRAD SRD 500
48 chnls., Videocrypt, 1 input, tunable sound .... £125.00 + pp
AMSTRAD SRD 600
99 chnls., Videocrypt, D2 Mac, Eurocrypt, tunable sound .... £399.00 + pp

ALLOY DISHES (Offset) – High quality aluminium dish packs with manufacturers' 10 Year anti-corrosion warranty

55cm square mesh, black .... £34.00 + pp
60cm oval mesh, black .... £34.00 + pp
60cm solid black or light grey .... £56 80 + pp
80cm oval mesh, black .... £56 80 + pp
80cm solid black or light grey .... £56.80 + pp
Pole adaptor for above .... £9.40 + pp
100cm solid light grey 2" pole mount .... £95.00 + pp
NOTE The above dishes can be motorised using the components at the end of this list

SMC DISHES (Offset)

120cm including pola mount – requires 3" pole .... £180.00 + pp
Universal Wall/Floor Stand for above .... £45.00 + pp

LNBs

CONTINENTAL MICROWAVE 1 2dB LNB, 40mm collar, 10 GHz L.O. .... £52 00 + pp
CONTINENTAL MICROWAVE 1.0dB LNB, 40mm collar, 10 GHz L O. .... £70 00 + pp
CONTINENTAL MICROWAVE TELECOM (K5) LNB, 23mm collar, 11.45 GHz L O .... £70.00 + pp
CONTINENTAL MICROWAVE TWIN LNB, 40mm collar, 10.00 GHz L O .... £80 00 + pp
CONTINENTAL MICROWAVE DUAL LNB, 40mm collar, 10.00 GHz L.O .... £80 00 + pp
4-Way Switch for Twin or Dual LNB .... 50.00 + pp
4-Way Switch (as above) with Terrestrial Aerial Input .... £58.00 + pp

POSITIONERS

PACE MSP 990 – Fully integrates with above Pace receivers, operating under one remote control .... £115.00 + pp
PALCOM POSITIONER .... £180 00 + pp
(Both of the above positioners can also be used independently with receivers of other makes).

MOTORISING YOUR DISH

For our 80-100cm dish – the H to H Pola Mount and Motor .... £95.00 + pp
For our 1.2m dish – 12" Jack .... £65.00 + pp
or 18" Jack .... £75.00 + pp

EST. **COME TO THE EXPERT** 1977

J.W. HARDY

FOR SATELLITE +ACCESSORIES

SKY DECODERS

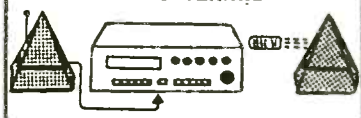
FROM £75.00
Choice of Thompsons or Pace
New and secondhand as available

PALCOM RECEIVERS

Have greatest ease of operation from one selector Maximum features yet simple for adjustment!

SL 650 .... £289 00 + £6 50 pp
SL 650 IRD .... £379.00 + £6.50 pp
SL 4000 MK II .... £599 00 + £6 50 pp
GS-4 .... £630 00 + £6.50 pp

X-10 POWERMID



Uses your existing remote controls to control your TV, VCR, stereo, CD, Satellite or Cable Converter from anywhere in your house. Just plug in – no wires.
£58.00 + £2 50 pp. **DTI Approved**

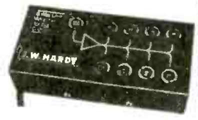
LITTLE EXTRA

Astra Eutelsat and Astra Telecom from one fixed dish
Dish Adaptor Kits – **from £18.00**
(Note: second LNB required)

TRADE STOCK ALWAYS AVAILABLE
Trade Price List available on request to Bona Fide TV Aerial & Satellite Dealers

J.W.HARDY 8-WAY AMPLIFIER

FOR TV DISTRIBUTION
Embodies all the features of a professional TV distribution network in a mini distribution box.
£34.55 + £2.50



XTRA LINK

With a simple cable attachment, lets you control and view your Cable TV, VCR and Satellite reception from any room in the house.
£50.00 (incl. power supply)

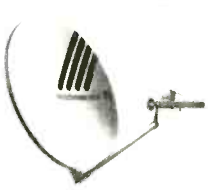
REPLACEMENT REMOTE CONTROL

The intelligent range of universal remotes:
Fox 400E £34.95
Fox 600E £49.95
Fox 800E .... P.O.A.

THE SATELLITE BOOK EDITION No.2 by John Breeds
– a complete guide to Satellite TV theory and practice **£27 95**

HIRSCHMANN

YOUR PRESTIGE DEALER
Details on Application



TECHNICAL ADVICE AND CONSULTATION

- We provide full technical assistance and service back-up
- Dish Sharing
- Design Consultant
- Systems built around Telesti, Wolsey and Global products
- Market Leaders in commercial grade products

Prices correct at time of going to press

021-784 8478

J.W Hardy
231 Station Road, Stechford,
Birmingham B33 8BB

INFOTECH

76 CHURCH STREET, LARKHALL, LANARKSHIRE, ML9 1HE
Tel. (0698) 884585 Mon-Fri 8.30am-5.00pm
Tel. (0698) 883334 Outwith business hours
FAX available all day, Mon-Sat, on either line
Send a large SAE for your FREE catalogue of our other publications

HOW WOULD YOU LIKE TO GET *ANY* SERVICE MANUAL YOU WANTED FOR ONLY *£7.50?* *WELL, NOW YOU CAN!*

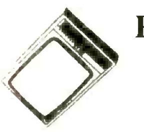
We are running a very special offer of any 20 manuals for only £150. No catches! Order as you need them (no time limit), or as one lot of all those expensive manuals you couldn't previously afford. No hidden expenses like post & packing (that's included in the price).

And if that isn't enough!

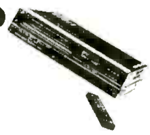
We are giving away our Data Reference Manual FREE with every subscription to this 20 manuals for £150 offer!

PRACTICAL GUIDE TO BUYING, SELLING, REPAIRING & SERVICING USED VCRs

Everything from choosing good ex-rentals to containing more stock faults for common ex-rentals than elsewhere at many times the cost. Brilliant practical repair and service system.



PRACTICAL GUIDE TO BUYING, SELLING, REPAIRING & SERVICING USED TVs



More stock faults and servicing advice on TVs. Again containing more data than books at twice the price.

Only £9.95 each or £16.95 for both

SERVICE MANUALS

For most U.K. European, Far East & USA types of CTV – MTV – VCR – CAM – SAT – M/WAVE – AUDIO including "Unusuals" – and all at reasonable prices.

VCR circuits also available separately for most models

Some examples from thousands of VCR manuals available. These are all complete at £10 each

PANASONIC NV-FS100, L20, NV-MC10, MC20, MC30, MS50, ORION D500, D1000/1100, D1200, D1500, D2000, FERGUSON FV11R, FV12L, FV13H, FV14T, FV20B, FV30B.

+ MANY OTHER BARGAINS

Write or telephone with your requirements.
All U.K. orders subject to £1 P&P. No VAT

D-TEC

PO BOX 1171, FERNDOWN, DORSET BH22 9YG.
Telephone: 0202 870656

SERVICING DOMESTIC VIDEO CASSETTE RECORDERS

A TEACHING PROGRAMME ON 7 SEPARATE VIDEOS WITH ILLUSTRATED BOOKLETS AND ADDITIONAL INFORMATION FOR THE REPAIR OF VCR'S FOR INFO PACKAGE SEND COUPON TO:
TELSAT COMMUNICATIONS LTD
16 PARK ROAD, ST ANNES, LANCS FY8 1QX.
0253 712011

PLEASE SEND ME INFO PACK ON
SERVICING DOMESTIC VCR'S
NAME
ADDRESS
POST CODE

SOFTWARE

User Friendly

SOFTWARE

FOR IBM COMPATIBLE PC'S RUNNING ON MSDOS

FOR THE BUSY TV/VCR SHOP/SERVICE DEPT

RECEIPT/INVOICE PROGRAM **£89** + VAT + P&P

OUR TV/VCR RENTAL PROGRAMME IS NOW AVAILABLE

Phone or write for details:

TBR Software 369 Chepstow Road
Newport, Gwent. NP9 8HJ
Tel. 0633 282556

RELAY
OMAGH LTD COMPUTER SOFTWARE

DO YOU RENT TELEVISIONS?

DO YOU STILL USE A CARD SYSTEM?

DO YOU FIND IT DIFFICULT TO KNOW YOUR ARREARS TOTAL AT ANY GIVEN TIME?

If you do then we recommend our computer TV and Video Rental package. This package includes

- ★ automatic updating of each customer's record
- ★ alphabetical print-out of each customer's arrears and payments missed
- ★ total arrears immediately available
- ★ easy to use and operate.

NEW HIRE PURCHASE PROGRAMME NOW AVAILABLE AS WELL.

These programmes operate on all IBM compatibles running under MS-DOS. Free demonstration discs available.

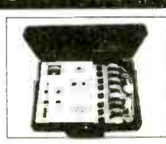
CONTACT WILLIAM J THOMPSON
Donaghanie Post Office
Beragh Co. Tyrone
Telephone Beragh 58214 (0662 7)

TEST EQUIPMENT

MÜTER · AT2 · BMR 95 · BMR 700

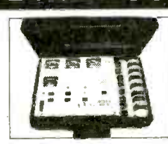
AT 2, Audi-Multi-Tester, 16 test-circuits for loudspeakers, tuners, amplifiers, headphones, tape recorders, mikes, boosters,

car radios, CD-players; measurment of millivolt, drift, watt, performance: with generator, radio, signal tracer/injector, 13 volt supply etc.



BMR 95

BMR 700



Regenerating Computers & Measurers for CRT's with cathode protection, gas clean-up aid, short repair; exhausted CRT's becomes bright and sharp again even if all other machines do not succeed.

United Kingdom: P & E Services, Llandudno, Tel. (0492) 549246, Fax 547880.
Ireland: Dönberg Electronics, Ranafast, Co. Donegal, Tel./Fax (0 75) 4 82 75.
New Zealand: TDON Ltd., Onehunga, Auckland, Tel. 6 68-9 07, Fax 6 68-4 99.
Germany: Ulrich Müter, Oer-Erkenschwick, Fax (0 23 68) 5 70 17.

P & E SERVICES

SUPPLIERS OF ALL MUTER REPAIR AND TEST EQUIPMENT.

BMR 95	TUBE REGENERATOR £446 + VAT (INC SIX ADAPTORS)
BMR 700	TUBE REGENERATOR £367 + VAT (INC SIX ADAPTORS)
AT2	AUDIO SERVICING UNIT £447 + VAT

ASK FOR FREE BROCHURE

34 GLAN-Y-MOR ROAD, PENRHYN BAY, LLANDUDNO, GWYNEDD LL30 3PF.
TEL: 0492 549246 FAX: 0492 547880

TRAINING

Looking for a home study course, in the fundamentals of electronics? Whether you are a beginner, or an old hand requiring a refresher, the

DIRECT PERSONAL LEARNING

course, could be right for you. Contact: K. Sparrow etc... 11 Claydon Green Whitchurch BRISTOL Avon BS14 0NG Telephone: (0275) 835669

TUBES

REBUILT CRTs

VDU – MONITOR – TV

Image Burn-In Removed From Screen Phosphers

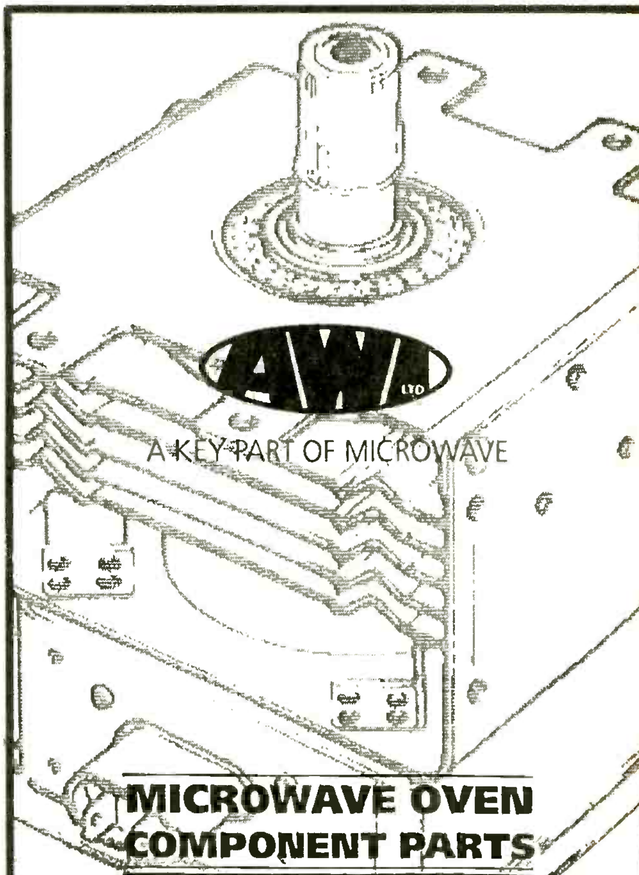
B.S.I. Certification

N.G.T. ELECTRONICS LTD.
120, Selhurst Road, London SE25 6LL

PHONE: 081-771 3535

Britain's Oldest Established Tube Rebuilder

MISCELLANEOUS



AWI Ltd., Samuel Whites Estate, Medina Road, Cowes, Isle of Wight PO31 7LP
Tel: (0983) 296121. Telex: 86736 Sotex G. Fax: (0983) 296122

WHY BUY SECONDHAND GOODS

Double your profits with brand new goods.

Please state your requirements. Bulk buyer only

Write to:

**M.E., PO Box 2739
West Bromwich,
West Midlands B70 6EU**

AERIAL WORK

Competent firm of Aerial/Satellite Engineers. Require further work for expansion, good rates of commission paid and fair charges to customers, will cover 20 miles from Romford.

Phone John 0708 348086.

CLASSIFIED CLASSIFIED CLASSIFIED CLASSIFIED CLASSIFIED

LINEAGE

ASSORTED VACUUM pumps for sale. 4 leybold 56P type 2 Gen evec rotary piston. 1 speedvac mercury diffusion. 3 oil diffusion. Ring 081 800 3226. weekends.

AVO MULTIMETER Model 8. £45.00. 500 volt megers £30.00. Prices plus VAT and p & p. Send SAE for lists of Surplus Instruments & Scopes etc. A. C. Electronics. 17 Apleton Grove. Leeds LS9 9EN Tel: 0532 496048.

BUSINESS FOR sale Merseyside established 7 yrs. showroom. large workshop. 2 storerooms. fully modernised. living accom. freehold £75,000 + S.A.V. enquires to Television Ad P.O. Box 11. Liverpool L17 9RL.

EX-EQUIPMENT television and video spares available. Panels. lopt. tuners. handsets etc. J.H. Services. 0243 820311.

EX DEMONSTRATION testgear. C.E.C. 7a CRT tester/reactivators £140 Semaht Satellite Meters rechargeable type reviewed in Television June 1991. £195. UHF/band 2 meters £120. Satellite receivers from £30. Capener Electronics. 0296 682030 anytime.

WANTED: B & K tube rejuvenator. Pref model 490. Also quantity VHF varicap tuners. single sweep thru B1, B3. plus S Band. Also quantity old Grundig tuning pot units for B7100 (CUC 120). Simon: 010 353-1-973751. 9-6pm.

HITACHI MULTISYSTEM (CMT 2091) and Japanese basic Televisions wanted working or "complete" large or small quantities. Telephone Simon (0922) 694759 (evenings) or Mr Khalifa, Dubai (0109714) 369848.

BUSINESS FOR sale. Established. profitable. TV. video and audio sales and service business in beautiful Harrogate. North Yorkshire. In busy area. Immaculate shop with excellent modern workshop facilities. Three year renewable lease. Very low rent. £22,000 plus stock at valuation. Telephone (0423) 521689.

BUSINESS KENT coast. Electronics components. accessories. TV/video repairs good earner. Genuine reason for sale. Accommodation. Leasehold £20,000 + S.A.V. 0304 202056.

C.R.T. FOR oscilloscopes. monitors etc. Regret no domestic TV types. Possibly biggest stock of scope types in England! Big stocks of DG7-5/6/32. M31-184W etc. Billington Export. Unit F2. Oakendene Industrial Estate. West Sussex. RH13 8AZ. Callers strictly by appointment only. Phone 0403 865105. Fax 0403 856106. Telex 923492 TRAG.

ILLNESS FORCES sale. television. video sales. rentals. repairs business. Derbyshire. Well established. Leasehold premises. low rental. £15,000 o.n.o. S.A.V. optional Telephone 0773 811124.

OCHRE MILL Technical Services. Grundig TV spares for most models to 1985. fast. friendly. helpful. sensible prices. Gt Lype Farm. Charlton. Nr Malmesbury. Wilts SN16 9DR. Tel. 0785 814643.

SKY VIDEOCRYPT decoder service sheets with colour decoding tracks £15. Amstrad satellite tuneable audio £18. E.M.O. Ramsbottom. Lancashire. BL0 9AG 0706 823036.

SONY CONDUCTORS 100 assorted Japanese transmitter chips diodes £5.50 per bag incl. Morris. 0782 212695.

STUDY ELECTRONICS on the BBC Micro. An interactive approach to learning. Four program titles available. 'Introduction to Electronics Principles'. 'Electronics Mathematics'. 'Digital Techniques' and now 'programming for Electronics'. Programs include theory, examples. self test questions. formulae. charts and circuit diagrams. User inputs calculated outputs. £29.05 each + £2.00 p & p. Cheque or postal order to E.P.T. Educational Software. Pump House. Lockram Lane Witham. Essex CM8 2BJ. Please state BBC 'B' or Master series and disc size.

WANTED: KT66. KT88. PX4 PX25 transmittors etc. If possible send a written list. Prompt reply and payment Billington Export. Unit F2. Oakdene Industrial Estate. Near Horsham. West Sussex RH13 8AZ. Callers strictly by appointment only. Phone: 0403 865105. Fax 0403 856106. Telex 923492 TRAG.

VALVES HUGE stocks. credit cards accepted. Full 45 page value catalogue now available. £2.00 post paid VWC. 20a Cosham Street. Mangotsfield. Bristol BS17 3EN. Telephone 0282 56472 (24hrs) Fax 0272 575442 (24hrs).

TELEVISION BUSINESS & property with 1 acre land on Orkney Mainland. Detials from G & M Grieve. Makerhouse. Dounby. Orkney. KW17 2HS. Tel 085 677 245 evenings.

USED BLUE cap Marconi 1.8db LNB but in working order £14 plus p & p. Phone 081 902 5447.

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel 0494 814317.

METERS RECONDITIONED. £1.00 slot meters for TV rental £6.95. 50p slot £2.95 Audiotech Tel 0790 3245.

TRANSFORMERS

TV LINE OUTPUT TRANSFORMERS

PHONE 081-948 3702 FAX: 081-332 0583

ALBA . AMSTRAD . BUSH . DECCA . DORIC . BLAUPUNKT. FERGUSON . FIDELITY . GEC . GRUNDIG . GRANADA . HITACHI . HINARI . INDESIT . ITT . KIMARA . NIKKAI . MATSUI . MURPHY . OSAKI . NORDMENDE . LOEWE-OPTA. REDIFFUSION PYE . PHILIPS . SANYO . SAISHO . SHARP . SONY . SOLOVOX . SUSUMU . TANDBURG . TELEFUNKEN. THORN . TRIUMPH . HUANYU . GOLDSTAR . BINATONE .

FULL RANGE OF KONIG: VIDEO HEADS, BELT KITS, IDLERS, PINCH ROLLERS, TENSION BANDS. LARGE RANGE OF REMOTE CONTROLS IN STOCK

TIDMAN MAIL ORDER LTD . 236 SANDYCOMBE ROAD . RICHMOND . SURREY . TW9 2EQ.

Approx. 1 mile from Kew Bridge.

Mon-Fri 9 am to 12.30 pm & 1.30-4.30 pm
Sat 10 am to 12 noon

AERIALS

HIGH GAIN TV AERIALS

Superb 10 element 'X' antenna. Very rugged construction, 16dB gain, 6 bar reflector, PCB connector & heavy duty clamp. **£37.95** incl. postage.

Send for spec sheet to:
TVM, 52 St Andrews Street, Northampton NN1 2HY. Tel: (0604) 37769

ACCESS + VISA WELCOME

REPAIRS

LOEWE OPTA TV REPAIRS

FAST EFFICIENT SERVICE

Factory Trained Engineers
Competitive Rates

MARWETECH,
Unit A7B, Aladdin Workspace, 426 Longdrive, Greenford, Middlesex UB6 8UH.
Tel: 081-575 0434 Fax: 081-575 0468

INDEX TO ADVERTISERS

TELEVISION CLASSIFIED LINEAGE *advertisements can be submitted on this coupon with a cheque made payable to Reed Business Publishing. Television Classified Room L327, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. The charge is £12.00 per line plus 17½% (minimum £24.00 + VAT.)*

TV8/92

For Issue Dated .... or next available. Total insertions .... Total of Cheque £.....................................

Name .... Address.....................................

.... Post Code .... Tel Num .... Signature ....

Access **Debit my Access/ Visa Card (delete)** VISA

Expiry Date .... VAT Reg. No. 238 8937 10

SENDZ COMPONENTS

TO ORDER SEE BACK PAGE

LA11440 £1.00

TAA7750 50p
HA 11485 £1.00
UPC1373 50p
M58657P £1.00
M491BB1 £3.00
M50441 550 £1.00
M58658P £1.00

Receiver TX100 Panel
I.C. No. SAB3035
MAB8440P D066
SAA1060
PCF8571P

20 off £2 00 High Voltage Condenser
IN5 to 8NZ 1500V to 2KV

TX9 CCAM Decoder £5.00

4 Types Fidelity front panels with i.c. & pots £2.00 each
BH 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 FQV-BY228 10 for £1.00
2 amp bridge rec. wire end 15p
SKE4G2 02 15p
Eqv. BYX71 600 500ns.

Thorn Spares
9000 Frame panel £8.00
9000 Cvelops panel £1.50
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 ITT £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
6/7 Push Button Unit £6.00
Z916B panel £5.00
1513AP 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

FERGUSON
TX85 CHASSIS £20.00
TX86 CHASSIS £20.00
TX96 CHASSIS £20.00

DIODES
Bridge KBF-08 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 5p
BY 210 400 10p
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 BY 229 black 15p
BY 229 Red 20p
BY 229 400 30p
BY 229 600p 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 5amp 8p
BY 527 10p
BY 602 10p
BYX 26C 10p
E247 10p
GP20G (TX10) 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
BYT71 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

Bush Tube Base on panel £1.00

TX10 Tube Base on Panel £3.00

1100 L.O.P.T. Green Spot

TX100 Thorn

Universal Tripler
with small focus pot Green type £7.00

Black Triplers
KT3 Triplers £6.00
S.E.C. Universal Tripler £6.00
ITT CVC 5-8-9 £3.50
Rank 125LT Tripler £2.00
Rank ITTCP A-823 £3.50
1T 25 30K Rank £3.00
1T 1EZ 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 TVM25 Tripler £2.00
Universal Tripler £5.00
GS Tripler £5.00
CVC 20-32 £5.00
Decca 80 100 £4.50
Grundig TVK 52 £2.50
ITT BQ Pye 731 £3.00
ITT1Y £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 1907
BG2087 £5.00
T/text ultrasonic rec'r panel £14.00
12 14X 200 for £25.00
20 for £5.00
GEC 8 touch unit assy complete with all I.C's & pots £4.00
GITF.W. Transformer 50p
GITF.W. coils £1.00
G11 Transient Suppressors 285V 20p
G11 Scan Coils £5.00
G11 100K tuner pots 12 for £1.00
KT3 IF panel £6.00
KT3 line 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 AT Sockets 50p
KT3 receiver panel £8.00
KT3 line driver transformer 50p
Ove. K30, GEC etc. Pre-mains stand-by switch £1.00
Decca 80 100 IF panel £5.00
NPN PNP 80V 6 Amp TO66 O.P. Trans. pair 25p
5 button touch tuner BBC1 2 ITV1 2 video with ic SAS 5601 570T £7.00
Control panel 5 sliders + mains lead £1.50
G11 5 touch button unit replaces old 6 P B U £24.00
Tube base + base unit for 820 Euro chassis £4.00
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 NE 511N £1.20
LM337M Reg. 30p
20 GEC Black Spark Gaps £1.00
KT3 Front Panel Control Assy. £2.50
BTW 30 50 50p

FERGUSON
TX85 CHASSIS £20
TX86 CHASSIS £20
TX99 CHASSIS £20

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/UA78PO5SC 30p
-8V/79M08c £30p
+6V/78M06c £30p
LM 317T 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

U 19885 40p
U 3832 15p
U 3845 15p
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 36/600 35p
BYX 38/300 25p
BYX 49/600R 75p
BYX 55/350 10p
BYX 55/600 (Bead) 10p
BYX 36/600 50p
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
BZU 15/24 54p
BZY 93c75 50p
BZW 15/18 30p
BZW 15/30 30p
BZW 70c6v2 10p
BZW 79.3v 10p

Bush Thyristor RCA 76122 £1.00
Transformer 240v/20v-500Ma 75p
Chassis type Transformer
240v/12 Volts 500m/a 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

G11 Drawer ASS 3 pots Mans Switch and
Lead £2.00

K30 Drawer Ass with pots cable forme £1.00

TX10 Drawer with 8 way pots. ass £2.50

Hills 9 piece tool kit in case £5.00

Philips Coaxial Cable Stripper SBC325 £7.50

Self adjusting cutter stripper £5.00

10 mixed tube bars £4.00

5000 Diodes-Resistors £3.00 pack

D/P push mains switch 20p each

Mains lead & two pin socket for radio cassette 35p

T/V loop aerial 75p

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

Dual v/u meter -20 — +10db £1.00

K30 Thermistor 232266298009 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 2257 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 2775=TIP41c 40p
R 3129=TIP47 40p
T 6068V 50p
R 4050 £1.00
S 2008b 80p
2SD898B £1.00
2SC1942 £1.00

Hitachi sets etc.
STR454 £2.00
STR6020 Kit £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 426A 45p
BU 500 £1.10
BU 500D £1.00
BU 508A 90p
BU 508AF £1.00
BU 508D 80p
BU 508V £1.00
BU 705 £1.00
BU 806A £1.00
BU 807 £1.00
BU 824 50p
BUT 11 50p
BUT 13 600V-28A £1.00
BUW 11 50p
BUW 84 60p
BYW 2048-9 £1.00
BYW 95 10p
BUX 39 25A-150V £1.00
BUX 84 50p
BUX 85 50p
BUY 49 20p
TIC 106a 30p
TIC 116m 30p
TIC 116m/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 35B 50p
TIP 35C 70p
TIP 35D 80p
TIP 36 50p
TIP 36C 70p
TIP 41 15p
TIP 41B 40p
TIP41D 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 L761A-1000V/4Amp 75p
T6032 30p
T6036 40p
T6040 40p
T6047 40p
T6049 40p
T6051 40p

Philips Handset IC £3.00
SAA3010P £3.00
MAB8461 WD63 £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-1001 £3.00
MAB 8441P-T132 £2.00

M58484P £2.00

Hand Sets — Fidelity £15.00 to £35.00

ITT 8 and 6 Push Button £1.00
Pye 725 LOPTs £6.00
Pye 731 LOPTs £6.00
Thorn 8500-8800 LOPTS £5.00

CMC 301 front panel £5.00
CMC 303 front panel £5.00

CMC 302 Panel with TC mains switch etc £5.00

Tuneable Satellite Modulator
5.5MHz MPM 1000
6.0MHz MPM 1040
£4.00 each

Safe Block £5.00

6 Sub C Nicad Batteries £1.80

Ferguson TX85
TX86
Switch Mod Transformer £4.00

ICC5 Ferguson Switch Mod Trans
3112-338-32642 £4.00

ICC5 L.O.P.T
DST 88B243
DST 85B243 £10.00 each

ICC5 Remote I.C.
CCUFRG07 £3.00
CCUFRG09 £5.00

Ferguson LATR 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
RC400 KT3 and Teletex £14.00
ITCVC 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

ITT
TV & Video Processor, 1200 Type £10.00

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

PHILIPS
RC5174 £12.00

K35-K4 HAND SET
Repaired for £5.00

International Rectifier EHT Diodes G770/1V34 6KV 3 for 8p
6A/600V Stud Diodes 20p
BTW 92/800R £3.00
6A/1000V Stud Diodes 20p
25A473 PNP C/P 10p

SENDZ COMPONENTS

63 Bishopsteignton, Shoeburyness, ESSEX SS3 8AF.
SAME DAY SERVICE
All items subject to availability. Technical information by telephone only. No accounts: No Credit Cards
Postal Order/Cheque with order
Please add £1.70 post/packing (unless otherwise specified) and then 17½% VAT to total. Export orders charged at cost.
Callers: To shop at 212 London Rd., Southend. Tel. 0702-332992. Fax 0702 338805
Open 9-12/2.30-6. GVMT + school orders accepted on official headings.

TUNER UNITS

TX90-TX100 Tuners with AE socket	£5.00
Thorn TX Tuner V/Cap eqv. to ELC1043	£4.50
AMSTRAD Tuner	
Thorn TX10 Export V/Cap UHF. VHF	£3.00
ENV 5786G2F UHF/VHF Small	£4.00
NEW G8 Tuner V/Cap	£3.50
ELC2000 in Panel	£2.50
GEC 2110 V/Cap	£5.00
ELC1043 Ex Panel)	£3.75
ELC2000 NEW	£4.00
ELC2003	£4.00
GEC Tuner V/Cap Hitachi After 1979 ETS48, ETS47, ETS41B	£8.00
ET546	£6.00
Moultor Astec UM1233	50p
UE33-B01 Amstrad UHF Tuner	£5.00
VHF/UHF EG522F	£6.00
ASTEC UM1183	£10.00
V314 (VHF)	£5.00
V334	£4.00
U321	£6.00
U322	£8.00
U341 UHF	£6.00
U342 (UHF)	£5.00
U343 Phone	£5.00
U343C	£6.00
U344C	£10.00
U411 UHF	£4.00
UVF10	£8.00
U.V. 411 Tuner	£8.00
U.V. 417	£5.00
U.V. 617	£6.00
U.V. 618	£10.00
UHF/VHF Tuner 1500 DKO	£5.00
U743 Tuner	£7.00
Fidelity/Amstrad 2000 V/Cap Tuner	£5.00
Small V/Cap Mitsumi	
UHF	£4.00
VHF	£3.00
Portable & rotary Tuners Sanyo & Mitsumi UHF	£5.00
Mosfit UHF/VHF (new type)	£8.00
UE2-B31 Fidelity V/Cap T/Unit	£6.00
UHF-VHF V/Caps on panel	£3.00
HITACHI 20 Turn Pot	40p
U321 on panel	£6.00
Mullard Video Modulator. Application, video tape recorders. TV cameras, video games, closed circuit TV. C.C.I.R. system. Data supplied	£10.00
4 Button Rank Z18 Tuner	£4.00
T85 250v AC mains filter 0.1 + (03x2) 11" leader & earth clip	25p
NEW U321 Mullard	£4.00

U944	£5
Astec 230V/.6A Switch Mode Power Supply	£5.00
Astec UM1623 VHF	£2.00
Astec UM1286	£4.00
VHF/UHF Tuner S Band......	£3.00
UHF/VHF Tuner EGG13F	£6.00
ENV-5765G2 VHF/UHF	£5.00
Change over switch co-ax type box with lead	50p
TX90MOD 37141B The Sweep Tuning System TX9 139/001	£12.00
UF745 BAV UHF Tuner and IF in one can Small	£5.00
KT 3 Luminance	75p
UF7548	£5
Co-Ax Belling Lee Plug	14p
Co-Ax Splitter	£1.00
Infra Red Emitting Diode	20p
NE286H Small Neon Lamps GEC & Philips	5p
Mullard 5 Watt Amps. LP1162 New	75p

S.W. Filters

HW2011	50P	**S.W. Filters**	
HW2013	50P	SW185	£1.00
SW453	50P	SW153A	50P
SW150	£1.00	SW154	50P
HW2013	50P	SW173	50P
RW303	50P	F1035B	50P
SY2153	50P	F1045A	50P

BF694	10p
BF758	30p
BF760	30p
BFT34	15p
BFT43	10p
BFT84	8p
BFW11	20p
BFX29	30p
BFX84	25p
BFY50	15p
BFY52	20p
BFY90	25p
BLY49	25p
BPW11	25p
BRC116	25p
BRX43	15p
BRX48X	10p
BRY56	30p
BSS68	10p
BSY79	10p
BSY95a	10p
BTY80	20p
BSX19	17p
BSX20	17p
FT3055	30p
TCE82	30p
TCE520	30p
2N930	5p
2N2221	8p
2N2222	8p
2N2906	10p
2N3055	40p
2N3566	10p
2N3702	10p
2N3711	10p
2N3583	50p
2N3904	15p
2N4355	10p
2N4442	£1.00
2N4444	£1.00
2N5278	20p
2N5296	40p
2N5983	30p
2N6099	40p
2N6109	40p
2N6130	50p
2N6133	20p
2N6348	20p
2N6399	10p
2SA437	20p
2SA673P	10p
2SA844P	10p
2SC643A	£1.00
2SA992	10p
2SB474	30p
2SB566	10p
2SB686	75p
2SC515A	£1.00
2SC772	20p
2SC381	10p
2SC458	50p
2SC491	50p
2SC732	10p
2SC733	10p
2SC940	£1.00
2SC1030	£1.00
2SC1061	30p
2SC1162 C/18	30p
2SC1514	30p
2SC1520	25p
2SC1546	20p
2SC1617	£1.00
2SC1725	20p
2SC1740	20p
2SC1756	50p
2SC1942	£1.00
2SC2027	£1.00
2SC2068	20p
2SC2073	8p
2SC2229	15p
2SC2688	20p

2SC3795	30p
2SC3973B	30p
2SC7350	15p
2SD180 TO3 8W/6A	15p
2SD200	£2.00
2SD401	£1.00
2SD716	£1.00
2SD787	30p
2SD789	30p
2SD820	£1.00
2SD868	75p
2SD880	30p
2SD1264	£1.00
2SD1266	£1.00
2SD1415	£1.00
2SD1427	£1.00
2SD1432	£1.00
2SD1576	£1.00
2SD1577	£2.00
2SD1878	£1.00
2SK30A	10p
BC107	10p
BC108	10p
BC109	5p
BC113	10p
BC114	10p
BC115	10p
BC116	10p
BC117	20p
BC119	20p
BC125	10p
BC126	10p
BC139	10p
BC140	30p
BC141	25p
BC143	25p
BC147	10p
BC148	10p
BC149	10p
BC153	10p
BC154	10p
BC157a	10p
BC158	10p
BC159	10p
BC160/16	25p
BC171	5p
BC172	5p
BC173	5p
BC174	5p
BC183	5p
BC184	5p
BC204	5p
BC207	5p
BC212	5p
BC213	5p
BC214	5p
BC237	5p
BC238	5p
BC239	5p
BC250	5p
BC251	5p
BC252	5p
BC262	10p
BC263b	20p
BC294	30p
BC298	10p
BC300	30p
BC301	30p
BC303	30p
BC307	7p
BC308	7p
BC309	10p
BC327	10p
BC328	10p
BC328/338 pair	15p
BC337	10p
BC338	10p
BC347	10p
BC349b	10p
BC350	20p
BC365	10p

BC368	10p
BC369	10p
BC384	10p
BC394	10p
BC413	10p
BC414	10p
BC416	10p
BC440	30p
BC454	10p
BC455	10p
BC456	10p
BC460	25p
BC462	10p
BC463	10p
BC478	10p
BC527	10p
BC532	10p
BC546	10p
BC547	10p
BC548	10p
BC556	10p
BC557	10p
BC558	10p
BC559	10p
BC635	10p
BC636	10p
BCX31	25p
BCX32	25p
BD116	25p
BD124	30p
BD124 (metal)	30p
BD130Y	25p
BD131	30p
BD132/238	30p
BD135	25p
BD136	30p
BD138	30p
BD140	30p
BD176	25p
BD182	£1.00
BD183	70p
BD202	30p
BD204	30p
BD207	60p
BD221	20p
BD222	30p
BD228	30p
BD226	20p
BD233	30p
BD234	25p
BD235	30p
BD238	30p
BD239	15p
BD240	50p
BD243c	30p
BD244	50p
BD250a	30p
BD252	20p
BD253B	50p
BD331	20p
BD373b	20p
BD416	25p
BD433	25p
BD437	25p
BD438	30p
BD139	30p
BD439	50p
BD544D	40p
BD650	50p
BD678	30p
BD681	30p
BD682	30p
BD507	50p
BD508	30p
BD509	30p
BD517	30p
BD519	30p
BD534	30p
BD535	30p
BD544D	30p
BD562	30p
BD610	40p

BD646	50p
BD676A	30p
BD807	20p
BD826	50p
BD933	30p
BD939	30p
BD948	30p
BDT31A	50p
BDX75	20p
BDV64B	50p
BDU65	50p
BF761	30p
BF769	30p
BF788	20p
BF819A	30p
BF858	30p
BF869	30p
BF871	30p
BFR52	7p
BFR81	15p
BFS60	10p
BFT42	20p
BFT57	20p
BFW11	30p
BFX85 100V. 1amp	30p
BSD215	50p
MR1366	20p
AN6350	£2.00
BRC-M-200	40p
BRC-M-300	50p
BRC 1693	£1.00
BRC 3064	£1.00
BTT822	£1.00
BTT6016	£1.20
BTT6018/ML237B	£1.50
BTT6218	£1.50
BFT8124	£1.00
BT18224	£1.00
BUP22A	£1.00
CA270AE	50p
CA270CW	50p
CA270CE	50p
CA920AE	£1.00
CA1310	50p
CA3046	50p
CA3065Q	50p
CA3094AE	50p
CA3123	40p
CA3146	£1.00
CA3189	40p
CBF16848	50p
CD4510	30p
CD4555BE	30p
DM7492	50p
HA1124A	40p
HA1196	40p
HA1370	£2.00
HA1377	£3.00
HA11223	40p
HA11423	£1.00
HA11440	50p
HA11484	£3.00
HA11485 Ant	£1.00
HA17458	50p
HEF4001	10p
HEF4518B	25p
HBF4011AF	10p
HEF4053B	30p
HEF4066BP	20p
HEF4528	20p
HD3890C	£3.00
K5731D 1001012	£1.00
LA3220	50p
LA4102	£1.00
LA4261	£1.00
LA7830	£2.00
LA7831	£2.00
LM111N	£1.00
LM1017N	25p
LM8361	£3.00
PCF8571P	£5.00
M913	£2.00
M1024=SAA	£2.00
M1025=SAA	£2.00
M5840A-84RS	£3.00
MC476p	£1.00
MC1307	75p
MC1312	
MC1330 GN76530	£1.00
MC1352	£1.00
MC1358	£1.00
MC1496	50p
MC14002	15p
MC14013	25p
MC14016	25p
MC14066	30p
MC14514	50p
MC1748	80p
MEM4956	£1.00
ML231	£2.50
ETT6016	£2.00
ML232	£1.00
ML236E	£1.00
ML237B	£1.00
ML238B	£4.00
ML239	£2.00

Thyristors

Philips Kits OT121	50p
IR106A	30p
BT151/500	20p
BT106 Plastic	30p
BT106 Metal	£1.20
BT119	£1.00
BT120	£1.00
BRC4443	75p
GIT Thyristor	60p
Decca 80-100	60p
2N4444	£1.00
MCR72-6	25p
OT112	£1.00
3F320M	£1.00
HC8441	£2.00
17052	£2.00
17088H	£2.00
17089R	£2.00
17053R	£2.00
5P2M	50p
RCA Line Thyristor	
CC02400	£2.00
CC0240R	£2.00

Thermistors

PT1BG180M	75p
G8 Degausing	35p
Philip type VA1104	70p
PTTP7366312	15p
PTH451 AOR	15p
PT37P Fits Pye & PT34	20p
Degausing Thermistor (fits most sets)	20p
POS 009 Philips	50p
POS 016 Philips	50p

ML926	£1.00
MAB8400B-C	£2.00
MAB8440 P-1070	£2.00
MAB8441 P1001	£3.00
MAB8420PC035	£2.00
MAB8422P-0005	£2.00
MAB8440P	£2.00
MAB8400XX	£3.00
M708L81	£2.00
MM5387	£1.00
MM5611	£1.00
MM5840	£3.00
PCD8571P	£3.00
K35 Philips Receiver IC	
MA1250BJC	£3.00
M491BB1	£3.00
M58401-84RS	£5.00
MM5290N-4	75p
MM53108N	£4.00
MN650	£1.00
MN1250B1C	£2.00
MR1366	20p
N6400	£1.00
NE555P	60p
NE555	60p
NE556	50p
NE646	50p
HD38980C	£3.00
IL1	20p
PH2369	10p
PCD8571P	50p
PCD8572P	£2.00
SAA611	£1.00
SAA661	£1.75
SAA1024	£2.50
SAA1073	£3.00
SAA1074	£3.00
SAA1075	£3.00
SAA1124	£2.00
SAA1174	£3.00
SAA1176	£2.00
SAA1250	£3.00
SAA1251	£4.00
SAA1272	£3.00
SAA1274	£3.00
SAA1276	£3.00
SAA1293	£6.00
SAA4027P	£1.00
SAA5000A	£1.50
SAB3013	£2.00
SAB3037	£3.00
SAB3205	£3.00
SAB3210	£2.00
SAB4209	£2.00
TB00124	£1.00
SAA3008P	£3.00
SAA3018P	£2.00
SAA5000A	£2.00
SAA5010	£2.20
SAA5020	£3.50
SAA5025D	£3.00
SAA5030	£4.50
SAA5040A	£3.00
SAA5042A	£3.00
SAA5043	£4.00
SAA5050	£4.50
SAA5051	£2.00
SAA5052	£2.00
SAA5053	£2.00
SDA2531 2	£3.00
SDA2543 2	£5.00
SAA5240	£5.00
SAA5241 P/A TEXT IC	£5.00
SAF1032p	£2.50
SAF1039	£2.00
SAS5700	75p
SAS660	£1.00
SAS670	£1.00
SAS580	75p
SAS590	75p
SAS3210	£2.00
SL437F	£4.00
SL471	50p
SL480	£1.00
SL901B	£4.50
SL971B	£3.00
SL918	£4.50
SL1430	£1.00
STK4793	£3.00
STK5471	£3.00
STK5481	£6.00
STR58041	£5.00
TA7122	£1.15
TAA320A	50p
TAA470	£1.50
TAA570	75p
TAA611B	£1.00
TAA621	£2.00
TA7108P	£1.00
TA7117	50p
TA7120P	50p
TA7315AP	50p
TA7137P	50p
TA7193AP	£3.00
TA7240AP	£3.00
TA7205	£3.00
TA7609P	£2.00
TA7227P	£1.00
TA7205AP	£3.00
TA7608AP	£3.75
TA7680AP	£3.00
TA7750P	30p
TBA120A	40p
TBA120AS	40p
TBA120SA	40p
TBA120B	40p
TBA120SB	40p
TBA1201	50p
TBA120SQ	£1.00
TBA120U	75p
TBA120Q	30p
TBA120C	40p
TBA1440	£1.00
TBA1441	£2.00
TBA231	75p
TBA395Q	50p
TBA396Q	£1.00
TBA396	75p
TBA440P	£1.00

TV Crystals

4MHz	
4.433-619	
6MHz	
8.867238	
11.059.000	
Large or small	50p each
Antistatic Isolators	
Disc Type Black	10p

Filters

CSA 3.97M		15p
6MEG	CDA	25p
6MHz	SFE	12p
SFE 5.5MHz		20p
SFD460B		15p
CSB455A		15p

TBA1440	£1.00
TBA480Q	£1.00
TBA520	£2.00
TBA530	£2.00
TBA540	£1.00
TBA560CQ	£1.00
TBA570	£1.50
TBA625	50p
TBA651	£2.00
TBA673	£1.00
TBA750Q	£2.50
TBA780	£1.50
TBA800	50p
TBA810AP	60p
TBA810S	60p
TBA820	60p
TBA820M	25p
TBA920	£1.50
TBA920Q	£1.50
TBA990Q	£1.00
TMS1000NL	£2.00
TMS1943 N2L (clockchip)	£1.00
TMS9980	£4.00
TMS9901	£1.00
TMS2708JG45	45p
TMS2716JL	£1.00
TMS3529	£1.00
TMS3720ANS	£3.00
TMS4014	70p
TX412	£1.00
TMS9902	£1.20
UAA2001	£3.00
ULN2004P	£1.50
ULN2216	75p
UPC566H	£2.00
UPC585C	£1.00
UPC1009	£2.00
UPC1031H	£2.00
UPC1353C	£1.00
UPC1363C	£2.75
UPC1364C	£2.00
UPC1365C	£2.00
UPC1366	£1.00
UPC1378H	£2.00
UPC1514C	£3.00
UPC2002	35p
UPD1943G	£2.00
UPD8049HC	£2.00
SN29848	50p
SN29770BN	£2.00
SN29771BN	£2.00
SN29772BN	£2.00
SN76001	£2.00
SN76013ND	£2.00
SN76018	£1.00
SN76110N	£1.00
SN76115AN	50p
SN76131	50p
SN76141N	£1.00
SN76226	£1.00
SN76227N	£1.00
SN76228N	£1.00
SN76270	£1.00
SN76532N	£1.00
SN76545N	£3.00
SN76546	£3.00
SN76550	30p
SN76552	30p
SN76570	£1.00
SN76620	50p
SN76660N	40p
SN76620AN	50p
SN76666	£1.00
SN76705N	£1.00
SN76707N	75p
SN76708AN	75p
SN76720	£1.00
SN76709N	£2.00
UA783P3C	40p
BT100A/02	40p
BT138 10A	70p
BT146	30p
TBA540Q	£1.50
TCA270	£1.00
TCA270Q	£1.00
TCA270S	£1.00
TCA270SQ	£1.00
TCA740	£1.00
TCA800	£1.50
TCA830	£1.00
TCA940	£1.00
TCEP100	£1.00
TCE120CQ	£1.00
TCE520	30p
TD6306P	£3.00
TDEA440Q	50p
TDA1003A	£1.00
TDA1010	£1.00
TDA1013	£1.00
TDA1012	£1.00
TDA1013A	£1.00
TDA1035SB	£1.00
TDA1072	£1.00
TDA1150	50p
TDA1151	30p
TDA1154	50p
TDA1170S	£1.00
TDA1180	£2.00
TDA1190	£1.00
TDA1200	75p
TDA1270	£1.50
TDA1327A	69p
TDA1365	£3.00
TDA1512	£2.00
TDA1540P	£3.00
TDA1670A	£2.00
TDA1908A	£1.00
TDA2002	£1.00
TDA2003	25p
TDA2004	£2.00
TDA2008	£2.00
TDA2010	£1.00
TDA2020	£1.00
TDA2320	50p
TDA2545A	£1.00
TDA2600	£3.00
TDA2640	£2.00
TDA2522	£5.00
TDA2530	£1.50
TDA2532	£1.00
TDA2540	80p
TDA2541	£1.00
TDA2542	£1.00
TDA2545	£2.00
TDA2546	£2.00
TDA2556	£1.00
TDA2560	75p

TDA3565	£3.00
TDA2575A	£1.00
TDA2577A	£2.00
TDA2578A	£2.00
TDA2579A	£2.00
TDA2581	£2.00
TDA2591	£1.00
TDA2593	£3.00
TDA2560	50p
TDA2556	£1.50
TDA2600	£3.00
TDA2611A	£1.00
TDA2611AQ	£1.00
TDA3651A	£1.00
TDA3652	£2.50
TDA2653	£4.00
TDA2640	£2.00
TDA2593	£1.00
TDA3047	£1.00
TDA3048	£3.00
TDA3083	£2.00
TDA3190	£1.00
TDA3300B	£5.00
TDA3301	£3.00
TDA3505	£3.00
TDA3506	£3.00
TDA3561	£3.00
TDA3560	£4.00
TDA3561A	£3.00
TDA3662ZA	£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	£10.00
TDA3651	£3.00
TDA3651AQ	£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
TDA4600-2 Flat	£3.00
TDA4601	£2.00
TDA8190	£3.00
TDA9403	£1.50
TDA9503	£3.00
TDB2033	£1.00
TDD1610S	50p
TD6306P	£2.00
TDA1060	£3.00
TEA1009	50p
TEA1039	£2.00
TEA1060	£2.00
TEA2017	£2.00
TEA5114	£1.00
TDA3300B	£6.00
TDA3301	£6.00
SIL4516	50p
SN16861NG	50p
SN16862AN	£1.00
SN16964AN	50p
SN29764AN	£1.00
UA721	40p
UA7300	40p
MPS43A	25p
MJ13005	30p
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
AC106	25p	BF184	20p
AC121	25p	BF194	10p
AC124	25p	BF195	10p
AC128	25p	BF196	10p
AC137	25p	BF197	12p
AC151	25p	BF198	10p
AC131	25p	BF199	10p
AC138	25p	BF200	20p
AC152	25p	BF222	10p
AC153K	25p	BF224	15p
AC142K	25p	BF238	20p
AC169	25p	BF240	16p
AC176	25p	BF244	40p
AC178K	25p	BF245b	20p
AC179	25p	BF255	20p
AC186	25p	BF256	20p
AC188	25p	BF257	20p
ACY21	25p	BF258	25p
AD143	50p	BF262	15p
AD149	50p	BF263p	25p
AD161 162 pair 40p		BF264	15p
		BF271	10p
		BF273	10p
AF17A	25p	BF274	10p
AF139	25p	BF324	25p
AF181	£1.00	BF337	50p
AF239	25p	BF355	30p
AF367	25p	BF362	20p
AU102	£1.75	BF363	15p
BLY49	50p	BF367	15p
BF115	20p	BF391	15p
BF121	20p	BF394	10p
BF127	20p	BF419	30p
BF137	20p	BF422	15p
BF157	20p	BF423	15p
BF160	20p	BF448	30p
BF161	20p	BF470	30p
BF164	60p	BF471	30p
BF179	30p	BF5971	10p
BF180	20p	BF694	10p

Thorn Transformers

DT2076/78	£10.00
90D34035403	£10.00
90D4-106-003	£1.00
90D3438-001	£5.00
OT204130	£3.00

I.C.s

MA721PC	£1.00	UPD114LC-2	£1.00
M50430-8505P	£1.00	MN1250B1C	£1.00
TD6359P	£1.00	M50441-5505P	£1.00
M58657P	£1.00	M491BB1	£2.00
PCD8572	£1.00	HA513385	£1.00
HD74HC86P	£1.00		