MARCH 1995

£2.20

TELEVISION

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

A REED BUSINESS PUBLICATION

Inside the Ferguson ICC9 Chassis

Servicing The ITT Monoprint B Chassis

Satellite Receiver Servicing

VCR Clinic

DX-TV

Fax Principles and Practice

The Las Vegas CES '95

9 770032 647047 03>

WILLOW VALE ELECTRONICS LIMITED

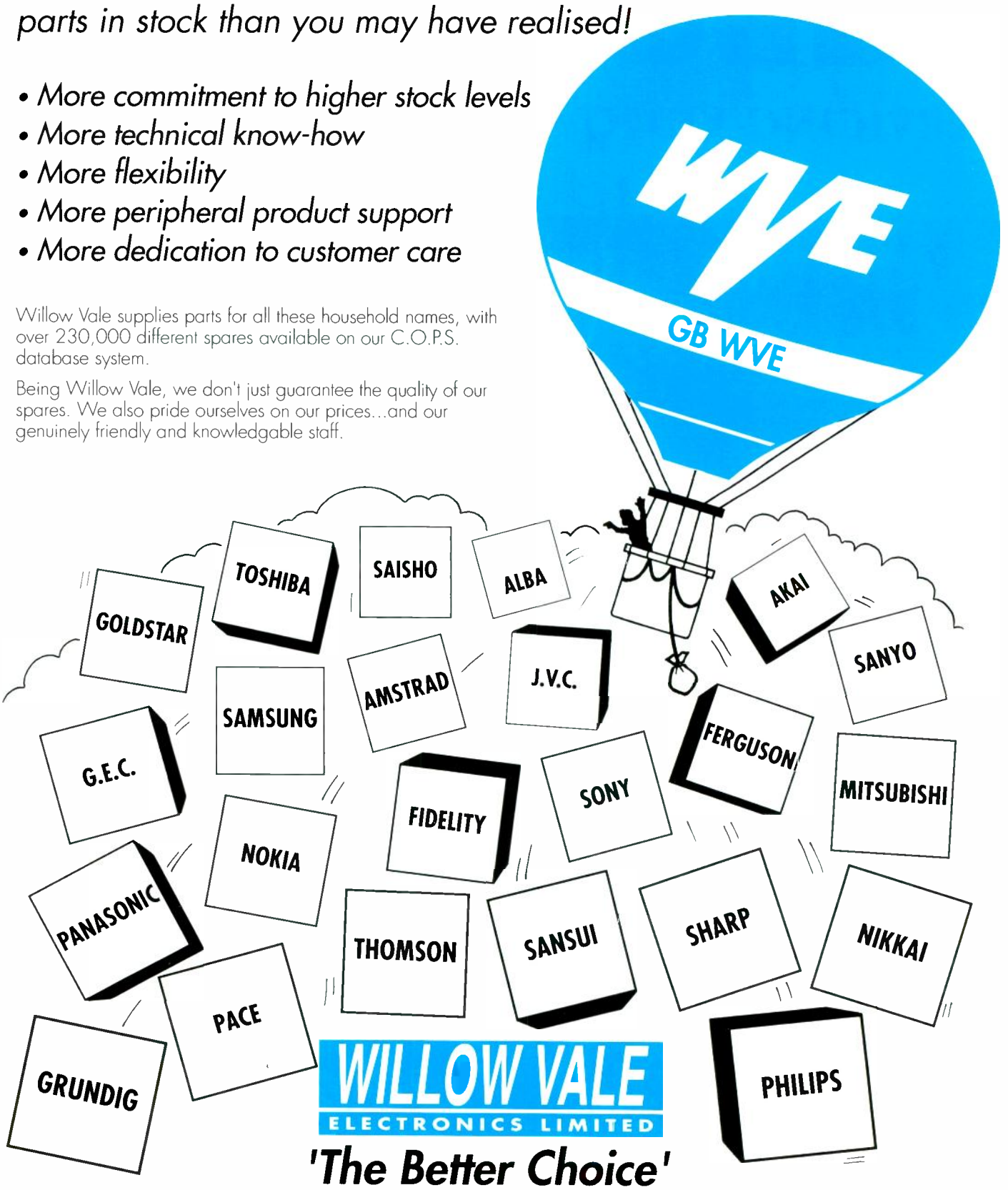
Willow Vale gives you more...

parts in stock than you may have realised!

- *More commitment to higher stock levels*
- *More technical know-how*
- *More flexibility*
- *More peripheral product support*
- *More dedication to customer care*

Willow Vale supplies parts for all these household names, with over 230,000 different spares available on our C.O.P.S. database system.

Being Willow Vale, we don't just guarantee the quality of our spares. We also pride ourselves on our prices...and our genuinely friendly and knowledgable staff.



'The Better Choice'

Reading (0734) 876444 Manchester (061) 682 1415

TELEVISION

MARCH 1995
On Sale
February 15th

Vol. 45, No. 5

Issue 533

The April issue will be published on March 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 for Vols. 38 to 44 are available at £3.50 each from Video Interface Products Ltd., who can also supply a seven-year consolidated index on computer disc. For further details see page 323.
Binders that hold twelve issues of *Television* are available for £5.50 each from Television Binders, 78 Whalley Road, Wilpshire, Blackburn BB1 9LF. Make cheques payable to "Television Binders".

SUBSCRIPTIONS
Annual subscription rates (inclusive of postage) are as follows: UK £26.00; overseas £30.00 (airfreight); Europe £37.00 (airmail); rest of the world £48.00 (airmail). Send orders with payment (make cheques payable to Television) to Television, Subscriptions Dept., PO Box 302, Haywards Heath, West Sussex RH16 3YY (UK). Telephone 01444 445 566.

Subscription hotline for 24-hour ordering with Credit Card telephone 01622 778 000 quoting INJ.

NEWSAGENT ENQUIRIES
0181 652 8171, fax 0181 652 8997.
Distributed by Marketforce (UK) Ltd., 247 Tottenham Court Road, London W1P 0AU. 0171 261 5555.

BACK NUMBERS
Some back issues are available at £2.75 each. For further details see box on page 351.

ISSN **0032-647X**

GRANDATA LTD

K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY, WEMBLEY, MIDDLESEX, ENGLAND HA9 0HB

Telephone: 081-900 2329 Fax: 081-903 6126

TRANSISTORS / LINEAR ICs

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
AAY32	9p	BD246A	50p	BFY64	25p	MJ15004	300p	2N1613	24p
AC107	40p	BD265	45p	BFY90	45p	MJ2501	100p	2N1711	24p
AC125	30p	BD267	45p	BLY48	85p	MJ2955	55p	2N1893	30p
AC126	30p	BD269	45p	BR100	14p	MJ3000	100p	2N2102	50p
AC127	30p	BD278	50p	BR103	37p	MJ3001	100p	2N2218A	24p
AC128K	40p	BD311	100p	BR303	85p	MJE29A	30p	2N2219	24p
AC141K	45p	BD314	100p	BSS74	33p	MJE30A	30p	2N2221	23p
AC176	22p	BD315	150p	BSX20	15p	MJE340	25p	2N2222	23p
ACY18	48p	BD317	150p	BT100A	70p	MJE350	80p	2N2369	15p
ACY19	48p	BD331	40p	BT106	180p	MJE520	30p	2N2484	15p
AD149	60p	BD332	40p	BT109	90p	MP8112	45p	2N2646	40p
AF125	50p	BD361	60p	BT119	100p	MPSA05	15p	2N2904	20p
AF139	30p	BD362	60p	BT146	99p	MPSA06	15p	2N2905	20p
AF239	30p	BD370	30p	BTY79	140p	MPSA13	15p	2N2906	18p
BB105B	18p	BD371	30p	BU105	80p	MPSA20	15p	2N2907	18p
BB205B	24p	BD410	50p	BU108	100p	MPSA42	15p	2N3019	28p
BC107	8p	BD433	28p	BU109	80p	MPSA43	15p	2N3053	18p
BC108	8p	BD434	30p	BU110	90p	MPSA70	15p	2N3054	40p
BC109	8p	BD435	31p	BU111	100p	MPSA92	20p	2N3055	38p
BC109C	10p	BD436	30p	BU124	60p	MPSA93	20p	2N3055H	50p
BC140	20p	BD437	28p	BU126	65p	MR510	35p	2N3442	85p
BC141	20p	BD438	36p	BU180	100p	MR856	36p	2N3702	9p
BC142	20p	BD439	40p	BU184	100p	OC28	350p	2N3703	9p
BC143	20p	BD440	40p	BU204	65p	OC29	250p	2N3704	9p
BC147	8p	BD441	40p	BU205	70p	OC35	350p	2N3705	9p
BC149	8p	BD533	50p	BU206	100p	OC36	250p	2N3706	9p
BC159	8p	BD534	38p	BU208	70p	OC45	50p	2N3707	9p
BC160	30p	BD535	38p	BU208A	75p	OC200	180p	2N3710	12p
BC171	10p	BD536	38p	BU208AT	200p	R2008B	100p	2N3711	12p
BC172	10p	BD537	40p	BU208D	130p	R2010B	100p	2N3771	85p
BC177	14p	BD538	40p	BU209	90p	S2000A3	175p	2N3772	90p
BC178	14p	BD643	50p	BU225	120p	S2000AF	175p	2N3773	100p
BC179	14p	BD645	50p	BU226	120p	S2055A	175p	2N3799	18p
BC182	7p	BD647	50p	BU312	90p	S2055AF	200p	2N3819	29p
BC182L	7p	BD649	50p	BU325	55p	S2530A	100p	2N3903	11p
BC183	7p	BD675	40p	BU326A	75p	S2800M	72p	2N3906	11p
BC183L	7p	BD676	40p	BU406	60p	TIP29	15p	2N4031	25p
BC184	7p	BD677	38p	BU406D	85p	TIP29A	22p	2N4401	12p
BC184L	7p	BD678	40p	BU407	55p	TIP29C	25p	2N4403	12p
BC212	7p	BD679	40p	BU407D	75p	TIP29E	40p	2N5061	20p
BC212L	7p	BD680	40p	BU408	60p	TIP30	25p	2N5088	20p
BC213	7p	BD681	45p	BU408D	75p	TIP30C	25p	2N5192	50p
BC213L	7p	BD682	45p	BU409	85p	TIP31A	22p	2N5241	500p
BC214	7p	BD705	50p	BU426A	70p	TIP31C	27p	2N5245	45p
BC214L	7p	BD707	50p	BU500	100p	TIP32	24p	2N5294	30p
BC237	7p	BD709	50p	BU505	90p	TIP32A	21p	2N5296	30p
BC238	7p	BD711	50p	BU505D	90p	TIP32C	28p	2N5448	12p
BC239	7p	BD736	50p	BU505DF	90p	TIP33	50p	2N6107	40p
BC300	20p	BD826	50p	BU506	100p	TIP33C	60p	2N6292	40p
BC301	20p	BD828	50p	BU506D	70p	TIP34	50p	2N6385	120p
BC302	20p	BD839	55p	BU506DF	120p	TIP34C	60p	2N6403	160p
BC303	20p	BD897	50p	BU508A	70p	TIP35C	65p		
BC304	25p	BD899	50p	BU508AF	95p	TIP36C	65p		
BC327	7p	BD977	50p	BU508D	75p	TIP41A	20p		
BC328	7p	BDX33	60p	BU508DF	115p	TIP41C	22p		
BC337	7p	BDX65	80p	BU508V	110p	TIP42A	20p		
BC338	7p	BDW24	55p	BU508VF	190p	TIP42C	22p		
BC441	28p	BDW93	50p	BU526	75p	TIP47	40p		
BC446	8p	BDW94	50p	BU536	100p	TIP48	40p		
BC477	18p	BDY92	100p	BU546	125p	TIP50	60p		
BC516	22p	BF137	35p	BU608	120p	TIP51	80p		
BC537	25p	BF167	30p	BU626	120p	TIP52	80p		
BC546	8p	BF181	18p	BU705	130p	TIP54	85p		
BC547	8p	BF183	20p	BU706DF	175p	TIP105	65p		
BC548	8p	BF195	7p	BU706F	150p	TIP106	65p		
BC549	8p	BF199	8p	BU801	70p	TIP107	65p		
BC550	8p	BF200	16p	BU806	70p	TIP110	40p		
BC556	8p	BF225	30p	BU807	60p	TIP111	40p		
BC557	7p	BF240	16p	BU902	110p	TIP112	35p		
BC558	8p	BF245	25p	BU903	110p	TIP112H	50p		
BC559	8p	BF254	15p	BU920	100p	TIP115	30p		
BC560	8p	BF255	12p	BU922	110p	TIP116	30p		
BC637	20p	BF256	18p	BU930	130p	TIP117	30p		
BC639	20p	BF257	18p	BU2508A	130p	TIP120	37p		
BC640	20p	BF259	18p	BU2508AF	130p	TIP121	35p		
BCY33	200p	BF262	25p	BU2508D	130p	TIP122	30p		
BCY34	200p	BF270	18p	BU2508DF	150p	TIP125	30p		
BCY70	16p	BF273	15p	BU2520AF	225p	TIP126	40p		
BCY71	16p	BF311	21p	BU2520DF	225p	TIP127	35p		
BCY72	16p	BF336	20p	BU2525AF	325p	TIP130	30p		
BD115	30p	BF337	20p	BUH515	200p	TIP131	30p		
BD124P	50p	BF338	20p	BUT11AF	55p	TIP132	30p		
BD131	25p	BF362	30p	BUT12	80p	TIP141	65p		
BD132	25p	BF367	13p	BUT56A	75p	TIP142	75p		
BD133	50p	BF371	17p	BU18	80p	TIP145	50p		
BD135	20p	BF421	18p	BU18AF	80p	TIP146	70p		
BD136	20p	BF422	21p	BUX10	150p	TIP147	80p		
BD137	20p	BF423	25p	BUX11	200p	TIP150	90p		
BD138	20p	BF455	12p	BUX12	150p	TIP151	60p		
BD139	20p	BF458	19p	BUX20	350p	TIP2955	42p		
BD140	20p	BF462	50p	BUX21	450p	TIP3055	42p		
BD144	90p	BF471	28p	BUX22	450p	TIPL763A	200p		
BD157	38p	BF472	28p	BUX37	220p	TIPL791A	80p		
BD166	30p	BF479	30p	BUX40	210p	TIS61	15p		
BD175	30p	BF494	16p	BUX41	200p	TIS90	15p		
BD177	30p	BF495	16p	BUX42	200p	TIS93	20p		
BD179	32p	BF595	16p	BUX47A	220p	VK1010	88p		
BD181	45p	BF596	16p	BUX48A	150p	VN10KM	60p		
BD182	60p	BF615	30p	BUX80	180p	ZTX107	11p		
BD184	60p	BF617	30p	BUX84	50p	ZTX108	11p		
BD187	30p	BF760	40p	BUX85	50p	ZTX109	12p		
BD201	33p	BF763	40p	BUX86	30p	ZTX212	20p		
BD202	38p	BF870	22p	BUX87	50p	ZTX300	10p		
BD203	42p	BF871	22p	BUX98A	350p	ZTX301	16p		
BD204	42p	BF960	38p	BU69A	200p	ZTX302	10p		
BD222	31p	BF961	35p	BUY71	250p	ZTX303	20p		
BD225	31p	BF964	38p	BUZ11	200p	ZTX304	10p		
BD232	31p	BFR90	85p	BUZ71	75p	ZTX320	20p		
BD233	30p	BFR91	99p	BUZ80	200p	ZTX501	13p		
BD234	32p	BFT43	30p	BY448	20p	ZTX502	10p		
BD235	28p	BFX29	20p	BYT11	25p	ZTX503	18p		
BD236	30p	BFX84	20p	C106D	28p	ZTX504	25p		
BD237	21p	BFX85	20p	IRF630	150p	2N696	26p		
BD238	24p	BFX87	15p	J174	38p	2N697	22p		
BD239	30p	BFX88	15p	J300	50p	2N698	40p		
BD240	40p	BFX89	60p	MJ900	200p	2N78	22p		
BD241A	40p	BFY50	14p	MJ1000	200p	2N914	28p		
BD243A	50p	BFY51	14p	MJ1001	200p	2N930	18p		
BD244	50p	BFY52	14p	MJ10012	300p	2N1131	28p		
BD245	50p	BFY56	25p	MJ15003	250p	2N1132	28p		

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
LM309K	100p
LM317T	100p
LM323K	350p
78H08KC	800p
79H12KC	700p
79HGKC	800p

VALVES

DAF96	100p
DY87	80p
EBF80	60p
ECC84	80p
ECH84	90p
ECL84	100p
EF183	75p
EF184	85p
EL500	100p
EY86	70p
EY87	70p
EY88	80p
PCF97	100p
PCC85	60p
PCF80	100p
PCF801	110p
PCF806	115p
PCH200	100p
PCL81	65p
PCL82	80p
PCL84	60p
PFL200	110p
PL36	120p
PL83	60p
PL84	80p
PL95	180p
PY81	100p
PY500A	190p

RECTIFIER DIODES

BY127	8p
BY133	8p
BY164	40p
BY179	35p
BY184	32p
BY206	11p
BY207	9p
BY227	19p
BY228	28p
BY298	15p
BY299	18p
BY448	20p
BYX10	15p
BYX55/600	25p
BYX70/500	32p
OA47	10p
OA91	10p
OA202	10p
IN4001	3p
IN4002	3p
IN4003	3p
IN4004	3p
IN4005	3p
IN4006	3p
IN4007	4p
IN4148	2p
IN5400	9p
IN5401	8p
IN5402	8p
IN5403	8p
IN5404	8p
IN5405	11p
IN5406	12p
IN5407	12p
IN5408	12p
RGP15	25p
RGP30	16p
SKE4F2/06	60p
SKE4F2/08	80p
SKE4F2/10	100p
SR2M	60p

LEDs

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

RECTANGULAR LEDs

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

OPTO COUPLERS

4N37	48p
4N38	68p
AN203	210p

BRIDGE RECTIFIERS

W005	16p
1A/50V	
W01	18p
1A/100V	
W02	19p
1A/200V	
W04	21p
1A/400V	
W06	23p
1A/600V	
W08	28p
1A/800V	
BR81D	33p
2A/100V	
BR82D	33p
2A/200V	

I.C. SOCKETS

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

ZENERS

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

CRYSTALS

Freq in MHz	
2.4576	180p

BR84D	37p
2A/400V	
BR86D	43p
2A/600V	
BR88D	43p
2A/800V	
BR32	43p
2A/200V	
BR34	43p
2A/400V	
BR36	44p
2A/600V	
BR62	80p
6A/200V	
BR64	72p
6A/400V	
BR251	150p
25A/100V	
BR252	165p
25A/200V	
BR254	185p
25A/400V	
BR256	200p
25A/600V	
BR258	240p
25A/800V	
BR351	185p
35V/100V	
BR352	200p
35V/200V	
BR354	220p
35V/400V	
BR356	230p
35V/600V	
BR358	260p
35V/800V	
BY164 1.5A/100V	40p
BY176 1.5A/800V	40p

TRIACS

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

THYRISTORS

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

COMPUTER ICs

Z80ACPU	100p
Z80ADMA	200p
Z80ACTC	140p
Z80ASIO-1	210p
Z80ASIO-2	210p
75107	65p
75110	75p
75113	100p
75122	110p
75154	100p
75162	700p
75182	95p
75183	95p
75195	185p
2114	150p
2532	200p
2716	100p
2732	200p
2732A	220p
2764	150p
27C64	200p
27128	150p
27256-25	150p
27512	300p
4116	40p
4164-15	80p
4164-12	90p
41256-15	80p
41256-12	100p
41256-10	110p
41464-12	150p
6116	80p
6264-10	210p
62256-12	300p

Part	Price	Part	Price	Part	Price	Part	Price
6502A	360p	AN7156	240p	HA13108	350p		
65C02	930p	AN7168	200p	HA13412	600p		
6522	280p	AN7178	180p	HA13432	400p		
6800	210p	AN7222	75p	HA17524	250p		
6802	220p	AN7254	150p	ICL7106	650p		
680	500p	AN7256	250p	ICL7660	240p		
36808	500p	AN7310	60p	KA2102	150p		
6809	500p	AN7311	90p	KA2130	150p		
6810	150p	AN7410	150p	KA2206	150p		
6818	380p	AY3-1015	290p	KA2209	125p		
6821	130p	AY3-1270	800p	KA2210	230p		
6840	290p	AY3-1350	450p	KA2212	80p		
6845	200p	AY3-8910	360p	KA2213	130p		
6850	90p	AY3-8912	400p	KA2214	150p		
8085A	300p	BA301	55p	KA2261	100p		
8086	500p	BA311	80p	KA2263	100p		
8088	480p	BA313	60p	KA2264	100p		
8156	300p	BA333	80p	KA2284	100p		
8224	240p	BA401	60p	KA2401	150p		
8226	240p	BA402	50p	KA2412	350p		
8250	750p	BA511	145p	KA2912	125p		
8251	200p	BA514	160p	KA2914A	300p		
8253	160p	BA516	150p	LA1130	240p		
8257	220p	BA521	100p	LA1150	150p		
8271	3400p	BA524	240p	LA1185	150p		
8279	270p	BA526	180p	LA1201	75p		
8283	400p	BA527	95p	LA1210	140p		
8284	440p	BA532	100p	LA1222	80p		
8287	260p	BA534	220p	LA1230	130p		
8288	650p	BA536	150p	LA1364	200p		
8748	700p	BA546	160p	LA1365	120p		
8765	800p	BA612	120p	LA1368	220p		
8T26	95p	BA656	110p	LA1385	170p		
8T28	110p	BA658	350p	LA2000	150p		
		BA684	400p	LA2101	270p		
		BA685	400p	LA2200	190p		
		BA1310	160p	LA3160	120p		
		BA1320	75p	LA3210	65p		
		BA1330	120p	LA3300	140p		
		BA1360	160p	LA3301	110p		
		BA4403	220p	LA3361	100p		
		BA5101	350p	LA3375	300p		
		BA5102	140p	LA4030	180p		
		BA5204	200p	LA4031	140p		
		BA5402	180p	LA4032	140p		
		BA5406	180p	LA4051	160p		
		BA5408	180p	LA4100	85p		
		BA6104	250p	LA4101	80p		
		BA6208	175p	LA4102	100p		
		BA6209	85p	LA4110	120p		
		BA6304	120p	LA4120	270p		
		BA6305	140p	LA4140	60p		
		BA6410	220p	LA4160	100p		
		BA6411	250p	LA4182	180p		
		BA6993	150p	LA4190	300p		
		BA7001	150p	LA4192	140p		
		BA7004	200p	LA4200	130p		
		BA7007	200p	LA4201	120p		
		BA7021	180p	LA4260	230p		
		BA7022	350p	LA4261	300p		
		BA7751LS	150p	LA4270	300p		
		BA7752	250p	LA4420	140p		
		BA7755	150p	LA4422	130p		
		BA7767AS	155p	LA4430	130p		
		CA3011	110p	LA4440	150p		
		CA3048	190p	LA4445	150p		
		CA3052	190p	LA4460	120p		
		CA3054	95p	LA4461	120p		
		CA3085	135p	LA4500	200p		
		CA3088E	200p	LA4505	220p		
		CA3089E	150p	LA4508	200p		
		CA3090Q	250p	LA4510	100p		
		CA3130S	100p	LA4520	170p		
		CA3134E	280p	LA4550	200p		
		CA3140E	38p	LA4555	120p		
		CA3160	85p	LA4570	130p		
		CA3189E	230p	LA5112	200p		
		CA3193E	230p	LA5523	150p		
		CA3260E	170p	LA5527	150p		
		CA3290E	150p	LA5700	300p		
		CX108	950p	LA7011	220p		
		CX136	600p	LA7033	400p		
		CX139A	750p	LA7042	280p		
		CX141	750p	LA7046	300p		
		CX145	725p	LA7212	150p		
		CX150B	325p	LA7505	250p		
		CX175	325p	LA7507	250p		
		CX187	825p	LA7520	200p		
		CX804A	775p	LA7620	500p		
		CX867	575p	LA7800	90p		
		CX868	525p	LA7801	100p		
		CX877	300p	LA7802	300p		
		HA1125	120p	LA7806	260p		
		HA1197	130p	LA7808	250p		
		HA1199	130p	LA7820	100p		
		HA1319	200p	LA7823	200p		
		HA1338	300p	LA7910	150p		
		HA1339A	350p	LA7940	200p		
		HA1377	120p	LC7131	260p		
		HA1388	320p	LC7132	400p		
		HA1389	210p	LC7137	450p		
		HA1392	120p	LF347	110p		
		HA1394	170p	LF353	48p		
		HA1397	200p	LF355	60p		
		HA1398	240p	LF357	70p		
		HA11219	280p	LF398	300p		
		HA11221	180p	LM301	26p		
		HA11225	130p	LM311	35p		
		HA11235	120p	LM319	165p		
		HA11251	190p	LM324	30p		
		HA11423	140p	LM335Z	120p		
		HA11724	650p	LM339	35p		
		HA12002	220p	LM348	50p		
		HA12003	250p	LM358	45p		
		HA12005	180p	LM380	80p		
		HA12017	100p	LM381	150p		
		HA13001	110p	LM382	130p		
		HA13002	200p	LM386	60p		
		HA13006	400p	LM387	100p		
		HA13007	400p	LM393	45p		

LINEAR ICs

AN203	210p
AN210	165p
AN214Q	170p
AN228	280p
AN252	150p
AN258	250p
AN262	140p
AN271	230p
AN274	250p
AN301	330p
AN303	250p
AN304	360p
AN315	210p
AN316	350p
AN360	100p
AN362	140p
AN366	150p
AN610	160p
AN3312	350p
AN3821K	600p
AN3822K	600p
AN3990K	300p
AN3991K	400p
AN5025	250p
AN5033	400p
AN5132	250p
AN5150	400p
AN5151	600p
AN5215	100p
AN5256	150p
AN5262	175p
AN5265	80p
AN5352	600p
AN5411	450p
AN5421	150p
AN5429	420p
AN5512	100p
AN5515	160p
AN5520	550p
AN5521	100p
AN5612	200p
AN5613	200p
AN5615	300p
AN5620	250p
AN5622	275p
AN5625	400p
AN5712	180p
AN5722	140p
AN5730	160p
AN5732	120p
AN5753	130p
AN5763	450p
AN5790	240p
AN5791	225p
AN5836	450p
AN5900	130p
AN6135	120p
AN6247	200p
AN6270	400p
AN6300	600p
AN6306	380p
AN6320	180p
AN6332	320p
AN6341	200p
AN6344	440p
AN6350	610p
AN6359	500p
AN6360	320p
AN6362	400p
AN6371	350p
AN6387	480p
AN6884	200p
AN7105	170p
AN7110	75p
AN7114	120p
AN7115	110p
AN7116	90p
AN7120	100p
AN7130	75p
AN7140	170p
AN7145	195p
AN7146	210p
AN7154	180p

PLEASE PHONE US FOR TYPE NOT LISTED HERE
AS WE ARE HOLDING 10,000 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.
TV & video parts sold are replacement parts.

Access & Visa Card accepted

VISA

LINEAR ICs / JAPANESE TRANSISTORS

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
LM431	50p	STK441	680p	STK5422	375p	STR30115	275p	TA7784	250p	TDA1574	125p	TDA3586	750p	TDA8170	170p	UPC1158H	70p	2SA937	20p
LM710	45p	STK443	700p	STK5431	550p	STR30120	400p	TA8132AN	200p	TDA1576	170p	TDA3590	300p	TDA8172	250p	UPC1178H	250p	2SA939	140p
LM723	40p	STK457	470p	STK5434	570p	STR30123	450p	TA8205	250p	TDA1578A	210p	TDA3591	360p	TDA8173	280p	UPC1180C	200p	2SA940	50p
LM741DIL	18p	STK459	560p	STK5436	500p	STR30125	550p	TA8210	300p	TDA1579	200p	TDA3592A	350p	TDA8174	300p	UPC1185H2	400p	2SA942	60p
LM741MET	45p	STK460	660p	STK5441	400p	STR30130	250p	TA8215	300p	TDA1596	200p	TDA3640	350p	TDA8175	300p	UPC1186	80p	2SA949	70p
LM747	55p	STK461	620p	STK5451	390p	STR40090	350p	TA8216H	375p	TDA1598	250p	TDA3651	200p	TDA8178	400p	UPC1187	150p	2SA950	18p
LM1889	300p	STK463	950p	STK5461	500p	STR41090	400p	TA8227	250p	TDA1600	275p	TDA3652	500p	TDA8185	300p	UPC1188H	350p	2SA952	50p
LM1894N	200p	STK465	720p	STK5462	500p	STR44115	550p	TA8691N	550p	TDA1670A	230p	TDA3652TX10	800p	TDA8190	200p	UPC1197	140p	2SA953	60p
LM3900	40p	STK501	550p	STK5464	300p	STR45111	550p	TA8718N	550p	TDA1675	250p	TDA3653	150p	TDA8191	425p	UPC1198H	200p	2SA954	75p
LM3909	100p	STK561	450p	STK5466	500p	STR50020	450p	TAA550	25p	TDA1701	300p	TDA3654	90p	TDA8192	275p	UPC1222	130p	2SA958	60p
LM3914	160p	STK563	415p	STK5467	400p	STR50092	550p	TBA120S	40p	TDA1771	250p	TDA3710	300p	TDA8196	150p	UPC1225H	220p	2SA963	120p
LM3915	160p	STK583	500p	STK5468	300p	STR50103A	260p	TBA396	70p	TDA1870A	200p	TDA3720	175p	TDA8214B	225p	UPC1230	150p	2SA965	40p
LM3916	270p	ST*760	600p	STK5471	330p	STR50113	500p	TBA520	120p	TDA1872A	275p	TDA3724	500p	TDA8215B	300p	UPC1238	120p	2SA966	35p
L200	200p	STK770	400p	STK5473	480p	STR50115	500p	TBA530	100p	TDA1904	80p	TDA3725	500p	TDA8303	350p	UPC1270H	250p	2SA968	55p
M491BB1	500p	STK772B	480p	STK5476	350p	STR51041	500p	TBA540	90p	TDA1905	80p	TDA3730	400p	TDA8304	600p	UPC1274V	250p	2SA970	25p
M494B1	700p	STK780	575p	STK5478	380p	STR50213	500p	TBA560	90p	TDA1908A	90p	TDA3740	480p	TDA8305	500p	UPC1277	240p	2SA979	35p
M50115P	320p	STK1039	460p	STK5479	300p	STR53041	500p	TBA800	40p	TDA1910	225p	TDA3750	400p	TDA8340	200p	UPC1278	240p	2SA984	25p
M50117P	500p	STK1040	640p	STK5481	520p	STR54041	350p	TBA810AS	40p	TDA1940	180p	TDA3760	350p	TDA8341	250p	UPC1288V	230p	2SA985	60p
M50119P	525p	STK1049	700p	STK5482	285p	STR55041	500p	TBA820	55p	TDA1941	300p	TDA3771	460p	TDA8380	200p	UPC1298V	320p	2SA988	25p
M50784	300p	STK1050	650p	STK5483	440p	STR56041	550p	TBA820M	35p	TDA1950	175p	TDA3791	300p	TDA8390A	650p	UPC1318	300p	2SA992	30p
M50786	500p	STK1060	700p	STK5486	450p	STR58041	325p	TBA920	100p	TDA2002	50p	TDA3800	350p	TDA8405	550p	UPC1335V	320p	2SA993	50p
M50790	600p	STK1070	850p	STK5488	480p	STR59041	475p	TBA950	100p	TDA2003	65p	TDA3803A	500p	TDA8415	650p	UPC1350	115p	2SA999	30p
M51161	300p	STK1080	940p	STK5490	450p	STR60001	525p	TBA990	60p	TDA2004	150p	TDA3810	200p	TDA8417	550p	UPC1363	190p	2SA1006	90p
M51381P	200p	STK2025	620p	STK5632	450p	STR61001	550p	TC5020	200p	TDA2005	150p	TDA3825	225p	TDA8421	500p	UPC1363C	300p	2SA1008	125p
M51387P	800p	STK2028	500p	STK5725	450p	STR80145	550p	TC5081AP	80p	TDA2006	70p	TDA3840	300p	TDA8425	500p	UPC1364C	350p	2SA1009	200p
M51544	150p	STK2029	480p	STK5730	450p	STR81145	600p	TC9106	500p	TDA2007	120p	TDA3843	200p	TDA8432	550p	UPC1365	250p	2SA1010	225p
M51848	150p	STK2038	700p	STK6316	300p	STRD1206	600p	TC9125BP	410p	TDA2008	100p	TDA3845	325p	TDA8433	600p	UPC1370C	300p	2SA1011	80p
M54523P	200p	STK2048	950p	STK6324B	500p	STRD1406	600p	TC9134	750p	TDA2009	160p	TDA3856	400p	TDA8440	300p	UPC1373	85p	2SA1012	85p
M54563P	200p	STK2110	550p	STK6431	850p	STRD1706	450p	TC9142	320p	TDA2010	150p	TDA3857	350p	TDA8442	200p	UPC1377C	200p	2SA1013	100p
M58484	500p	STK2125	580p	STK6722	725p	STRD1806	400p	TC9143	300p	TDA2020	120p	TDA3950	225p	TDA8443	350p	UPC1378	180p	2SA1015	15p
M51516	260p	STK2129	610p	STK6732	1000p	STRD1816	400p	TC9145	150p	TDA2030	80p	TDA4050	150p	TDA8451	400p	UPC1382	110p	2SA1018	30p
M51518	200p	STK2139	675p	STK6822	900p	STRD3035	300p	TC9148	200p	TDA2040	140p	TDA4092	350p	TDA8452	200p	UPC1384	425p	2SA1018	100p
MB3712	140p	STK2155	900p	STK6922	500p	STRD4412	500p	TC149	225p	TDA2048	600p	TDA4100	225p	TDA8453	350p	UPC1387C	250p	2SA1020	30p
MB3713	130p	STK2230	470p	STK6932	525p	STRD4512	400p	TC9150	425p	TDA2054M	110p	TDA4180	145p	TDA8490	350p	UPC1394	120p	2SA1021	35p
MB3714	270p	STK2240	740p	STK6962	275p	TA7054	190p	TC9152	425p	TDA2107	250p	TDA4190	180p	TDA8702	275p	UPC1397	350p	2SA1023	60p
MB3715	250p	STK2250	650p	STK6972	490p	TA7061	115p	TC9153	300p	TDA2148	350p	TDA4200	360p	TDA8703	500p	UPC1403CA	650p	2SA1026	90p
MB3722	280p	STK3041	370p	STK6981B	600p	TA7066	120p	TC9156	300p	TDA2151	375p	TDA4280	320p	TDA8708	900p	UPC1420CA	450p	2SA1029	60p
MB3730	160p	STK3042	375p	STK6982	600p	TA7089	300p	TC9163	375p	TDA2170	260p	TDA4282	360p	TDA8732	400p	UPC1421CA	650p	2SA1036	60p
MB3731	220p	STK3044	500p	STK7216	420p	TA7119	150p	TC9164	400p	TDA2220	200p	TDA4290	200p	TDA9045	400p	UPC1423CA	550p	2SA1037	50p
MB3756	160p	STK3062	500p	STK7217	400p	TA7120	55p	TC9172P	300p	TDA2270	250p	TDA4400	175p	TDA9080	550p	UPC1470	200p	2SA1038	40p
MB3759	200p	STK3082	550p	STK7225	500p	TA7137	60p	TCA9940	100p	TDA2320	80p	TDA4420	120p	TDA9803	180p	UPC1488H	150p	2SA1048	25p
MB8719	360p	STK3102II	530p	STK7226	600p	TA7140	100p	TCEP100	100p	TDA2501	400p	TDA4421	300p	TDA9503	150p	UPC1505C	400p	2SA1051	300p
MC1455	45p	STK3152II	900p	STK7251	500p	TA7157	100p	TD62308AP	200p	TDA2503	200p	TDA4426	170p	TDA9613	300p	UPC1514CA	200p	2SA1060	120p
MC1496	65p	STK3156	500p	STK7308	350p	TA7193	320p	TD62382	200p	TDA2504	200p	TDA4427	200p	TEA1002	650p	UPC1515CA	250p	2SA1069	150p
MC3401	45p	STK4017	405p	STK7309	400p	TA7200	200p	TD62506	200p	TDA2505	300p	TDA4431	150p	TEA1007	120p	UPC1520CA	250p	2SA1076	230p
NE555	20p	STK4019	480p	STK7310	470p	TA7205	110p	TD62705	250p	TDA2506	500p	TDA4437	300p	TEA1009	100p	UPC1536C	550p	2SA1077	300p
NE556	40p	STK4021	380p	STK7348	400p	TA7207	150p	TD6304AP	300p	TDA2510	450p	TDA4439	220p	TEA1017	280p	ZN423	100p	2SA1081	80p
NE558	80p	STK4024II	550p	STK7356	425p	TA7208	125p	TD6306P	350p	TDA2514A	500p	TDA4440	180p	TEA1019	130p	ZN424	100p	2SA1082	80p
NE565	110p	STK4025	530p	STK7358	440p	TA7214	220p	TD6350P	200p	TDA2515	450p	TDA4442	240p	TEA1024	150p	ZN425	320p	2SA1084	100p
NE567	115p	STK4026	480p	STK7402	560p	TA7217	145p	TD6359P	300p	TDA2530	450p	TDA4443	250p	TEA1045	300p	ZN426	260p	2SA1085	75p
NE571	290p	STK4028	550p	STK7404	400p	TA7220	220p	TDA1001	200p	TDA2532	120p	TDA4445	220p	TEA1060	225p	ZN427	560p	2SA1091	100p
NE592	85p	STK4032II	510p	STK7406	650p	TA7222	90p	TDA1002	200p	TDA2540	85p	TDA4450	225p	TEA1067	150p	ZN429	215p	2SA1094	190p
NE5532P	140p	STK4036	470p	STK7408	675p	TA7223	210p	TDA1003	150p	TDA2541	120p	TDA4452	250p	TEA1080P	170p	ZN459	190p	2SA1095	300p
SAA1006	300p	STK4038	680p	STK7410	900p	TA7225	300p	TDA1005A	175p	TDA2542	110p	TDA4453	275p	TEA1087	40p	ZN1040	640p	2SA1096	80p
SAA1008	450p	STK4040II	650p	STK7654	600p	TA7226	290p	TDA1010A	80p	TDA2543	210p	TDA4480	280p	TEA1101	425p	ZNA134H	2150p	2SA1102	130p
SAA1010	400p	STK4042II	800p	STK7561	650p	TA7227	170p	TDA1011	75p	TDA2545	120p	TDA4482	350p	TEA1330	650p			2SA1103	130p
SAA1024	250p	STK4044	800p	STK7562	1000p	TA7230	100p	TDA1012	120p	TDA2546A	200p	TDA4500	300p	TEA1511	150p			2SA1104	140p
SAA1025	250p	STK4046	950p	STK7563	800p	TA7232	95p	TDA1013A	110p	TDA2549	300p	TDA4501	400p	TEA2000	275p	*JAPANESE TRANSISTORS*		2SA1105	250p
SAA1075	350p	STK4048	1280p	STK8050	750p	TA7233	120p	TDA1015	85p	TDA2555	175p	TDA4502	550p	TEA2014A	80p			2SA1106	160p
SAA1124	200p	STK4060	510p	STK8250	500p	TA7237	300p	TDA1016	140p	TDA2556	230p	TDA4503	300p	TEA2018A	200p	2SA473	29p	2SA1111	90p
SAA1250	280p	STK4065	650p	STK8260	1200p	TA7238	400p	TDA1020	110p	TDA2557	225p	TDA4505	300p	TEA2114	200p	2SA490	45p	2SA1112	150p
SAA1251	380p	STK4101	500p	STK8280	1850p	TA7240	160p	TDA1022	330p	TDA2558	500p	TDA4510	270p	TEA2117	450p	2SA496	30p	2SA1115	30p
SAA1274	280p	STK4111	500p	STK73410	350p	TA7241	165p	TDA1023	130p	TDA2575A	100p	TDA4555	400p	TEA5114A	200p	2SA505	120p	2SA1123	40p
SAA1293	550p	STK4112	500p	STK73410II	500p	TA7242	190p	TDA1024	150p	TDA2577A	200p	TDA4556	370p	TL431	45p	2SA509	35p	2SA1124	60p
SAA3004	400p	STK4121	480p	STK73605	375p	TA7243	320p	TDA1025	320p	TDA2578A	200p	TDA4557	450p	TL061	40p	2SA537	170p	2SA1127	50p
SAA5000	200p	STK4122	560p	STR370	300p	TA7245	225p	TDA1028	175p	TDA2579A	250p	TDA4560	270p	TL064	80p	2SA544	650p	2SA1133	120p
SAA5010	220p	STK4131	600p	STR371	400p	TA7267	220p	TDA1029	200p	TDA2582	130p	TDA4600	140p	TL071	38p	2SA550	150p	2SA1141	200p
SAA5012	400p	STK4132II	600p	STR380	350p	TA7269	260p	TDA1035	160p	TDA2590	170p	TDA4600II	160p	TL074	80p	2SA562	30p	2SA1142	100p
SAA5020	350p	STK4141II	420p	STR381	390p	TA7270	170p	TDA1041E	250p	TDA2593	110p	TDA4601	120p	TL083	55p	2SA671	650p	2SA1145	40p
SAA5030	440p	STK4142	530p	STR383	410p	TA7271	220p	TDA1041P	180p	TDA2594	300p	TDA4605	220p	TL084	70p	2SA603	100p	2SA1152	150p
SAA5040A	280p	STK4151	680p	STR384	350p	TA7272	260p	TDA1044	110p	TDA2595	200p	TDA4610	370p	TMS1000-041	400p	2SA606	200p	2SA1156	90p
SAA5040B	400p	STK4152	650p	STR440	700p	TA7273	300p	TDA1047	200p	TDA2600	250p	TDA4660	370p	TMS1000NLPM	200p	2SA608	15p	2SA1162	30p
SAA5050	650p	STK4161	650p	STR450	520p	TA7274	210p	TDA1048	200p	TDA2611A	100p	TDA4800	350p	TMS4100-233	400p	2SA614	150p	2SA1169	500p
SAA5231	300p	STK4162	550p	STR541	600p	TA7280	190p	TDA1053	300p	TDA2630	300p	TDA4935	300p	TMS8024	300p	2SA634	50p	2SA1170	500p
SAA5243PE	800p	STK4171	750p	STR452	600p	TA7281	200p	TDA1054	180p	TDA2640	220p	TDA4940	325p	TMS1025	350p	2SA636	50p	2SA1176	30p
SAB3013	200p	STK4172II	680p	STR453	500p	TA7282	160p	TDA1059B	40p	TDA2653A	225p	TDA4950	120p	TMS3617NS	350p	2SA640	60p	2SA1184	120p
SAB3035	600p	STK4181	680p	STR454	400p	TA7283	200p	TDA1060	140p	TDA2654	200p	TDA5330T	300p	TMS3701BN	300p	2SA642	50p	2SA1186	500p
STA301A	200p	STK4182II	750p	STR455	500p	TA7288	220p	TDA1062	140p	TDA2670	150p	TDA5600	450p	TMS3712	350p	2SA673	15p	2SA1198	40p
STA401A	220p	STK4191	700p	STR456	470p	TA7299	200p	TDA1072	150p	TDA2690	100p	TDA5660P	250p	TMS3891	550p	2SA677	35p	2SA1206	60p
STA403A	270p	STK4192	700p	STR457	600p	TA7310	100p	TDA1074	280p	TDA2730	200p	TDA5700	200p	TPU2732	1200p	2SA678	26p	2SA1208	70p
STA405A	280p	STK4231II	700p	STR470	400p	TA7312	120p	TDA1077	250p	TDA2760	400p	TDA5708	400p	TPU2735	900p	2SA683	25p	2SA1209	100p
STA431A	250p	STK4241	1050p	STR1096	275p	TA7313	70p	TDA1082	275p	TDA2780	600p	TDA5709	450p	U11B	250p	2SA684	25p	2SA1210	120p
STA432A	220p	STK4241V	1250p	STR1195	350p	TA7314	175p	TDA1083	95p	TDA2791	275p	TDA5800	600p	U21B	300p	2SA699	100p	2SA1215	600p
STA434A	270p	STK4272	500p	STR1229	325p	TA7315	200p	TDA1085	170p	TDA2795	200p	TDA5820	370p	U254B	150p	2SA708	240p	2SA1216	550p
STA435A	270p	STK4273	550p	STR2005	400p	TA7317P	120p	TDA1087	60p	TDA2822M	60p	TDA5850	175p	U318M	350p	2SA711	280p	2SA1217	100p
STA441C	220p	STK4301	500p	STR2012	400p	TA7324	75p	TDA1092	100p	TDA2840	200p	TDA6200	750p	U321M	450p	2SA715	50p	2SA1220	75p
STA456C	240p	STK4311	650p	STR2013	300p	TA7325	90p	TDA1097	475p	TDA3047	100p	TDA7000	170p	U323M	350p	2SA719	50p	2SA1232	180p
STA471	210p	STK4332	365p	STR2015	550p	TA7328	110p	TDA1151	40p	TDA3048	130p	TDA7010T	120p	U338M	300p	2SA720	20p	2SA1242	80p
STA901M	280p	STK4352	500p	STR2105	600p	TA7335	85p	TDA1154	50p	TDA3082	200p	TDA7050	200p	U420B	70p	2SA725	80p	2SA1244	120p
STK0025	420p	STK4362	450p	STR3113	225p	TA7336	180p	TDA1170	85p	TDA3083	200p	TDA7052	120p	U421B	70p	2SA726	20p	2SA1246	80p
STK0029	360p	STK4372	490p	STR3115	400p	TA7341	250p	TDA1180	120p	TDA3190	100p	TDA7053	200p	U664B	175p	2SA733	15p	2SA1249	100p
STK0039	600p	STK4392	500p	STR3123	400p	TA7343	120p	TDA1180A	190p	TDA3300B	480p	TDA7056	200p	U2401B	125p	2SA747A	425p	2SA1261	150p
STK0040	520p	STK4432	600p	STR3125	480p	TA7357	340p	TDA1190	80p	TDA3301B	280p	TDA7072	175p	U2829B	130p	2SA748	60p	2SA1262	110p
STK0049	510p	STK4773	820p	STR3135	250p	TA7358	85p	TDA1200B	80p	TDA3310	120p	TDA7077	175p	U4606B	600p	2SA764	200p	2SA1263	280p
STK0050	440p	STK4793	800p	STR3212	275p	TA7401	250p	TDA1220	75p	TDA3330	500p	TDA7211	150p	UC3842N	125p	2SA769	80p	2SA1264	280p
STK0059	620p	STK4803	640p	STR3214	275p	TA7607	200p	TDA1235	300p	TDA3410	150p	TDA7220	100p	UC3844	100p	2SA770	200p	2SA1265	200p
STK0060	820p	STK4813	860p	STR3215	275p	TA7608	360p	TDA1236	240p	TDA3420	200p	TDA7222	200p	ULN2002	70p	2SA771	90p	2SA1283	50p
STK0070	1100p	STK4833	780p	STR3315	275p	TA7609	170p	TDA1251	150p	TDA3501	340p	TDA7230A	225p	ULN2003	69p	2SA777	35p	2SA1284	60p
STK0080	580p	STK4843	720p	STR4090A	650p	TA7611	210p	TDA1270	150p	TDA3502	450p	TDA7233	150p	ULN2068	270p	2SA778	100p	2SA1286	60p
STK011	330p	STK4853	720p	STR4142	450p	TA7612	300p	TDA1327	200p	TDA3504	300p	TDA7240	175p	ULN2804	170p	2SA781	150p	2SA1290	150p
STK015	440p	STK4863	780p	STR4211	370p	TA7614	170p	TDA1410	220p	TDA3505	275p	TDA7241	250p	UPC20C	220p	2SA786	25p	2SA1294	450p
STK016	760p	STK4873	840p	STR4512	400p	TA7616	300p	TDA1412	35p	TDA3506	260p	TDA7250	500p	UPC554	130p	2SA794	50p	2SA1295	500p
STK025	650p	STK4893	1040p	STR5015	500p	TA7621	300p	TDA1510	170p	TDA3507	450p	TDA7255	500p	UPC555	60p	2SA798	30p	2SA1301	260p
STK050	1600p	STK4913	900p	STR5100	550p	TA7622	420p	TDA1512	180p	TDA3510	350p	TDA7256	600p	UPC556H	80p	2SA814	60p	2SA1302	300p
STK077	520p	STK5314	475p	STR5214	475p	TA7628	110p	TDA1514A	450p	TDA3520	650p	TDA7272	170p	UPC571	220p	2SA817	20p	2SA1303	400p
STK078	580p	STK5315	540p	STR5315	575p	TA7629	220p	TDA1515A	200p	TDA3530	350p	TDA7273	80p	UPC574	60p	2SA836	20p	2SA1304	110p
STK080	550p	STK5322	580p	STR5412	350p	TA7630	200p	TDA1516Q	350p	TDA3540	200p	TDA7274	60p	UPC575C2	90p	2SA839	110p	2SA1306	110p
STK082	540p	STK5324	450p	STR6020	325p	TA7632	400p	TDA1517	250p	TDA3541	175p	TDA7275	75p	UPC577	64p	2SA844	20p	2SA1307	100p
STK084	600p	STK5325	370p	STR9005	400p	TA7640	90p	TDA1519	200p	TDA3560	260p	TDA7284	100p	UPC592	95p	2SA872	25p	2SA1309	50p
STK085	900p	STK5331	300p	STR9012	450p	TA7641	140p	TDA1519A	200p	TDA3561	300p	TDA7350	650p	UPC595	190p	2SA872A	50p	2SA1315	100p
STK086	800p	STK5332	180p	STR10006	450p	TA7658	100p	TDA1520	275p	TDA3561A	300p	TDA7359	300p	UPC596	190p	2SA886	45p	2SA1317	30p
STK0100	900p	STK5333	500p	STR11006	400p	TA7668	100p	TDA1521	250p	TDA3562	260p	TDA7360	700p	UPC1001	220p	2SA899	40p	2SA1318	20p
STK0100II	1200p	STK5335	350p	STR12006	450p	TA7680AP	225p	TDA1522	110p	TDA3562TFK	300p	TDA7770	225p	UPC1018	170p	2SA907	650p	2SA1321	80p
STK420	400p	STK5337	500p	STR13006	500p	TA7688	150p	TDA1524	200p	TDA3563	350p	TDA8114	225p	UPC1020	200p	2SA909	500p	2SA1329	200p
STK430	500p	STK5338	295p	STR15006	500p	TA7698	450p	TDA1540	420p	TDA3564	325p	TDA8115	200p	UPC1023	66p	2SA913	100p	2SA1346	20p
STK433	400p	STK5339	400p	STR16006	500p	TA7699	600p	TDA1541	750p	TDA3565	275p	TDA8140	200p	UPC1026	230p	2SA916	30p	2SA1352	100p
STK435	375p	STK5342	295p	STR20005	450p	TA7705	300p	TDA1542	250p	TDA3566	280p	TDA8143	166p	UPC1026	95p	2SA921	40p	2SA1353	100p
STK436	430p	STK5361	324p	STR20012	450p	TA7750	200p	TDA1543	300p	TDA3567	350p	TDA8145	120p	UPC1028	90p	2SA933	30p	2SA1356	100p
STK437	460p	STK5372	294p	STR20015	450p	TA7757	200p	TDA1571	300p	TDA3570	375p	TDA8153	250p	UPC1031H	150p	2SA934	30p	2SA1358	130p
STK439	500p	STK5421	458p	STR30110	400p	TA7769	130p	TDA1572	175p	TDA3580	400p	TDA8160	125p	UPC1032	60p	2SA935	40p	2SA1370	100p

JAPANESE TRANSISTORS

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
2SA1371	100p	2SC1008	20p	2SC1730	10p	2SC2270	60p	2SC2750	300p	2SC3277	280p	2SC3893	225p	2SD836A	60p	2SD1279	600p	2SD1815	100p
2SA1380	75p	2SC1010	225p	2SC1735	70p	2SC2271	30p	2SC2751	270p	2SC3280	200p	2SC3895	400p	2SD837	55p	2SD1288	175p	2SD1825	60p
2SA1381	100p	2SC1012	75p	2SC1739	800p	2SC2274	15p	2SC2752	140p	2SC3281	200p	2SC3897	650p	2SD838	300p	2SD1289	250p	2SD1843	100p
2SA1382	120p	2SC1013	170p	2SC1740	10p	2SC2275	50p	2SC2767	300p	2SC3284	600p	2SC3907	250p	2SD841	110p	2SD1291	400p	2SD1846	350p
2SA1385	180p	2SC1014	140p	2SC1741	35p	2SC2278	70p	2SC2769	400p	2SC3293	85p	2SC3927	250p	2SD844	200p	2SD1292	60p	2SD1849	325p
2SA1386	400p	2SC1030	150p	2SC1755	90p	2SC2290	1800p	2SC2773	700p	2SC3298	50p	2SC3950	120p	2SD845	250p	2SD1297	300p	2SD1850	325p
2SA1423	30p	2SC1047	20p	2SC1756	35p	2SC2291	40p	2SC2774	500p	2SC3299	120p	2SC3953	60p	2SD850	170p	2SD1302	20p	2SD1858	40p
2SA1489	300p	2SC1050	280p	2SC1758	30p	2SC2295	60p	2SC2785	60p	2SC3300	400p	2SC3973	210p	2SD856	48p	2SD1308	80p	2SD1877	250p
2SA1491	300p	2SC1060	70p	2SC1775	10p	2SC2298	35p	2SC2786	20p	2SC3303	100p	2SC3987	220p	2SD858	250p	2SD1309	140p	2SD1878	230p
2SA1493	500p	2SC1061	85p	2SC1781	20p	2SC2307	500p	2SC2787	10p	2SC3306	130p	2SC3996	1200p	2SD863	23p	2SD1310	140p	2SD1879	275p
2SA1516	280p	2SC1070	65p	2SC1789	100p	2SC2308	10p	2SC2791	500p	2SC3307	600p	2SC4006	100p	2SD864	200p	2SD1313	1000p	2SD1884	300p
2SA1535	175p	2SC1096	40p	2SC1809	40p	2SC2312	300p	2SC2792	220p	2SC3309	150p	2SC4020	280p	2SD866	120p	2SD1326	200p	2SD1886	450p
2SB324	40p	2SC1098	120p	2SC1810	250p	2SC2314	70p	2SC2793	700p	2SC3316	280p	2SC4023	325p	2SD866A	140p	2SD1328	60p	2SD1887	450p
2SB546	45p	2SC1106	180p	2SC1815	10p	2SC2316	150p	2SC2808	40p	2SC3317	350p	2SC4056	350p	2SD868	260p	2SD1347	70p	2SD1910	280p
2SB561	50p	2SC1115	280p	2SC1819	70p	2SC2320	10p	2SC2810	360p	2SC3323	480p	2SC4106	200p	2SD870	190p	2SD1348	65p	2SD1911	300p
2SB562	25p	2SC1116	290p	2SC1826	60p	2SC2324	120p	2SC2812	40p	2SC3327	60p	2SC4123	450p	2SD871	300p	2SD1350	150p	2SD1913	50p
2SB566	90p	2SC1124	270p	2SC1827	60p	2SC2329	480p	2SC2814	40p	2SC3331	25p	2SC4124	250p	2SD879	60p	2SD1376	125p	2SD1929	60p
2SB595	55p	2SC1161	110p	2SC1829	500p	2SC2331	50p	2SC2824	75p	2SC3333	120p	2SC4169	60p	2SD880	40p	2SD1379	100p	2SD1939	75p
2SB596	50p	2SC1162	30p	2SC1833	40p	2SC2333	200p	2SC2825	900p	2SC3345	100p	2SC4236	550p	2SD882	25p	2SD1380	100p	2SD1941	500p
2SB598	30p	2SC1164	600p	2SC1834	50p	2SC2334	80p	2SC2826	200p	2SC3352	200p	2SC4237	650p	2SD892A	100p	2SD1384	50p	2SD1959	280p
2SB600	500p	2SC1165	750p	2SC1844	50p	2SC2335	75p	2SC2827	200p	2SC3353	280p	2SC4242	170p	2SD894	35p	2SD1390	350p	2SD1961	50p
2SB646	40p	2SC1166	100p	2SC1845	15p	2SC2344	150p	2SC2832	300p	2SC3355	50p	2SC4301	550p	2SD895	200p	2SD1391	250p	2SD1978	50p
2SB647	20p	2SC1170	180p	2SC1846	35p	2SC2347	60p	2SC2834	400p	2SC3356	120p	2SC4742	275p	2SD896	200p	2SD1392	150p	2SD1984	450p
2SB648	45p	2SC1172	150p	2SC1847	45p	2SC2353	120p	2SC2837	250p	2SC3358	50p	2SC4769	300p	2SD900	400p	2SD1395	150p	2SD2012	50p
2SB649	35p	2SC1173	40p	2SC1855	85p	2SC2360	120p	2SC2839	40p	2SC3361	50p	2SD198	140p	2SD905	450p	2SD1396	120p	2SD2125	225p
2SB688	90p	2SC1195	210p	2SC1856	25p	2SC2361	150p	2SC2853	70p	2SC3376	300p	2SD199	195p	2SD916	130p	2SD1397	120p	2SD2333	300p
2SB703	90p	2SC1212	35p	2SC1865	700p	2SC2362	50p	2SC2877	120p	2SC3377	50p	2SD200	180p	2SD917	300p	2SD1398	120p	2SJ48	425p
2SB705	200p	2SC1213	15p	2SC1870	700p	2SC2365	280p	2SC2878	20p	2SC3378	120p	2SD201	260p	2SD921	320p	2SD1399	300p	2SJ49	425p
2SB707	200p	2SC1214	15p	2SC1875	220p	2SC2369	100p	2SC2879	3200p	2SC3383	80p	2SD257	195p	2SD923	360p	2SD1400	280p	2SJ50	425p
2SB716	20p	2SC1215	25p	2SC1881	70p	2SC2371	25p	2SC2883	60p	2SC3387	550p	2SD313	25p	2SD946	120p	2SD1402	150p	2SJ56	700p
2SB718	60p	2SC1216	200p	2SC1890	15p	2SC2373	210p	2SC2898	200p	2SC3393	80p	2SD315	75p	2SD947	100p	2SD1406	60p	2SJ74	60p
2SB727	200p	2SC1222	15p	2SC1904	125p	2SC2383	50p	2SC2899	50p	2SC3399	50p	2SD325	30p	2SD950	300p	2SD1407	60p	2SJ75	280p
2SB754	80p	2SC1226	75p	2SC1906	15p	2SC2389	45p	2SC2909	60p	2SC3400	35p	2SD330	65p	2SD951	290p	2SD1408	125p	2SJ76	220p
2SB755	310p	2SC1252	850p	2SC1907	20p	2SC2407	110p	2SC2911	80p	2SC3401	50p	2SD348	300p	2SD957A	520p	2SD1409	170p	2SJ77	350p
2SB772	25p	2SC1278	110p	2SC1909	250p	2SC2408	120p	2SC2912	120p	2SC3402	40p	2SD357	40p	2SD958	60p	2SD1412	75p	2SJ79	225p
2SB774	50p	2SC1279	30p	2SC1913	90p	2SC2412K	50p	2SC2921	650p	2SC3409	400p	2SD358	40p	2SD965	35p	2SD1413	60p	2SJ103	75p
2SB775	100p	2SC1306	90p	2SC1921	15p	2SC2440	200p	2SC2922	480p	2SC3412	800p	2SD371	240p	2SD970	170p	2SD1415	190p	2SJ108	60p
2SB791	280p	2SC1308K	350p	2SC1923	10p	2SC2458	10p	2SC2928	550p	2SC3416	30p	2SD380	650p	2SD973	60p	2SD1417	125p	2SJ115	525p
2SB795	60p	2SC1312	40p	2SC1929	180p	2SC2459	50p	2SC2929	280p	2SC3417	90p	2SD381	50p	2SD973A	70p	2SD1425	260p	2SJ117	550p
2SB825	135p	2SC1317	15p	2SC1940	110p	2SC2470	65p	2SC2934	75p	2SC3419	120p	2SD386	150p	2SD985	120p	2SD1426	160p	2SJ119	700p
2SB861	110p	2SC1318	10p	2SC1941	27p	2SC2481	120p	2SC2937	250p	2SC3420	80p	2SD389	60p	2SD986	120p	2SD1427	180p	2SJ161	650p
2SB882	180p	2SC1325	400p	2SC1942	350p	2SC2482	20p	2SC2938	235p	2SC3422	75p	2SD400	14p	2SD1012	40p	2SD1428	220p	2SJ162	680p
2SB886	90p	2SC1327	20p	2SC1944	350p	2SC2483	120p	2SC2939	400p	2SC3423	60p	2SD401	50p	2SD1020	40p	2SD1429	410p	2SK19	45p
2SB950	180p	2SC1328	15p	2SC1945	1500p	2SC2484	185p	2SC2944	300p	2SC3446	150p	2SD402	120p	2SD1021	120p	2SD1430	280p	2SK40	50p
2SB951	190p	2SC1342	15p	2SC1947	450p	2SC2491	200p	2SC2958	50p	2SC3447	200p	2SD415	55p	2SD1022	400p	2SD1431	400p	2SK49	50p
2SB1009	110p	2SC1345	15p	2SC1957	70p	2SC2495	1900p	2SC2962	800p	2SC3456	200p	2SD424	350p	2SD1024	130p	2SD1432	400p	2SK55	100p
2SB1077	180p	2SC1346	100p	2SC1959	10p	2SC2498	50p	2SC2979	160p	2SC3457	125p	2SD426	150p	2SD1030	75p	2SD1433	750p	2SK68	100p
2SB1109	100p	2SC1358	270p	2SC1967	1300p	2SC2500	25p	2SC2987	250p	2SC3459	180p	2SD427	350p	2SD1031	70p	2SD1438	140p	2SK73	75p
2SC182	75p	2SC1359	15p	2SC1969	160p	2SC2502	200p	2SC2988	150p	2SC3460	180p	2SD438	35p	2SD1046	200p	2SD1439	165p	2SK106	40p
2SC372	25p	2SC1360	70p	2SC1970	100p	2SC2519	60p	2SC2995	60p	2SC3461	350p	2SD467	15p	2SD1047	180p	2SD1441	280p	2SK107	40p
2SC380	10p	2SC1364	25p	2SC1971	400p	2SC2527	300p	2SC2999	50p	2SC3466	225p	2SD468	15p	2SD1051	130p	2SD1445	200p	2SK118	50p
2SC382	50p	2SC1383	25p	2SC1972	600p	2SC2534	150p	2SC3001	1400p	2SC3468	70p	2SD471	20p	2SD1060	130p	2SD1450	60p	2SK125	100p
2SC388A	60p	2SC1384	20p	2SC1973	150p	2SC2535	300p	2SC3012	300p	2SC3481	300p	2SD525	50p	2SD1062	150p	2SD1451	260p	2SK133	650p
2SC394	60p	2SC1393	20p	2SC1983	75p	2SC2538	100p	2SC3019	320p	2SC3482	275p	2SD526	70p	2SD1063	200p	2SD1452	350p	2SK134	415p
2SC403	25p	2SC1394	15p	2SC1984	150p	2SC2540	1900p	2SC3025	500p	2SC3486	275p	2SD545	18p	2SD1064	250p	2SD1453	140p	2SK135	415p
2SC454	15p	2SC1398	55p	2SC1985	100p	2SC2542	300p	2SC3026	550p	2SC3502	100p	2SD549	120p	2SD1065	160p	2SD1455	250p	2SK147	160p
2SC458	10p	2SC1400	50p	2SC1986	100p	2SC2545	55p	2SC3030	300p	2SC3503	50p	2SD551	300p	2SD1069	150p	2SD1457	165p	2SK150	150p
2SC460	10p	2SC1403	500p	2SC2001	15p	2SC2546	25p	2SC3037	125p	2SC3504	120p	2SD555	500p	2SD1071	450p	2SD1459	120p	2SK163	40p
2SC461	15p	2SC1407	550p	2SC2002	15p	2SC2547	65p	2SC3038	125p	2SC3505	240p	2SD560	50p	2SD1073	350p	2SD1468	60p	2SK168	40p
2SC495	45p	2SC1413	150p	2SC2003	20p	2SC2550	50p	2SC3039	80p	2SC3506	250p	2SD571	20p	2SD1088	150p	2SD1479	200p	2SK176	800p
2SC496	25p	2SC1419	50p	2SC2004	20p	2SC2551	70p	2SC3040	260p	2SC3507	650p	2SD575	530p	2SD1094	520p	2SD1487	225p	2SK192	45p
2SC497	85p	2SC1429	50p	2SC2021	10p	2SC2552	60p	2SC3042	300p	2SC3509	750p	2SD600	30p	2SD1110	225p	2SD1491	100p	2SK195	150p
2SC515	100p	2SC1444	275p	2SC2022	110p	2SC2553	200p	2SC3057	150p	2SC3518	120p	2SD601	40p	2SD1111	20p	2SD1494	300p	2SK197	140p
2SC535	30p	2SC1446	55p	2SC2023	180p	2SC2555	120p	2SC3058	2500p	2SC3519	250p	2SD602	60p	2SD1113	225p	2SD1496	350p	2SK214	170p
2SC536	20p	2SC1447	70p	2SC2026	30p	2SC2562	90p	2SC3068	60p	2SC3531	225p	2SD612	50p	2SD1128	200p	2SD1497	230p	2SK216	200p
2SC558	275p	2SC1448	100p	2SC2027	200p	2SC2563	200p	2SC3070	35p	2SC3549	200p	2SD613	70p	2SD1133	100p	2SD1497-02	350p	2SK218	400p
2SC563	120p	2SC1449	120p	2SC2028	75p	2SC2564	230p	2SC3074	200p	2SC3552	300p	2SD636	10p	2SD1135	75p	2SD1505	120p	2SK240	140p
2SC605	100p	2SC1450	200p	2SC2029	120p	2SC2565	260p	2SC3075	150p	2SC3568	200p	2SD637	15p	2SD1138	50p	2SD1507	60p	2SK312	750p
2SC619	100p	2SC1454	250p	2SC2037	50p	2SC2568	120p	2SC3077	120p	2SC3584	200p	2SD638	15p	2SD1140	40p	2SD1509	100p	2SK315	70p
2SC641	80p	2SC1470	120p	2SC2053	120p	2SC2570	30p	2SC3086	150p	2SC3595	220p	2SD639	20p	2SD1142	350p	2SD1511	100p	2SK320	120p
2SC644	10p	2SC1472	40p	2SC2055	150p	2SC2571	350p	2SC3089	130p	2SC3605	60p	2SD640	350p	2SD1148	175p	2SD1519	250p	2SK323	130p
2SC647	300p	2SC1473	15p	2SC2058	20p	2SC2577	110p	2SC3101	750p	2SC3606	100p	2SD655	18p	2SD1159	90p	2SD1521	70p	2SK386	600p
2SC681	250p	2SC1474	45p	2SC2060	60p	2SC2578	170p	2SC3112	35p	2SC3607	150p	2SD661	60p	2SD1160	150p	2SD1541	350p	2SK405	450p
2SC683	35p	2SC1475	60p	2SC2061	75p	2SC2579	110p	2SC3114	40p	2SC3636	280p	2SD666	25p	2SD1163A	220p	2SD1548	450p	2SK413	500p
2SC708	100p	2SC1505	80p	2SC2068	60p	2SC2580	175p	2SC3116	75p	2SC3657	400p	2SD667	20p	2SD1164	75p	2SD1554	170p	2SK415	500p
2SC710	15p	2SC1507	45p	2SC2071	140p	2SC2581	225p	2SC3117	120p	2SC3659	600p	2SD668	120p	2SD1168	270p	2SD1555	170p	2SK429	180p
2SC711	15p	2SC1509	35p	2SC2073	40p	2SC2588	600p	2SC3122	50p	2SC3668	120p	2SD669	35p	2SD1169	280p	2SD1556	400p	2SK511	450p
2SC730	350p	2SC1514	35p	2SC2075	60p	2SC2590	40p	2SC3148	185p	2SC3675	100p	2SD673	350p	2SD1173	350p	2SD1564	100p	2SK513	325p
2SC732	40p	2SC1515	60p	2SC2078	95p	2SC2591	50p	2SC3149	180p	2SC3678	280p	2SD676	250p	2SD1185	400p	2SD1565	75p	2SK531	350p
2SC733	15p	2SC1520	45p	2SC2085	100p	2SC2592	200p	2SC3150	125p	2SC3679	180p	2SD716	80p	2SD1186	400p	2SD1571	170p	2SK534	700p
2SC735	40p	2SC1541	110p	2SC2086	60p	2SC2603	10p	2SC3151	230p	2SC3680	380p	2SD717	180p	2SD1187	250p	2SD1572	100p	2SK537	900p
2SC738	15p	2SC1545	120p	2SC2092	100p	2SC2610	60p	2SC3152	130p	2SC3685	450p	2SD718	85p	2SD1189	55p	2SD1576	250p	2SK538	450p
2SC739	150p	2SC1567	40p	2SC2094	1200p	2SC2611	30p	2SC3153	230p	2SC3687	600p	2SD722	240p	2SD1190	150p	2SD1577	250p	2SK539	1100p
2SC761	110p	2SC1568	35p	2SC2097	2300p	2SC2621	70p	2SC3156	350p	2SC3688	550p	2SD725	270p	2SD1191	120p	2SD1579	120p	2SK555	400p
2SC762	150p	2SC1569	55p	2SC2099	2500p	2SC2625	190p	2SC3157	200p	2SC3692	150p	2SD734	15p	2SD1192	90p	2SD1589	60p	2SK556	500p
2SC783	85p	2SC1570	40p	2SC2118	1100p	2SC2626	600p	2SC3158	260p	2SC3715	480p	2SD741	120p	2SD1196	150p	2SD1590	100p	2SK557	400p
2SC790	50p	2SC1571	50p	2SC2120	10p	2SC2631	20p	2SC3159	200p	2SC3717	120p	2SD743	130p	2SD1197	150p	2SD1591	310p	2SK566	475p
2SC792	380p	2SC1573	25p	2SC2131	550p	2SC2634	10p	2SC3164	350p	2SC3729	450p	2SD756	100p	2SD1207	40p	2SD1593	125p	2SK695	550p
2SC805	225p	2SC1580	600p	2SC2141	60p	2SC2636	40p	2SC3169	150p	2SC3746	100p	2SD757	120p	2SD1210	280p	2SD1595	160p	2SK719	300p
2SC828	20p	2SC1583	25p	2SC2153	40p	2SC2637	120p	2SC3170	300p	2SC3747	120p	2SD758	140p	2SD1211	120p	2SD1608	210p	2SK724	600p
2SC829	15p	2SC1586	540p	2SC2166	80p	2SC2640	1800p	2SC3173	180p	2SC3752	250p	2SD762	100p	2SD1218	75p	2SD1609	70p	2SK725	600p
2SC839	20p	2SC1617	340p	2SC2168	120p	2SC2653	100p	2SC3175	150p	2SC3781	150p	2SD763	140p	2SD1223	75p	2SD1632	500p	2SK727	1200p
2SC870	100p	2SC1623	50p	2SC2188	70p	2SC2654	180p	2SC3178	175p	2SC3783	600p	2SD768	180p	2SD1225	120p	2SD1637	50p	2SK735	600p
2SC898	275p	2SC1624	60p	2SC2200	250p	2SC2655	75p	2SC3179	70p	2SC3787	100p	2SD772	200p	2SD1227	40p	2SD1647	40p	2SK758	300p
2SC930	15p	2SC1626	55p	2SC2221	650p	2SC2656	550p	2SC3181	200p	2SC3789	75p	2SD773	20p	2SD1229	250p	2SD1649	260p	2SK787	1100p
2SC941	15p	2SC1627	15p	2SC2228A	60p	2SC2660	100p	2SC3182	120p	2SC3790	120p	2SD774	30p	2SD1237	300p	2SD1650	180p	2SK794	500p
2SC943	160p	2SC1628	75p	2SC2229	15p	2SC2665	200p	2SC3199	40p	2SC3795	175p	2SD777	400p	2SD1246	20p	2SD1651	150p	2SK872	650p
2SC944	140p	2SC1634	50p	2SC2230	80p	2SC2668	10p	2SC3209	120p	2SC3798	220p	2SD784	650p	2SD1247	40p	2SD1663	450p	2SK903	500p
2SC945	10p	2SC1669	100p	2SC2233	100p	2SC2671	100p	2SC3210	550p	2SC3807	120p	2SD786	100p	2SD1248	270p	2SD1666	90p	2SK1057	600p
2SC950	40p	2SC1674	15p	2SC2235	60p	2SC2681	170p	2SC3211	220p	2SC3811	80p	2SD787	20p	2SD1251	180p	2SD1667	120p	2SK1058	800p
2SC959	225p	2SC1675	90p	2SC2236	20p	2SC2682	70p	2SC3212	260p	2SC3832	200p	2SD788	30p	2SD1263	90p	2SD1668	120p	2SK1117	250p
2SC980	40p	2SC1678	80p	2SC2237	540p	2SC2688	27p	2SC3225	50p	2SC3833	250p	2SD789	20p	2SD1264	55p	2SD1677	300p	2SK1118	225p
2SC982	20p	2SC1683	100p	2SC2238	45p	2SC2690	75p	2SC3244	45p	2SC3853	220p	2SD792	400p	2SD1265	75p	2SD1730	350p	3SK45	100p
2SC983	120p	2SC1684	30p	2SC2240	15p	2SC2705	50p	2SC3246	50p	2SC3854	250p	2SD794	33p	2SD1266	180p	2SD1732	400p	3SK51	100p
2SC1000	20p	2SC1685	30p	2SC2258	30p	2SC2710	50p	2SC3259	350p	2SC3855	220p	2SD795A	140p	2SD1267	55p	2SD1739	275p	3SK59	100p
2SC1001	950p	2SC1729	900p	2SC2259	60p	2SC2712	20p	2SC3260	220p	2SC3857	500p	2SD811	450p	2SD1271	55p	2SD1740	125p	3SK74	50p
						2SC2716	50p	2SC3261	230p	2SC3858	550p	2SD819	200p	2SD1271A	225p	2SD1748	90p	3SK77	50p
						2SC2719	25p	2SC3262	280p	2SC3870	200p	2SD820	250p	2SD1272	200p	2SD1760	80p	3SK81	50p
						2SC2721	120p	2SC3263	280p	2SC3883	280p	2SD821	550p	2SD1273	50p	2SD1762	50p	3SK85	160p
						2SC2738	200p	2SC3264	390p	2SC3884A	300p	2SD822	290p	2SD1275	50p	2SD1773	160p	3SK88	70p
						2SC2740	450p	2SC3269	50p	2SC3886A	400p	2SD826	30p	2SD1276	60p	2SD1783	100p	3SK121	150p
						2SC2749	350p	2SC3270	50p	2SC3890	150p	2SD836	60p	2SD1277	190p	2SD1796	180p		

SEE OTHER PAGES FOR MORE GRANDATA BARGAINS

REPLACEMENT VIDEO HEADS

Model	Price
AIWA	
AV66/AV77	1200p
G700	1100p
G900	1500p
AKAI	
VS105, 112, 115, 116, 125, 126, 201, 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8, VSP82	1350p
VP7100, VS9300, VS9500, VS9800	650p
VP77, VP88, VP7100, VP7206, VS9700, VS9800	1400p
VS1, VS2, VS3, VS4, VS5, VS10, VSP1	1350p
VS33, VS35, VS37, VS38, VS53, VS55, VS66, VS765, VS767, VS768	2400p
VS512, VS515, VS516	2800p
VS465	2600p
VS11, VS12	1400p
VS6, VS8, VS9	2400p
VSX9	2500p
VSF600, VSF650	3600p
VS155, VS165	2500p
VS20, 22, 24, 25, 26, 27, 422, 426, 427, VSF10, VSP9	1400p
VSR9	1500p
VS109, VS603, VS606, VS607	2500p
VS75	2500p
ALBA	
VCR4000, VCR5000, VCR6000	1650p
AMSTRAD	
VCR4500, VCR5200, VCR9000, TVR1	1100p
VCR7000	1100p
VCR6000, 6100, 6200, 8600, 8602, 8700, DD8900, 8904, TVR4	1200p
TVR2, TVR3, VCR4600, VCR4600 MKII, VCH4700	1150p
AUTHENTIC	
N850	800p
AWA	
ATVI	800p
BAIRD	
8900, 8901, 8902, 8903, 8906, 8922, 8928	650p
8904, 8923, 8924, 8925, 8929, 8935, 8943, 8944	650p
8909, 8912	800p
8930, 8931, 8933, 8940	800p
8942	2300p
8945	2000p
8947, 8948	1600p
8950	1700p
VC141L	3000p
VH582	7000p
BLAUPUNKT	
RTV100, 200, 202, 211, 214, 222, 224, RTX100, 200	800p
RTV301, RTX250, RTV333	800p
RTV306, 307, 309, 311, 315, 316, 520, 707	1650p
RTV310, 311A, 312, 317, 319, 320	1100p
RTV324, RTV325	1550p
RTV328	1850p
RTV424	3500p
RTV434, RTV444	3900p
RTX260, RTX720, RTV330	2300p
RTV454, RTV740	5000p
RTV478	3700p
RTV520, RTV530	1800p
RTV535, RTV560, RTV570	2000p
RTV635, RTV660, RTV670, RTV730	3000p
CR1000, CR1200, CR1500	4650p
CR1800	4100p
RTV321, RTV322	1700p
RTV338	2800p
RTV348	2700p
RTV404, RTV414	3000p
RTV640	3000p
RTV750, RTV800, RTV900	3500p
RTV810	4400p
RTV910	4500p
BOSCH BAUER	
VRH50	1000p
VRP20	1000p
VRP25	1000p
VRP30	3350p
CANON	
VR10	1000p
VR30A, VR30B, VR30E, VR40A	3350p
DAEWOOD	
912, VCR12, VCR30, VCR32, VCR50, VCH52	1800p
VCP11 RAF	1800p
DECCA	
8300	1000p
8400, 8500	650p
DUAL	
EVR101	2300p
VR70, VR71, VR74, VR81, VR90, VR91	650p
VR85, VR96	2300p
VR97	3300p
VR80, VR92	650p
VR93	2450p
EDISON	
VC2130, 2133, 2135, 2140, 2830, 2930, 2932, 2934, 3122	650p
VK2132, VK2512	2300p
VK2436, VK2340	650p
VK2530, VK2532, VK2631, VK2541	1600p
VK2632	1700p
VK2637	3050p
VKH2545	2450p
VKH2639, VKH2439	3300p
FUNAI	
E11, 1100, VIP1000, 1400, 3000, 5000, VCR4000, 4500, 4800, 5200, VCR5600, 6400, 6600, V1, V25	1100p
VCR4600, VCR5400, VCR5800	1200p
VCR5480, 5843, 8007, VIP2500A, 3000A, 6000, 150	2000p
VCR4530, VCR6000, VCR6100, VCR6800, VCR6803	1300p
VCR8103, VCR8107	2200p
VIP300A MKII	1900p
FISHER	
FVHP420, 510, 520, 530, 615, 618, 620, 622, 710, 711, 715, 720, 721, 722, 730, 830, 905, 906, 908, 910, 911, 915, 916, 918, 5000, 5001, 5005, 5050, 5075	1150p
VBS3500, 7100, 7500, 7600, 9900, VBH330	2000p
VBS7000, VBS7100, VBS9000	2000p
FVHP500, 711, 715, 721, 722, 730, 830, 5100, FVHD720	1100p
FVHP725, 830, 980	2500p
FVHP990	2700p
FVHP975	2400p
FVHD40, FVHD140, FVHP1, FVHP10, FVHP20	1150p
FIDELITY	
HQS200, VCR600, VCR6100, VR900, VR9100	1500p
VCR100	1100p
VTR1000	1100p
GOLDSTAR	
8000 3HSSDB	1900p
GVH51, GVH122, VCP4000, VCP4100, VCP4200	1300p
GHV1232, 1233, 1241, 1242, 1243, 1244, 1245, 1246, 1290, 1291, 1295, 1296, 1891, 8210, 8215, GVHP1240, 1241, 1247, 1248, VCP400, VCP4130, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316, 4320, 4321, 4326	1300p
G.E.C.	
4000H, 4001H, 4002H	1200p
V4001H, V4004	1200p
V4005H	1500p
GRANADA	
CS1, DS2	1600p
VHSAH1	1100p
VHSAH3	2400p
VHSAN3	800p
VHSAY3	1200p
VHSBH1, VHSCH1	2100p
VHSBP1	850p
VHSBY3	2600p
VHSD52	1600p
VHSEH2	1600p
VHSEY1, VHSEY2	1400p
VHSFG2, VHSFG4	1300p
VHFS1, VHSFS2	1300p
VHSTJ1, VHSTJ2, VHSTJ3, VHSWJ3, VHSYJ2	700p
VHSVH4, VHSWH1, VHSXH1, VHSYH2	1600p
VHSWJ1, VHSXJ3	700p
GRAETZ	
4312, 4605, 4905, 4912, 4913, P4833, TR4605, TR4812, TR4905, TR4912, TR4913, TR4914, TR4943	650p
4935, 4943, 4963, 4985, 4993, TR4833, TR4935, TR4985, TR4993	650p
4920, 4927, 4930	1700p
4946, TR4906, TR4916	1600p
TR4994	2300p
TR4995	3300p
GRUNDIG	
VS410, 450, 460, 500, 505, 510, 520, 521, 530, 546	1600p
BARCELONA, MVS400, 440, 500, 600, SE5100, 6100, 6110, 9100, TVR4500, 4510, 5510, VS400, 440, 500, 505, 510, 518, 600, 610, 5180, VS6190, 700, 900	1400p
MADRID, SE5140, VS540, VS5480	3000p
MVS550, 620, VS550, 620, 630, 640, 790, 930, 940	2400p
VS120	2300p
VS680	4600p
VS160, VS740	4400p
VS170	4600p
MVS660, SE6160, VERONA, VS660, VS6690	3500p
MVS710, 720, 910, SE7120, 9120, VS710, 720, 800, 810, 910, 920	1700p
HINARI	
VXL2, 3, 4, 20, 35	1150p
VXL5, V20H	1300p
VXL6	1500p
VXL7	2200p
VXL8, 9, 10, 11, 90, VCR34H, VTV200	1300p
HITACHI	
VT11, 14, 15, 16, 30, 33, 34, 330, 340, 503, 640, 5030, VTP10, 30	1000p
VT7, VT17, VT18, VT19	2200p
VT35, VT38, VT39	2400p
VT100, 110, 111, 112, 113, 115, 118, 120, 125, 128, 220, 225, 400, 405, 410, 413, 414, 415, 418, 510, 518, 520, 525, 526, VTM625, 626, 725, 726, 728	1400p
VT3000	800p
VT4000, 4200, 5000, 5500, 5600	1100p
VT77, 680, 6500, 6700, 6800, 7000, 8000, 8030, 8040, 8100, 8300, 8500, 8700, 9000, 9300, 9500, 9700, 9900	1000p
VT8, 9, 56, 57, 570, 575, 576, 580, 585, 588	3400p
VT65	2400p
VT130, 135, 138, 145, 250, 255, 258, 420, 425, 426, 428, 430, 431, 435, 438, 535, 538, VTL30, 301, VTM630, 635, 636	2000p
VT52, VT60, VT61E, VT62E, VT63, VT64, VT640	1300p
VT168, VT150, VT260, VT498 (4 HEAD)	2600p
VT530	2500p
VT522, VTM620, VTM622, VTM720, VTM722, VTM822	1900p
VT660E	2600p
H.M.V.	
HV1000, HV2000, HV3000	650p
HV4000, HV7000, HV8000p	
I.T.T.	
VR3605, 3905, 3935, 3943, 3954, 3958, 3985, 3993, 4993	650p
VR3833, 3912, 3913, 3914, 3963, 3975, 4913, VRP3833	650p
VR3986	2000p
VP3826, 3906, 3916, 3926, 3946, 3948	1550p
VR3927	1400p
VR3976	2300p
VR3977	2700p
VR3984, VR3994	2300p
VR3995, 3997	1800p
VR3917	1400p
VR3730, VR3731, VR3749	2500p
VR3918, VR3919, VR3938	1500p
VR3520, 3701, 3719, 3720, 3721, 3759, 9720	2000p
VR3907, VR3908	1600p
VR3968	700p
J.V.C. & FERGUSON	
HR2200, 3300, 3320, 3330, 3350, 3360, 3660, 3750, 3860, 4100, 3292, 8900, 8901, 8902, 8903, 8906, 8922, 8928, 3V01, 3V06, 3V22	600p
HR3660, 7600, 7610, 7650, 7700, HRD110, 111, 120, 121, 220, 225, HRS100, 8904, 8923, 8924, 8925, 8929, 8935, 8941, 8943, 8944, 3V16, 3V23, 3V24, 3V31, 3V35, 3V36, 3V38, 3V39, 3V49	625p
BR1600, HRD140, 141, 142, 143, 150, 152, 156, 157, 158, 160, 5101, HRS10, 8947, 8948, 3V42, 3V44, 3V45, 3V46, 3V47, 3V52, 3V54, 3V55, 3V56, 3V57	1250p
HRD154, 170, 171, 210, 211, 217, 320, 321, 350, 521, 522, 525, 526, 527, 550, 8950, 8951, 3V64, 3V65, FV10, FV11, FV20, FV21, FV26	1400p
HRD565, HRD566, 3V48	2450p
HRD725, HRD755, 3V43, 3V53	3150p
8930, 8931, 8933, 8940, 3V29, 3V30	700p
8945	2400p
3V00, 8902, 8903, 8909, 8912, 8922	1000p
FV31	1500p
FV37, FV43H, HRD860	3500p
BR7000E, BR7000S	2800p
HR7200, 7300, 7350, 2650, BR6200	700p
HRD455	2000p
HRD520	1400p
HRD300, 400, 580, 600, 620, 650	2300p
HR4100	1000p
HRD750, HRD830	3300p
HRD250, HRD257	2700p
3V32, 8942, HR7655	2300p
HRD180, 190, 230, 610, 3V59, FV12L, FV20B, 26, 30, 32, 33, VC141L	2450p
HRD370, HRD430, HRD470, 3V58, FV13H	2300p
HRD530, HRD700, FV14T	3100p
GRC1, GRC2, 3V41	2800p
HRD330, 337, 440, 637, 641, 660, HRFC100, FV44L	2100p
KENWOOD	
KV901, KV903, KV905	650p
KV917	2450p
LOGIK	
VR960	1500p
VR950	1400p
LOEWE	
OC410, OC420, OC440	2400p
OC50, OC55, OC60, OC65	1500p
LUXOR	
9225, 9256	1800p
9245, 9251, 9254	1225p
9270, 9271, 9273	1800p
9272, 928217	2700p
9252	2500p
928017, 928077, 928097, 929107, 928117	1700p
9253	2500p
9281	2700p
9284, 9295, VR3701, VR3721, VR3731, VR3761	2100p
MATSUI	
VX500E, 800A, 810A, 820, 80A, 770B, 773B	1200p
VCR13, VX730, VX750	1450p
VX735, VX755, VX990	1500p
VX735A, VX765, VX850	1750p
VX600	1100p
MITSUBISHI	
HS303, HS304, HS320, HS700	1500p
HS306, HS318, HS710	1600p
HS307	2600p
HS319	2500p
HS330	2600p
HS400	2800p
HS349, HSE31, HSE32, HS831	2400p
HS411	2900p
HSE30, HSB30	2400p
HS338	2200p
HSE10, HSE11, HSE20, HSE21, HSE41, HSB10, HSB20	2200p
HS300, HS301, HS302, HS310, HS273	1550p
HS200	650p
HS337, HS347	1500p
HSE12, HSE22, MX1	2200p
HS411EZ, HS411GZ	2900p
HSB11, HSB21	2200p
HSE50	3300p
NATIONAL PANASONIC	
NV300, 322, 333, 390, 2000, 2010, 3000, 7000, 7500, 7800, 7850, 8170, 8200, 8400, 8600, 8610, 8620	625p
NV777, NV330	1500p
NV8050, NV8051	2800p
AG1000, AG1050, NV260, NV280, NV460, NV470, NV480	1600p
AG6010, AG6015	2500p
AG6840	2400p
NV100, NV200, NV370, NV380, NV630	725p
NVD80, NVH65	3900p
NVF65, NVH75	3200p
NVF51	4200p
NVG19	2300p
NVJ30, NVHJ33, NVL20, NVL21, NVG30, 31, 40, 130	1800p
NVJ35, NVG46	2500p
NVM1, NVM3, NVM5	4200p
AG2100, AG2200	700p
NV430	1100p
NV730, NV770 4 HEAD	1550p
NV366	1850p
NV180, NVD48	2300p
NV788	2900p
NV810, NV830	2600p
NV850, NV950	2750p
NV870, NV890, NV970	3600p
NVG33, NVG46, NVL23, NVL25, NVL28	2000p
NVG10, 11, 12, 14, 16, 120, NV250, 280, 450, 465	1650p
NVG18	2000p
NVG20, 21, 22, 25, 28, 200, NVD48	2200p
NVG50, NVG300	2650p
NVG45	2000p
NVH70	3600p
NV688	2400p
NV600	1600p
AG6800, AH6810	2600p
AG6100, AG6200, AG6300	2800p
NVG7, NVG9, NV230	1200p
NV780	2800p
NVG15, NVG400	2600p
NVM7, NVMC20	3800p
NVF70	5200p
N.E.C.	
N9011, 9012, 9013E, 9014E, 9014G, 9015, 9016, 901A, 902A, 9033, 9034, 9040, 9053, 9054, 9055, 9063, 9065, 9066, 906, DX1000, 1600	1300p
N911A, 914C, 915A, 916A, 917, 9110, 9120	2400p
PVC600, 740, 744, 754, 763E, 764, PV2300, 2400, 760, 794, 770, 774	1650p
N380, N381, N830, N831, N832, N833, N834, N835, N836	700p
8261, AH1 (for model DX3000), DX4000, N9610	3000p
N895	3150p
N9052, N9530, DX2000	3400p
VCP1	1700p
PVC2300, 2400, 740, 744, 760, 764	1400p
DS6000	3500p
NORDMENDE	
460, 9-460, V100, 140, 200, 250, 304, 341, 450, 550	700p
V1001, 1005, 1015, 1025, 1035, 1041, 1055, 1065, 1105, 2005	1250p
V110, V333	2000p
V101, 102, 103, 112, 141, 142, 200, 300, 301, 302, 350, 500, 3005	700p
V1205, V1215, V1235, V1248	1400p
V1305	2450p
V380	2300p
V502, V503, V5005	3150p
ORION	
VH3, VH555, VH600, VH700, VH844, VH900, VH1000 (ALL MODELS)	1100p
VH1, VH2A	700p
PHILIPS	
VR6460, VR6520, 64VR60, VR6420	725p
VR6711 4 HEAD	1800p
6920, VR6440	2500p
VR6441, VR6540, VR6541, VR6640, VR6642	1300p
RANK	
BV6900AS	1800p
N830EA, RV300, RV310, RV320, RV330, RV340, RV350, RV380	700p
REDSON	
MR100	1700p
SABA	
2A10, 2A70, 2B20	1400p
4A10, 4B20	2450p
6A10, 6A70	2300p
8A10, VR6038	3150p
CVR6083, VR600, 66007, 6608, 6009, 7006, 7007	1250p
PVR6068, 6070, 8070, VR2000, 6000, 6010, 6012, 7000, 9010	600p
VHR7000, VR5005	1500p
VR6004, 6005, 6011, 6013, 6014, 6020, 6022, 6023, 6024, 7004, 7011, 7014, 7720, 7730, 8011, 8014	700p
VR6018, VR7018	2450p
VR6028	2300p
VR7016	2000p
SAISHO	
VR100, 605, 705, 805, 905, 1000, 1100, 1200, 1600	1200p
VR3300X, VR3600X, VR3650, VR3800	1400p
VR3200, VR3500	1400p
VR2000, VR3300, VR3600	1400p
SALORA	
6500, 6600	1600p
SV7300, SV8200, SV8300, SV9200	1500p
SV7400, 8400	1600p
SV8100	1200p
SAMSUNG	
SVX301, VB900, 910, VVT510, VT320, 5600, VX510, 511, 520, 616, 626, 627, 717, 614, 619, 629, 710, 712, 728, 730, 970, 971, 972, SV716, 717, SVX303, 305, VB510, 520, 610, 616, 617, 619, 628, 626, 627, 629, 710, 971, V1520, 616, 621, 626, 900, 910	1350p
VB770, V1730, V1770, VK8220, VX750, VK770, VK8225	1900p
VM1560, VN1561	2200p
SANYO	
VTC5000, 5400, 6000, 6500, VPH5000, VTC1500, VTCM10, 11, 20, 21, 25, VTC2000, 5100, 5150, 5300, 5400, 5350, 5370, VTCNX10, VTCNX15, 20, 30, VPR5800	1800p
VTC5500, 5550, 9100, 9300, 9350, 9355, 9455, 9500	1900p
VHR1110, VHR1150, VHR1300, VHR1700, VHR2300	1300p
VHR3200, 3270, 3100, 3150, 3300, 3400, 3310, VHRD500	1500p
VHR1100, VHR1200	1500p
VHR1500, VHR2500	2100p
VHR2700	2450p
VHR7900	3000p
SHARP	
VC390, VC393, VC496	2750p
VC488	4200p
VC779	1800p
VC789, VC790	2900p
VC200, 220, 300, 381, 383, 384, 385, 386, 387, 388, 471, 477, 481, 482, 483, 486, 3300, 8381, 9100, 9300, 9400, 9500, 9600, 9700	1100p
VC582, 583, 651, 681, 750, 780, 781, 683, 684, 402, 500, 571, 573, 580, 584, 600, 682, 693, 700, 772, 7810, 782, 7822, 783, 8481	1100p
VC6000, 6200, 6300, 7300, 7700, 7750, 8000, 8300	1800p
VC793	3000p
VC473, 785, 786	2200p
VC699, VCA501, VCA602	2800p
VC585, VC685	2000p
VC90ET	3900p
VFH815	2800p
SIEMENS	
FM350, FM352, FM355, FM361, FM362, FM363	1300p
FM364	1350p
FM391, FM392, FM461	1800p
FM394, FM464	2800p
FM462, FM561	1600p
FM468	2450p
FM484, FM485, FM602, FM604, FM622, FM624	1800p
FM585	1425p
FM600	1900p
SONY	
DSR-19R (FOR SL-T9ME)	3100p
DSR-21R (FOR SLC 8-C9)	2800p
DSR-35R (FOR C20, C30, C40, SLF1UB, SLF1E) 2 PIN SLC24PS, SLC33E, SLC44PS, SLF30PF, SLF60PS, SLK85, SLT20ME, SLT30ME	1500p
DSR-43R (FOR SLC7 RANGE, SL5000, SL5100, SL3000) 1 PIN SLC6E, SL36ES, SL37E	1300p
SL3000, 8000, 8080, SLC5E, SLT7ME	1600p
SLV201, 202	2000p
SLK95, SLT50ME	2900p
SLV373VB	2600p
TOSHIBA	
V63	1500p
V9680	3400p
V8600, V8700	3000p
V21, V31, V33, V50, V51, V53, V9600	1450p
V55, V57	700p
V71, V73, V74, V75, V77, V80, V81, V82, V83, V84, V85, V86, V87	1200p
V80, V93	1450p
V5470, V5480	1300p
V600	2350p
V880MS	2600p
V700G	3700p
V500G, V509G	2500p
V9680	2900p
V300G, V301, V305, V309G	2550p
V61, V63	1700p
V110, V120, V130, V140, V210, V220	1800p
TRIUMPH	
VR9500, VR9501, VR9525	1100p
TELEFUNKEN	
A890	2700p
A920, VR1970, 2920, 2925, 2930, 410, 7921, 7926, 7931, 7970, 970	1250p
VR400, 410, 450, 510, 519, 520, 529, 540, 610, 620, 640, 920, 1920	700p
A930, 932, 935, VR2931, 2935, 2941, 3935, 4935, 4940, 4942, 4945, 5935, 7932	1400p
A935, VR3945, VR3950, VR7959	2450p
A940, VR1925, 1930, 1940, 1950, 2960, 440, 449, 530, 535, 539, 549, 550, 630, 650, 925, 930, 940, 950	700p
VR1980, VR7980, VR980	3150p
VR2915	1100p
VR2970, VR7971, VR975	2450p
VR7979	2300p
THOMSON	
TX8000, V309, 316, 320, 321, 323, 326, 4100, 4200, 4300, VX305T, 306T, 309BL, 3301, 312T, 410T, 411T	650p
TX8500, V318, 342, 343, 351, 352, 353, 4210, 4230, 4260	1250p
V333	1100p
V340	1100p
V357, VK309LP	2300p
V360, V5500	2450p
V364, V4400	2000p
V368, V6000, V8540	3150p
V410, 510, 610, 630, 715, 4240	1400p
V430, 530, 4340	2450p
V450	2300p
VK300T, VK301T, VK302T, VK303T, VK308P	650p
VM10, VM20	2700p

PINCH ROLLERS / VCR BELT KITS

Model	Price

AKAI
VS10, VS9300, VS9500, VS9700, VS9800, VP7100, VP77 200p
VS1, VS2, VS3, VS4, VS5, VS6, VS8, VS9 200p
VS105, 112, 115, 116, 126, 205, 220, 240, 244, 245, 247, 248, 250, 512, 515, 516, VSX9 200p
VS201, VS301, VS303, VS304, VS603, VS606, VS607, VP58-P82 200p
VS125, VS155, VS165, VS220, VS240, VS250, VS512 200p
VS22, 23, 25, 35, 37, 38, 53, 66, 75, 422, 425, 426, 427, 462, 465, 467, 485, 965, 967, VSA77 200p
VSF260, 261, 262, 265, 270, 274, 280, 290, 410, 440, 450, 455, 480, 490, 497, 560, 599 200p

AMSTRAD
VCR4500, 4600, 4700, 5200, 6000, 6100, 8600, 8602, 8603, 8604, 8700, 8704, 8714, 8800, 8804, 9000, 9340, DD8904, TVR1, 2, 3, 4 200p
VCR7000 200p

AIWA
AV66, AV77 200p
G700, G900 200p

ALBA
VCR3000X, VCR4000 200p
VCR5000, VCR6000 200p

AUTHENTIC
N850 200p

BLAUPUNKT
RVT100, 200, 202, 222, 224, 301, 306, 307, 309, 311, 312, 315, 316, 317, 319, 320, 328, 404, 414, 434, 444, 478, 707, RTX100 200p
RTV211, 214, 321, 322, 348, RTX250, 260 200p
RTV324, 325 200p
RTV330, 454, 520, 530, 535, 560, 660, 670, 720, 730, 740, 800, 810, 900, 910, 920 200p

DAEWOOD
VCR12, VCR32, VCR52 200p
VCR30, VCR500 200

DECCA
VR8300 200p
VRH8495DK (Pressure Roller Assembly) PS403-40205 450p

FERGUSON
3V00, 3V01, 3V16, 3V22, 3V23, 3V24, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922, 8923, 8924, 8926, 8929 200p
3V29, 3V30, 3V31, 3V32, 3V52, 8930, 8931, 8933, 8940, 8941, 8942 200p
3V35, 3V36, 3V38, 3V39, 3V42, 3V43, 3V44, 3V45, 3V48, 3V49, 3V53, 3V54, 3V55, 3V56, 3V57, 3V58, 3V59, 3V65, FV10, FV11, FV12, FV14, 8943, 8944, 8945, 8947, 8948 200p
3V52 200p
8950, 8951, FV10B, 11R, 13H, 14T, 20B, 21R, 26D, 31R, 32L, 41R, FV42L, 50B, 51R, 52L, VC141L 200p
FV44L, FV46T, FV43H 200p

FISHER
FVHP420, 520, 530 200p
FVHP615, 618, 620, 622, 710, 711, 715, 716, 720, 721, 722, 725, 730, 830, 840 200p
FVHP905, 906, 908, 910, 911, 916, 916, 918, 970, 975, 980, 990, 5000, 5005, 5050, 5075, 5100 200p
VBR330, VBS3500, 7000, 7500, 7600, 9000, 9900 200p
FVHD250, 270, 370, 2000D, FVHP3, 210, 250, 300, 310, FVSD2095 200p

FIDELITY
HQS200, VCR100, 600, 6100 200p
VTR100 200p

FUJITSU
HS760, VX715, VX720D 200p

FUNAI
V1, V2, VCR4000, 4500, 4530, 4540, 4600, 4800, 5200, 5400, 5600, 5800, 5840, 5843, 6000, 6400, 6600, 6800, 6803, 8007, 8103, VIP150, 3000, 5000, 6000 200p
VIP1000, VIP1400 200p

G.E.C.
V4004 200p

GRANADA
VHSAH1, 3, VHSVH4, VHSWH1, VHSXH1, VHSYH2 200p
VHSAN3, VHSBP1, VHSVN1, VHSVN2 200p
VHSAY3, VHSX42 200p
VHSBH1, VHSCH1, VHSFS1, VHSFS2, VHSEH2, VHSEH3 200p
VHSBY3, VHSCC1 200p
VHSDS2, VHSXN2 200p
VHSDP1, VHSFP2 (Pressure Roller Assembly) PS403-40205 450p
VHSEY1, VHSEY2, VHSFY2 200p
VHSFG2, VHSFG3, VHSFG4, VHSFH6 200p
VHSFJ2, VHSFJ4 200p
VHSF63, VBXAS1 200p

SEE OTHER PAGES FOR MORE GRANDATA BARGAINS

Model	Price

VHSTJ1, VHSTJ2, VHSTJ3 200p
VHSWJ1, VHSWJ3, VHSXJ3 200p
VBXY83 200p
VHSEH3, VHSES2 200p
VHSF34 200p
VHSFP2 200p

GRUNDIG
BARCELONA, MADRID, MVS500, 510, 600, 620, 660, 710, 720, 910, 9105, SE5110, 5140, 6100, 6110, 7120, 9100, 9120, TVR4500, 4510, 5510, VERONA, VS500, 505, 510, 520, 530, 540, 550, 600, 610, 620, 630, 640, VS650, 660, 680, 700, 710, 720, 740, 790, 800, 810, 900, 910, 920, 930, VS940, 5180, 5480, 6190, 6690 200p
MVS400, 440, 400, 410, 440, 441, 450, 456, 460 200p
VS120 200p
VS150 200p
VS180, 200, 220, 226, 262, 265, 267, 300, 310, 315, 320, 326, 345, 380 200p

GOLDSTAR
GHV51, 1221, 1232, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 8000, 8200, 8210, 8215, GHVP1240, 1241, 1247, 1248, 1290, 1291, 1295, 1296, VCP4000, 4100, 4130, 4200, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316, 4320, 4321, 4325, 4326 200p

HINARI
V20H, VXL6, VXL6, VXL7, VXL8, VXL9, VXL10, VXL11, VXL19 200p
VXL2, VXL3 200p
VXL4, VXL20, VXL35 200p

HITACHI
VT7, 11, 14, 16, 17, 19, 33, 34, 35, 38, 39, 88, 330, 680, 6500, 6800, 5000, 5500, 7000, 8000, 8300, 8500, 9300, 9500, 9700, 9900 200p
VT8, 52, 57, 61, 62, 63, 64, 65, 85, 86, 88, 100, 110, 111, 113, 115, 118, 120, 122, 125, 130, 135, 138, 145, 150, 168, 175, 220, 225, 250, 255, 258, 260, 400, 405, 410, 413, 414, 415, 418, 420, 425, 426, 428, 430, 431, 435, 438, 450, 498, 510, 518, 520, 525, 526, 576, 580, 585, 588, 640, VTD650, 665, VTF770, 775, VTL30, VTLC50, VTM620V, TM625, 826, 630, 635, 636, 640, 645, 646, 720, 722, 725, 726, 728, VTM730, 731, 735, 736, 740, 745, 746, VTS80, 85 200p
VT3000 200p

I.T.T.
VR3605, 3826, 3905, 3906, 3916, 3926, 3935, 3946, 3948, 3976, 3985, 3986, 3995, 3997, 6348 200p
VR3913, 3914, 3943, 3954, 3984, 3993, 3994 200p
VR3907 200p
VR3908 200p
VR3912, VR3963, VRP3833 200p
VR3917, VR3833 200p
VR3927, 3929, 3968 (PRESSURE ROLLER ASSEMBLY) PS403-40205 450p
SVR3799, VR3520, 3701, 3719, 3720, 3721, 3730, 3731, 3749, 3759, VR3761, 3781 200p
VR3918, 3919, 3958, 3998 200p
VR670, VR680, VR681 200p
VR3927, VR3977 200p
VR482, VR580, VR581, VR582 200p
VR9720 200p

J.V.C.
HR2200, 3300, 3330, 3360, 3660, 4100, 7700 200p
HR2650, 7200, 7300, 7350, 7600, 7610, 7650, 7655 200p
HRD110, 111, 120, 121, 140, 150, 157, 158, 160, 225, 257, 455, 565, 566, 725, 755, HRP50 200p
HRD520, 540, 550, 580, 600, 620, 637, 641, 650, 660, 830, 860, 960, HRS5800 200p
HRD170, 180, 210, 230, 300, 320, 321, 330, 337, 350, 370, 400, 430, 440, 441, 470, 500, 530, 700, 750, 950, HRS5000, 5500, 9000 200p
HRS10 200p

LOGIK
VR955 200p

LUXOR
9245, 9251 200p
8252, 8253, 8256, 8285 200p
9254 200p
9255 200p
9270, 9271, 9273, 9274 200p
9272, 928017, 928077, 928097, 928217, 929017, 929117, 929317 200p
9281, 9283, 9284, 9292, 9295, VR3701, 3721, 3731, 3761, 3781 200p

MATSUI
VX850 200p

MITSUBISHI
HS200, HS300, HS301, HS302, HS303, HS304, HS310, HS320, HS330, HS700 200p
HS306, HS307, HS318, HS319, HS337, HS338, HS347, HS349, HS400, HS410, HS411, HS412, HS421, HS710, HSB10, 20, 30, HSE10, 20, 30, 70 200p
HSE11, HSE12, HSE21, HSE22, HSE31, HSE32, HSE41, HSE51, HSE52 200p

NATIONAL PANASONIC
NV100, 180, 300, 332, 333, 340, 366, 600, 688, 777, 788, 3321, AG6010, 6015, 6100, 6200, 6400, 6800 200p
NV230, 250, 260, 280, 370, 380, 430, 431, 433, 450, 460, 465, 470, 480, 630, 650, 730, 770, 780, 810, 830, 850, 870, 890, 2000, 2010, 3000, 7000, 7200, 7800, 8050, 8150, 8200, 8300, 8400, 8600, 8610, 8620, NVG14, NVG7, 10, 12, 15, 18, 30, 130, 400, AG1000, 1050, 1200, 1500, 2100, 2200, 6810, NVH70 200p
NVG9, NVG120 200p
AG6840, NVH65, 75, NVJ30, NVL20, 23, 25, 28, NVG300, NVF66, NVF70, NVFS1, NVFS100, NVG19, 20, 25, 33, 40, 50 200p
NVD48, NVD80, NVG21, NVG45 200p

Model	Price

N.E.C.
N830, 831, 832, 833, 895 200p
PVC2300, 2400, 740, 744, 748, 760, 764, 766 200p
DX1000, 1600, 2000, 3000, N9012, 9013, 9014, 9016, 9033, 9034, N9053, 9054, 9055, 9066, 9110, 9120, 9510, 9520, 9530, 9610 200p

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

PHILIPS
VR6460, VR6920 200p
VR2020, VR2021, VR2022, VR2023, VR2024 200p
VR6711 200p
VR6540 200p
DV856, 586, VR702, 703, 6485, 6589, 6785, 6880, 6948 200p
VR445, VR6442, VR6542, VR6843, VR6943 200p
DV464, VR2220, 2300, 2324, 2330, 2334, 2340, 2350, 2414, 2480, VR2485, 2486, 2489, 2490, 2498, 2840, 6462, 6463, 6464, 6560, 6660, 6850, 6861, 6862, 6863 200p
N-1700, VR2870 200p
VR2025, VR6580 200p
VR6548, VR6648 200p
PRESSURE ROLLER ASSEMBLY PS403-40205, DV186, 190, 286, 291, 292, 486, 471, 562, 582, 571, 761, VR201, 202, 203, 302, 303, 305, 6180, 6182, 6185, 6285, 6290, 6291, 6293, 6362, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, 6676, 6760, 6761, 6762, 6870, 6970, 6975, 86B1, 63SB7, 68SB4, 71SB4, 72SB8, 92SB31 450p

SANYO
VHR1100, 1150, 1200, 1300, 1500, 2100, 2300, 2500, 2700 200p
VTC5000, 5150, 5300, 5350, 5400, 5500, 6000, 6500, 9100, 9300, VTCM10, 20, 11, 21, 31, 50, VPR5800 200p
VHR3100, 3300, 3310, 3400, 3700, 3800, VHRD500, 700 200p
VTC3000 200p
VHR4100, 4150, 4200, 4300, 4350, 4770, 5100, 5200, 5300, 5350, 5700, 7100, 7200, 7500, 7530, 7540, 7800, 8100, 8200, 8250, 8500, VHRD4400, 4410, 4500, 4600, 4610, 4710, 4890, 6700, VHRS700 200p
VCR100 200p

SHARP
VC200, 381, 384, 385, 386, 388, 390, 393, 800, 2300, 3300, 6000, 6200, 7300, 7700, 7750, 8300, 9100, 9300, 9500 200p
VC300, 387, 402, 471, 473, 477, 481, 482, 483, 486, 488, 496, 500, 571, 573, 581, 582, 583, 584, 585, 8481, VC5F3, VC5W20E, VCA1031 200p
VC600, 651, 681, 682, 684, 685, 693, 699, 700, 772, 750, 779, 780, 781, 782, VC782MK2, 783, 785, 786, 787, 793, 800, 7810, 7822, VCT72, VC6F3, VC6V3, VCA100, 102, 104, 131, 140, 170, 202, 203, 211, 234, VCA303, 501, 602, 5011, VCD801, 802, 851, 852, 881, 882, VCM73, VCT73 200p
VC220 200p
VCA10, 30G, 60, 103, 105, 106, 211, 244, 505, 605, 615, 1031, VCD806, 810, 815, VCH480, 865, 910, VCS1000, VCT310, 410, 610, VCT1314, 5313 200p

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

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

SAMSUNG
SV716, 717, VB510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 900, SV910, VI510, 520, 611, 616, 621, 626, 900, 910, VX510, 520, 616, 617, 619, 626, 627, 629 200p
SVX301, 303, 305, 307, 319, 322, VB710, 770, 971, 8220, 8225, V1730, 1790, 18220, 18225, VX710, 712, 720, 730, 750, 770, 790, 825, 970, 971, 972, 8220 200p

SANSUI
SVR5030 200p
SVR7010 200p

SIEMEN
FM350, FM352, FM355 200p
FM361, FM362, FM363, FM364 200p
FM391, FM392, FM394, FM461, FM462, FM464, FM468, FM561 200p
FM484, FM485 200p
FM585, FM602, FM604, FM622, FM624, FM627 200p
FM600 200p
FM204, 303, 304, 314, 325, 328, 374, 375, 376, 384, 386, 388, 404, 424, 428, 429, 488, 489 200p

Model	Price

FM556, FM558, FM560, FM562, FM564, FM574, FM578 200p
FM601, 603, 605, 607, 608, 617, 619, 620, 621, 623, 625, 626, 628, 630, 632, 634, 636, 638, 639 200p

SOLAVOX
NCVR1000, NCVR5000 200p

SONY
SLC5, 6, 7, SL3000, 8000, B080, 8200, SLJ10, SLT6ME, SLT7ME 200p
SLC9, 20, 24, 30, 33, 44, SLHF100, SLF1, 11, 20, 25, 30, 60, 100, 200, SLF60PS, SLF90E, SLHF150, 850, SLK88, 95, SLT20ME, SLT30ME, SLT50ME 200p
BMC100, BMC200, BMC500 200p
SLV201, 202, 301, 302, 401, 402, 801 802 200p
SLV210, 270, 273, 275, 300, 353, 373, 410, 415, 474, 656, 715, SLV757, 777 200p
SLV255 200p

TELEFUNKEN
A920, 930, 932, 935, 940, 960, 980, 990, 1200, VR925, 930, 940, 950, 971, 975, 980, 1920, 1925, 1930, 1940, 1950, 2920, 2925, 2930, 2931, 2935, 2941, 2960, 2970, 2671, 3935, 3945, 3950, 3965, 3975, 4935, 4940, 4942, 4945, 4970, 6000, 7921, 7926, 7929, 7931, 7932, 7970, 7971, 7979, 7980 200p
VR1935, VR2915 200p
VR1970, VR1980 200p
VR400, 410, 440, 449, 450, 510, 519, 540, 549, 610, 640 200p
VR520, 529, 530, 535, 539, 550, 620, 630, 650, 920 200p

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

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

VCR BELT KITS

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

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

ALBA
VCR4000 130p
VCR5000, VCR6000 105p

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

AUTHENTIC
N850 120p

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

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

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

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

DECCA
VR8300 90p
VRH8945DK 80p

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

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

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

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

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

FUJITSU
HS760, HS750, VGX715, VGX720D 160p

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

G.E.C.
4005 100p
V4004 100p

GOLDSTAR
GHV1221, 1232, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 8210, 8215, VCP4100, VCP4130 80p
GHV1290, 1291, 1295, 1296, VCP4000, 4200, 4300, 4301, 4305, 4306, 4310, 4311, 4316, 4320, 4321, 4325, 4326 120p

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

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

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

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

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

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

VCR BELT KITS / REPLACEMENT VIDEO LAMPS

Model	Price
HRD520, 600, 620, 637, 641, 650, 830	95p
HRD540, 550, 580, 660, 860, 960, HRS5800	130p
KENWOOD	
KV901	70p
KV903	90p
LOEWE	
OC11, OC40	95p
OC410, OC420, OC440, OC460	130p
OC50, OC55, OC60, OC65, OC70, OC75	120p
LOGIK	
VR955	180p
LUXOR	
9245, 9251	130p
9252	140p
9253	140p
9254	100p
9255	130p
9256	130p
9270, 9271, 9273, 9274	115p
9272, 9280	140p
9281, 9284, 9285, 9292, VR3701, 3721, 3731, 3761, 3781	95p
MATSUI	
VX850	75p
MITSUBISHI	
HS200	200p
HS300, 301, 302, 307, 310, 337, 338, 347, 349, 411, 412, 421, HSB10, 20, 30, HSE10, 20, 30, 70	150p
HS303, HS304, HS306, HS307, HS330, HS400, HS700	150p
HS318, HS319, HS410	130p
N.E.C.	
N830, N831, N832, N833	100p
N895	80p
PVC2300, PVC2400	180p
DX1000, 1600, 2000, 3000, N9012, 9013, 9014, 9016, 9033, 9034, 9053, 9054, 9055, 9066, 9110, 9120, 9510, 9520, 9530, 9610	95p
NATIONAL PANASONIC	
NV300, NV332, NV333, NV340, NV366	125p
NV777, NV788	100p
NV2000, NV2010, NV3000	130p
NV7000, NV7200, NV7800	95p
NV8600, NV8610, NV8620	145p
NV230, 250, 280, 430, 431, 433, 450, 460, 465, 470, 730, 770, 810, 870, 890, AG1000, 1050	125p
NV370, NV380, NV480, NV630, NV780, NV830, NV850	100p
NV600, NV688, AG6010, AG6015	110p
NVG7, 10, 12, 14, 15, 18, 30, 130, 400, NVH70	70p
NORDMENDE	
V100, V140	70p
V1000M, 1005M, 1205, 1215, 1235, 1245, 1305, 1403, 1405, V1500P, 1503, 1505K, 1805K, 2000D, 2405, 2500H, 3000H, V3405H, 3105, 4405H, 5000, 8005, 900, 905	65p
V1001, 1005, 1015, 1025, 1035, 1041, 1055, 1065, 1105, 3005, 304, 5005, 502, 503	80p
V101, V102, V103, V112, V141, V142, V301, V302	90p
V110, V333	110p
V1500T, V2000B, V2000P, V400H	95p
V250, V460, V9460, V20035542, V20035543	130p
V300, V303, V380	75p
V500	75p
ORION	
COMBI15000, 16000, NEVHM, TVP230RC, 900MVH1012, VH1030, 1040, 1060, 1070, 1100, 1120, 1440, 1500, 1660, 1800, 2150, 2308, 2400, 2500, 2600, 2700, 2960, 300, 358, 360, 362, 4010, 4015, 4016, 4020, 4300, 5010, 5015, 530, 535, 536, 630, 635, 640, 730, 735, VP220, 225, 245, VR1032, 2966, 2980, 821, 925, VXL25	30p
NEVHL, VCP, VH1204, 2004, 2204, 3050, 3060, 4008, 400, 4012, 412, 512, 600, 666, 744, 774, 7905, 800, 820, 900, 974, VP200, VR2949, 2956, 2957, VXL20	90p
VC150, 180, VH1000, 200, 201, 205, 212, 250, 254, 285, 300, 303, 3030, 312, 33, 3310, 404, 555, 700, 704, 708, 712, 770, 780, 844, 900, VHF2, VH3	80p
VH1, VH2A	150p
PHILIPS	
VR6460, VR6920	170p
VR6540	100
DV186, 286, 291, 292, 468, 471, 562, 571, 761, VR201, 202, VR20DV1, 20DV2, 20RW7, 25BO1, 25BO2, 302, 303, 305, VR30DV2, 35BO2, 35BO3, 635B7, 715B4, 715B5, 715B8, VR865B2, 915B2, 925B3, VR6180, 6185, 6285, 6290, 6291, 6293, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, 6676, 6760, VR68SB4, 86SB1, 92SB3	85p
VR6442, VR6542	70p
VR2025, VR2580	100p
VR445B9, BR445B920, VR445B922, BR6843	100p
VR6548, VR6648, VR49SB620, VR644869S	110p
SABA	
VR6420, 6435, 6440, 6460, 6480, 6620, 6770, 7200, 8420, 2A10, 70, 2B20, 3B20, 4A10, 4B20, 6A10, 6A70, 6B20, 8B20	65p
VR6004, 6005, 6011, 6014, 7004, 7011, 7014, 8011, 8014, BERLIN	90p
VR2000, VR6000, VR6012, VR7000, VR7720, PVR6068	130p
VR5005, VHR7000	135p
VR6006, 6007, 6008, 6009, 6015, 9016, 9018, 6038, 7006, 7007, 7016, 7018, 9006	65p

Model	Price
VR6010, VR9010	70p
VR6020, VR6022, VR6023, VR6028, VR7730	75p
VR6024	75p
VR6520, VR6540, VR6560	90p
VR6710, VR6720, VR6735, VR8720	130p
VR6720, VR6730, VR6760, VR6775, VR6780	160p
SAISHO	
VR2000, VHL3	90p
VR3800	75p
SALORA	
SV6500	100p
SV6600	150p
SV8000	120p
SV8100	60p
SV8500, SV8520, SV9500	150p
SV7400, SV8400, SV8420, SV8550	120p
SV6700, SV8710, SV8750, SV9700	120p
SV6800, 6900, 8810, 8820, 8870, 8910, 8920, 8970	95p
SV8600, 8620, 8700, 8720, 8830, 9600, 9810	130p
SAMSUNG	
SV716, 717, V1616, V1621, V1626, VX616, VX617, VX619, VX626, VX627, VX629	85p
VB520, 510, 610, 616, 617, 619, 620, 626, 627, 629, VI510, 520, 611, 616, 621, 626, VX510, 520	100
VB900, VB910, V1900, V1910	110
PX980, 981, 982, SE9001, SV9001, SVX307, 319, 322, VB770, 8220, 8225, V1770, 790, 8220, 8225, VK8220, VPX31, VX750, VX790, 8220, 8225	135p
SVX301, 303, 305, SX7301, VB710, 971, V1730, 710, VX712, VX720, 730, 970, 971, 972	230p
VX9880	110p
SANYO	
VTC5000, 5150, 6000, 6500, VTCM10, 11, 20, 21, 30, 31, 50	75p
VTC5300, VTC5350, VTC5400, VPR5800	100p
VTC5500	95p
VTC9100, VTC9300	220p
VTC1100, 1300, 1500, 1100, 1150, 1200, 1300, 1500	90p
VHR2100, VHR2300, VHR2500, VHR2700	150p
VHR3100, 3300, 3310, 3400, 3700, 3800, VHRD500, 700	110p
VHR4100, 4150, 4200, 4300, 4350, 4770, 5100, 5200, 5300, 5350, 5700, 7100, 7200, 7500, 7530, 7540, 7800, 7810, 8100, 8200, 8250, 8500, VHRD4400, 4410, 4500, 4600, 4610, 4710, 4890, 6700	90p
SHARP	
VC200, 384, 385, 386, 388, 390, 9300, 9500, 9700	100p
VC7300, VC7700, VC7750, VC7800, VC8000	150p
VC8300	150p
VC300, 387, 471, 473, 481, 482, 483, 486, 488, 496, 8481	80p
VC402, 500, 571, 573, 581, 582, 583, 584, 585, VCSF3	80p
VC600, 651, 682, 684, 685, 693, 783, VC6F3, VC6V3	70
VC772, 779, 781, 782, 785, 786, 793, 800, 7810, 7822, VCA100, VCA102, 104, 131, 140, 170, 202, 203, 234, 501, 602, 5011, VCD806, 810, 815, VCH80, 865, 910, VC51000, VCT310, 410, VCT1314, VCTS312	115p
SIEMENS	
FM350, FM352, FM355	60p
FM484, FM485	55p
FM391, FM392, FM394, FM462	100p
FM461, FM464, FM468, FM561	150p
FM361, FM362, FM363, FM364	120p
SONY	
SLC6, SLJ10, SLT6ME	140p
SLC5, SLC7, SLJ7, SLJ9	140p
SLC9, SL8000, SL8080, SLT50	165p
SL8000E, SL8080E, SL8200, SL8600	175p
SLV255	95p
TELEFUNKEN	
VR400, VR410, VR440, VR449	130p
VR450, VR540, VR549, VR640	70p
VR520, VR529, VR620, VR920	70p
VR530, VR535, VR539, VR550, VR630, VR650	75p
A940, VR1925, 1930, 1940, 1950, 2960, 925, 930, 940, 950	90p
A920, VR1970, 1980, 2920, 2925, 2930, 2970, 7921, 7926, 7931, 7970, 7971, 7980, 970, 7981, 975, 980	65p
A1200, 930, 932, 935, 960, 980, 990, VR2931, 2935, 2941, 2971, 3935, 3945, 3950, 3965, 3975, 4935, 4940, 4942, 4945, 486, 5VR4970, 6000, 7932, 7959, 7979	65p
VR1935	100p
VR2915	90p
THOMSON	
SV1000, V410, 430, 450, 510, 520, 530, 540, 620, 630, 640, 4240, SV5540	65p
TX8000, V309, V357, VK411	75p
TX8500, V342, 343, 351, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, 5500, 6000, 8564	90p
V320, V321, V323, V326, V4200, V4300	90p
V333	100p
V340	90p
V4100, VK308, VK309, VK410	120p
VK300, VK301, VK302, VK303, VK305, VK3301	135p
VK312	65p
TOSHIBA	
V55, V57	85p
V33, V31, V51, V53, V9600, V9680	85p
V31, V63, V65, V66, V67	150p
DV80B, DV80D, V71, 73, 74, 75, 81, 83, 85, 86	120p
V108, V109, V199, V209, V609	120p
V31G, V95G	115p

Models & Description	Order Code	Price
UNIVERSAL VIDEO LAMP 9V 80mV (310mm WIRES)	VL01	25p
PANASONIC VIDEO LAMPS	VL02	35p
SHARP VIDEO LAMPS	VL02	35p
HITACHI 5381682 (VT63, VT64) VIDEO LAMPS	VL04	135p
AIWA, AKAI, ALBA, AMSTRAD, BLAUPUNKT, FERGUSON, FIDELITY, FISHER, FUJITSU, FUNAI, G.E.C., GOLDSTAR, GRANADA, GRUNDIG, HINARI, HITACHI, ITT, JVC (HRD SERIES), MATSUI, MITSUBISHI, NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA, SAMSUNG, SANYO, SHARP, SIEMEN, SONY, TELEFUNKEN, THOMSON, TOSHIBA	VL05	150p
AKAI, GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 8912, 8922, 8925)	VL01	25p
BLAUPUNKT, ORION (VH1, 2A), NATIONAL (NV200, 2010, 3000, 7000, 8150, 8200, 8400, 8600, 8610, 8620), SHARP (VC2300, 6000, 6200, 6300, 7300, 7700, 8000, 8300)	VL02	40p
AKAI (VS10), GRANADA (VHSXJ3), ITT (VR3993, 3994), JVC (HR2650, 7600, 7610, 7650, 7655), TELEFUNKEN (VR530, 535, 539, 550, 630, 650), THOMSON (V309, 316, 357, VK309, 411, TX8000), FERGUSON (3V31, 8941, 8942)	VL06	40p
AUTHENTIC (N850), DECCA (VR8300), GRANADA (VHSTJ3, WJ1, WJ3), ITT (VR3913, 3914, 3963), JVC (HT7200, 7300, 7350, 7700), TELEFUNKEN (VR450, 520, 529, 540, 549, 620, 640, 920, 1920), THOMSON (V4100, VK308, 309, 312, 410), FERGUSON (3V23, 29, 30, 8923, 8924, 8929, 8930, 8931, 8940)	VL07	40p
GRANADA (VHSAY3), SHARP (VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700)	VL08	60p

PANASONIC MODE SWITCHES

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

ON/OFF MAIN SWITCHES

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

ITT
PART NO: 13/1074
USED ON: CP0200, 0211F, 0323, 0323/1, 0341/14, 0345F, 0351/1, 0361, 0361/1, 9350, CT0500, 0500/1/T, 0500T
PRICE: £3.25
PART NO: LFC 005
USED ON: CVC40
PRICE: £3.00

MATSUI/SAISHO
USED ON: MATSUI-2190, SAISHO-PST2130TX
PRICE: £3.50

PHILIPS
USED ON: K30, K35, K40, KT3, KT4
PRICE: £1.00

SONY
PART NO: (POWER SWITCH + REMOTE SWITCH)
USED ON: KV1612 MK1, KV1612 MK2, KV1614, KV2052, KV2056, KV2062, KV2068, KV2212, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV2752PE3, KX20PS1, KX20PS2, KX27PS1
PRICE: £3.50
PART NO: (POWER SWITCH + REMOTE SWITCH)
USED ON: KV2022, KV2024
PRICE: £3.25
PART NO: (POWER SWITCH)
USED ON: KV1810 MK1, KV1810 MK2, KV1820, KV1822, KV2000 MK1
PRICE: £8.00
PART NO: (POWER SWITCH 26mm)
USED ON: KV1400, KV1440, KV2040, KV2060
PRICE: £2.00
PART NO: (POWER SWITCH 21mm + REMOTE SWITCH)
USED ON: KV2020
PRICE: £2.50
PART NO: 2 PIN (FUNCTION SWITCH)
USED ON: KV1612 MK1, KV1612 MK2, KV2052, KV2056, KV2212, KV2215, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV275PE3, KV2756PE3
PRICE: £0.45
PART NO: (4 PIN FUNCTION SWITCH)
USED ON: VARIOUS
PRICE: £0.50

REPLACEMENT IDLER TYRES

AKAI	M132773	IT01
	MZ366960J2	IT02
GOLDSTAR	VXP0521	IT17
HITACHI	6861471	IT03
	6861482	IT04
	6886971	IT05
JVC/ FERGUSON	PU 48967B	IT06
	PU 51380	IT07
	PU 51402A	IT08
	PU 55373	IT09
	PU 55374	IT10
NATIONAL PANASONIC	VXP 0329	IT11
	VXP 0343	IT12
	VXP 0344	IT13
	VXP 0401	IT14
	VXP 0433	IT15
	VXP 0463	IT16
	VXP 0521	IT17
	VXP 0581	IT18
SANYO	1430662T15620	IT19
SHARP	NIDL005GEZZ	IT20
	NIDL0006GEZZ	IT21
	NPLY0107GEZZ	IT22

PRICE
22p EACH
18p EACH FOR A PACK OF 5 FOR EACH MODEL
15p EACH FOR A PACK OF 10 FOR EACH MODEL

VIDEO SERVICE KITS

AMSTRAD

VCR700

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

FERGUSON & JVC

3V42/43
HRD455/HRD725

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER CLUTCH MECHANISM. TENSION BAND		BELT SET. PINCH ROLLER SUPPLY CLUTCH. TAKE UP CLUTCH	
Order Code: SK37	**£17.50**	**Order Code: SK38**	**£9.50**

3V58/59/64/65
HRD170/180/210/230/300/320/370/400/430/530/700/750
HRS5000

Contents
BELT SET. PINCH ROLLER. IDELR ARM. TENSION BAND
Order Code: SK44 **£8.50**

3V29/3V30
HR7200/7300/7350

Contents
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES
Order Code: SK05 **£6.00**

3V35/36.38/39/49
HRD110/111/120/225

Contents
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES
Order Code: SK04 **£5.50**

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

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

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

Contents		*Economy Kit Contents*	
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER. REEL IDLER. TENSION BAND		BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER TYRE. REEL IDLER TYRE	
Order Code: SK35	**£10.50**	**Order Code: SK36**	**£5.80**

3V29/3V30
HR7200/7300/7350

Contents		*Economy Kit Contents*	
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLER. T/U CLUTCH. T/U IDLER. TENSION BAND. VIDEO LAMP		BELT SET. T/U REEL IDLER TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLE TYRE. T/U IDLER TYRE. T/U CLUTCH	
Order Code: SK31	**£11.00**	**Order Code: SK32**	**£5.10**

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

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

FISHER

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

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

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

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

HITACHI

VT11/VT33

Contents
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES
Order Code: SK08 **£6.00**

UNIVERSAL TRIPLER
Price: £4.00 each

AMSTRAD MODE KIT
Price: £3.00 each

SEE OTHER PAGES FOR MORE GRANDATA BARGAINS

VIDEO SERVICE KITS *(Cont.)*

VT11/VT33

Contents		*Economy Kit Contents*	
BELT SET. T/UP REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. FF/REW IDLER. CLUTCH PLATE. TENSION BAND		BELT SET. PINCH ROLLER. FF/REW IDLER TYRE. T/UP REEL TABLE TYRE. SUPPLY REEL TABLE TYRE	
Order Code: SK45	**£14.00**	**Order Code: SK46**	**£4.50**

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

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

VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/48/450/498/510/520/25/26/530/35/36/540/545/46/48/570/75/576/580/85/88

Contents
TIMING BELT. PINCH ROLLER. FF/REW ARM. CLUTCH BASE. TENSION BAND
Order Code: SK52 **£11.50**

VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/VTL30

Contents
BELT SET. PINCH ROLLER. FF/REW ARM. CLUTCH PLATE. TENSION BAND
Order Code: SK51 **£14.00**

PANASONIC

NV2000/NV2010

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES		BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES	
Order Code: SK03	**£6.25**	**Order Code: SK02**	**£5.50**

NV300/NV330/NV333/NV340/NV366

Contents
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRE
Order Code: SK01 **£5.50**

NV2000/NV2010

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

NV7000/NV7200/NV7800

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

NV300/NV330/NV333/NV340/NV366

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

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

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

NV332

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

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

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

NV600/NV688

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

NV730/NV770

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

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

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

NV777/NV788

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER IDLER UNIT. TENSION BAND		BELT SET. PINCH ROLLER. IDLER TYRE	
Order Code: SK17	**£7.00**	**Order Code: SK18**	**£4.00**

VIDEO SERVICE KITS *(Cont.)*

SHARP

VC381

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER. REEL IDLER. TENSION BAND. VIDEO LAMP		BELT SET. PINCH ROLLER. REEL IDLER TYRE	
Order Code: SK47	**£9.00**	**Order Code: SK48**	**£4.75**

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

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

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

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

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

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER. REEL DRIVE UNIT. TENSION BAND		BELT SET. PINCH ROLLER REEL DRIVE UNIT TYRE	
Order Code: SK62	**£13.50**	**Order Code: SK63**	**£6.00**

FOR MORE DETAILS OF OVER 500 TYPES OF SERVICE KITS...
PLEASE RING US!

BACKUP BATTERIES

REPLACEMENT PHILIPS NI-CAD BACKUP BATTERIES

Replaces Ferguson Part No:
00E6-067-001, used on TX10, L2V — 150P
Replaces Philips Part No's:
138-10138, 138-10313. 1.2V – 90mAh — 120p
Replaces Philips Part No's:
138-10229. 2.4V – 90mAh — 200p

REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES

Replaces Ferguson Part Nos:
00E6-066-001, 2.4V
Used on: 3V35, 3V56, 3V58, 3V65 — 200p

REPLACEMENT LINE OUTPUT TRANSFORMERS

Description	Price	Order Code
HITACHI 2433752	1500p	LOT01
ORION 3714002	1500p	LOT02
FIDELITY ZX300	1500p	LOT03
FE TX100 90 DEG	1500p	LOT04
SABA 490007182	1500p	LOT05
FE TX90 WHITE	1650p	LOT06
ITT D307/37 EQ	1600p	LOT07
BLAUPUNKT 210	1600p	LOT08
GRUNDIG 2922010	1600p	LOT09
ITT CVC800/1/3	1500p	LOT10
ITTD218/37 EQ	1600p	LOT11
NORMENDE 5255	1600p	LOT12
SABA 81000 200	1600p	LOT13
SALORA T236 EQ	1650p	LOT14
SABA 811-50-24	1600p	LOT15
SABA 770223500	1600p	LOT16
TELEFUNKEN AT1	1450p	LOT17
TELEFUNKEN EQ	1400p	LOT18
SALORA FM0218B	1600p	LOT19
NORMENDE 5255	1600p	LOT20
ITT CVC 1150/1	1500p	LOT21
ITT COMPACT 80	1500p	LOT22
FE TX100 GREEN	1450p	LOT23
HINARI CT4/5 5113	1500p	LOT24
SELECO 6320410	1600p	LOT25
BLAUPUNKT 8667	1600p	LOT26
ITT COMPACT 81	1450p	LOT27
ITT CT3326 MUL	1500p	LOT28
ITT D066/37 EQ	1600p	LOT29
ITT 3546 EQ	1500p	LOT30
LUXOR 5810110	1600p	LOT31
SABA 849380920	1600p	LOT32
HITACHI 2434141 CP	1450p	LOT33
FE TX100 110 D	1700p	LOT34
HANTAREX 28021	1600p	LOT35
SHARP C3700 EQ	1600p	LOT36
HITACHI 2432981 CP	1500p	LOT37
FERGUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cm Used On: 51K2, 51J8, 51J7, 41H3, 41H3, 41H2, 51K3	1650p	LOT38
PANASONIC TLF14567F Used On: TC2043, TC2243, TX300	1850p	LOT39
PANASONIC TLF14568F Used On: TX2231, TX2244	1850p	LOT40
PANASONIC TLF14584F Used On: TC2210, TC2160, TX1752, TX2112 TX2112, TX2162, TXC22	2350p	LOT41
PANASONIC TLF14586F TC1651, TC2051, TC2061, TC2253, TC2263, TX5500	2350p	LOT42
HINARI Used On: CT15	1600p	LOT43
HITCHI 2434274 CPT2174, CPT2176, CPT2178, 2434274	1400p	LOT44

We stock line output transformers for over 100 different models. Please ring 081-900 2329 for more information.

IDLERS & PULLEYS REPLACEMENT

AKAI

VS1-2, VS4-5, VS15	FF-REW IDLER	M1327773	400p
VS3, 6, 12, 56, 58, 59			
VS1-2, VS4-5, VS15	T-UP IDLER	BV327815	500p
VS3, 6, 12, 59, 59			
V9700	IDLER	BV321979	600p
VS125, 126, 155,	IDLER ASSY	MZ366960J2	900p
VS165, 240, 244, 245, 247, 248, 250, 512, 515, 516			
VS22, 38, 105, 112, 115, 116, 205, 220			
VP7100, VS9300	T-UP IDLER	PU47752	£4.50
VS9500, VS9800			
VP7100, VS9300	UNLOADING	PU46381	£4.00
VS9500, VS9800	IDLER		
VP7100, VS9300	REW IDLER	PU46380	500p
VS9500, VS9800			
VP88	IDLER	BV336067	£5.00
VS1, 3, 4, 9, 12	REEL TABLE	BR347731	450p
VS15, 58			
VS23, 35, 37, 53, 55	CLUTCH	ML373043	1100p
VS66, 75, VSA77			
VS9700	FF IDLER	BV321761	£3.20
VS9700	REW IDLER	W321762	£4.25

AMSTRAD

VCH7000	IDLER	150280	£1.50
TVR1, VCR4500	CLUTCH	150873	£3.75
VCR4600, VC5200, VCR9000			
TVR1, VCR4500	GEAR HOLDER	151284	£3.50
VCR4600, VCR5200, VCR9000			
TVR1, VCR4600	REF CLUTCH		£3.50
VCR5200			
VCR6000, VCR6100	CLUTCH	153202	£3.80
VCR4500, VCR9000	CLUTCH		£4.00
VCR4500, VCR4600	MOD KIT	(TAPE CREASING)	300p
VCR4700			
MOD KIT TAPE CREASING FOR AMSTRAD			
VCR4500, 4600, 4700			£3.00

FERGUSON

3V00, 3V01, 3V16	T-UP IDLER	PU47752	£4.50
3V22, 3292, 8900, 8901, 8904, 9806			
3V16, 3V22	T-UP IDLER	PU49280	£5.50
8903, 8909, 8912, 8922			
3V23, 3V29 3V30,	REEL IDLER	PU48967	175p
3V31, 3V32, 3V35, 8923, 8924, 8929, 8930, 8931, 8940, 8941, 8942			
3V23, 3V31	ROLLER ASSY	PU49042A	350p
3V29, 3V30, 3V31	T-UP IDLER	51402	100p
3V32, 3V35, 3V36, 3V38, 3V39, 3V49, 8930, 8931, 8940, 8941, 8942			
3V29, 3V30, 3V31	T-UP CLUTCH	PU51380	200p
3V32, 8930, 8931, 8940, 8941, 8942			
3V35, 3V36, 3V38	REEL IDLER	PU55374	200p
3V39, 3V49, 8943, 8944			
3V35, 3V36, 3V38	T-UP CLUTCH	PU55373	150p
3V39, 3V49, 8943, 8944			
3V58, 3V59, 3V64	IDLER ARM	PU58645	£2.25
3V65, FV10, FV11, FV12 FV13, FV14, FV20, FV21, FV22, FV26			
FV30, FV32, FV33, 8950, VC141L			
3V42, 3V43	CLUTCH ASSY	PU56822	1200p
3V43, 3V44, 3V45	CLUTCH ASSY	PU57658	1050p
3V48, 3V53, 3V54, 3V55, 3V57, 8947, 8948			
3V42, 3V43, 3V44	T-UP CLUTCH	PU56043-1-4	240p
3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948			
3V42, 3V43, 3V44	SUPPORT CLUTCH	PU56044-1-5	160p
3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948			
3V00, 3V01, 3V16	LOADING IDLER	PU43681	£4.00
3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909			
8912, 8922			
3V00, 3V01, 3V16	REW IDLER	PU46380	500p
3292, 8900, 8901, 8904, 8906			
3V16, 3V22, 8902	IDLER	PU49281	£1.70
8909, 8912, 8922			

FISHER

FVHP420, 520, 530	FF-REW PULLEY	HI638531	80p
FVHP615, 618, 620	COMP. IDLER ASSY	FI1430420400300	£220p
FVHP622, 710, 711, FVHP720, 721, 722, FVHP725, 730, 830			
FVHP840, 905, 906, FVHP908, 910, 911, FVHP915, 916, 918			
FVHP615, 618, 620	GEAR IDLER ASSY	FI1430490400900	380p
FVHP622, 710, 711, FVHP720, 721, 722			
FVHP725, 730, 830, FVHP840			
FVHP615, 618, 620	REEL T-UP ASSY	FI1430410400900	£5.50
FVHP662, 710, 711, FVHP720, 721, 722			
FVHP725, 730, 830, FVHP840			
FVHP905, 906, 908	GEAR IDLER ASSY	FI1430490402400	275p
FVHP910, 911, 915, FVHP916, 918			
FVHP975, 980, 990	IDLER	FI1430420400700	300p
FVHP999, 5000, 5005			
FVHP5050, 5075, 5100			
FVHD40, 55, 140	REEL DRIVE ROLLER		£6.00
FVHP1, 10, 20			
FVHP975, 980, 990	CLUTCH	FI2430510404200	£9.50
FVHP420, 520, 530	IDLER		£2.80
FVHP420, 520, 530	TAKE UP IDLER		290p
FVHP990	LOADING GEAR		90p
VBS3500	REEL DRIVE PULLEY		£3.20
VBS3500	IDLER		250p
VBS7000	REW IDLER		95p

GOLDSTAR

GHV1221, 1232, 1240	CLUTCH GEAR	435038A	£2.50
GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000,			
GHV8200, 8210, 8215, GHVP51, VCP4100, 4130			
GHV1221, 1232, 1240	IDLER		110p
GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000,			
GHV8200, 8210, 8215, GHVP51, VCP4100, 4130			

HINARI

VXL3, VXL20	REEL IDLER	40000009	110p
VXL2	IDLER		110p
VXL4, VXL35	IDLER		£2.75
VXL4, VXL35	CLUTCH		£6.50
VXL4, VXL12, VXL25	LIMITER POST		£1.30
VXL30, VXL35, VTV300			
VXL5, VXL6	CLUTCH		£3.75
VXL5, VXL6	GEAR HOLDER		£3.50
VXL7, VXL8, VXL9	CLUTCH		£3.80

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, 200		6886972	
125, 128, 130, 135, 138, 145, 150, 175, 225, 250,			
255, 258, 260, VTL30			
VT8000 8300, 7000	FF-REW IDLER	6413663	£2.80
VT8500-8700			
VT8000-8300, 7000	PLAY IDLER	6414221	290p
VT8500-8700			
VT8000 8300, 7000	FF-REW PULLEY	6383531	80p
VT8500-8700			
VT9300-9500, 6500	FF-REW IDLER	8681471	250p
VT680, 6800, 9700, 9900			
VT9300 9500, 6500	PLAY IDLER	6861482	230p
VT680, 6800, 9700		6861481	
VT 9900			
VT9300 9500, 9700	IDLER	681505	230p
VT9900, 6500, 680, 6800	IDLER	687043	£3.80
VT11, 33, VT63-64	FF-REW IDLER	6886971	125p
VT14, 16S, 17, 19, 34, VT35, 38, 39, 52, 61, 62			
VT65, 85, 86, 88, 330, 640			
VT1000, 110, 111, 113	FF-REW ARM	6886792	240p
VT115, 118, 119, 120, 125, 128, 130, 135, 138, 145, 150			
VT175, 220, 225, 250, 255, 258, 260, VTL30			
VT400, 405, 410, 413	FF-REW ARM	6897094	£1.30
VT414, 415, 418, 420, 425, 426, 428, 430, 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	230p
VT9700, 9900			

HITACHI TV

OUTPUT MODULE HM 6251		£5.50
OUTPUT MODULE HM 6232		£8

JVC

HR330, 3660, 4100	T-UP IDLER SML	PU49280	£5.50
HR7200, 7600, 7650	T-UP CLUTCH	PU53462A	220p
HR7655, 7300, 7350, 7610			
HR7200, 7300, 7350	REEL IDLER	PU48967	175p
HR7600, 7610, 7650, 7655, 7700			
HR7600, 7610, 7650	ROLLER ASSY	PU49042A	350p
HR7655, 7700			
HR3300, 3660, 4100	T-UP IDLER LRG	PU47752	£4.50
HR7200, 7600, 7650	T-UP IDLER	PU51402A	100p
HR7655, HRD110, HRD111, HR7300, 7350, 7610, HRD120-121, 225			
HRD110, HRD120-121,	T-UP CLUTCH	PU55373	150p
HRD225, HRD111,			
HRD110, HRD120-121,	IDLER ARM	PU55374-3-8	200p
HRD225, HRD111			
HRD170, 180, 210, 230	IDLER ARM	PU58465	£2.25
HRD320, 370, 400, 430, 470, 530, 700, 750, 950, 3000			
HRS5000, HRS5500			
HRD455, HRD725	CLUTCH MECH	PU558822	1200p
HRD140, 150, 157, 158	CLUTCH MECH	PU57658	1050p
HRD160, 250, 257, 565, 566, 755, HRP50			
HR3300, HR3330	REW IDLER	PU46380	500p
HR3660, HR4100			
HRD140, 150, 157, 158	TAKE UP CLUTCH	PU56043-1-4	240p
HRD160, 250, 257, 455, 565, 566, 725, 755, HRP50			
HRD140, 150, 157, 158	TAKE UP CLUTCH	PU56044-1-5	160p
HRD160, 250, 257, 455, 565, 566, 725, 755, HRP50			

MATSUI

VX730, 735, 750, 755,	CLUTCH	850A00005	420p
VX810, 820, 850, 880, 990			
VX730, 735, 750, 755	LIMITED POST LEVER		£1.30
VX770, 800, 810, 880	ASSY		
VX990			
VX800A, VX900	IDLER REEL		£1.50
VX800A, VX820	REEL UNIT CLUTCH		280p

MITSUBISHI

HS306, 307, 318, 319,	GEAR ASSY	522B00201	£6.25
HS400, 410, 710			
HS337, 338, 347, 349	IDLER	552B01701	325p
HS411, 412, 421, HSB10, HSB20, HSB30, HSE10, HSE20, HSE20, HSE30,			
HSE70			
HS306, 307, 318, 319	IDLER	641C34301	£2.00
HS400, 410, 710			
HS347, 349, 412	IDLER	522902002	£3.00
HSB10, HSB20, HSB30, HSE10, HSE20, HSE30, HSE70			
HS337, 338, 411, 421	IDLER	552B01801	320p
HS200	TAKE UP IDLER (LARGE)		£4.50
HS200	UNLOADING IDLER		£4.00
HS200	REWIND IDLER		£6.00
HS306, 307, 318, 319	SUPPLY REEL	522A00101	£3.20
HS400, 410, 710	DISK		
HS306, 307, 318, 319	TAKE UP REEL	522A00102	£3.20
HS400, 410, 710	DISK		
HS320	REEL DISK	522C06301	£3.00
HS337, 338, 411, 421	REEL DISK	522P00601	£5.00
HS300, 301, 302, 310	PULLEY	522C05201	£2.25
HS306, 307, 318, 319	GEAR WHEEL	641D71101	£1.50
HS400, 410, 710			
HS306, 307, 318, 319	GEAR WHEEL	641D71001	£1.50
HS400, 410, 710			

NEC

N830, N831, N832, N833	TAKE UP CLUTCH		150p
N830, N831, N832, N833	TAKE UP IDLER		100p
N830, N831, N832, N833	REEL IDLER		200p
N895	TAKE UP IDLER SMALL		550p
N911, N915, N916, N917	REEL DRIVE PULLEY		350p
N9012, 9013, 9014, 9016, 9033, 9034, 9054, 9055, 9066, 9110			
N9510, 9520, 9530, 9610			

NATIONAL

NV322, NV600, NV688,	IDLER UNIT	VXP0463	£2.75
NV777, NV788, NV332, AG6100, 6200, 6800, 6810			
NV300, NV333, NV340	IDLER ARM	VXL0997	£3.60
NV366			
NV300, NV330, NV333	IDLER UNIT	VXP0401	60p
NV340, NV366			
NV300, NV330, NV333	PLAY IDLER	VXP0433	£2.75
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	110p
NV280, NV370, NV380, NV430, NV450, NV460, NV465, NV470, NV480			
NV630, NV650, NV730, NV780, NV810, NV830, NV850, NV870			
NVG7, NVG8, NVG10, NVG11, NVG12, NVG 14, NVG15, NVG16, VG18			
NVG30, NVG400, AG1000, AG1200, 1500, 1810, 2100,			
AG2200, NVH65, NVH70			
NV370, NV430, NV870,	CAM GEAR	VDG0200	£1.20
NV730, NV830, NV850, NVG10, NVG12, NVG18			
NV730, NV770	IDLER UNIT	VXP0581	£2.50
NV2000, 2010 3000	IDLER UNIT	VXP0331	80p
NV2000, 2010, 3000	IDLER UNIT	VXP0329	80p
NV2000, NV3000	CAM GEAR	VDG0069	£1.00
NV7000, 7200, 7800	IDLER UNIT	VXP0344	75p
NV7000, 7200, 7800	CLUTCH	VXP0343	300p
NV8150, 8200, 8300	IDLER UNIT	VXP0245	80p
NV8400, 8600, 8610, 8620			
NV8200, 8400, 8600	PLAY IDLER	VXP0243	80p
NV8610, 8620			
NV8620	CLUTCH	VXP0343	250p
NV332, NV600, NV688	IDLER	VXP0488	300p
NVG20, NVG21, NGV25	PULLEY UNIT	VXP0767	400p
NVG40, NVG45			
NV230, NV250, NV280	WORM WHEEL	VXP0604	160p
NV430, NV450, NV460, NV465, NV650, NV730, NV770, NV810			
NV870, NV890, AG1000			
NV370, NV380, NV630	IDLER	VXP0523	300p
NV780, NV830			
NV370	CLUTCH GEAR	VXP0595	£1.00
NVG7, NVG11, NVG12	WORM WHEEL	VXP0691	£1.50
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			
NGV130, 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			
NCG120, 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	280p
MULTIPLE MODELS	IDLER	850A200005	420p
VC150, VC180, VH200	IDLER		110p
VH201, VH205, VH212, VH250, VH254, VH288, VH300, CH303, VH312			
VH404, VH555, VH700, VH704, VH708, VH712, VH780, VH844, VH900, VH3,			
VH33			

SAISHO

VR605, VR800, VR900	CLUTCH	850A20000	420p
VR1100, 1200, 1600, 2500, 3200, 3300			
VR3500, 3600, 3800	LIMITER POST		£1.30
VR1100, 1200, 1600, 2500, 3200, 3300, 3500, 3600, 3700			
VR605, VR800, VR900	IDLER		280p
VR2500, 3200, 3300, 3500, 3600, 3800			
VR705, VR805, VR905	IDLER		110p

SANYO

VHR1110, 1150, 1200	IDLER	143-0-662T-14730	£5.00
VHR1300, 1500			
VTC5000, 5150, 6000	FF-REW IDLER	143-0-741T-20001	250p
VTC6500, VTCM10, M11, M20, M21, M30, M31, M50			
VTC9100, VTC9300	IDLER	143-0-551T-01400	95p
VTC9300	FF ROLLER ASSY	143-0-547T-00200	200p
VTCM10, M11, M20, M21	REEL DRIVE PULLEY	143-0-662T-10350	£5.00
VTCM30, M31, M50			
VHR2100, 2300, 2500	IDLER	6130374899	300p
VHR2700			
VTC5000, 5150, 6000	PULLEY	143-0-662T-01201	£5.20
VTC6500			
VTCM10, M11, M20, M21	PULLEY	143-0-662T-10350	£5.50
VTCM30, M31, M50			
VHR3100, 3300, 3310	REEL DRIVE	143-0-662T-15621	350p
VHR3400, 3700, 3800	ROLLER		
VHRD500, VHRD700			
VPR5800, VTP5300	LOADING ROLLER	143-0-661T-03800	80p
VTC5400			
VTC3000	FWD LIMITER		£3.50
VTC3000	IDLER		750p

SHARP

	IDLER ASSY	NIDL0005GEZZ	110p
	IDLER	NIDL0006GEZZ	110p
VC300, 651, 681, 682	IDLER ASSY	NPLYV0107GEZZ	£6.15
VC584, 685, 693, 699, 700, 783, VC6FR, VC6V3			
VC7300, VC7700, 7750	PLAY IDLER KIT	NPLYY0041+ NDA1V1007	£7.50

REMOTE CONTROLS

Description	Order Code	Price
GRUNDIG		
TP160E	RC 107	900p
TP200, TP300	RC 380	800p
TP400	RC 401	800p
TP590-600	RC 600	850p
TP390,TP610	RC 610	850p
TP621	RC 621	850p
TP630, TP650	RC 650	850p
TP660	RC 660	850p
TP661	RC 661	850p
HITACHI		
CLE800-CLE830	RC 140M	850p
A617402/655602	RC 192	875p
A512120/230	RC 900	800p
A514790	RC 901	850p
A5088470	RC 902	800p
A518612	RC903	900p
SCL002	RC904	850p
C2096	RC 905	850p
A511940	RC 906	800p
655602H	RC 907	850p
ITT		
IFB13, 14, 15	RC 143	875p
FS4	RC 148	850p
RG305	RC 305	825p
RG306	RC 306	825p
FS9/1-10/1	RC 307	850p
VS5 RUK	RC 308	825p
VS4-1	RC 310	850p
MULTICONTROL (17C20)	RC 311	800p
KORTING		
18279, 18396, 18460, 18521 SE	RC 108	850p
40540 VTS	RC 108	900p
LOEWE		
DC11	RC 146	850p
MATSUI		
010270601	RC 889	850p
VX770	RC 892	850p
METZ		
JAVA COLOR (6890)	RC 166	850p
COLOR (7156)	RC 183	850p
JAVA (7180)	RC 184	850p
MITSUBISHI		
939P/03607, 939P/03609	RC 140M	850p
NOKIA		
SATELLITE	RC 550	850p
NORDMENDE		
TC2336	RC 351N	850p
CMC1, TC3519	RC 356	875p
OCEANIC		
390C9500	RC 339	900p
ORION		
RC53	RC 892	850p
PANASONIC		
EUR51200	RC 200	850p
TC2200	RC 201	850p
VSQ0357/NV730	RC 202	875p
TNQ1621	RC 203	900p
PHILCO		
CARVEL, CONCORDE, MERCURY, TELESTAR	RC 108	850p
TC10	RC 152	900p
PHILIPS		
RC5002,5154	RC 134	850p
KT3 NON TEXT	RC 135	825p
69117032	RC 178	875p
69117194	RC 180	875p
RC5991-UNIV	RC 300	850p

Description	Order Code	Price
PHILIPS (continued)		
RC38	RC 301	875p
KT3 TEXT	RC 5301	800p
RC5352	RC 5352	800p
RC5375	RC 5375	850p
RC5 STANDARD	RC 5534	850p
RC5901	RC 5901	850p
RC5903	RC 5903	800p
SABA		
T6772	RC 149	900p
TC319-320	RC 328	875p
TC356	RC 356	875p
TC358	RC 358	850p
TC360	RC 360	800p
TC365	RC 365	800p
SALORA		
SERIES L	RC 190	875p
86173	RC 882	850p
SANYO		
RC218, RC222, RC228, RC238	RC 140M	850p
JXGE	RC 878	850p
JXDE	RC 884	850p
VHR2300	RC 890	850p
RC628	RC 865	900p
SHARP		
G0121CESA, 123CESA, 204, 251	RC 140M	850p
SIEMENS		
FC616	RC 130	850p
FC631	RC 132	850p
FC742	RC 164	900p
SONY		
RM604, RM605, RM606	RC 140	850p
32 CHANNEL	RC 140M	850p
RM613	RC 141	850p
RM632, RM636	RC 160	850p
TATUNG		
FXA	RC 877	850p
RC70	RC 883	750p
FX70 FASTTEXT	RC 894	850p
TELEFUNKEN		
FB632	RC 632 ST	850p
FB639	RC 639 ST	850p
THORN/FERGUSON		
3V35-42	RC 342	850p
3V31-32	RC 344	850p
3V57-58	RC 628	900p
TX10 TEXT	RC 732	750p
TX10 STEREO TEXT	RC 738	750p
TX9-90-100	RC 740	750p
3V55, FV11	RC 783	900p
TX100 FASTTEXT	RC 785	800p
TX100 STEREO FASTTEXT	RC 789	800p
PROFESSIONAL	RC 790	800p
TOSHIBA		
CT937	RC 950	850p
CT9117	RC 951	850p
201R4B	RC 952	850p

UNIVERSAL PROGRAMMABLE REMOTE CONTROL

Controls up to 4 different devices which use infra red remote controls including TV, audio, VCR and satellite. (need original remote control TC program)

Order code: IR100R Price: 1950p

We stock Remote Controls for over 5000 different models. Ring for further details on 081-900-2329.

VCR ALIGNMENT KIT

CONTAINS:

SET OF 7 HEAD & TAPE PATH ALIGNERS
- RCA TYPE AUDIO & CONTROL HEAD POSITIONING TOOL
- RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS
- RCA TYPE BACK TENSION TOOL
- TENSION ADJUSTMENT TOOL FOR VARIOUS USES
- VCR ADJUSTMENT TOOL

SET OF 8 ALLEN KEYS
- 0.77mm
- 0.90mm
- 1.27mm
- 1.50mm
- 1.60mm
- 2.00mm
- 2.40mm
- 3.00mm

3 Reversible Screwdrivers
Circlip Pliers
Spring Hook
Micro Screwdriver
VCR Head Extractor

Order Code: TOOL10 Price: 3000p

FUSES

	TIME LAG (20mm)		QUICK BLOW (20mm)	
Value	Order Code	Price	Order Code	Price
160mA	FUSE01	75P	FUSE17	60P
250mA	FUSE02	75P	FUSE18	60P
315mA	FUSE03	75P	FUSE19	60P
400mA	FUSE04	75P	FUSE20	60P
500mA	FUSE05	75P	FUSE21	60P
630mA	FUSE06	75P	FUSE22	60P
800mA	FUSE07	60P	FUSE23	60P
1A	FUSE08	60P	FUSE24	60P
1.25A	FUSE09	60P	FUSE25	60P
1.6A	FUSE10	60P	FUSE26	60P
2A	FUSE11	50P	FUSE27	60P
2.5A	FUSE12	50P	FUSE28	60P
3.15A	FUSE13	55P	FUSE29	50P
4A	FUSE14	55P	FUSE30	50P
5A	FUSE15	60P	FUSE31	50P
6.3A	FUSE16	60P	FUSE32	50P

FUSES

CURRENT RATING	ORDER CODE	PRICE
CERAMIC PLUG TOP		
3A	FUSE33	100P
5A	FUSE34	100P
13A	FUSE35	100P
20MM CERAMIC TIME LAG		
3.15A	FUSE41	100P
4A	FUSE42	100P
5A	FUSE43	100P
6.3A	FUSE38	100P
8A	FUSE39	100P
10A	FUSE40	100P
32MM CERAMIC SLOW BLOW		
8A	FUSE44	210P
10A	FUSE45	210P
15A	FUSE46	210P
20A	FUSE47	210P
38MM CERAMIC SLOW BLOW		
10A	FUSE48	875P

ALL THE ABOVE PRICES ARE FOR PACKS OF 10 FUSES

I.C. PROTECTOR

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

Price: Only 30p each

AUDIO CONTROL HEAD

Amstrad Original No: 150751

Used on Amstrad TVR1.2.3, VCR4600, 4600MII, 4700 Funai V2S, VCR4600, 4800, 5200, 5600, 6600, VIP3000, 5000 Also fits: Fidelity, Funai, Hinari, Proline, Schneider, Towada, Ultravox

Order Code: AH01 Price: £13.50

Amstrad Original No: 153154

Used on Amstrad 008900, 8904, VCR2000, 6000, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 9244

Also fits: Antitech, Boadstec, Casio, Crown, Fidelity, Goldhead, Granada, Hinari, Marguant, Omega, Protex, Schneider, SEG, Sentra, Shiptom, Tashiko, Tatung, Towada, Universum

Order Code: AH02 Price: £14.50

GRANDATA LTD

K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY, WEMBLEY, MIDDLESEX, ENGLAND HA9 0HB

Telephone: 081-900 2329 Fax: 081-903 6126

OPEN Monday to Saturday. Times: Mon-Fri 9.00-5.30 Sat 9.00-2.00

JUST ARRIVED!!! NEW ITEMS

Satellite PSU Repair Kits

Experience shows that 50% of all receiver power supplies 'bounce' unless the correct precautionary measures are taken when being serviced. A kit of all the recommended parts is supplied for the 4 most popular models, which when fitted should overcome this.

MAKE & MODEL	ORDER CODE	PRICE
PACE PRD800, PRD900	SATPSU1	670p
PACE SS9000, 9200, 9010, 9020, 9220	SATPSU2	670p
AMSTRAD SRD510, SRD520	SATPSU3	670p
AMSTRAD SRD500	SATPSU4	670p

Replacement Video Heads

MAKE	MODELS	PRICE
HITACHI	VT570, VT575, VT576, VT580, VT585 VT588, VTF70	3100p
I.T.T.	VR3761	3100p
JVC & FERGUSSON	HRD950, HRD960, HRD980, FV46	5000p
LUXOR	VR3761	3100p
MITSUBISHI	HSE51	3000p
NATIONAL PANASONIC	NVFS200, NVFS90, NVV8000	4600p
	NVHD100, NVHD101, NVHF100	3100p
	NVSD	1400p
	AG7330, AG7350, AG7355, AG7450	5000p
	NVFS100	5000p
N.E.C.	D5600	3500p
SANYO	TLS1000P, TLS1001P, TLS1100	3100p
	VHR7800, VHR7810, VHR8000SP, VHR8801SP, VHRD4800	3100p
SHARP	VCH80, VCH81, VFH815	2800p
	VCA33, VCA36, VCA43, VCA44, VCA46, VCA49	1500p
	VCA55, VCA63	2200p
SONY	SLV656, SLV715, SLV757 SLV777, SLV815, SLV825	4600p
	SLV353UB	3200p
	CCDF340E, CCDF500E, CCDV90E, CCDV95E, CCDSP5E	4800p

Original Video Heads

MAKE	MODELS	PRICE
NATIONAL PANASONIC	NVG20, NVG21, NVG22, NVG25 NVG25, NVG28, NVG200, NVD48 PART NO: VEH 0343	3000p
	NVG33, NVG45, NVG46, NVL23 NVL25, NVL28 PART NO: VEH 0417	2900p
	NVJ30, NVHJ33, NVL20, NVL21, NVG30, NVG31, NVG40, NVG130 PART NO: VEH 0416	2700p

Audio Control Head

AMSTRAD ORIGINAL NO: 150751
Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4600MKII, 4700, FUNAI VS2, VCR4600, 4800, 5200, 5600, 6600, VIP3000, 5000
Also fits: FIDELITY, FUNAI, HINARI, PROLINE, SCHNEIDER, TOWADA, UNIVERSUM **ORDER CODE: AH01 PRICE: 1350p**

AMSTRAD ORIGINAL NO: 153134
Used on: AMSTRAD DD8900, 8904, VCR2000, 6000, 6100, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 8244
Also fits: ANITECH, BONDSTEC, CASIO, CROWN, FIDELITY, GOLDHAND, GRANADA, HINARI, MARQUANT, OMEGE, PROFEX, SCHNEDIER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA, UNIVERSUM **ORDER CODE: AH02 PRICE: 1450p**

Replacement Audio Control Video Sound Head for National Panasonic

PART NUMBER	MODELS	PRICE
VBR 0091	NVG7 etc	875p
VBR 0050	NV300, NV340 etc	875p
VBR 0061	NV777 etc	875p
VBR 0103A	NV250, NV450 etc	625p
VBR 0125		625p

4 way Preprogrammed Universal Remote Control

A single remote control to operate Televisions, Videos and Satellite Receivers. Plus Auxilliary Options!!
* Replaces up to 8 remotes with one * Simple 4 digit setup routine
* Controls 1000s of models * Teletext functions with Fastext
* Clear (large key) layout * Code Search Facility
* Stylish and easy to operate * Replace broken or lost remotes
* Original Remote not required

Order Code: RCBW0200 Price 1500p + VAT

Replacement Video Cassette Housings

MAKE	MODELS	CODE	PRICE
AKAI	VS35, VS53, VS55, VS56, VS75	CH18	2600p
GRANADA	VHSDP1	CH05	1100p
	VHSYJ2	CH01	2600p
GOLDSTAR	GHV1290P, 1291P, 1295P, 9400, 73401, GSE1295P, GSE1891P, 20001Q, 20051Q, VCP4200, 4300, 4301, 4305, VCP4306, 4311, 4315, 4316, 4320, 4321, 4325	CH25	2000p
	GHV51, 1221, 1232, 1240, 1241, 1242, 1244, 1246, 1248, GHV8000, 8200	CH26	2900p
FERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, 3V49, HRD 110, 111, 120, 121, 225	CH01	2600p
	3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57 8945, 8947, 8948, HRD140, 141, 150, 157, 158, 180, 250, HRD257, 455, 565, 566, 725, 755	CH02	2600p
	8948, 8950, FV10B, 12L, 13H, 14T, 20B, 21R, 22L, 26, 355, HRD230, 430, 530	CH03	2600p
	3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRD370	CH04	2600p
	FV31R	CH19	4300p
	HRD515, 520, 527, 540, 550, 580, 600, 610, 620, 660, 670, HRD830, 840, 850, 860, 4050, 6600, FV37H	CH20	2400p
	HRD540, 580, 830, 860, 910, 960, HRD970, HRDX20, FERGUSON FV57H	CH27	2400p
I.T.T.	VR3605, VR3905	CH01	2600p
	VR3915, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2600p
	VR3915, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2600p
NATIONAL PANASONIC	NV730	CH06	4300p
N.E.C.	N830EG, N831EG, N832, N833EG	CH01	2600p
	N895	CH02	2600p
PHILIPS	CASSETTE LIFT ASSEMBLY (69120366) DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 6285, VR6290, 6291, 6293, 6362, 6367, 6393, 6467, 6468, 6470, VR6561, 6670, 6760, 6761, 6870, 6970	CH05	1100p
	VR6443	CH22	2900p
	VR6448	CH23	2500p
	49SB6	CH24	2500p
SHARP	VCA100, VCH851, VCH852	CH22	2900p
	VCA103, 103GV, 106, 106GVM, 254GVM	CH23	2500p
	VCS211, 244, 5055, 605, VCB230, VCD806G, 810G, VCT212, 310, 410G, 610	CH24	2500p
TELEFUNKEN	VR2970	CH02	2600p
THOMSON	V320, 321, 323, 326, 4200, 4300	CH01	2600p
	V342, 343, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, V5500, 6000, 8540	CH02	2600p
TOSHIBA	V55, V57	CH01	2600p
	V65, V66	CH02	2600p

Service Aids

DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER	75ML	SP01	140p
SWITCH CLEANER	176ML	SP02	150p
SILICONE GREASE	200ML	SP03	170p
FREEZE IT	170ML	SP04	200p
FREEZE IT	400ML	SP16	350p
FOAM CLEANER	400ML	SP05	170p
ANTI STATIC	150ML	SP06	170p
AEROKLEANE	135ML	SP07	140p
AERO DUSTER	150ML	SP08	200p
AERO DUSTER	400ML	SP17	425p
PLASTIC SEAL	200ML	SP09	200p
GLASS CLEANER	250ML	SP10	160p
COLDKLENE	250ML	SP13	160p
EXCEL POLISH 80	250ML	SP18	150p
ADHESIVE 120	400ML	SP19	190p
LABEL REMOVER 130	200ML	SP20	240p
REFURB 140	400ML	SP21	240p
TUBE SILICON GREASE	50 GRAMMES	SP11	200p
TUBE SILICON SEALANT WHITE	75ML	SP22	280p
TUBE SILICON SEALANT CLEAR	75ML	SP23	280p
TUBE HEAT SINK COMPOUND	25 GRAMMES	SP12	150p
DRIVE CLEANER	200ML	SP24	150p
SCREEN CLEANER	200ML	SP25	150p
COMPUTER CARE KIT	—	SP26	2100p

All the above items are manufactured by Servisol

If you purchase more than one Servisol Product, postage & package will be charged as follows:
300p for 5 cans **450p** for more than 5 cans

CD Pick Ups

SONY OPTICAL PICK UP
PART NO: KSS210A SONY CDPC 301M, CDPC 305M **2200p**
Fits most Sony, Akai & J.V.C. Portable Hi-Fi and Midi Systems

PART NO: KSS210B
USED ON MODELS:
CFD100, 105L, 120, 300, 440, 454, 455, 50, 500, 55, 58, 60
CFD68, 750, 755, 760, 765, 770, 775, 440S, W100, 100S **2200p**

Cassette DC Motors

MOTOR TYPE	PRICE
6V MOTOR	170p
9V MOTOR	170p
12V CW MOTOR	170p
12V CCW MOTOR	170p
13.2 CCW MOTOR	290p

Cassette Tape Heads

HEAD TYPE	PRICE
MONO HEAD	90p
STEREO HEAD	110p
MINI HEAD	150p
AUTO REVERSE HEAD	200p

Soldering Accessories

DESCRIPTION	CODE	PRICE
ANTEX SOLDERING IRONS		
25 WATT 240 VAC (XS25W 240V)	S101	900p
15 WATT 240 VAC (XS15W 240V)	S102	900p
25 WATT SPARE ELEMENT	S103	450p
15 WATT SPARE ELEMENT	S104	450p
SOLDERING STAND & SPONGES		
SOLDERING STAND (MADE BY ANTEX)	S108	350p
SPARE SPONGE	S109	55p
SOLDER		
18 SWG 500 GRAMMES	S110	500p
20 SWG 500 GRAMMES	S111	650p
22 SWG 500 GRAMMES	S112	700p
DESOLDERING AIDS		
SOLDER MOP STANDARD GAUGE 1.2mm x 1.5M	S107	70p
SOLDER MOP 1.2mm x 10M	S113	300p
DESOLDERING PUMP	S105	320p
SPARE NOZZLE	S106	60p

Transistors & ICS

BU 508A (PHIL)	80p	MJE 13009	100p	2SC 3885A	350p
BU 810	110p	MJE 18004	125p	2SD 633	70p
BUZ 90A	180p	STK 6982H	600p	2SD 1680	225p
CXA 1043P	550p	STK 7253	450p	2SK 793	400p
HA 13408	350p	TDA 2030H	100p	2SK 956	1400p
IRFBC40	400p	TEA 2019	200p	2SK 1023	550p
L272	200p	TMP 47C434N	1250p	2SK 1342	750p
L6210	250p	SAA 1300	200p	2SK 1358	600p
MC 3423P	100p	2SA 1540	55p	68000	500p
MJ 15015	250p	2SC 3788	60p	82S147	450p
MJ 15016	350p	2SC 3885	350p		

GRANDATA LTD
Tel: 081-900 2329
Fax: 081-903 6126

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

REMOTE CONTROLS FROM £7.99
IDLER TYRES 50p 1+, 25p 10+
VIDEO HEADS FROM £6.99
Over 200 models at very attractive prices.
AKAI, AMSTRAD, FERGUSON, FISHER, GOLDSTAR, HINARI, HITACHI, LOGIC, MATSUI, ORION, PANASONIC, SAISHO, SHARP AND MANY MORE

VIDEO SPARES

3V29 TAKE UP IDLER	£1.30p
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
SANYO 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
PANASONIC NV370 IDLER	£1.95p
FISHER 615 IDLER	£3.50p
FISHER GEAR ASSEMBLY	£4.50p
AMSTRAD PINCH WHEEL MOD KIT	£3.99p
UNIVERSAL TRIPLER	£4.99p
UNIVERSAL TRIPLER WITH FOCUS	£7.99p
HITACHI MODULE HM6251	£6.99p
CUC2410 TRIPLER	£16.99
TENSION BAND FOR MOST MOD. FROM	£1.99p
CIRCUIT PROTECTOR ICP	50p
TX10 FOCUS UNIT	£7.99p
PHILIPS BACK-UP BATTERY	£1.30p
ALBA BATTERY 1F 5.5V	£2.50p
TV SWITCHES FOR MOST MOD. FROM	£1.99p
SONY FUNCTION SWITCH	0.85p

VIDEO BELT KITS

AKAI	
VS1/2/5	1.75
VS22/35	2.00
VS105/250	1.50
ALBA	
VCR4000	1.50
AMSTRAD	
VCR4600	1.80
VCR6000	1.30
VCR7000	1.00
FERGUSON	
3V22	1.80
3V29/30/33	1.00
3V42/65	0.85
HRD520/830	1.20
FISHERS	
FYHP615/725	1.10
FYHP905/910	1.10
GRUNDIG	
VS180	1.45
VS300	1.90
VS380	1.75
HINARI	
VXL3-20	1.25
VXL4-35	1.50
HITACHI	
VT11/33	1.30
VT52/65	1.75
VT110/220	1.80
MITSUBISHI	
HS306/307	1.75
PHILIPS	
YR6548	2.40
YR6367	1.50
SAMSUNG	
VX510/520	1.50
SANYO	
VHR1300	2.15
VHR3300	2.05
SHARP	
VC381	1.30
VC651/681	1.25
VC9300	1.50

ELC EAST LONDON COMPONENTS
63 PLASHET GROVE, EAST HAM,
LONDON E6 1AD. TEL: 081-472 4871
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

LINE OUTPUT TRANSFORMERS
OVER 100 MODELS AT LOW PRICES

AKAI		**MATSUI**	
CT2570E	19.99	1420	16.99
CT2870	19.99	1440B	16.99
ALBA		1450	16.99
CTV14RS	19.99	1465	19.99
AMSTRAD		1480A	16.99
CTV2200	14.99	**MITSUBISHI**	
CTV2210	14.99	CT2528ETX	16.99
TVR1/2/4	16.99	CT2839ETX	16.99
BUSH		**ORION**	
2020T	16.99	14RX	16.99
2714	16.99	**PHILIPS**	
FIDELITY		KT3	13.99
ZX2000	14.50	KT4	16.99
ZX3000	12.99	KT30	16.99
FERGUSON		KT40	16.99
TX85/86	16.99	2A	16.99
TX90		3A	16.99
REDSPOT	16.99	CTX E/S	16.99
WHITE	14.99	CF1	16.99
TX98	19.99	NCR	16.99
TX99	16.99	GR1-AX	16.99
TX100		G90 AE	16.99
FST	16.99	**PANASONIC**	
BLUESPOT	16.99	TLF14520F	24.99
GREEN	14.99	TLF14521F	24.99
YELLOW	16.99	TLF14567F	24.99
GOLDSTAR		TLF14568F	24.99
CB14282	16.99	TLF14584F	24.99
HINARI		TLF14586F	24.99
CT4/5	16.99	**SAISHO**	
CTV140	12.99	CT14R	16.99
HITACHI		CT141RB	16.99
CPT1446	16.99	**SALORA**	
CPT1455	16.99	21C60	16.99
CPT1476	16.99	25C51	16.99
CPT1493	16.99	**SANYO**	
CPT1646	16.99	CBP2146	29.99
CPT2028	16.99	CTP3246	29.99
CPT2036	16.99	CTP6262	29.99
CPT2048	16.99	CTP7130	39.99
CPT2078	16.99	CTP7132	39.99
CPT2084	16.99	CTP7135	39.99
CPT2087	16.99	**SENTRA**	
CPT2174	16.99	GX9000	16.99
CPT2176	16.99	GX9700	16.99
CPT2178	16.99	**SHARP**	
CPT2238	16.99	C1410S	29.99
CPT2248	16.99	C3700	39.99
CPT2276	16.99	CT2810S	29.99
CPT2278	16.99	**SOLAVOX**	
CPT2476	16.99	16R19	16.99
CPT2478	16.99	20R19	16.99
ITT		22R19	16.99
CT2613	16.99	26R09	16.99
CT3306	16.99	**SONY**	
CT3325	16.99	KV1442	16.99
CT3425	16.99	KV1882	16.99
CT3835	16.99	KV2052	16.99
ST3487	16.99	KV2066	16.99
ST35467	16.99	KV2096	16.99
TX2613	16.99	KV21XRTU	16.99
TX3327	16.99	KV2204	16.99
TX3447	16.99	KV2212	16.99
TX3835	16.99	KV2217	16.99
COM 80R	16.99	KV2704	16.99
COM B	16.99	KV2705	16.99
DIGI 1-3	16.99	KV2752	16.99
MONOPRINT	16.99	KV2756	16.99
CVC25/32	9.99	**TATUNG**	
LOEWE OPTA		TN8422	19.99
ART 1	16.99	**TOSHIBA**	
CLAS M 124	16.99	150F6D	35.00
PROF S 28	16.99	**ZANUSSI**	
STUDIO 1	16.99	20SM502	19.99
STUDIO S 28	16.99	22ST502	19.99
STUDIO T 28	16.99	26ZT511	19.99

AN3822K	7.99	LA7835	1.99	STK5730	6.00	TDA1510	3.50	UPC1378	2.20	2SB755	3.50
AN5151	6.99	MEA2901	2.60	STK6962	5.80	TDA1515	2.50	UPC1394	1.90	2SB817	2.00
AN5435	2.50	M4908B1	8.50	STK7216	7.00	TDA1516	4.00	UPC1420	5.25	2SB861	0.60
AN5515	2.99	M4918B1	8.50	STK7226	8.50	TDA1518	4.00	UPC1470	2.00	2SB882	0.80
AN5521	2.99	M49481	8.50	STK7308	4.25	TDA1520	4.00	UPC1488	3.50	2SB891	1.40
AN5900	1.50	M5840A-B4	9.99	STK7348	4.50	TDA1521	3.50	UPC1498	3.50	2SB892	0.80
AN7161	3.40	M54543L	2.99	STK7356	9.00	TDA1522	3.99	X2402P	4.25	2SB1010	0.75
AN7171	4.25	M54544L	2.99	STK8250	8.00	TDA1670	3.00	SG264A THY	7.00	2SB1016	0.80
AN7178	2.60	M54545L	2.99	STK73410	6.99	TDA1701	4.25	SG613 THY	11.00	2SC828	0.25
BA718	1.99	M54548L	4.25	STR3125	5.99	TDA1770	10.00	**TRANSISTORS**		2SC829	0.25
BA3402	3.99	M54549L	4.50	STR4211	5.99	TDA1908	1.00	BC372	0.50	2SC867	3.75
BA5402	2.50	M54644L	3.99	STR5412	4.50	TDA2003	1.00	BC368	0.30	2SC1061	0.90
BA6109	1.80	M54647L	3.99	STR6020	4.50	TDA2005	1.30	BF869	0.60	2SC1173	0.50
BA6121	2.99	M54648L	3.99	STR9012	6.00	TDA2030	1.30	BU208A	1.10	2SC1212	0.50
BA6122	1.99	M54649L	3.99	STR41090	6.00	TDA2170	3.00	BU500	0.99	2SC1399	0.60
BA6209	2.50	MB3730	2.00	STR44115	7.75	TDA2270	3.25	BU508A	0.99	2SC1413A	2.40
BA6219	2.99	MB3731	2.99	STR40090	5.99	TDA2575	2.00	BU508AF	1.30	2SC1454	3.25
BA6222	1.99	MB3732	2.99	STR50020	6.50	TDA2578	3.00	BU508DF	1.50	2SC1573	0.40
BA6229	2.80	MC13306T3	4.99	STR50103	4.99	TDA2581	2.50	BU508DR	1.60	2SC1670	0.85
BA6238	1.99	MDA2061	5.99	STR50115	6.50	TDA2582	3.00	BU903	1.60	2SC1678	1.20
BA6239	2.50	MDA2062	4.25	STR54041	5.50	TDA2600	5.75	BU908	1.99	2SC1827	1.20
BA6304	1.90	STK430	7.00	STR55051	8.50	TDA2653A	3.50	BUT11A	0.85	2SC1922	2.75
BA6305	1.90	STK433	4.99	STR58041	5.50	TDA3330	7.00	BUT11AF	1.20	2SC1941	0.65
BA6259	2.99	STK457	6.50	STR59041	6.50	TDA3505	4.00	BUT56A	1.20	2SC1942	1.95
BA10324	1.99	STK459	5.99	STR10006	6.00	TDA3560	3.25	BUK444	2.99	2SC1969	1.60
BA10358	1.80	STK461	7.50	STR01806	6.00	TDA3561	3.00	BUX85	0.65	2SC2078	0.80
BA15218	2.20	STK463	10.00	STRD5541	7.99	TDA3562	3.00	BUW11A	1.40	2SC2229	0.30
CNY65	4.99	STK465	7.50	STRD6008	8.00	TDA3565	3.00	DTA114	0.70	2SC2235	0.40
CNY75	2.99	STK0029	3.99	SAA1025	6.00	TDA3576	7.00	DTA124	0.45	2SC2458	0.30
CNX62A	2.99	STK0040	5.50	SAA1250	3.50	TDA3640	4.00	DTA144	0.50	2SC2502	0.90
CNX82	3.99	STK0060	9.99	SAA1251	4.50	TDA3650	10.00	DTC114	0.60	2SC2564	2.40
CNX83	2.99	STK2029	5.99	SAB3037	9.99	TDA3651	2.00	DTC124	0.50	2SC2565	2.75
HA1377	1.99	STK2048	11.00	SAA1291	9.00	TDA3653	2.99	DTC144	0.55	2SC2577	1.20
HA1397	2.60	STK2129	7.00	SAA1293-03	8.50	TDA3654	1.99	MJ2955	0.75	2SC2579	1.30
HA11225	1.99	STK2250	8.00	SAA1294-03	13.00	TDA3300	5.00	MJE340	0.40	2SC2580	1.80
HA11227	2.20	STK3041	6.00	SAA5000	2.50	TDA4500	3.75	MJE13005	1.30	2SC2581	2.00
HA11235	1.99	STK3042II	6.50	SAA5010	4.30	TDA4501	4.75	MN650	4.00	2SC2791	2.60
HA11423	2.20	STK3062II	7.00	SAA5012	3.75	TDA4502	5.00	R4050	1.30	2SC3156	2.60
HA11711	6.50	STK4026	9.00	SAA5020	3.50	TDA4503	3.00	R4051	1.50	2SC3169	2.00
HA11717	4.75	STK4121II	7.00	SAA5030	4.99	TDA4505 3Y	4.00	S2000AF	1.50	2SC3182	2.50
HA11753	5.99	STK4122	8.00	TA7193	4.00	TDA4504	4.99	S2055AF	1.50	2SC3281	3.00
HA11758	5.00	STK4131II	6.50	TA7205	1.00	TDA4505 E	5.99	TIPL761A	1.75	2SC3284	1.60
HA13001	1.95	STK4132II	7.00	TA7222	1.20	TDA4505 M	12.99	TIPL791A	1.30	2SC3519	1.50
HA13008	9.99	STK4141II	6.50	TA7240	2.60	TDA4600	1.99	TIP112	0.70	2SC3679	2.00
HA13108	3.50	STK4141V	8.00	TA7241	2.60	TDA4601	1.99	TIP3055	0.60	2SC3944	1.60
HA13117	2.99	STK4142II	7.75	TA7264	4.99	TDA4950	1.99	2N3055	0.75	2SD315	0.80
HA13118	2.99	STK4151II	7.00	TA7269	5.50	TDA6200	8.00	2N3773	1.30	2SD400	0.20
HA13119	2.99	STK4152II	7.00	TA7270	2.50	TDA7240	3.00	2SA769	1.30	2SD401	0.50
HA13402	3.25	STK4161II	9.99	TA7271	2.50	TDA8170	2.99	2SA773	0.75	2SD424	3.50
HA13403V	5.50	STK4162II	8.00	TA7273	3.50	TDA8175	2.99	2SA965	0.25	2SD427	3.50
LA4182	1.99	STK4171II	9.99	TA7279	4.00	TDA8178	4.25	2SA985	0.65	2SD716	1.20
LA4270	2.99	STK4172II	9.00	TA7280	2.99	TDA8185	5.00	2SA999	0.20	2SD718	1.30
LA4282	6.00	STK4181II	9.00	TA7281	2.75	TDA8190	3.00	2SA1013	0.30	2SD725	3.50
LA4440	2.20	STK4182	9.99	TA7283	2.60	TPU2732	19.99	2SA1020	0.30	2SD837	0.80
LA4445	2.60	STK4191II	9.99	TA7288	2.20	TMS47C432	15.00	2SA1102	1.80	2SD845	2.50
LA4460	1.60	STK4192	9.99	TA7293	4.50	UPA81C	1.99	2SA1104	2.00	2SD856	0.80
LA4461	1.60	STK4372	6.00	TA7299	3.99	UC3844	2.99	2SA1106	2.00	2SD869	3.25
LA4465	2.99	STK4392	7.50	TA7680	4.00	U4646	8.50	2SA1141	2.00	2SD870	3.25
LA4466	2.99	STK4853	9.99	TA7699	8.50	UPC1031	1.80	2SA1146	1.90	2SD871	3.25
LA4475	2.99	STK5315	6.50	TA8200	4.99	UPC1181	1.10	2SA1208	1.50	2SD1047	2.00
LA4476	2.99	STK5325	7.00	TA8201	3.50	UPC1182	1.10	2SA1232	1.80	2SD1065	2.00
LA4495	3.95	STK5332	3.50	TA8207	3.25	UPC1185	6.00	2SA1265	1.50	2SD1138	0.60
LA4496	3.99	STK5333	8.00	TA8210	3.50	UPC1188	4.00	2SA1302	3.00	2SD1207	0.50
LA4500	2.30	STK5338	3.99	TA8214	3.50	UPC1230	2.10	2SA1386	2.75	2SD1276	1.20
LA4505	2.60	STK5342	5.99	TA8215	3.99	UPC1238	1.80	2SA1535	1.60	2SD1292	0.50
LA4508	2.60	STK5372H	5.50	TA8216	4.25	UPC1225	2.20	2SB536	0.60	2SD1397	2.00
LA4700	3.99	STK5421	7.00	TA8220	6.75	UPC1241	3.50	2SB554	3.50	2SD1398	1.70
LA6324	2.50	STK5422	6.50	TA8221	6.75	UPC1277	2.40	2SB557	3.00	2SD1426	2.75
LA7330	4.99	STK5434	7.00	TA8400	3.99	UPC1278	2.40	2SB558	3.00	2SD1427	2.75
LA7520	4.99	STK5436	8.00	TA8659N	12.99	UPC1288	4.00	2SB560	0.40	2SD1432	2.75
LA7522	6.50	STK5451	7.00	TEA1039	1.99	UPC1298	4.00	2SB562	0.40	2SD1439	2.00
LA7530	3.99	STK5466	8.50	TEA2018A	1.40	UPC1310	8.00	2SB595	0.80	2SD1453	1.70
LA7800	1.80	STK5471	4.99	TEA2029	3.00	UPC1335	4.00	2SB632	0.40	2SD1497.02	6.00
LA7801	1.95	STK5476	6.99	TEA2164	3.00	UPC1318	4.00	2SB643	0.20	2SD1497.06	6.00
LA7802	1.95	STK5481	4.99	TDA1037	2.00	UPC1363	3.00	2SB649	0.65	2SD1548	5.50
LA7820	3.50	STK5482	4.99	TDA1044	2.50	UPC1364	5.00	2SB686	1.20	2SD1555	4.00
LA7830	1.99	STK5490	5.50	TDA1062	9.50	UPC1365	3.25	2SB688	1.30	2SD1877	2.50
LA7832	3.99	STK5720	6.00	TDA1170	1.20	UPC1377	2.50	2SB705	2.00	2SD1911	4.00

REMOTE TESTER £14.99 LOPT TESTER £29.99 VIDEO HEAD TESTER £29.99 DEGUSSING ROD 29.99
SATELLITE FINDER KIT £29.99 MICROWAVE LEAK DETECTOR £14.99 DIGITAL MULTIMETER FROM £9.99

Capacitance Meter 2000UF £29.99

CAMBRIDGE LNB
Replacement for Blue Cap
Suitable for Astra £26.99

Dual Polarised 1DB LNB
£26.99

ASTRA D Converter £17.99

Satellite Finder Kit PG-753

£29.95

VRC SERVICE TOOL KIT

£29.99

PACE MODKIT
Power Supply £9.99
SRD 500/510
PSU Kit £9.99

PHILIPS
Pressure Roller Assembly £4.40

Rack Assembly £8.99

Charlie Gear £5.99

Mitsubishi
Pinch Assembly
£8.99

PANASONIC
Pressure Roller Assembly £5.99

Gear Kit £8.99

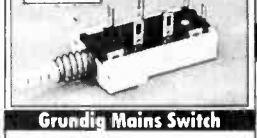
SOLDA-MOP

1.2 metres	£0.85
7 metres	£3.50
10 metres	£4.40
30 metres	£9.99

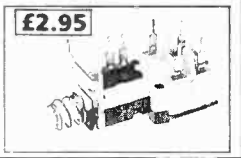
ELC – EAST LONDON COMPONENTS
VISIT OUR SHOP – OPEN MON - SAT 9AM - 7PM
100s OF TOOLS, COMPONENTS, TEST INSTRUMENTS, SPEAKERS, POWER SUPPLIES, REPAIR KITS, BOOKS & CABLES TO CHOOSE.

JVC CAPSTAN MOTOR
HRD 540, 660, 740, 860,
FV 43, FV 44, PU 61003-1-2
£14.99

Hitachi/Sabora Mains Switch
£1.99



Grundig Mains Switch
£2.95



ONLY £2.99

NIKKAI BABY 10 REGULATOR
BL 210 N £12.99

VHS ALIGNMENT TAPE
£39.99

£0.59

SPRING AND WASHER
ASSORTED SIZES KIT
£3.99

REGULATED POWER SUPPLY
Variable 5 to 14V 5Amps
£49.99

HITACHI VTM 722
Capstan Motor
£29.99

£11.99

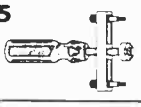
U 2.4mm

TOOL CASE
Aluminium £22.50

FREQUENCY COUNTER
200MHz £79.99

SOLDERING IRON
Temperature Control
Station £49.99

Video Head Puller
£7.95



Tape Transport Adjustment Tool
£5.99

Model PGO15 Capacitance Meter

£29.99

The New 4 Way Universal Remote Control

£19.95

Suitable for TV, Video, Satellite & AUX (cable TV)
Pre-Programmed with codes to control 1000's of models
Simple 4 digit setup routine
Code search facility for models not listed
TELETEXT all the most useful functions
FASTEXT feature supported
Clear large buttons for easy use

Transparent-Service/Cassette
£5.75

PHILIPS
Power Supply Mod Kit

G110	£9.99
CP110	£9.99

AKAI
VS22/25 Power Supply
£29.99

FERGUSON
Power Supply FV 31/32 Mod
£9.99

TECHNICAL BOOKS
FAULT FINDING

Video Fault	1994	£12.99
TV Fault	1994	£13.99
Video Fault	1993	£7.99
Satellite Fault		£14.99

EQUIVALENT BOOKS

A to Z 1994	£14.99
IN to 60,000	£14.99

CAMCORDER BATTERIES
JVC, PANASONIC, SONY, SHARP, PENTAX, SANYO COMPATABLES £19.99

BATTERY CHARGER/DISCHARGER £29.99

CAMCORDER BAGS £9.99

CD PLAYER MOTOR
PEA 1233 & Panasonic
£9.99

TELEVISION

REED BUSINESS PUBLISHING

Video Discs

High-density CD technology, which uses a shorter-wavelength laser to increase CD storage capacity, making it ideally suited to digital video and data applications, has been with us for only a comparatively short while. Yet we are already witnessing what looks like that bugbear of consumer electronics development, a format war. Philips and Sony have now, at the recent Las Vegas Consumer Electronics Show, given a public demonstration of their system. From all reports it works very well. It has just one minor disadvantage: the playing time is not quite sufficient for some movies. So along comes Toshiba with an alternative digital video disc (DVD) which overcomes the problem by storing information on both sides of the disc. It may also have improved performance in other respects, though a public demonstration has still to be given. However that might be, the fact that it has already been given wide support by other consumer electronics manufacturers and the entertainment industry suggests that it has passed the development stage.

We should not be surprised that Toshiba has come up with a significant video innovation in this field. Though the company was the original developer of the helical-scan VTR, it didn't get involved in the VHS/Betamax/V2000 video tape system wars of the Eighties. Toshiba built its first, experimental (it was hand made!) helical-scan VTR in 1957; a trial machine was produced in the following year, and given a public demonstration in early 1959. By 1962 Toshiba had perfected a helical-scan VTR with full-colour capability. But the company failed to follow up this initiative and go on to develop products for the consumer electronics market. Nevertheless the Toshiba Central Research Laboratory has been a significant contributor to video technology. And now the company has come up with its own version of the DVD.

The Philips-Sony camp has one advantage. It seems to have completed development of a practical system first, and can go into full production with little delay. It's unlikely to do so without significant support from the rest of the industry however. What seem to be going on at present are high-level negotiations on patent rights and exactly what technology will be used in a final DVD standard.

All this highlights the subject of managing technological innovation. It must be a fiendishly complex business. The historian has difficulty enough establishing who succeeded in producing a practical system or device first. Imagine trying to negotiate with others as parallel development programmes keep coming up with something new. Remember the battle over a colour TV standard for Europe, when PAL Mk 1, 2, 3, Secam Mk 1, 2, 3 and others were appearing by the week? With this in mind it's not surprising that inferior systems are sometimes adopted as the standard. It probably doesn't matter too much as far as the consumer is concerned: systems can always be tweaked to obtain improved performance, as has happened with VHS.

The history of the video disc to date (from Baird's 78s of the early Thirties!) has not been a happy one. Remember JVC's VHD and RCA's capacitance disc? The latter in particular must have lost its creators a fortune. Neither made any headway against the original LaserDisc, whose performance is excellent though it never caught on. What people wanted was tape, to be able to both play and record. It would be ironic if Toshiba, which failed to take advantage of its early work on helical-scan recording, now seized the initiative with discs. Toshiba has suggested that within a couple of years or so its technology could provide us with discs that can be used for recording as well as playback. The basic idea has been around for some time now – the use of different-power lasers for the two purposes. Getting low-cost disc material that will provide a long-term store could be the problem here. Once someone comes up with a reliable play/record disc, tape could be in for a tough time.

Meanwhile we already have LaserDisc, CDi, the Video CD, Photo CD and other disc-based systems. One wonders how long it will be before they go the way of the capacitance disc.

EDITOR
John A. Reddihough

PRODUCTION EDITOR
Tessa Winford

EDITORIAL OFFICE
0181 652 8120
Fax 0181 652 8956

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

PUBLISHING DIRECTOR
Susan Downey

ADVERTISEMENT MANAGER
Carol Nobbs
0181 652 8327

ADVERTISEMENT SALES EXECUTIVE AND PRODUCTION
Pat Bunce
0181 652 8339
Fax 0181 652 8931

SUBSCRIPTION ENQUIRIES

01444 445 566
Fax 01444 445 599

SUBSCRIPTION HOTLINE

24-hour subscription ordering with credit card number, phone 01622 778 000 and quote reference INJ.

COVER PHOTO

This month's cover photograph shows the Ferguson ICC9 chassis. The particular set is a Model D59N. See article on pages 324-328.

Teletopics

DIGITAL VIDEO DISCS

There have been rapid developments in moves to establish a second-generation video CD format. First of all we have to start calling them DVDs instead of HDCDs. But that's the least of it: the big thing is what sort of DVDs will they be? Despite the Sony-Philips disc being demonstrated at the Las Vegas CES and making a very good impression (see page 332), the industry appears to have moved in favour of Toshiba's alternative double-sided disc, with which Time Warner has been collaborating. The thing that seems to have tipped the balance in favour of this format is the announcement that it is now being backed by Matsushita, which is still the world's largest consumer electronics manufacturer. Other firms which are backing it include Hitachi, JVC, Denon, Pioneer, Thomson and several major entertainment groups. The disc was not demonstrated at Las Vegas, but support for it is such that Sony and Philips have started top-level discussions with Toshiba, the aim being to agree on a common approach to the development of DVDs. The Sony-Philips discs have a maximum playing time of about 145 minutes: the Toshiba disc increases the playing time to around 270 minutes.

As far as the consumer is concerned this could postpone the launch of DVDs in the marketplace. Sony had suggested a launch next year, though Philips seemed to be thinking more in terms of five years or so. A disc with industry-wide backing would be to everyone's advantage. At the time of writing it looks as if this will be the Toshiba version, possibly as early as autumn 1996 – Matsushita has suggested that it will have players available then at around £320, with the discs costing £20 or so. The players are complicated by the fact that the laser has to move around after scanning one side of the disc to scan the other side. With the alternative dual-layer system that Philips and Sony have been working on with 3M, the laser has to refocus on to the deeper layer after scanning the layer closer to the surface of the disc.

Time Warner is manufacturing the Toshiba discs at its CD production plant in Pennsylvania, and has demonstrated that they can be mass-produced competitively using existing pressing equipment which has been only slightly modified. EMI, Matsushita and Pioneer have also produced test discs.

SATELLITE TV

SES, owner of the Astra satellites, has signed an agreement with Hughes Space and Communications International to produce Astra 1G. It's due to be launched in the first half of 1997 and will be the third satellite dedicated to digital transmissions at 19·2°E. Astra 1E-1G will operate in the system's high band (11·7-12·75GHz), with a total of 56 transponders. The HS601 body will be used for 1G, with gallium-arsenide solar panels generating 8kW. It will have 32 transponders for the first years of operation, with 28 active transponders at the end of its lifetime – expected lifetime is fifteen years. 100W travelling-wave tube amplifiers will provide the outputs.

While 1E is to be launched by Arianespace at Kourou, French Guiana, 1F is to be launched at the Baikonur Cosmodrome, Kazakhstan, using a Lockheed-Khrunichev-Energia International Proton D1E system. No decision has been made on the launch of 1G. Arianespace has announced the cause of the failure of Flight 70 on December 1st: because of a pressure problem that resulted in insufficient supply to the gas generator, the third stage didn't operate at full thrust.

BSkyB added a net 180,000 direct-to-home subscribers during the fourth quarter of 1994. Seventy per cent subscribe to all the premium channels, paying the top monthly rate of £22.99. During the period Sky's subscriber base increased by seven per cent, from 2·64 to 2·82 million, with the churn rate falling from twelve per cent in the second half of 1993 to ten per cent during the second half of 1994 – despite a price increase in October 1994. According to BARB (Broadcasters' Audience Research Board) figures the total number of homes able to receive Sky programming now exceeds four million.

Philex Plc., Philex House, 110-124 The Broadway, West Hendon, London NW9 7BP (0181 202 1717, fax 0181 202 0014) is now distributing the Taiwanese-manufactured Veccom 40031 LNB in the UK. The impressive noise figure is 0·8dB, while its compact dimensions (129 x 40mm) make installation easy. The glass fibre cap over the horn, instead of the more usual plastic type, should provide improved performance under adverse weather conditions.

Baylin book distributor Swift Television Publications, 17 Pittsfield, Cricklade, Wilts SN6 6AN (01793 750 620, fax 01793 752 399) can now supply, at £59 plus carriage (UK £5, rest of Europe £5, rest of the world £16), the *1995/96 World Satellite Yearly*. This 786-page, large-format reference book provides up-to-date information on the programming available at sites across the globe as well as on equipment, broadcast methods and standards, an overview of scrambling and encryption techniques and much else. Footprints are included for nearly all of the world's operational broadcast satellites, presented in a standard format.

THE VIDEO MARKET

According to research consultancy BIS Strategic Decisions the video rental market peaked at £578m in 1993, falling back to £545m in 1994. Sales of cassettes increased from £630m to £751m during the same period – they have doubled in value over the past five years, from £340 in 1990. The video market has been changing. While the rental side enjoyed rapid growth in the Eighties, it is now in decline with video sales increasing sharply. There has also been a marked trend away from corner shop video stores to the larger type.

Blockbuster, the largest UK video retailer, is to close 133 of its Ritz rental shops. The Ritz name is to be dropped: 225 Ritz units have already been converted to Blockbuster Express shops and the remaining 350 outlets will be converted to this format. There are now 83 Blockbuster Superstores.

TV SETS

Sony and Philips are to launch PALplus sets later this year. Nokia plans to introduce a PALplus adaptor this spring for existing widescreen TV sets. Channel Four is expected to increase the number of PALplus broadcasts this year. Recent Sharp releases include a projection set, Model XV315P, that can produce pictures measuring up to 100in. diagonally. The display uses a 3·6in. TFT LC panel with over 100,386 pixels and a newly developed metal halide lamp which produces a picture brightness of 330 lux. Suggested price is £1,800.

DON'T FORGET!

The cost of a colour TV licence will be £86.50 from April 1st. A monochrome TV licence will cost £28.50 from the same date.

WE WILL ONLY SUPPLY TOP QUALITY, BRANDED COMPONENTS. REPUTATION COUNTS WITH US

G.G.L. COMPONENTS

PO BOX 72, UNIT 7, SOUTH JOHN STREET, CARLISLE, CUMBRIA CA2 5AL.
Tel: (0228) 39693/20358 Fax: (0228) 515127.

BUY WITH

AERIAL ACCESSORIES

AL COAX PLUG	18
FLY LEAD	70
VIDEO LEAD	70
4-WAY DISTRIB AMP	18.50
8-WAY DISTRIB AMP	20.25

BATTERIES

Philips MEMORY 1V2	1.70
MEMORY 2V4	2.50

CAPACITOR

63V	
47uf at 63V	18
100uf at 63V	22
220uf at 63V	35
250V	
1uf at 250V	20
4.7uf at 250V	25
10uf at 250V	35
22uf at 250V	40
47uf at 250V	65
100uf at 250V	1.25
400V	
1uf at 400V	23
4.7uf at 400V	35
10uf at 400V	70
22uf at 400V	85

EHT TRAYS

CONTINENTAL 30AX	8.95
GRUNDIG CUC2400/2410	13.70
PHILIPS KT3	7.95
UNIVERSAL (5-LEAD)	5.95

FUSES

20mm A/S (10 PER PK)	
500MA 630MA/800MA 1A/1 6A	
2A/2 5A/3 15A/5A	1.00
20mm Q/B (10 PER PK)	
500MA/800MA 1A/2A/2 5A	80

SERVICE MANUALS

Amstrad 4600	9.95
6000	9.95
Ferguson TX85	8.50
3V59	13.50
3V65	13.50
FV11	13.50
FV37	17.25

SERVICE AIDS

CLEAR TEST TAPE	7.95
FIBRE PEN	3.50
HEATSINK COMP	1.55
SILICON GREASE	1.85
SOLDA MOP	75
SOLDER 5KG/18SWG	7.95
WELLER GUN TIPS (2)	1.65

DIODES

R2M	95
BY133	09
BY227	20
IN4007	10
IN5408	20

I.C's

CNX62A	3.50
SAA1293 02	5.95
SAA1293-03	6.95
SAA1293A-93	8.15
STK5332	4.95
STK5421	3.50
STK5422	5.50
STK5481	6.95
STK5482	4.95
STK7308	5.50
STK7348	5.50
STK5412	4.95
STR50103A	5.95
STK5404	6.95
STK5804	5.95
TDA1170S	1.95
TDA2270	2.75
TDA2576A	5.95
TDA2577A	3.50
TDA2578A	2.95
TDA2579	3.95
TDA2581	4.50
TDA2582	2.50
TDA2653AQ	2.95
TDA3560	4.95
TDA3562A(TFK)	4.65
TDA3565	3.95
TDA3571BQ	8.95
TDA3576B	10.25
TDA3650	8.95
TDA3651 3	2.95
TDA3653A	3.50
TDA3654A	2.95
TDA4500	4.50
TDA4501	5.25
TDA4503	4.95
TDA4505E	5.45
TDA4600/2	2.95
TDA4600-2D	3.95
TDA4601	2.95
TDA4601 DIL	3.75
TEA1039	1.95
TEA2018A	2.50
TMP47C434N-3414	14.95
TMP47C434N-3415	14.95
TMP47C434N-3537	14.95
TMP47C434N-3555	15.55
TMP47C434N-3559	14.95

LINE O/P TRANSFORMERS

Ferguson TX90 20"	14.85
TX100 90D	16.95
TX100 110D	13.60
TX100 FST	15.75
Ferguson A51F	17.75
Fidelity ZX2000 & MOD	13.65
ZX3000	12.75
Hinari CT4/5	14.95
Hitachi CPT1474 1476	16.25
Hitachi CPT2158	22.50
CPT2174/76/78	14.95
CPT2276/2278	14.95
CPT2476 2478	16.25
ITT COMPACT 80R/110	14.95
CVC1200	17.50
Matsui 1410/20/40	16.95
Panasonic TLF14567F	19.25
TLF14568F	19.25
Philips CP90	16.50
2A	18.50

SWITCHES

FIDELITY CRV140	1.50
GRUNDIG CUC731	3.50
KT4 CTX SW-REMOTE	1.50
PHILIPS UNIVERSAL	4.25
SONY UNIVERSAL	4.25
TX9/10 STANDARD	1.00
TX9/10 REMOTE	1.75
TX90/100 REMOTE	1.50

TRANSISTORS

BC639	20
BC640	20
BU208D	1.80
BU426A	1.25
BU500	1.80
BU508A	1.20
BU508AF	1.50
BU508D	1.50
BU508V	1.65
BUT11AF	1.20
BUT56A	1.60
BUX84	80
R4050	2.45
T9053/54V	1.80
T9064V	1.50
TIP29E(T0168V)	60
TIP112M(T0167V)	60
TIPL791A	1.70

REMOTE CONTROLS

Ferguson T725	8.95
T34/742	8.95
T785 F T	9.50
T789 F/T	9.50
TX9 10 N/T	11.50
TX9/10 TEXT	8.95
TX100 (ST)	11.95
SRA1	13.50
Fidelity CTV14R/S	12.95
Goodmans TX1100/1200	18.95
Grundig TP400 T T	12.90
Hitachi CPT2174	17.95
CPT2246	12.75
ITT VS4	10.75
Pace 6000	11.95
Panasonic TNQ1419	13.95
Philips KT3 30 TEXT	12.50
RC5991	10.70
RC5993 (GEN)	11.95
VR6462	11.50
VR6467	11.50
Sanyo 1100 1200	13.25
Sony RM632/636	9.70
RM670/672/675	9.70
Tatung RC40/45	9.25
RC70	9.25
RC90	11.95
Toptel WITH FST	24.95
NON FST	17.95

VIDEO HEADS

Alba 4000 5000X	16.95
Amstrad 4500 9000	14.70
4600 4700	13.75
6000/6100	15.25
7000	14.95
Ferguson 3V04/39	8.50
3V42 55	17.25
3V59/FV12	27.95
3V65/FV11R	16.50
FV12/32L	27.95
FV31	25.95
FV42L	33.95
Fisher FVH615/910	15.95
FVH906 916	15.50
Hitachi 8000/9700	13.50
VT11 33E	14.30
63/64E	19.25
VT65E	28.50
VT100 120	21.25
VT130E	25.30
VT150E	36.50
Matsui VX735A	18.90
NEC 9034 9053	19.75
Panasonic NV333	8.50
NV366	19.50
NV370	9.50
NV430	13.95
NV730	18.50
NV777	18.95
NV2000 7000	8.50
NVG7/9	15.95
NVG10/12	16.25
NVG18	29.50
NVG21 25	29.50
NVG30 40	21.95
NVG45	27.80
Philips 6460/6520	9.50
6462/6520(G)	43.50
6467/6468(G)	38.75
Samsung VX510/970	17.00
Sanyo VHR1130/1300	18.50
VHR2300/3200	18.50
Sentra 8000/8400	16.75
Sharp VC9303/381/481	14.95
581/681	14.00
Sony C5 6/7	14.75
Toshiba V73/93B	14.25
V93B	17.50

HEADS ARE OF THE VERY HIGHEST QUALITY

AMSTRAD VIDEO SPARES

VCR4600	
BELT KIT	1.95
GEAR ASSEMBLY	9.95
MODIFICATION KIT	5.25
PINCH ROLLER	2.95
VCR6000	
BELT KIT	1.80
PINCH ROLLER	2.95
CLUTCH	3.95

FERGUSON VIDEO SPARES

3V29/30	
BELT KIT	1.80
CASSETTE LAMP	70
LOAD BELTS (PK-5)	1.80
PINCH ROLLER	2.95
REEL IDLER	2.95
TAKE UP CLUTCH	2.95
TAKE UP IDLER	1.95
3V35/39	
BELT KIT	1.80
CAPSTAN MOTOR	22.95
CASSETTE HOUSING	31.50
LOAD BELTS (PK-5)	1.80
PINCH ROLLER	2.95
REEL IDLER	2.95
TAKE UP CLUTCH	2.95
TAKE UP IDLER	1.95
3V44/45	
BELT KIT	1.50
PINCH ROLLER	2.95
CASSETTE HOUSING	31.50
3V65/FV11R	
BELT KIT	1.80
PINCH ROLLER	2.95
REEL IDLER	2.60

FISHER VIDEO SPARES

FVH5000/5100	
BELT KIT	1.85
REEL IDLER	4.95
PINCH ROLLER	2.95
FV615/720	
BELT KIT	1.80
PINCH ROLLER	2.95
REEL IDLER	5.35
CLUTCH ASSEMBLY	5.35
FVH905/910	
BELT KIT	1.85
REEL IDLER	5.35
CLUTCH ASSEMBLY	5.35
PINCH ROLLER	2.95

HITACHI VIDEO SPARES

VT9300/9700E	
BELT KIT	1.85
PINCH ROLLER	2.95
PULLEY	95
F/F REW IDLER	2.75
PLAY IDLER	3.75
VT11/33E	
BELT KIT	1.85
F F REW IDLER (GEN)	2.50
PINCH ROLLER	2.95
CLUTCH ASSEMBLY	7.75
CAPSTAN MOTOR VT11E	27.50
CAPSTAN MOTOR VT33E	27.50
VT63/64E	
BELT KIT	1.85
F F REW IDLER (GEN)	2.50
PINCH ROLLER	2.95
CLUTCH ASSEMBLY	7.75
CAPSTAN MOTOR	27.50
VT120 130E	
BELT KIT	1.85
F F REW IDLER	2.50
PINCH ROLLER	2.95
CLUTCH ASSEMBLY	7.95
CAPSTAN MOTOR	22.50

PANASONIC VIDEO SPARES

NV333/366	
BELT KIT	1.85
PINCH ROLLER	2.95
PLAY IDLER (GEN)	5.50
REEL IDLER (GEN)	1.35
BELT KIT	1.80
PINCH ROLLER	3.60
REEL IDLER (GEN)	3.50
NV730	
BELT KIT	1.80
PINCH ROLLER	2.95
REEL IDLER (GEN)	4.30
NV2000/2010	
BELT KIT	1.80
PINCH ROLLER	2.95
PLAY IDLER (GEN)	1.35
REEL IDLER	1.35
NV7000/7200	
BELT KIT	1.80
PINCH ROLLER	2.95
PLAY CLUTCH (GEN)	6.15
REEL IDLER (GEN)	1.35

PHILIPS VIDEO SPARES

VR6460/6520	
(SEE NV370 SPARES)	
VR6462/6560	
PINCH ROLLER	2.95
REEL IDLER	4.75
CASSETTE HOUSING	14.75
VR6467/6760	
BELT KIT	1.95
PINCH ROLLER ASSM	6.75
CASSETTE HOUSING	10.95

SANYO VIDEO SPARES

VHR1100/1300	
BELT KIT	1.90
REEL DRIVE ROLLER	5.25
PINCH ROLLER	2.95
VHR3100/3300	
BELT KIT	1.75
REEL DRIVE ROLLER	4.95
PINCH ROLLER	2.95

SHARP VIDEO SPARES

VC9300/381	
BELT KIT	1.95
PINCH ROLLER	2.95
REEL IDLER (GEN)	3.95
VC481/482	
BELT KIT	1.95
PINCH ROLLER	2.95
REEL IDLER (GEN)	3.95
VC581/582	
BELT KIT	2.20
PINCH ROLLER	2.95
REEL IDLER (GEN)	3.95
VC681	
BELT KIT	2.20
PINCH ROLLER	2.95
REEL PULLEY (GEN)	7.95
VCA140/VCT72	
BELT KIT	2.20
PINCH ROLLER	2.95
REEL PULLEY (GEN)	7.95

VIDEO LAMPS

Ferguson 3V00/22	50
3V29/30	70
Sharp 9300/381	1.50
UNIVERSAL	50

VIDEO LEADS

SCART TO SCART F/W	4.75
SCART LEAD TO 6 PHONO	4.95
SCART TO 2 SCART SKT	5.25

VIDEO REPAIR KITS

Ferguson 3V29/30	12.95
3V35/39	12.95
3V44/45	14.95
3V64/65	11.95
Hitachi	
VT9300	12.95
VT11 33E	16.95
VT120/130E	16.95
Panasonic NV230 (GEN)	14.50
NV333 (GEN)	14.50
NV370 (GEN)	14.50
NV430 (GEN)	14.50
NV730 (GEN)	13.95
NV777 (GEN)	13.50
NV2000 (GEN)	23.95
NV7000 (GEN)	20.45
NVG10-12"	12.95
Philips VR6460	14.50
VR6462	12.50
VR6467 (C-KIT)	21.50

NEW CATALOGUE NOW BEING COMPLETED. PLEASE REQUEST

CELLULAR SPARES

ANTENNAE	
308 BODY MOUNT	14.25
308 GLASS MOUNT	15.95
Motorola 8500 1/4 WVE	9.95
8800X	9.95
9800X	19.95
Nokia 101	14.95

BATTERIES

Ericson HOTLINE	23.50
Mitsubishi MT5	24.50
MT7 700MA	23.50
Motorola 8500/1000MA	23.50
8500/1500MA	29.50
8800 1000MA	23.95
8800/1500MA	29.50
9800/700MA	23.50
NEC P3 700MAH	23.50
Nokia 101 700MAH	24.50
190	23.50
Panasonic F1 700MAH	23.50
Sony CMH333	24.50
Technophone TP3	24.50
TP405 700MAH	23.50

BATTERY CHARGERS DESK TOP TRICKLE

MOTOROLA 8000/8800X	23.95
MOTOROLA MICTRATAC	24.50
NEC P3	24.95
NOKIO 101	24.95
PANASONIC F	24.50
SONY CMH333	24.95

DESK TOP RAPID/COND.

MOTOROLA 9800X	42.50
NEC P3	42.95
NOKIO 101	42.95
PANASONIC F-SERIES	42.95
SONY CMH333	44.95

P/PACKING £1 00 + VAT FOR COMPONENTS

MANUALS £1 25 P/PACKING

EXPORT ORDERS P/PACKING AT COST

CELLULAR PARTS – £3 PER ITEM

WHEN ORDERING PLEASE ADD P/P TO THE ORDER & THEN ADD VAT AT 17 5% TO THIS TOTAL

NB. "MINIMUM ORDER VALUE £5. ALL STOCK ITEMS BY RETURN"

DUE TO MANUFACTURERS PRICE RISES WE RESERVE THE RIGHT TO CHANGE PRICES WITHOUT PRIOR NOTICE.

PREPROGRAMMED EASY TO USE UNIVERSAL REMOTE CONTROL

4way Infra Red

A single remote to operate your TV, video & satellite receiver. Plus auxiliary options!

- **Replace up to 8 remotes with 1** — Ideal if you have multiple TVs, VCRs, satellite receivers or cable TV.
- **Replace lost or broken remotes** — The 4 way can save you the trouble and expense of tracking down a replacement.
- **Teletext functions with Fastext** — All the most useful text functions covered including fastext.
- **Easy & simple to set up** — Just tap in the correct codes listed for your equipment or use 'code search routine'.
- **Controls 1000's of models** — Preprogrammed for the most popular brands of TV, VCR, Satellite & cable.
- **Clear (Large Key) Layout** — Carefully designed for maximum ease of use.
- **Freefone helpline** — Any problems just call. Its free!

ONLY £14.95 + VAT

TO ORDER Your 4 way remote control

BY POST simply send your cheque for £18.74 inc P&P/VAT
P.V. TUBES, 104 Abbey Street, Accrington, Lancs BB5 1EE
(Please enclose your Nome, Address & Telephone No.)

BY TELEPHONE call now on 01254-232611 or 01254-236521 with your Credit Card details for immediate dispatch.

Please allow 21 days for delivery

MARAPET ELECTRONIC COMPONENTS

Tel: (01452) 53 22 53 — 24hr Answering Service for out of hours ordering

PHONE for a PRICE & AVAILABILITY on your requirements, or send S.A.E. for more information on our service

IC SELECTION

Ams40054	£11 69	TA8410K	£4 59
Ams40092	£9 01	TBA530	£1 25
AY38912/F	£7 74	TBA810P	£1 29
BUV48A	£4 17	TBA810S	£1 35
CA741CE	£0 25	TDA1011B	£2 39
CNY65	£3 99	TDA2595	£4 24
CDP6818AE	£7 24	TDA3562A	
CO24947	£10 03	TFK	£4 99
CO25913	£27 99	TDA3654	£2 89
DS1488N	£0 79	TDA4600-2	£3 70
DS1489N	£0 79	TDA8170	£3 45
DS75150N	£1 49	TEA2000	£5 78
DS75154N	£1 50	TIPL791A	£2 25
H11L3	£2 99	TL431CLP	£1 99
HA12006	£7 08	TL497ACN	£3 99
LM1203N	£9 92	TMS4532NL4	£0 99
LM3909	£2 15	UC3842	£2 34
LM833	£1 95	UM6845	£8 72
MAB8461P 0/9	£2 04	UPD8039LC	£10 55
MB81416-12	£3 75	ZX8302	£6 49
MC1377P	£6 73	ZX8400APS	£4 79
MC74HC85	£0 85	ZX8401	£5 44
MK4564-15	£1 79	14DN476G	£14 30
MSM62423	£9 99	2SA1706	£1 34
NE555CDP	£0 27	2SC2331	£1 35
P8255A	£2 85	27C256-200	£3 50
PC713V	£2 89	4116-2N	£1 75
R2G	£1 29	6569R5 VIC	£13 49
S2000AF1	£1 99	8565R2 VIC	£15 03
SED9420CAC	£14 93	74LS00	£0 15
TA7280P	£4 95	74LS157	£0 25
TA7281P	£4 95	74LS245	£0 39

IC Protectors – F or N Series 50p each

EQUIPMENT MANUALS

Large selection of Manufacturers Service & User information available. Original manuals supplied if possible. We only show a few. Computer Equipment examples here. Contact us for TV, VCR, Audio Equip.

Amstrad PCW9512 Service	£14 53
Amstrad PC14CD/O Service	£5 00
CBM C64/C64C Service	£14 99
CBM C64 User	£5 49
CBM C64C User	£4 99
CBM C +4 User	£5 49
CBM 1084S-P	£9 87
Panasonic KX-1123 Service	£14 95
Philips CM8833 (Mk1) Service	£8 55
Philips CM88xx Service Supp	£3 00
Philips CM8873 Service	£8 76
Philips CM1 1342/62 Service	£9 99

*NO VAT ON MANUALS

SELECTED COMPUTER SPARES

AMSTRAD		COMMODORE	
PCW 9512 Armature	£3 58	A3000 IC 8372B	£29 91
CPC464 Keyboard	£25 52	C64C Modulator	£15 96

PHILIPS		MONITOR LEAD	
CM9073 On/Off Switch	£5 25	Amiga to Scart I/P	£8 29

We are unable to list all we can supply. A large range of Amstrad, CBM, Philips, parts is available – plus selected spares for Acorn, Atari, Epson, Panasonic, Sinclair, Star and others.

THIS IS JUST A VERY SMALL SAMPLE OF OUR STOCK

TV/MONITOR LINE OUTPUT TRANSFORMERS

AMSTRAD, IBM, DIGITAL etc	P O A
COMMODORE 1084-P/SP etc	P O A
PHILIPS CM8533/CM8833 etc	£21 27
PHILIPS CM1342/62 (CM8833 MK II)	£24 49
Ferguson TX90 14" 90°	£19 75
Ferguson TX100 20" 90°	£19 82
Ferguson TX100 22"/26" 110°	£18 99
Ferguson TX100 51cm FST	£20 49
Fidelity (Please quote model)	P O A
GEC C2089H/90H/C2288 to 2291H/C2294H	£21 60
Hitachi CPT2036/46/76/78/CPT2234/36/CPT2246/78	£21 60
Hitachi CPT2174/2176/2178	£21 43
ITT/Philips	P O A
Panasonic TC2160 & TX2122/2162	£24 64

We can also supply LOPTx's for many other makes. MATSUI, MITSUBISHI, SAISHO, SONY – to name just a few others. Please supply Model Info. & No. on part.

AUDIO SPARES

AMSTRAD MX200/CDX400 (FUNAI) CASSETTE DOOR	£2 90
B T FREEWAY TELEPHONE – REPLACEMENT AERIAL	£3 65
SHARP RGF278, 281, 284 MAIN BELT	£1 19
TOSHIBA STU2/L MAINS TRANSFORMER	£9 99

Many other specific Parts and Manuals available

TV SPARES

GEC/HITACHI FRAME MODULE HM6251	£7 94
GOLDSTAR CIS4361/4441/CIT2162X/2172X 0/0 SWITCH	£5 65
HITACHI CPT2188/2650 On/Off SWITCH	£4 33
SAMSUNG CI537V/CX558WT On/Off SWITCH	£6 05

Large range of TV Spares available for many makes

VIDEO SPARES

Large range of Video Heads, Idlers, Belt Kits, Pinch Rollers from stock – plus much, much more. Please contact us.

REMOTE CONTROLS FOR SATELLITE

AMSTRAD SRX200/SRD400 & SRD510/520/600	each type £12 75
PACE PRD800/PRD900/SS9000/SS9200	each type £12 95

We also stock other Remote Controls + Many General Components.

When ordering: Please add £1 20 P & P (+ 50p for LOPT's) then add 17 5% VAT (NB. VAT is due on P&P – Manuals are Zero-rated). Validity dates required for card orders, also issue No. for SWITCH.
Please send S.A.E. with all written enquiries

All items subject to availability – Prices can change without notice.

We are Unable to accept callers at present
PLEASE ORDER BY POST OR PHONE
We accept payment by VISA, Access, DELTA, SWITCH, Cheque or P.O.

MAIL ORDER ONLY to:
M.E.C. (Dept.TV)
1 HORNBEAM MEWS
GLOUCESTER GL2 0UE

VCR Clinic

Reports from Brian Storm, Eugene Trundle, Mike Leach, Bob McClenning, Michael Dranfield, Chris Watton, David Belmont, Gerald Smith and Terry Lamoon

Panasonic NVSD40

This machine wouldn't accept a cassette. Replacing the BA6219B loading motor drive chip seemed to cure the fault, but the machine failed again on the soak test bench. Eventually we found that the cause of the problem was a dry-joint at one of the loading motor pins: it sparked intermittently, blowing the drive chip. **B.S.**

Panasonic NVJ30/35 and NVL20/25/28

Intermittent stopping or shutting down, usually with the mechanism remaining fully loaded, is a common fault with all these machines. In nearly every case the cause is dry-joints at P2001, the capstan motor connector. Always resolder this socket and ensure that the plug is properly inserted. **B.S.**

Panasonic NVFS90

There were various complaints with this machine: picture problems, no VHS or S-VHS playback, and the owner mentioned fine lines across the picture when it was there. Lack of playback was soon narrowed down to the sub-luminance pack where we found that C3501 (1µF, 50V) which couples the input to the CCD delay line chip IC3504 was open-circuit.

We then found that the restored picture was smeary, with the fine lines complained about in evidence. These faults were cured by replacing C3509 and C3516 (both 3·3µF, 16V) which decouple pins 6 and 15 of the CCD delay line chip.

A check on the S-VHS playback produced a badly distorted, mushy picture. When IC303 was treated to a quick squirt of freezer the picture cleared up, proving that a replacement (VEFH05B) was required.

Finally, while the machine was on soak test another fault developed: fine lines across the picture slowly became more distinct. The cause of this fault was traced to yet another electrolytic capacitor, this time C3311 (10µF, 16V) which decouples the output buffer for the 1H delay line in the HQ pack.

The machine was then pronounced fit to resume its duties. **B.S.**

Akai VS422/425 etc

The symptom of a dim or extinguished fluorescent display with this range of models is well known: Akai has a modification kit (part no. BX744015J) which provides a cure. On two occasions recently however we've found that the display panel failed to come to life after fitting the kit. In each case the primary winding of the oscillator transformer L404 had gone open-circuit. Don't be fooled by the fact that the circuit continues to oscillate: the coil in parallel with L404's primary winding sustains oscillation. **E.T.**

Panasonic NVF70

If the symptom with one of these machines is no-go (dead) or reluctance to start, the likelihood is that the kick-start capacitor C1109 in the power supply has dried up. It gets very warm in its little box. Replace C1114 while you are at it. To prevent premature failure of the replacements make sure that you use 105°C rated components in both positions. **E.T.**

JVC HRS5800

If complete failure to operate (no display, no action) is the problem with one of these machines it's likely that the UNSW 12V line is at zero voltage because the 22Ω fusible resistor R15 in the power supply is open-circuit. The resistor seems to fail for internal reasons – we've never found it to be overloaded. **E.T.**

Sanyo VHR3300

Now that these machines are ageing a total jam up of the tape loading mechanism is becoming common. It's usually instigated by failure of the half-load arm to move clear of the exit guide assembly during the unlacing process. The cause is the fact that the metal pin on the half-load lever assembly has listed to starboard. Replacement is the only cure: it's item 79 in the exploded deck view in the manual. **E.T.**

Samsung VI712

This 7 series Samsung machine wouldn't record. When a new recording was played back nothing had been erased and nothing had been recorded on the tape. The cause was simply dry-joints on the main panel. These machines do suffer from dry-joints which cause various symptoms. **M.L.**

Ferguson 3V57/JVC HRD755

The customer complained of frequent tape damage. We tried everything: idlers, pinch rollers, the capstan motor. On its unhappy return to the workshop yet again it went wrong – this was the first time we'd actually seen the fault! Transistor Q604 in the capstan control line was the cause of the trouble. It's mounted on a large heatsink on the top main PCB and was going open-circuit very intermittently. **B.McC.**

Hitachi VT130

When this machine was switched on and a cassette was inserted none of the functions would work until play had been pressed. Once play had been pressed stop, fast forward and rewind worked all right, but when the cassette had been ejected and the operate button pressed the loading arms would start to come out and the loading motor continued to run, much to the distress of the loading belts.

Extensive checks eventually brought me to pin 6 of the syscon chip IC901 – the power control pin. The voltage here was high at around 7V. Since the supply to the chip is 5V, the voltage at pin 6 in the high state should be 5V. Tracing back through R952 I found that the voltage was even higher, about 10V. Checks in the power supply revealed that D865 (1S2473) in the power on/off control system was short-circuit. With a sigh or relief I fitted a 1N4148 as a replacement and then tried the machine again. To my horror the fault was still present, and this time the machine couldn't be turned

off, remaining on all the time. As the power control line was still at 10V I lifted pin 4 of CN852 on the power PCB, but the 10V was still present at R952. The only other component connected to the power control line is D508 (1SS119): when this was removed and checked it was also found to be short-circuit. Another 1N4148 restored normal operation, with the power control line back at 5V in the on state. **M.Dr.**

Matsui VX6600

This machine wouldn't load a cassette. When we checked it we found that the BA6247 loading motor drive chip was getting hot. Was it the motor or the chip? We disconnnected one lead to the motor and fed it from an external power supply. As it was in order a new chip was obtained and fitted, restoring normal operation. **M.Dr.**

Ferguson FV52

The dealer who brought this machine along had already changed the mode switch. There were two complaints. First the deck would carry out all sorts of operations without being asked. The cassette housing went up and down of its own accord, and cogs would grind. To make matters more difficult the faults were intermittent, ruling out mechanical alignment problems. Sometimes the machine would function normally. The second complaint was that there was no sound mute in the video search mode. On test we found that there was another problem: no E-E or playback pictures, just a blank screen.

Replacing the end sensors made no difference. We then found that when going through the modes play, rewind and fast forward the mode control motor, once the function had been selected and the machine was running, would twitch back and forwards on its own. A check through the circuit diagram revealed a likely suspect. Feeds from the cam switch, the cassette housing in switch and the end sensors go to a TC4021BP expander chip, IC161, on the capstan drive PCB. Replacing this cured the mechanical faults.

On then to the sound fault. Pin 18 of IS18 should go high in video search to mute the sound. It stayed low. Tracing the source back via diodes DW26 and DW27 brought us to two more expander chips, both type MC14094, on the main PCB. As replacements made no difference we decided to look for the cause of the video fault and come back to the sound one later.

Not much was happening at the video chip because the supply at pin 25 was 2V instead of 5V. After much messing around with no thanks to the manual we found an open-circuit Wickman fuse – it wasn't shown in our circuit diagram. Replacing it cured the remaining faults, as IW18 and IW27 are both fed from the 5V supply. **M.Dr.**

Matsui VX6600

This machine was brought in because there was no record picture. It played back all right, but in the E-E mode there was only a blue screen. On channel change a very ragged and overloaded picture appeared for half a second, then the blue screen returned. Checks in the vision i.f. strip revealed that C17, an 0·1µF, 50V electrolytic, was open-circuit. It decouples pin 4 of the vision/sound i.f. chip IC6001. **C.W.**

JVC HRD520

If the complaint is that the picture rolls or is in forward search all the time, check whether the brass retainer for one of the slant pole guide blocks – usually the supply side one – has come out. It may have been forced out of the guide block because of tape reclaim failure when unloading: some customers then pull the cassette out so hard that the tape breaks!

The mode switch is well worth checking. It may be that the tape loops around the guides etc. A component tester is great for checking mode switches. Check all combinations of the switch pins: if you see any raggedness, chuck the switch in the bin. The trace will be in either one position or the other, with no in betweens. Try the tester with a new one for experience. **C.W.**

Amstrad VCR9000

The tape was stuck in and wouldn't eject. When the machine was switched on, the stop symbol and channel indicator lit, the tape laced up about half way then the machine powered down and the cassette symbol flashed. If you pushed the power button the machine would unlace then relace fully, but with no drum rotation. The machine then shut down with only the cassette symbol flashing. Checks in the sub-power supply, on the main PCB, revealed that the power-on 5V was low at only 1V. The cause was transistor Q1505, which had a leaky base-emitter junction. Although a bit hefty, a BD131 proved to be a worthy substitute. **C.W.**

Samsung VI611

There was a loading fault with this machine: the loading motor tried to push the cassette tray out when it was already out with no cassette in it. After a few seconds the motor stopped and the power LED blinked. The cause of all this was switch 'a' on the lift assembly. It's the one beneath the stopper cam that prevents a second tape being inserted when one is already in. It also acts when the tray reaches its extreme unloaded position. As it was open it didn't tell the microcontroller chip to stop. **C.W.**

Akai VS1

This good old VCR had a cassette stuck half way in. The power LED came on as soon as the machine was plugged in, and the cassette lamp was lit, but there was no lift power. After poking about in the motor control system and worrying about the big i.c.s in the system control I spotted it – one of the wires had fallen off the cassette lift motor. Don't you feel a fool? – but relieved. **C.W.**

Philips VR6362

When a tape was inserted the machine powered down. The cause of this was the drum motor, which was very tight. No drum rotation switches the machine off of course. **C.W.**

Saisho VR905S

Intermittent loss of colour was the complaint with this machine. The cure was replacement of the two crystals X3001 and X3002 and realignment of the chroma circuits. **D.B.**

Panasonic NVSD40

This machine wouldn't record. Playback of prerecorded tapes was fine, but playback of one of its own 'recordings' produced just snow. Modulated r.f. reached the head amplifier, so the problem had to be within the head amplifier's screening can. We found that several of IC501's pins were

dry-jointed. Resoldering them provided a complete cure. **D.B.**

Matsui VX2500/VX2700

We've had a couple of these machines in recently because of no-colour faults. Replacing X4301 and IC4001 in the VX2700 restored the colour. With the VX2500 the colour dropped out when the machine warmed up. Use of freezer and a hairdryer brought us to IC4001. A replacement put an end to the trouble. **D.B.**

Ferguson FV68TX

The playback sound would switch from stereo to mono. This is becoming a very common fault with modern VCRs. Because the entry and exit guides guides had worked loose the playback envelope was very poor. Setting them up and locking them cured the fault. **D.B.**

Mitsubishi HS347

There were no functions and no display. Checks showed that the standby 5V supply was missing. The cause of this was traced to Q9A0, which was short-circuit base to emitter. A replacement restored normal operation. **G.S.**

Sharp VC484HM

There was either no or distorted right-channel sound with Nicam operation. I found that the waveform at pin 22 of IC1701 was distorted – the audio was not being converted properly. Resoldering pins 2, 3, 15 and 16 of IC702 restored full Nicam sound. **G.S.**

Toshiba V212

This machine would sometimes fail to accept or eject a tape, and appeared to load and unload rather slowly. A new loading motor put matters right. **G.S.**

Panasonic NVF70

There was no Nicam stereo. Checks at IC7901 (TA8662N) in the Nicam section showed that there was a digital audio output at pin 29 but no clock waveform at pin 27. X7902 wasn't oscillating and as pin 24 of IC7901 read 10Ω to chassis I decided to replace it. This restored the Nicam sound. **G.S.**

Samsung VIK310

This machine would cut off intermittently during record or playback. I found that the take-up was jerky and would very intermittently stop. The cause of this is a stiff 'idler arm' – the felt pad wears. **G.S.**

Sanyo VHR7250

This machine would play for about five seconds then cut out. I noticed that the loading motor continued to run after loading up. A replacement mode switch cured the fault. **G.S.**

Philips VR6542

This machine's recordings were very poor. The pictures produced were dull and rolled. There was just as bad a picture in the E-E mode. A check showed that the waveform at the video output socket was badly cramped. The video input to the YC PCB was o.k., but the output was cramped. C201 on the YC board was the cause of the trouble, a replacement putting matters right. **G.S.**

JVC HRD910

This machine failed to play and damaged tapes. On test I found that the drum and capstan motors turned very slowly. Checks on the servo PCB showed that the motor 13V and SWD 5V supplies were o.k. Further checks on this panel revealed that the fsc input at pin 42 of IC1 was missing. It comes from the video area, where there was no signal at crystal X1. I next found that the SWD 5V supply here was missing. Moving back I discovered that CP803 was open-circuit. It's not shown on the circuit diagram, but you'll find it near the corner of the main PCB, in the pinch roller area. **G.S.**

JVC HRC100

This machine is one of those that accepts normal or VHS-C camcorder cassettes. The problem was that it would load but not play. A check on the voltages showed that the 5V switched supply was missing. As usual with JVC VCRs a circuit protector (CP2) in the line had gone open-circuit. A replacement restored normal operation. **T.L.**

Panasonic NVF65

This machine worked perfectly when first switched on. But after an hour or so the channel jumped to the next one. As time went by the jumps got faster and faster. Each time it happened the machine beeped, so I thought I'd better cure it quickly before it drives me mad. Fortunately a squirt of freezer on the MN187125VFM tuning chip IC1 soon proved that it was the culprit. After fitting a replacement the machine never beeped on its own accord again! **T.L.**

Matsui VP9301

There was no playback sound with this machine. Tracing the signal path back I came to C5015 which was dry-jointed. Resoldering it restored the sound. **T.L.**

Akai VS55

If one of these machines is reluctant to come out of standby, or it does but the capstan seems to operate sluggishly, check the capacitors in the power supply, especially C15 (220µF, 25V). These electrolytics cause many problems as they dry out. **T.L.**

Mitsubishi HSB12

There was a strange fault with this machine. It could be tuned in when in the preset tuning mode but in the normal mode channels couldn't be obtained. I suspected the tuning or EAROM chip, but before ordering replacements I decided to check on the supplies. This was a worthwhile move: the –30V supply at pin 2 of the EAROM chip was low at about –10V. Moving back to the power supply I found that the fusible resistor R904 was open-circuit. Its replacement, using the correct type, restored normal operation. **T.L.**

Matsui VX6000A

On test I found that the capstan and drum were both rotating too fast. Replacing IC2001 (OEC9011) restored the correct speeds. **T.L.**

TV & VIDEO SPARES

REMOTE CONTROLS

Replacement for: Ferguson, Hitachi, Philips, Panasonic, Grundig, ITT, Sony, Saisho, Granada, Saisho + many others

Phone for make and model no.

IC SELECTION

14DN487	£15.80	SAF1039	£2.20	TBA121	£5.80	TDA2600	£6.80
AN5521	£3.80	SDA2546	£9.00	TBA120S	60p	TDA2611A	£1.90
AN5900	£2.20	SL470/471	£4.00	TBA750	£2.20	TDA2640	£3.20
BA6209	£3.80	SL486	£3.20	TBA920	£2.80	TDA2653A	£2.90
BA6219	£3.80	SL490	£3.80	TBA950	£2.20	TDA2654	£5.70
BA6229	£3.80	SL1430	£2.40	TBA2800	£1.80	TDA2655B	£16.60
BA6238A	£2.80	SL1432	£6.80	TCA270	£1.80	TDA2670	£3.20
BA6239	£3.80	SN76226DN	£1.80	TCA800	£6.80	TDA2680	£3.80
CCUFRG07	£14.40	SN76705	£9.80	TD6316AP	£4.80	TDA2690	£3.80
CNX62	£4.00	STK5322	£21.80	TDA1035T	£2.40	TDA2780	£6.80
HA11211	£2.80	STK5325	£6.80	TDA1037	£1.90	TDA3190	£4.20
HA11423	£3.80	STK5326	£6.80	TDA1044	£2.90	TDA3301	£6.80
HA51338SP	£21.50	STK5332	£4.80	TDA1060	£3.80	TDA3303	£19.80
LA4445	£3.00	STK5333	£8.80	TDA1082	£4.00	TDA3330	£12.50
LA4270	£4.95	STK5337	£4.80	TDA1170S	£1.80	TDA3500	£6.80
LA4520	£3.80	STK5338	£6.80	TDA1180	£2.20	TDA3505	£9.80
LA7800	£1.80	STK5339	£6.80	TDA1185A	£3.20	TDA3510	£9.80
LA7520	£2.80	STK5342	£4.80	TDA1190Z	£2.20	TDA3540	£2.50
LA7801	£3.50	STK5372H	£7.80	TDA1432P	£5.70	TDA3541	£3.50
LA7820	£3.80	STK5421	£6.80	TDA1512	£3.20	TDA3561A	£5.80
LA7830	£2.80	STK5421	£5.80	TDA1515	£4.50	TDA3562A	£4.00
M104B1	£6.80	STK5422	£5.30	TDA1524	£6.80	TDA3565	£7.80
M293B1	£18.80	STK5471	£6.50	TDA1670A	£3.20	TDA3566	£5.80
M490BB1	£18.80	STK5481	£5.80	TDA1701	£3.80	TDA3571B	£7.50
M491BB1	£9.80	STK5482	£4.90	TDA1770A	£9.20	TDA3576B	£10.25
M494	£9.80	STK5490	£7.80	TDA1870	£6.80	TDA3640	£5.20
MC13002P	£5.80	STK6962	£3.80	TDA1872	£9.80	TDA3650	£7.50
MDA2062	£3.80	STK7253	£5.80	TDA1908	£2.80	TDA3651	£2.50
ML926	£4.80	STK7308	£4.80	TDA1940	£3.20	TDA3653A	£3.20
MN15425	£15.80	STK7348	£5.40	TDA1950	£3.50	TDA3653B	£3.20
PCD8572P	£9.00	STR3125	£4.80	TDA2004	£2.80	TDA3654	£1.80
SAA1024	£5.80	STR4090	£13.50	TDA2006	£2.80	TDA3810	£5.50
SAA1061	£5.80	STR5412	£4.95	TDA2009A	£2.80	TDA4420	£2.20
SAA1124	£3.50	STR40090	£6.80	TDA2030	£2.80	TDA4426	£3.20
SAA1250	£3.80	STR44115	£9.80	TDA2030A	£3.80	TDA4427	£3.20
SAA1251	£8.40	STR50020	£6.80	TDA2040	£7.80	TDA4442	£2.80
SAA1293.02	£6.00	STR50103	£4.80	TDA2050	£4.80	TDA4443	£7.80
SAA1293.03	£6.80	STR50115	£7.50	TDA2150	£3.20	TDA4500	£4.00
SAA5000	£6.80	STR54041	£6.80	TDA2270	£3.90	TDA4501	£5.00
SAA5010	£5.80	STR55041	£10.50	TDA2540	£2.20	TDA4502A	£18.50
SAA5012	£5.80	STR58041	£5.80	TDA2548	£5.80	TDA4503	£7.80
SAA5020	£5.80	STR59041	£6.80	TDA2576A	£3.80	TDA4505E	£5.00
SAA5030	£6.80	STR6020	£7.80	TDA2577A	£3.20	TDA4555	£9.80
SAA5050	£11.80	STRD1806E	£4.80	TDA2578A	£2.70	TDA4600	£3.85
SAA5231	£7.80	STRD6108E	£5.80	TDA2579A	£3.60	TDA4601	£2.80
SAA5243	£23.50	TA7680AP	£5.80	TDA2581	£3.80	TDA4605	£2.20
SAB3035	£9.80	TA7681P	£7.80	TDA2582	£2.50	TDA4610	£6.80
SAB3037	£8.80	TA7698P	£6.80	TDA2593	£1.50	TDA4950	£1.60
SAF1032	£4.50	TA8739P	£4.50	TDA2594	£3.80	UPD1397C	£4.80
				TDA2595	£4.80	TDA5510	£12.50
						IC p.p 90p	

LINE OUTPUT TRANSFORMERS p.p £1.80

ALBA CTV14RS	£23.80	PHILIPS KT4	£22.50
B&O LX2500, 2800 AT2077/81	£23.50	PHILIPS 2A	£17.80
BUSH AT2079/10	£34.80	PHILIPS K40	£27.50
DECCA/TATUNG 145,146,147 P/N8537/86	£21.80	PHILIPS 3A	£20.00
FIDELITY ZX2000	£15.50	PHILIPS 2B	£20.00
FIDELITY ZX3000	£14.50	PHILIPS CF1	£23.80
FIDELITY ZX3000 22"	£21.80	PHILIPS CP90	£17.80
FIDELITY CTV140	£15.00	PHILIPS CP110	£32.00
HINARI CT4, CT5	£14.00	PHILIPS GR1AX	£29.90
HITACHI CPT1455, 1456, 1476, 2434141	£17.50	PHILIPS NC3	£29.50
HITACHI CPT2158	£19.50	SAISHO CT14R, CT141, 3714002	£19.80
HITACHI CPT1446, 1626 2432981	£18.60	SAISHO CT141B, CT142B, 3214009	£34.80
HITACHI CPT2174, 2176, 2178 2434274	£15.50	SANYO CBP2144, 2145	£22.80
HITACHI CPT2476, 2478 2434002	£17.80	SANYO CTP7132, 7135	£39.80
HITACHI CPT2074, 2274 2433752	£15.50	SOLAVOX 14R19	£16.50
HITACHI/SALORA FM503A	£49.80	SOLAVOX 16R19	£16.50
HITACHI/SALORA FM0513	£55.00	SOLAVOX 20T19	£21.80
ITT/NOKIA Compact B 110°	£17.80	SOLAVOX 22R19	£15.00
ITT/NOKIA Compact 80, 110°	£14.80	SOLAVOX 22S19	£15.00
ITT/NOKIA Compact 80, 90°	£14.70	SOLAVOX 22T09	£15.00
ITT/NOKIA Compact 80, 110° FST	£19.80	SOLAVOX 22119	£15.00
ITT/NOKIA CVC 25, 30, 32	£10.00	SONY KV1412	£21.80
ITT/NOKIA CVC 800, 801, 803	£14.95	SONY KV1440, 1460	£20.00
ITT/NOKIA CVC1100, Picos	£16.50	SONY KV1882	£24.80
ITT/NOKIA CVC1150, 1175	£14.95	SONY KV2056, 2062	£32.00
ITT/NOKIA CVC1200, 1201, Mini 2	£21.80	SONY KV2092/96	£24.80
ITT/NOKIA CVC1204	£11.50	SONY 2212, 2216, 2217	£24.80
ITT/NOKIA CVC1210/12/15/17	£15.80	SONY KV21XRTU	£52.00
ITT/NOKIA Digi 3, 110°	£18.45	SONY KV2252/56, 2752/56, 2762/66 PE3	£29.00
ITT/NOKIA Core 90° 4515-03-46	£19.80	SONY KV2704	£29.00
ITT/NOKIA Core 110°, 4515-03-48	£19.80	SONY KV27XRTU	£25.00
ITT/NOKIA Core 110° FST	£19.95	THORN/FERG TX9	£23.50
LOEWE C9000, Art1, Art T21, Art T28, Contur T24, T28, Profi T28	£25.90	THORN/FERG TX10 (Chopper)	£19.80
LOEWE C8001, Classic M24, S127, S28, Contur S124, S127, S128, S24, S28, Profi S28	£22.80	THORN/FERG TX85, 86	£19.80
LOEWE Classic M124, M27, Contur M27	£34.40	THORN/FERG TX89	£23.50
LOEWE Profi M21	£34.40	THORN/FERG TX90 14" T6031, Red Spot	£14.80
LUXOR 5810110 01	£27.60	THORN/FERG TX90 20", T6044, White Spot	£16.90
MATSUI 1440A, 1480A, 3714002	£19.80	THORN/FERG TX100/110° T6033L, Green Spot	£13.50
MATSUI 1420B, 1440B, 3214009	£19.80	THORN/FERG TX100/90° 243892, Yellow Spot	£16.90
MATSUI 1455	£32.20	THORN/FERG TX100/110° FST, T6045L	£16.80
MATSUI 1465	£21.80	THORN/FERG TX100/90°, T6031, Blue Spot	£15.00
PANASONIC TLF14520F, TLF14568F	£18.50	THORN/FERG TX100 Chopper Tx	£15.80
PANASONIC TLF14521F, TLF14576F	£18.50	THORN/FERG 51P7	£32.00
PANASONIC TLF14584F	£21.80	THORN/FERG ICC5, 44076100	£28.00
PANASONIC TLF 14586F	£21.80	THORN/FERG ICC5, 47235901	£21.80
PHILIPS KT3	£12.90	THORN/FERG ICC5, 47238700	£18.00
PHILIPS K30	£22.80	THORN/FERG ICC5, 59MS	£28.00
PHILIPS CTX-L/S	£23.80		

MANY OTHER LOPTS IN STOCK, PLEASE PHONE WITH MAKE AND MODEL NUMBER

TRIPLERS EHT MULTIPLIERS p.p. £1.80

CONTINENTAL UNIVERSAL TVK & BG RANGE (Quote exact no) £13.80
TVK 96-1 £13.80
TVK 96-3 £18.00
U.K. UNIVERSAL (best quality) £7.80
DECCA/TATUNG BG 200/44 TYPE £7.80
GRUNDIG BG 2077-642-1003/1004 £14.80
GRUNDIG BG 2087-642-1001/1002/1006 £14.80
GRUNDIG BG 2000-641 £13.80
THORN 9000 £9.80

MISCELLANEOUS p.p. £1.80

VHF/UHF upconnvertor £40.00 p.p £3.50
INFRA RED REMOTE CONTROL TESTER/ CRT TESTER & REACTIVATOR (under kits & pro belts) Swap places
MAINS TRANSFORMERS: 6.3 Volts CRT boost £8.80 p.p. £1.80
Mains Isolating 500VA £51.25 p.p £5.25
455 CRYSTALS for handsets 4 for £2.00 p.p 80p
DEGAUSSING ROD £33.75 p.p £3.50
TRANSPARENT VIDEO SERVICE CASSETTE £6.80 p.p. £1.80
TV FAULT FINDING GUIDE £14.80
VCR FAULT FINDING GUIDE £14.80
HITACHI FRAME MODULE HM 6251 £9.80, HM6232 £12.80 p.p £1.80
HITACHI THERMISTOR TH*02 £2.85
FERGUSON TX10 FOCUS UNIT £8.50 p.p £1.80
PHILIPS BACK UP BATTERY: 2.4V £3.00, 1.2V £2.00 p.p. 90p

HOW TO ORDER: ADD p&p TO ORDER + VAT 17.5% TO THE TOTAL
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Telephone 071-794 8751/794 7346
Fax 071-431 5778

VISA

MANOR SUPPLIES

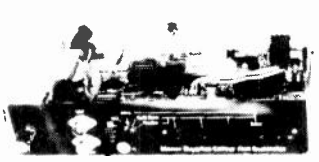
172 WEST END LANE, LONDON NW6 1SD

CALLERS WELCOME AT SHOP
Mon-Fri 9.30-6pm – Thurs 9.30-1pm – Sat 9.30-5pm

MANOR SUPPLIES

MKV PAL COLOUR TEST GENERATOR FOR DOMESTIC TV & VCR

TEST DEMONSTRATIONS AT 172 WEST END LANE



- ★ 40 different patterns and variations.
- ★ Fully interlaced syne pulses with correct picture blanking.
- ★ EBU colour bars, BBC colour bars, whole rasters & split bars (specially useful for VCR service), white, yellow, cyan, green, magenta, red, blue and black.
- ★ Chequerboard.
- ★ Mono outputs with border castellations, cross hatch, grey scale, vertical lines, horizontal lines and dots. UHF modulator output plugs straight into receiver aerial socket.
- ★ Additional video output for CCTV & VCR.
- ★ Facilities for sound output.
- ★ Easy to build kit, standard parts. Only 2 adjustments. No special test equipment required.
- ★ Mains operated with stabilised power supply.
- ★ All kits fully guaranteed with back-up service.
- ★ Also available with VHF Modulator.

Price of Kit	£79.00
Case (10"×6"×2¼") app	£19.00
Optional Sound Module (6MHz or 5.5MHz)	£5.90
Built & Tested in Case including Sound Module	£139.00

Post/Packing £4.50
Add VAT 17.5% TO ALL PRICES

PAL COLOUR BAR GENERATOR (Mk4)

- ★ Output at UHF, applied to receiver aerial socket.
- ★ In addition to colour bars R-Y, B-Y etc.
- ★ Cross-hatch, grey scale, peak white and black level.
- ★ Push button controls, battery or mains operated.
- ★ Simple design, only five i.c.s on colour bar P.C.B.
- ★ Backup service available.

PRICE OF Mk4 COLOUR BAR GENERATOR KIT £39.00.
CASE £5.80. BATT HOLDERS £4.20
MAINS SUPPLY KIT £5.80
(Combined P&P £4.50)

ADD VAT 17.5%

VHF MODULATOR (CH 1 to 4) FOR OVERSEAS £6.80
EASILY ADAPTED FOR VIDEO OUTPUT & C.C.R.V

LINE OUTPUT TRANSFORMER TESTER

NEW

- ★ Service Aid.
- ★ Saves time and Money.
- ★ Checks short turns.
- ★ Simple to use.
- ★ Reliable.
- ★ Battery operated.
- ★ Pocket size

PRICE £24.00
POST/PACKING £2.50

ADD VAT 17.5%

VIDEO (PAL) TO R.G.B. CONVERTER

NEW

- ★ Ready built & tested
- ★ Incl. Power Supply
- ★ Video In – Phono
- ★ 5-VHS Adaptable
- ★ R.G.B. + Sync Out –Scart
- ★ Colour/Brightness/ Contrast Controls
- ★ Size 5" x 5" x 2"

PRICE £99.00 POST/PACKING £3.50

CRT TESTER & REACTIVATOR KIT

★ For Colour & Mono complete with Case. Panel Meter Indicator – can be adapted for latest CRTs **£55.00** P.P. £4.50

KITS AND PROJECTS

SAW IF AND TURNER UNIT complete and tested for video & audio outputs **£28.50** p.p. £1.80.
PAL DECODER KIT (Video to RGB) for Monitors **£27.00** p.p. £1.80.
PAL ENCODER KIT (RGB to Video) **£20.00** p.p. £1.80.
INFRA RED REMOTE CONTROL TESTER Infra Red Remote Control Tester **£10.00** P.P. £2.50.

Satellite Notes

Reports from Andrew Tebbutt, Gerald White, J. LeJeune, Chris Watton, Nick Beer and Robert Philpot

Pace PRD800

The cause of a dead unit is commonly failure of the 100kΩ, 2W start-up resistor R2 in the power supply – it goes open-circuit. If the unit remains dead after replacing this item check D5 and D6, both type BYV96D, in the snubber network associated with the chopper transistor. One or both of these diodes may be leaky. They are best checked by replacement. In this event the BUT11A chopper transistor Q1 may also need to be replaced though it reads o.k. when checked with a meter. **A.T.**

Ferguson SRD4

If the 15V supply is missing, replace TP71 (BC369), CP69 (1,000µF, 25V), DP69 (BA158) and DP72 (1N4007). **G.W.**

Amstrad SRD500

The power supply started up quickly then went straight into the trip mode. Adjustment of the set voltage potentiometer stopped the tripping and allowed the unit to run, but the regulation was poor and tripping occurred at the next power up. The faulty component was C5, which had dried up. **J.LeJ.**

Echostar SR5500

For a dead unit with no power supply start up, check R1 (330kΩ) and R2 (100kΩ). These resistors go open-circuit or high in value. **C.W.**

Pace SS9200

One of these receivers came in with the mains fuse and the 4·7Ω resistor open-circuit. Although a short-circuit could be read across the collector and emitter of the chopper transistor both this item and the mains rectifier's reservoir capacitor were o.k. After further tests we found that there was an interwinding short between the primary winding and the close-coupled feedback winding of the chopper transformer – the primary read short to chassis. A new transformer, fuse and resistor restored normal operation. **N.B.**

Thomson SVA1 VideoCrypt Decoder

This one had been dropped and displayed the message "Programme Not Available". Not surprisingly the cause of the fault was broken print. The only breaks were at the rear right-hand corner of the board however, on the tracks to and from the regulators. This odd symptom could have led one to suspect a fault at the chip end of the board. It could equally have been caused by dry-joints around or failure of the i.c. regulators. **N.B.**

Up-market and Steerable Units

While a combined LNB/polariser is generally used nowadays, the more up-market types consist of separate units that are joined together with a circular neoprene washer and a sheet of plastic material. Preventing water from seeping into the joint and ruining both sections has always been a problem. In the past the solution has usually involved liberal application of insulating tape, self-amalgamating tape or bathroom sealer! There's a much easier solution however. Simply discard the plastic sheet, using a trace of silicone grease instead. Bolt up tightly and leave. I can only assume that the water seepage is caused by capillary action, the plastic being an ideal medium for this. Your call-back rate will drop dramatically when this solution is adopted. **R.P.**

Pace Modifications

MSS500 and MSS1000: With software versions up to and including 105 the audio output from the Surround sound speakers isn't muted when the receiver is operating in the timer mode. Software version 108 amends this. To carry out the modification replace U4 Z8 PCB version 1-5 with version 8, part no. 805-1000108.

MSP995: The software has been upgraded, by reducing the time window for an acceptable feedback pulse from 10 to 5msec, to provide compatibility with photointerrupter-type actuators that produce fourteen pulses per rotation. To carry out the modification replace processor U1 8621 with the later version part no. 809-8621707.

MRD950: The following modification enables J17 de-emphasis to operate with this model:

(1) Remove link 89 on the main PCB.

(2) Fit a wire link (100 x 0·5mm insulated) from the solder pad for link 89 farthest from the edge of the main PCB to pin 3 of PL1 on the underside of the MAC PCB. Secure the wire link with a spot of silicone adhesive at each end.

(3) Change U4 on the Z8 microcontroller board to version 2, part no. 805-0950101.

MSP991 and MSP995: The dish positioners used with these models can be susceptible to mains-borne interference. As a result there may be intermittent, random movement of the dish actuator. The problem can be overcome by carrying out the following modification:

(1) Remove links 21 and 36.

(2) Fit a 330pF, 10 per cent, 100V 5mm ceramic capacitor (part no. 150-3317651) in place of link 36.

(3) Replace R1 with a 100kΩ, 0·25W 5 per cent carbon film resistor (part no. 140-1042501).

(4) Fit a 1N4148 diode (part no. 120-0414801) in parallel with R1, with its anode end towards SK1 (the ring indicates the cathode end).

(5) Fit a 4·7nF, 10 per cent, 100V 5mm ceramic capacitor (part no. 150-4727651) between pins 5 and 11 of U1.

(6) Fit a 100µH axial lead inductor (part no. 130-1000611) in place of link 21.

A Z ELECTRICS

183 ACRE LANE, NORTHAMPTON NN2 8DX

Telephone: (01604) 841871 Fax: (01604) 454884

WE ARE REOPENING OUR LONDON SPARES TRADE COUNTER AT 18 BROOKWOOD ROAD, SOUTHFIELDS, LONDON SW18 5BP. PLEASE SEE OUR ADVERT IN THE NEXT ISSUE OF TELEVISION MAGAZINE FOR FURTHER INFORMATION

Stock items despatched by return

VIDEO HEADS

Amstrad
TVR1, 2, 3, 4, VCR4500, 5200, 4600, 4700, 6000, 6100, 81600, 9000, DD8900, 8904 etc £14.00

Ferguson/JVC
Universal 2 Head many models £7.50
8950, 8951, 3V64, 3V65, FV10, 11, 20, 21, 22, 26, 30 etc £14.50
FV31, 14, HRD210, 211, 520, 540, 550 etc £17.50

Hitachi
VT130, 135, 250, 420, 425, 430, 530, 630 etc £22.00
VTVT100, 110, 120, 220, 400 etc £19.00
VT52, 60, 61, 63, 640 etc £16.00
VT11, 33, 6500, 8000, 9300 etc £14.00

Matsui/Saisho
VX730, 750, 735, 755, 990, VR2000, 3200, 3300, 3500, 3600 ..... £18.00

Panasonic
Universal 2 Head many models £7.50
NVG130, 30, 40, NVJ30, NVL20 etc £17.50
NVG33, NVJ35, NVL25 ..... £22.50

Sharp
VC9300, 381, 481, 500, 571, 600, 682, 772, VCA100, 105, 106, 202, VCD801, VCM73, T72 ..... £14.50

Not all models are shown for each make. A vast range of other makes & models i.e. Akai, Alba, Aiwa, Fidelity, Fisher, Funai, GEC, Goldstar, Granada, Grundig, Hinari, Orion, Philips, Sanyo, Sentra, Proline, Salora, Sony, Samsung, Toshiba & Mitsubishi are available

IDLER ASSEMBLIES

Akai
FF/Rew Idler VS1, 2, 4, 5, 6, 9, 15 ..... £3.45
Take up Idler VS1, 2, 4, 5, 6, 9, 15 ..... £4.45
Clutch Assemb. VS112, 105, 125, 165, 205 ..... £10.00
Cassette Housing Repair Kit VS 22, 23 ..... £10.50
Alignment Training Tape VS22 etc £15.00

Amstrad
Tape Creasing Kit VCR4500, 4600, TVR1 ..... £5.00

Ferguson
Take up Idler 3V29, 30, 35 etc £1.20
Reel Idler 3V29, 30, 31, 32, 35, 36, 38, 39 ..... £3.00
Take up Clutch 3V29, 30, 35, 36, 38, 39 ..... £2.85
Idler Arm 3V58, 59, 65, FV10, 11, 13 etc £2.25
Cam Control Gear FV37, 43, 44, 46 ..... £2.75
Cap Motor Cog Repair Kit FV37 etc £3.50

Fisher
Idler Assembly FVHP615, 715, 905 etc £5.00
Gear Idler Assembly for above models £4.50

Hitachi
FF/Rew Idler VT11, 14, 33, 64, 88 etc £2.50
Clutch Assembly VT11, 14, 33, 64, 88 etc £8.50
Idlers for earlier models in stock also

Panasonic
Idler Arm Unit NV370, 430, 830, G7, 10 ..... £3.50
Idler Unit NV332, 777, 780 ..... £3.00
All G Mechanism Parts & Kits available
G Mechanism Training Tape £15.00

Sanyo
Idler VHR1100, 1300, 1500, 2100, 2500 ..... £5.50

Sharp
Idler Assembly VC9300, 381, 481, 581 ..... £3.50
Idler Assembly VC651, 751, 781 etc £6.50
Master Cam VC651, 772, VCA100 etc £1.50

MISCELLANEOUS MAKES

ALBA – MOTOR PULLEY 4000 ..... £1.20
Idler VCR5000, 6000 ..... £3.50
Goldstar – Idler GHV51, 1221, VCP4000 ..... £3.00
NEC – Idler N9013, 9033, 9053, 9066 ..... £6.65
Philips – Idler Mod. – VR6462, 6463 ..... £4.50
Samsung – Idler VI510, 520, 620, 626 ..... £1.50
Idler Assemb. VB710, 790 ..... £9.75

Not all the models are given under each make. Please ask for models & makes not listed.

VIDEO MOTORS

Ferguson
Capstan Motors 3V35, 36, 38, 39, 49 ..... £24.00
FV14, 26, 29 ..... £33.00

Hitachi
Capstan Motors – VT11, 14, 17, 38, 39 ..... £30.00
VT33, 34 ..... £32.00
VT62, 63, 64, 640, 65 ..... £22.75
VT100, 110, 220, 225 ..... £22.00

Sharp
Reel Motors – VC200, 381, 481, 581, 9300 ..... £21.00
Sharp Reel Motor Pulley £1.20

Toshiba
Capstan Motors – V71, 73, 74, 81, 83, 85 ..... £17.50
V53, 55, 57 ..... £24.00

PINCH ROLLERS & BELT KITS

A large selection of pinch rollers and belt kits for most models are in stock. Belt kit prices start from 40p and most of the pinch rollers are priced @ £2.80. Please ask for list.

TRIPLERS

Universal Tripler £6.20
Universal Tripler with Focus Unit £9.50
Decca 120/130 Sarires £8.50
Thorn TX10 Focus Unit £6.50
Grundig Triplers ..... POA

REPAIR KITS – TV/SATELLITE/VIDEO

Akai – Power Board VS22, 23 etc £28.00
Amstrad – PSU Kit PRD500, 510 Satellite £7.00
Ferguson – PSU Kit Video £7.00
ITT – Pico 1/1A Chassis £11.00
Philips – PSU Kit Anubis "A" Kit £6.50
PSU Kit G110 Chassis £12.00
PSU Kit G90AE/G90B Chassis £11.00
PSU Kit Philips Video £9.00
Pace – PSU Kit 800, 900, 8000, 9000 ..... £7.00
Panasonic – G Deck genuine kits in stock
Sharp – Cassette Housing Kit VCA113 Series £6.50
A wide range of maintenance kits also in stock

LINE OUTPUT TRANSFORMERS

Fidelity – Up to 20" ZX2000, 3000 ..... £14.50
Ferguson – TX100 Green Spot £14.50
TX100 Blue Spot £11.50
TX100 Yellow Spot £11.50
TX90 State Screen Size £17.50
Ask for models not listed
Hinari – CT4/5, TVA1 ..... £17.50
Hitachi – CPT1476, 2174, 76, 78 ..... £18.00
CPT2276, 2476, 78 ..... £19.00
Ask for models not listed
Matsui – 1440, 420 ..... £19.00
ITT – CV25/30/32 ..... £9.50
Compact 80, 110 ..... £15.75
Compact 80, 90 ..... £19.75
CVC1204 ..... £11.50
CV800/1/3 ..... £21.50
CVC1100 ..... £16.50
CVC1150/1175 ..... £20.00
Ask for models not listed
Pansonic – Originals ..... From £15.50
Sony – Please quote Sony part No. for price
Other makes & models in stock. Please ask.

BACK UP BATTERIES

Philips 1.2V Back Up Battery £1.75
Philips 2.4V Back Up Battery £2.80
Ferguson TX10 1.2V £2.10
Ferguson TX10 2.4V £3.85
0.1 Farad 5.5V Capacitor £1.85
State model and make for television on off switches and video mode switches.

OTHER SPARES

Hitachi TV Frame Module HM6251 ..... £8.00
Hitachi TV Frame Module HM6232 ..... £10.00
Degausing Positor White £1.30
Degausing Positor Blue £4.00
Degausing Positor Philips £3.00
Degausing Positor Hitachi £3.40
End Sensors Hitachi VT63, 64 etc £2.75
IC Circuit Protectors Most Values £0.60
Matsui Limiter Post £1.75
Clear Service Cassette £5.90
1994 TV Fault Guide £12.00
1994 Video Fault Guide £9.00
Satellite Fault Guide £15.00
Akai Alignment Training Tape £15.00
Panasonic G Mechanism Training Tape £15.00

SATELLITE SPARES

LNB 1.2DB Standard or Enhanced £24.00
Frequence Extender for 1D Reception on most receivers (Excluding LNB) £25.00
TV/Video and Satellite Remote Controls start from £7.50
A large range of Semiconductors in stock. Popular STKs. STRs, TAs, TDAs, 2SBs, 2SCs, 2SDs, BUs, BDs and many more types.
TX 90 complete Board. Limited stock at £29.00.
Idler Tyres for popular makes in stock for as little as 35p each.

Prices subject to change without notice. Please add £1.25 per order for p&p and then add 17.5% VAT.
POSTAGE VARIES ON HEAVY ITEMS. SEND A4 SAE FOR LIST (MAIL ORDER ONLY)
Cheques and Postal Orders should be crossed and made payable to A.Z. Electrics

VISA

EST. 1977

J.W. HARDY

YOUR ONE-STOP-SHOP

FOR THESE FINE BRANDED PRODUCTS – AND SO MUCH MORE . . .

Wolsey SMATV
DIAMOND AERIALS UHF/FM
GLOBAL COMMUNICATIONS FIRST IF, SMATV
J.W. HARDY communications UHF AERIALS UHF AMPLIFIERS
Labgear Cablevision SMATV
LH LENSON HEATH SATELLITE ANTENNA
PACE SATELLITE RECEIVERS, DECODERS
PALCOM SATELLITE RECEIVERS
PROMAX TEST EQUIPMENT
Fixings BOLTS PLUGS
mungo BOLTS PLUGS
Teleste SMATV
TRIAX U.K. UHF/VHF AERIALS
TOWER CLIPS
UNIFIX CLIPS
VOLEX RAYDEX COAX CABLES

- WE PROVIDE FULL TECHNICAL ASSISTANCE AND SERVICE BACK UP ON ALL OUR PRODUCTS
- SMATV – DISH SHARING – DESIGN CONSULTANT

Trade Price List available to bona fide TV Aerial and Satellite Dealers on proof of trading.

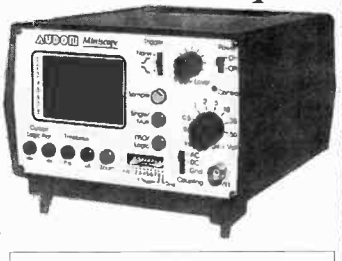
J.W. Hardy, 231 Station Road, Stechford, Birmingham B33 8BB. Telephone: 021-784 8478

A SAMPLING OSCILLOSCOPE AND LOGIC ANALYSER

IN AN AFFORDABLE PORTABLE PACKAGE

- 10 Mega samples per second single channel DSO
- 1MHz analogue bandwidth
- 0.2v-50v input range
- Various Triggering options
- 10 Mega samples per second 8 channel logic analyser
- 5v TTL/4.5-15v CMOS logic level inputs
- Crisp, clear LCD screen
- Zoom and Scroll facilities (selected ranges only)
- Battery or mains adapter powered
- 12 Months Warranty (Built version only)
- "Get you working" service (kits only)

The Miniscope



MINISCOPE KIT £139

MINISCOPE BUILT £179

MAINS PSU £6 P&P £6

PLEASE ADD VAT AT 17.5%

Write or phone for a free Information Pack to

AUDON

AUDON ELECTRONICS

36 Attenborough Lane, Chilwell, Nottingham NG9 5JW 0602 259737

LETTERS

WORDPERFECT WP6.0 FOR WINDOWS

WordPerfect WP6.0 for Windows (Test Report, January) at £329! Haven't you heard of the street price for items of computer equipment and software (or photographic equipment and lots of other things)? Many suppliers offer WP6.0a at prices in the range £210-£220, some at even less. Or look at the surplus dealers. Borland Office 2, which contains WP6.0, the Paradox 4.5 database and the Quattro Pro 5.0 spreadsheet is good value – but make sure that you get WP6.0a or later (if you don't get WP6.0a insist on a free upgrade from WordPerfect). Evesham Micros have been advertising this at £129, UK Home Computers at £125. There may still be some copies of WP5.2Win at around £50, though I understand that WP has decided to reissue this in slightly updated form, presumably with a street price of £200 plus.

More seriously, we were very unhappy with WP6.0 and, after some arguing and a very long wait, obtained the upgrade to WP6.0a free of charge. This stopped the crashes, but why should we be expected to upgrade the RAM in our system from 4Mbytes to 8Mbytes in order to run it considerably more slowly than we did with WP5.2? WP has now released WP6.1, which runs faster, but they want another £79 from us for the upgrade. Using WP6.0a we still had problems with the graphics, so we are using Word where we need the graphics facilities and staying with WP5.2 for those jobs where the customer insists that we use WP.

WP6.0 has changed the user interface completely. The pull-down menus are all different, the dialogue boxes much more complex, the font menu has disappeared (it requires many more clicks to change from bold to italics – only two clicks are required with WP5.2). The print preview function has also gone, which would have been o.k. if we hadn't had problems with the printed page being different from the display on the screen. You can configure WP6.0 with WP5.2's menus, but only at installation time, not at run time.

I am minded to send our WP6.0 licence back and ask for a refund.

Peter W. Tomlinson,
Bristol.

David Botto comments: The price I gave (£329) is the suggested retail price. In discussing software in a previous article (see page 721, August 1994) I pointed out that it is "advisable to shop around for prices before buying software – but check that the program is actually in stock and that it is the latest version". Incidentally this applies to PC hardware as well.

I have used both WP6.0 for Windows and the DOS version WP6.0b. Maybe I've been fortunate, but I have not so far experienced any crashes and am happy with both the Windows and DOS versions.

WP6.0 for Windows is a very powerful program. As such it requires as a minimum a 386 processor, 4Mbytes of RAM and Windows version 3.1 or later, as I pointed out at the beginning of my Test Report.

To view a document before printing, use View Mods – draft, page or two-page mode.

There seem to be two camps amongst wordprocessor users: those who prefer WP6.0 and those who plump for Microsoft Word for Windows. It's a good idea to see and try both before buying.

WP6.1 for Windows has one additional advantage over version 6.0a: it has Grammatik 6 instead of Grammatik 5.

MONITOR CIRCUITS

Philip Blundell asks about a source of monitor circuit diagrams (TV Fault Finding, January). I work for a maintenance company that repairs monitors: we have been able to get quite a number of circuits from Logitron Ltd., 42 Berrymeade Road, London W4 5SD (0181 747 3737).

Incidentally the Lite-On CM1414 that Philip repaired is also the Elonex SV14. This company will supply a circuit diagram, as will quite a lot of others.

Mike Webster,
Canvey Island.

ENTER THE TRADE – MAYBE

If I could add my twopennyworth to the saga of whether or not to enter the TV trade, I would say that it all depends. First on the type of person you are, and secondly on the circumstances of your employment.

When I started in the Fifties I had no formal qualifications. But I could repair television sets, and the shortage of engineers then was such that this was often the only qualification you needed. But the technology was laughable in comparison to now. The average power supply for example consisted of a mains transformer, a rectifier valve and a couple of smoothing condensers (sorry, capacitors!) with a series resistor or possibly a choke. Component count: 5. Compare that with a modern switch-mode circuit.

In those days you were regarded as some sort of wizard if you could repair television sets, and were treated like an honoured guest when you visited a customer's house. The money was good too. Not too many seventeen year olds ran cars in the Fifties, but most of the TV engineers I knew did.

New technology started to appear at an increasing rate, and I couldn't wait to get inside the sets to find out how they worked. But at 55 it's a different story. New technology now makes me bury my head in my hands. Whether it's age, lack of interest or just plain laziness I don't know, but I find it much harder to work than I used to do.

An additional problem today is the diversity of makes and types of equipment. It's nowadays a coincidence if I get two sets that are the same in a week: they are sometimes very different beasts. In the early days most sets were basically the same and, with relatively few components, they could usually be serviced without the need to consult a circuit diagram. Now maybe fifty per cent of sets with simple faults can be fixed without a circuit, but for the rest a manual, often at considerable expense, is required. The situation is better when you service a number of similar pieces of equipment, especially if you have all the relevant service data.

So, if you are an electronic whizkid, GO FOR IT! But if your brain is as fogged as mine, forget it.

Peter Nutkins,
Charmouth.

THE MATSUI 1580

Donald Bullock made a serious error in dealing with that Matsui 1580 (January, page 176). We've had the fault (dead set) many times with this model and the various equivalents. The basic cause is always C818 (1μF, 50V) in the power supply – it dries out.

The design follows the standard TDA4601 arrangement, with output regulation based on feedback from winding 7-8 on the chopper transformer. A negative voltage produced by

D803/C818 is fed to pin 3 of the chip. This pin also receives, via R803/4, a positive voltage from pin 1. The net result is that the voltage at pin 3 is around 2·5V. As the output load increases, the voltage across C818 falls and the voltage at pin 3 rises, telling the chip to increase the output voltages. Consequently as C818 dries out with age the voltage at pin 3 will be higher and the h.t. voltage will, over a period of time, increase. We usually find that R811 is damaged and that because of the excessive secondary voltages C810 (220µF, 160V), C806 (1,000µF, 16V) and C808 (1,000µF, 25V) will have either burst and leaked electrolyte or, because of the high internal temperature, have suffered a serious loss of capacitance. R409 (2·7kΩ) and C410 (100µF, 16V) are also items to check.

The stability of C818 and the equivalent capacitor in other TDA4600-4601 type power supply circuits is critical. I recommend using only a tantalum capacitor of the same value as a replacement. To see why, disconnect the line output transistor and load the h.t. rail (across C810) with a 100W bulb. Cool C818 with freezer and watch the bulb light up to almost full brightness as the 112V h.t. voltage rises to around 220V!

Don't be surprised if the customer complains that the picture isn't as good as it used to be, as the tube will have been run with a much higher than normal e.h.t. at its final anode.

If Donald replaced only the components he mentioned and reset the h.t. the receiver will have come bouncing back quicker than a rubber ball – especially if it's used in a cold house.

Michael Dranfield,
Buxton, Derbyshire.

THOSE MOD KIT CAPACITORS

Further to my complaint about the high cost of Akai modification kits, it is reassuring to know that manufacturers put a lot of time and research into any problems they may have (letter, January). It's a pity that they didn't do that when designing the circuit originally.

The high-temperature capacitors I always fit, from CHS, are the same price as 85° capacitors.

It's interesting that the Salora/Nokia SV9900 has exactly the same circuit and that there is also a modification for this. Yes, you've guessed it, it consists of one capacitor.

On checking my records I find that I have completed seven repairs: none have bounced! I have consulted other repairers in this area and they all agree.

J. Lunniss,
Swindon.

THANKS ALBA

There have been numerous complaints about unhelpful manufacturers. Someone asked for good news on this front instead of the usual moans. Well, I found that Alba could not have been more helpful.

I wrote to the firm about an MS4990. The problem was that if you switched the tape deck to record while playing a CD the CD would stop. I was told to replace the series regulator Q101 in the power supply to the tape deck, though it tests o.k. Alba rang me with this information, which I think is excellent technical backup.

Perhaps others will find this bit of information helpful – thanks Alba!

I have had a good response from other firms as well, such as Goodmans (loudspeaker faults with car radios), Sigma Alarms and many more.

Jim Littler,
Wigan, Lancs.

Inside the Ferguson ICC9 Chassis

Part 1

Mark Paul

The ICC9 is the most recent Thomson chassis to appear in the UK, in sets using the Ferguson brand name. As usual the basic design is international, customised by feature adjustment and circuit alteration to suit individual national markets. Although the chassis incorporates many new and novel features, those familiar with Thomson technology will recognise it as part of an evolutionary process. The closest link is the IDC2 chassis, which lost its way in the 16:9 HDTV debacle – it's currently used in the UK in only the Ferguson Pro Logic Model DSF68NX.

The ICC9 makes extensive use of minimelf and surface-mounted chip components. As a result there has been a large reduction in the overall component count – about 15 per cent in comparison with the ICC8 chassis. This state-of-the-art approach, with robot production, should mean improved product reliability in both the short and the long term. Two new, highly-integrated Thomson-designed i.c.s have, along with a new, improved scart circuit, enabled the i.c. count to be reduced by a factor of six in comparison with the ICC8. There has also been a massive reduction in the mechanical alignment procedures required since all adjustments, with the exception of a remaining few in the north-south correction module if and when this is fitted, are carried out under I2C bus control. All in all the chassis represents a further step by Thomson in its drive to reduce production costs while maintaining product reliability and quality.

The chassis can drive a range of displays ranging from a 51cm c.r.t. to a 96in. back-projection system currently being sold in the USA. This means that the ICC9 is intended to replace, eventually, the ICC7 and ICC8 chassis. The current range of Ferguson models that are fitted with the ICC9 chassis is as follows:

Mono sound: D59F.

Nicam sound: D51ND, D59N, D68N and D78N.

Nicam plus Phillipe Starck presentation: S59N and S68N.

Features

The following are the main features: a DFS or FST black matrix tube; 69 programmable channels plus two AV channels; Fastext; u.h.f./v.h.f. (cable) capability; 16:9 format switching; PSI (Picture Signal Improvement – produces crisper definition and better colour rendering); two scart sockets, with SVHS/Hi8 compatibility and modified NTSC video playback; 2 x 20W audio output; Surround sound; Nicam; dual remote type RHT10, or F2000 for Starck models; Navigator menu control (Expanded IMC – Interactive Menu Control); auto tuning – the receiver requires only country identification at installation; a timer for sleep and wake up; child lock. There are three service mode adjustment menus: set-up (TV settings); video adjustments; geometry adjustments

Overview and Block Diagram

Fig. 1 shows a block diagram of the ICC9 chassis.

The chopper power supply is based on the Thomson IDC2 chassis. A TEA2261 chip (IP01) drives the chopper transistor, but this chip is itself under control of the Thomson-designed STV2160 multi-function chip IV01. More on this item later. From the servicing point of view the thing to note is that the h.t. voltage (Usys) is set up via the remote control handset, which in the Service Mode communicates with IV01 via the I2C bus.

The circuitry used in the line and field output stages is again taken from the IDC2 chassis, with certain modifications to beef up the drive currents. A variety of tube types and sizes up to a maximum of 89cm can be driven. Geometry correction is set up in the Service Mode via the I2C bus. The line and field output devices are attached to aluminium heatsinks which are mounted across the rear and left-hand side of the chassis.

The tuner is type MPT2015, the i.f. module being IF2605 for mono sound and IF2145 for Nicam stereo sound. These cans are inherited from earlier Thomson IC series chassis. A development in this area is an alignment-free sound trap circuit, removing the last mechanical alignment procedure here.

A stand-alone satellite tuner can be fitted to the chassis but is not at present an option offered with UK models.

Two completely independent scart sockets are mounted at the rear of the chassis. Both will accept separate YC, composite video (CVBS) and audio signals. The scart-1 socket is wired up in accordance with the full Cenelec standard, while RGB operation is not available with the scart-2 socket. Switching between the AV1 and AV2 sources and the signals from the tuner is carried out using simple CMOS i.c.s which are controlled by the microcontroller chip IR01. Electronic enhancements have been added to improve the performance when external signal sources are used. Audio signal processing depends on the model specification, i.e. mono or Nicam. There are front panel video and audio input sockets which are wired in parallel with the AV1 connector. Use of loop-through facilities and the AV2 connector enables camera dubbing and editing to be carried out.

Colour signal processing is spread over three i.c.s. The newly-designed Thomson STV2151 chip IC01, a multi-standard device, carries out the initial chroma and luminance signal processing, i.e. filtering and chroma demodulation. It enables AV input signals of all standards, i.e. PAL, Secam, NTSC 3·58MHz and NTSC 4·43MHz, to be decoded. The chroma delay line is integrated into this chip. This, along with integrated switchable traps, results in whatever information is being processed appearing at the outputs in YUV form (luminance plus two colour-difference signals).

The second chip in this area, a Philips TDA4671 (IC02), provides Picture Signal Improvement (PSI). This means Colour Transient Improvement (CTI) plus adjustable luminance delay then peaking and coring.

The YUV signals are matrixed in the STV2160 chip IV01 to provide RGB outputs. This chip also accepts and switches in external or text/OSD RGB signals; provides

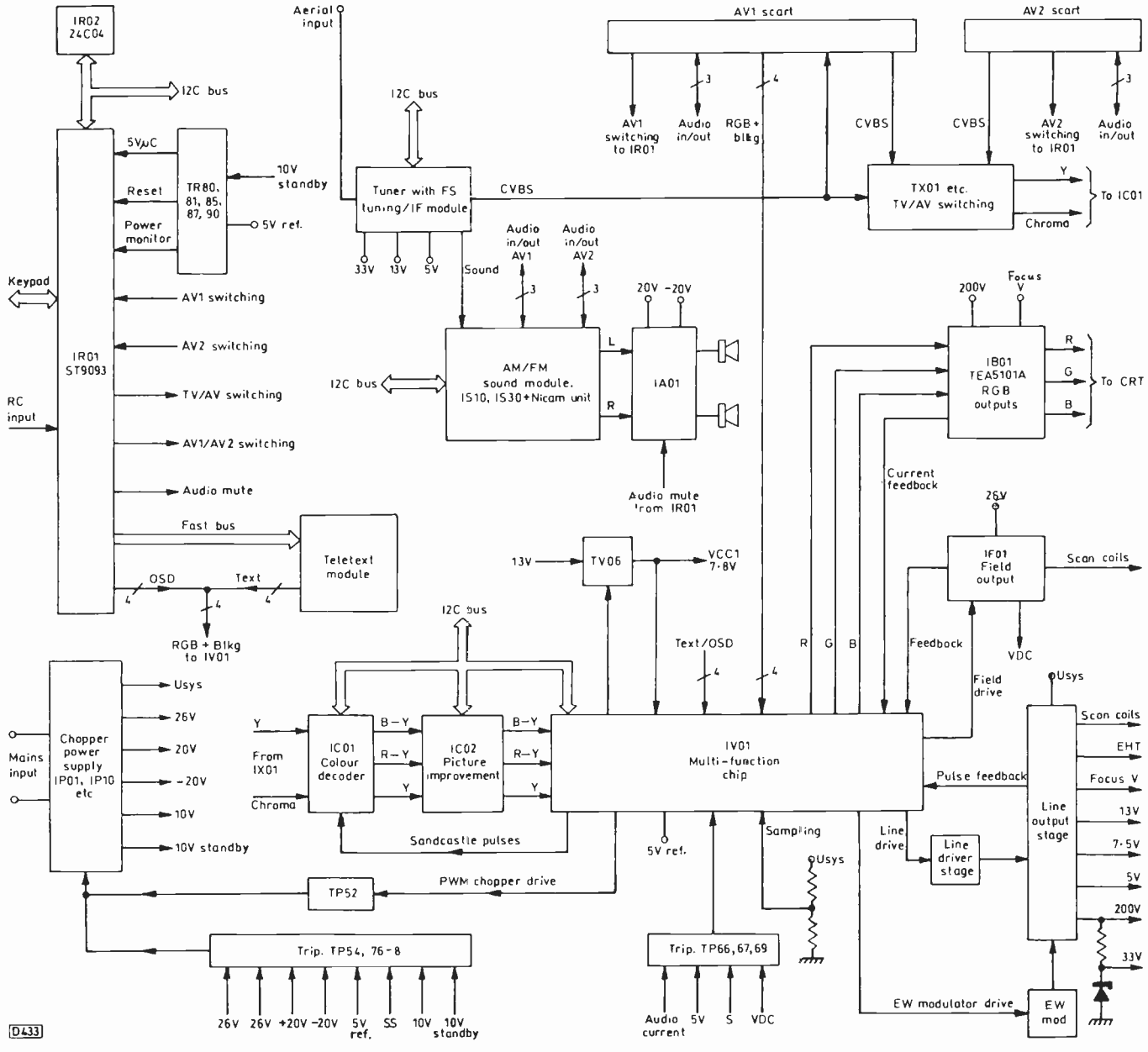


Fig. 1: Simplified block diagram of the Ferguson ICC9 chassis (stereo sound version with two scart sockets).

brightness, contrast and colour adjustment via I2C bus control; and carries out beam limiting and automatic black and white level adjustment. The RGB outputs are fed via buffer amplifiers to the TEA5101 output amplifier chip IB01 (another Thomson device) which is mounted on the tube base panel. The focus and first anode (G2) potentiometers are also on this panel.

IV01 carries out a lot more than RGB signal processing. It incorporates the sync separator and generates sandcastle pulse and line and field drive outputs, also a pulse-width modulated output to drive the chopper circuit and an EW drive output. The deflection side of this chip is highly integrated, reducing the number of external components required for these complex stages. The power supply, deflection and geometry parameters are all set up remotely via IR01 and the I2C bus.

Field output is provided by a TDA8172 chip (IF01). The line output stage is conventional though the driver circuit is not: we shall return to this later. The EW diode modulator is driven by transistor TL40 (BD675) which receives its base drive from pin 27 of IV01.

The audio output amplifier chip IA01 is on the main chassis. In mono receivers IA01 is a TDA2614 which provides 5W r.m.s. to an 8Ω speaker. In stereo models IA01 is a TDA2616 which provides 10W r.m.s. per channel to 8Ω speakers.

With mono receivers sound signal demodulation is carried out within the combined vision/sound i.f. module. With stereo models the intercarrier sound output from this module is fed to the 'a.m./f.m'. module: an additional PCB plugged into this module carries out Nicam decoding. Development work is under way at Thomson to produce an a.m./f.m., Nicam and Dolby Pro Logic audio processor combined on one PCB.

The a.m./f.m. module uses a Philips TDA9820 chip (IS10) to demodulate the f.m. signal and another Philips chip, type TDA6812 (IS30), for sound signal processing. An MC33076P1 chip (IS60) on this module provides amplification for the headphone outputs. For Nicam reception a TDA8732 chip provides demodulation while an SAA7282 chip decodes the signal.

The teletext module uses a Plessey MV18173D chip (IT01) for decoding, in conjunction with a 64Kbytes x 4 DRAM (IT02). A fast 750Kbytes I2C bus is used to control the teletext decoder.

Overall control of functions is carried out by the newly

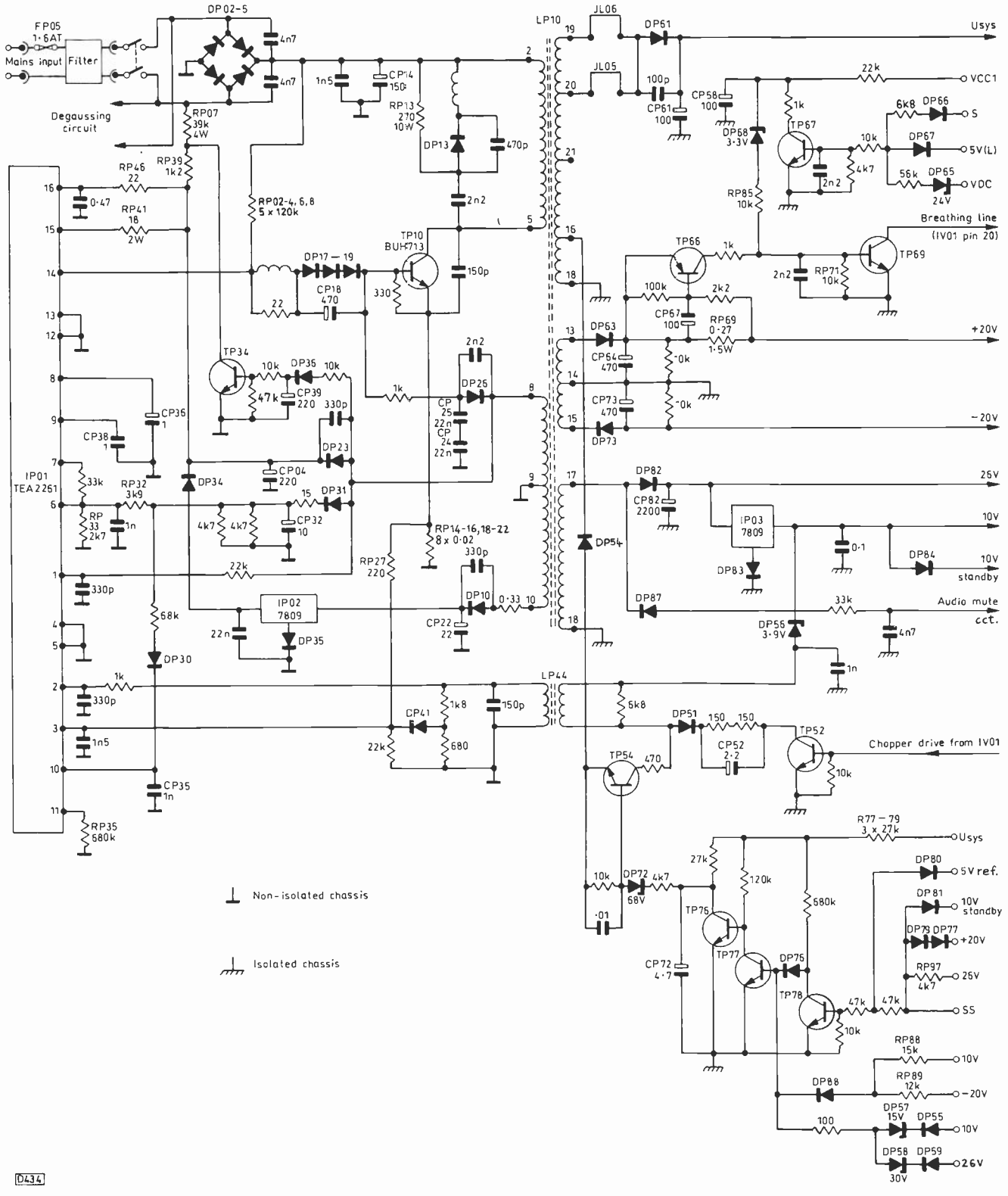


Fig. 2: The chopper power supply and trip arrangements in the Ferguson ICC9 chassis.

designed ST9093 Thomson microcomputer chip IR01. It controls the on-screen display menus, customer adjustments, teletext operation and the production and service adjustments via the I2C bus. It's backed by a 512Kbyte 24C04 EEPROM which is used to store transient customer information.

Additional modules can be fitted to the chassis to increase its capabilities, for example an NS correction module for use with Super Planar and BSP tubes, dynamic focus circuitry for large tubes and a zoom function module for both 4:3 and 16:9 formats.

Service Mode and Alignment

The following procedure gives access to the service mode, which produces the various menus for adjustments. For full information on this and other servicing matters the service manual should be consulted.

(1) Disconnect all scart cables.

(2) Switch the set on by pressing the on-board on/off switch. Then switch to standby by operating the remote control unit's standby button. The set is in the standby mode when

the red light is on.

(3) Switch the set off by pressing the on-board on/off switch. Wait for the red light to go off.

(4) Press the blue videotext key on the remote control unit while switching the set on with the on-board on/off switch. The set will come on after a few seconds.

(5) Enter the service mode by pressing the blue key on the remote control unit.

To exit the service mode, switch the set to standby or off by using the on/off key.

Operation of the Chopper Power Supply

The power supply uses a TEA2261 chip (IP01) to control the chopper transistor. This chip is also used in the ICC6, ICC7 and ICC8 chassis and has been described before in these pages, so we don't need to go into details about its internal workings here. A block diagram was shown in the article on the ICC6 chassis last October (see page 863). Unlike the ICC6 chassis, but as with the ICC7 and ICC8, the TEA2261 is for regulation purposes controlled from the secondary side of the circuit – at pin 2. Fig. 2 shows the basic power supply circuit used in the ICC9 chassis.

A start-up feed for IP01 is taken from the mains input via RP07, RP39 and RP46 to pin 16. Once the voltage at this pin, established across CP04, reaches the threshold level of 10·3V IP01's start-up phase is initiated, under the control of the soft-start arrangement within the chip. As a result, drive is applied to the chopper transistor TP10. This drive is obtained from an internal oscillator whose frequency, set by CP35 and RP35 at pins 10 and 11, is approximately 2kHz. The frequency is set by the initial charge established across CP35. Once the voltages obtained from the secondary windings on the chopper transformer start to rise, CP35 charges to a higher voltage and the frequency of the chopper drive increases to about 23kHz.

The soft-start drive is the result of a ramp voltage developed across CP38, which is connected to pin 9. This controlled delay to the development of full drive protects the chopper transistor. The drive comes via an internal pulse-width modulator, a logic circuit and driver stage, appearing at pin 14. It sits on a negative voltage at the base of TP10, ensuring correct switching of the chopper transistor. This bias is provided by DP26 in conjunction with CP25 and CP24. RP41, connected to pin 15, sets the maximum base current drive.

Regulation depends on the receiver's state, i.e. full on or standby. In the standby mode control depends on the feedback voltage at pin 6 of the chip: this is produced by DP31/CP32 then tapped down via the potential divider RP32/33. Pin 6 is connected to one input of an internal error amplifier, the other input being fed from an internal reference voltage.

Once this primary regulation has been established, the supply for IP01 is obtained from winding 9-10 on the chopper transformer LP10 with rectification by DP10/CP22. The feed to pin 16 is via the regulator chip IP02 and DP34. This diode is included to prevent variations in the mains voltage, via the start-up feed, affecting the supply.

To bring the power supply out of the standby mode the microcontroller chip IR01 has to start up IV01, which provides the basic chopper drive for normal running. Two things are required for this to happen. First IR01's 5V supply must be present. This is derived from the chopper supply derived 10V Standby line via TR80. Secondly IR01 and IV01 must have shaken hands, with IR01 sending data via the I2C bus. Once these conditions have been met, IV01 will start to produce a pulse-width modulated output to drive the chopper circuit. This is fed to TP52 and then coupled via the isolating transformer LP44 to pin 2 of IP01. When these pulses start to arrive at IP01 it automatically switches over to secondary regulation, i.e. it becomes a slave to IV01. IV01 is then in control of the chopper's switching time and thus the secondary voltages produced by the power supply. It does this by sampling, at pin 26, the main h.t. supply (Usys). The power supply is now in full operation.

There are two trip circuits, built into IP01, on the primary side of the circuit. The first is linked to pin 3, which is connected via RP27 to the emitter of TP10 and thus senses the voltage across RP14-22. There are two trip levels here, 0·6V which is called the intermediate trip level and 0·9V which is the shut-down level. The first level is used to prevent nuisance tripping due to a transient condition, e.g. a flashover. The transient level is also monitored by CP36 at pin 8: with each trip the voltage here increases, and at a preset level full shut-down is initiated in the same way as when the voltage at pin 3 reaches 0·9V. This latter condition means that the chopper transistor is passing excessive current due to an overload. Once the power supply has shut down it must undergo a total reset, which can be achieved only by switching the mains supply off, allowing the voltages on the supply lines to fall, then switching on again.

Further protection is provided against flashover. Any serious flashover is controlled by TP34. It operates as follows. At the time of the flashover CP04 will discharge and the supply at pin 16 of IP01 will drop below its threshold level. Thus IP01 ceases to operate and there is no drive to the chopper transistor. The power supply will remain shut down until CP04 recharges, which depends on the discharge time of CP39. While this capacitor is charged, TP34 is held conductive and the start-up feed is shorted to chassis. What we have here is an electronic shock-absorber circuit.

Chopper Outputs

The supplies developed on the secondary side of the circuit are as follows: Usys (h.t.) which depends on the deflection requirements, i.e. the type pf c.r.t.; ±20V for the audio output chip; 26V for the field output stage; and two 10V supplies, standard and standby.

Secondary Side Trips

There are two trips on the secondary side of the circuit. The first is referred to as the primary protection circuit (not to be confused with the primary side of the power supply) and consists of TP54, TP76-78 and the associated components. It continuously monitors the supplies to the audio, field and line output stages, also the 10V, 10V standby and the 5V reference supplies. It operates in either the standby or normal running modes.

A short-circuit across the 5V reference supply, the 10V standby supply, the +20V audio supply, the SS line which goes to the line driver stage or the 26V field output stage supply will switch off TP78 (it's normally held on by the feed via RP97 etc.). With TP78 off, TP77 will be on, TP76 off and TP54 on. The base of TP77 also monitors the –20V audio supply, the 10V supply and the 26V supply, the latter two via stand-off zener diodes.

When TP54 switches on, the voltage range for the output

from the PWM driver transistor TP52 is increased: a negative voltage from pin 16 of LP10 via DP54 is added, increasing the amplitude of the drive signal. This, coupled by LP44 to DP41, produces a higher than normal voltage at pin 3 of IP01, breaching the trip level. The idea is to achieve a more rapid response at pin 3 of IP01 in the event of a short on the secondary side of the circuit.

The secondary protection circuit provides additional security monitoring during normal operation. It's based on TP66, TP67 and TP69. This circuit checks voltages related to the deflection circuitry – the line and field output stage operation, the flyback tuning (e.h.t.) and line output stage derived supply lines. In the event of a failure here a signal is sent to pin 20 of IV01 via the 'breathing' line. This shuts down the chopper drive output from IV01. The trip also monitors the audio output chip's current consumption, to provide compensation when this is high.

It is important to take care when checking around pin 20 of IV01. This input has a very high impedance: simply touching the pin could switch the receiver to standby.

Three conditions are monitored at the base of TP67. The 5V supply derived from pins 9-11 of the line output transformer is linked to this point via DP67; the field flyback pulse is rectified (by DF32 and CF32) and monitored via zener diode DP65; and the S line (the source of this is the cold end of the e.h.t. section of the line output transformer) is monitored via DP66. The rectified field flyback pulses usually produce 26V (the VDC line), which holds TP67 conductive. As a result the VCC1 line is held at about 7·8V. In the event of field collapse (no VDC voltage), the LOPT derived 5V supply being low or leaky, or the e.h.t. increasing (this will drive the S line negatively), TP67 will switch off. Thus the VCC1 voltage will rise and zener diode DP68 will conduct. This, via the potential divider RP85/RP71, will switch TP69 on. Pin 20 of IV01 is taken low, removing the chopper drive at pin 31.

This protects the chopper, line and field output devices for the duration of the overload. If the overload is not a transient one, IV01 counts each trip cycle and after three trips shuts down permanently. This puts the chopper supply into the standby mode. To clear this the receiver has to go through a 'hot-switch cycle'.

TP66 monitors the current flowing via the +20V supply and the audio output chip. This is done by sensing the voltage across RP69, with CP67 providing hysteresis damping. The voltage changes at the collector of TP66 modulate the base of TP69, in turn varying the breathing line voltage applied to IV01. The idea here is to provide anti-breathing action via the timebase generator circuits in IV01, so that high audio power drain does not result, via the power supply, in raster modulation.

What Next?

In Part 2 we'll look at the scart interface, the audio processing and the microcontroller chip.

Test Case 387

From time to time the shop staff and the service receptionist get lax and the engineers have a moan: vague symptoms, insufficient details on the job card, wrong phone numbers, accessories not supplied – these problems can sometimes give the man at the bench more hassle than the actual diagnosis and repair.

Here was a case in point. A JVC HRD520 VCR without the remote control unit, with no customer phone number and, by way of the fault symptom, "sometimes picture goes". Goes ****** where? muttered Technocrat as he bore the machine away to his bench. He connected it to the mains supply, an aerial and a TV monitor and was alarmed to see, in place of the flashing 0:00 clock display he expected, a single horizontal segment of the display glaring unblinkingly at him. The operate key did nothing. He found that the machine would accept a cassette but then staunchly refused to do anything with it. Did the machine have the right job card with it? Yes, they both said JVC HRD520 and there were no other 520s about.

So what did we have? A microcontroller fault maybe? Or a data line snag up? TC opened the machine and found the control chip IC601. Its 5V supply was present at pin 52, there was oscillation at pins 24 and 25 (in conjunction with ceramic resonator CF601), and at mains switch on there was a reset pulse at pin 23. The same checks on the tuner/timer/display microcontroller chip IC1 on the front panel produced similarly correct results. Wow! TC wasn't keen to start changing 64-pin processor chips, and didn't know which one might be responsible anyway. He confirmed that the various clock and data lines weren't stuck, then phoned JVC technical department for help.

The conversation with the guru at Staples Corner lasted less than thirty seconds. TC came away from the phone kicking himself. What was the immediate problem? It certainly wasn't anything like a faulty microcontroller chip. More like a faulty technician. . .

Now that the machine was operational, TC was able to start the guessing game about the real symptom: not the fault but the symptom at this stage! He tried playback of his Walt Disney tape. This was o.k.: good sound and a good, stable colour picture. He once again cursed the laxity of the customer and the girl in the shop. All the TV channels were tried in the E-E mode. They came through fine. The machine was then set to record Anne and Nick's morning show while TC went off to brew some coffee. On his return to the bench he set the machine to rewind and then play. This time a fault did appear on the monitor's screen.

The playback picture was marred by the effects of erratic mistracking. It would roll from time to time, as a wave of noise invaded the played back field sync pulses, then the screen was swamped with noise and dropouts. At other times the picture remained stable for a few seconds at a time. TC also noticed that the real-time counter display on the front panel froze at irregular intervals. What, he wondered, could cause this when playback of tapes recorded by other machines was perfectly all right? He made a new off-air recording, during which the real-time counter clocked up the minutes and seconds accurately and with no hiccups. It played back as badly as before in the JVC machine but, once rewound and slotted into a soak-testing Mitsubishi VCR nearby, the picture it produced was good and stable.

So the machine could play back all right and record, but not do both with the same stretch of tape. The stop-go-stop behaviour of the tape running-time display was also a vital clue in the search for the cause of the fault (though it shouldn't have been such a difficult search!). Where did the problem lie? Would a good look at a certain vital part have revealed it straight away? For the solution, turn to page 350

A Latvian Experience

David Madgwick

When I accepted an invitation from my brother to visit Latvia for an impromptu holiday I didn't know what I was letting myself in for. Maybe the gifts I was asked to take should have served as a warning. A pop-up toaster and a kettle are not that unusual, but who takes a distributor cap for a Ford Granada on their hols?

News that English people are good at mending things had preceded us. When we arrived we found that several domestic repair jobs had been lined up for our attention. With the appropriate tools they would have caused us little trouble. But our hosts had only a screwdriver, a small hammer and a pair of pliers that didn't quite close.

Our first challenge was an elderly Russian fridge whose motor clacked like a Kalashnikov AK47. After spending a few minutes sandpapering the contacts and adding a few shirt buttons to the starting device it ran quite smoothly without the machine-gun sound.

This success was followed by a dual-standard colour TV set. There was no sign of a picture and we held out little hope of recovering it. As the aerial had long since disappeared we straightened out a coat hanger and pressed it into service. The sound then hissed quietly and after some twiddling we found a Russian station. So the tuner and sound worked and the omens for the power supply looked good. Next we noticed that some e.h.t. crackle could be heard at switch on

Access to the mass of low-tech electronics was gained by using some even lower-tech, home-made tools. Without a multimeter we had to assume that everything was live. The e.h.t. produced a decent spark to earth, and those present under forty years of age could hear the line whistle too. The connectors and valves were all wiggled to no effect. There was still no sign of a picture. I then remembered someone once talking about cathodes (or was it anodes?) shorting in the tube neck and the kill or cure way of dealing with this, a tap on the neck of the c.r.t. with the set in operation. With just our credibility to lose we decided to try it. Tap, tap. Nothing. Try again. Was it my imagination, or did I see something move on the screen? Try once more, this time a bit harder. Yes, a picture! Very dim, blurred and red, but definitely a picture. After a bit more tapping and twiddling the picture was, to our absolute amazement, perfectly viewable.

By now it seemed that we could almost walk on water. A small child appeared clutching a plastic clock that needed fixing. Easier said than done. One of the chunky little gears had been almost stripped, but by bending the bearings over a bit the engagement improved and the clock worked.

After tightening a few nuts on my bed frame I for one was ready for some kip. The gentle ticking of a plastic pendulum nudged me towards sleep. My slumber was disturbed by a sudden noise, then silence. Morning revealed exploded clock parts all over the floor. Oh well, you can't win them all.

What shall we fix today? Sorry, I draw the line at decrepit Ford Granadas and no Swarfega.

What a Life!

Donald Bullock

It's confession time. I have to admit to a keen dislike of watching television. This means that I seldom see any except when I'm working on a set. When I'm thus engaged I try, in the absence of the test cards we used to value so much, to find ways of reducing the aggravation that TV programmes cause me. One thing I do is to avoid ITV altogether, perhaps because the first ITV programme I ever suffered was an outrage called *Lunchbox*. And, unless I'm tackling a sound fault, I work with the sound off. People who know me reckon they understand. "It's because you've spent so many years working on them" they say. But it isn't. Television turned me off years ago. I find it intrusive and much prefer radio.

It was BBC radio that I always missed on our frequent Spanish holidays. One of the first things I did when we bought a house here was to erect a high aerial in an attempt to receive Radio 4. But the signal was awful. Then, just I learnt that it was available via satellite, by daughter Rebecca began to pine for her cartoons. So I purchased a Pace PRD800 receiver and a 90cm dish with a Continental LNB. We soon had it all installed, and I was able to hear BBC Radio 2, 3 and 4. The quality is striking: like locally transmitted v.h.f. radio in the UK.

Television reception was poor however, so I sought out Steve MacDonald. He's an English fellow who owns and runs a satellite TV wholesale company at Calpa nearby. He advised a larger dish and an LNB with a noise figure of 1dB. I obtained a 2m motorised dish and a more sensitive LNB and we now get excellent, noise-free TV as well as the radio programmes.

Like so many others, we enjoy seeing some of the older films on TNT. But I wonder why, very often, TNT's transmissions of perfectly-made, popular films come with the lip sync badly out? Can it be to do with the fact that the films are transmitted with several simultaneous sound tracks to cater for those in different countries?

Incidentally, Steve is a very go-ahead chap. He wants to open a satellite and fax servicing outfit as well and is looking for a technically capable and ambitious British chap to manage it for him. Anyone interested?

Old Abe

Old Abe, our scruffiest customer, looks like an emaciated scarecrow. He lives in a riverside hut with two old portable TV sets, a car battery and a screwdriver. It's the screwdriver that so often leads to his visits. He walks to us from fifteen miles away, carrying one of his sets in a horse blanket that smells so high we get him to unpack the set in the yard. As soon as we've put together the set he's taken to pieces he gets cracking on the other one. The worst time he ever gave us – apart from knocking the neck off a tube and carefully glueing it back on – was the time he changed the tube connections around in his old Ferguson 1590 set. The video output stage didn't like the focus voltage. Every time he brings us a set it costs us a bomb. I don't know why we tolerate him. Perhaps it's because of his deference and courtesy. He called in again last week.

"Mornin' Mr Bullock, sir" he beamed. "This old set 'ave broke hisself again."

We left it out in the open to sweeten a while, then brought it in. To our surprise it was as clean as new. When we plugged it in and switched on we got an immediate cracker-jack show. So we yanked it from the mains and opened it up. The chassis was soaked with brown water.

We poured it all out, dried everything with dusters then propped it on our heater for a couple of days to dry out. After that we gave it a final blasting with a hairdryer and started it up, nervously, via the variac. The mains switch spluttered and smoked, so we replaced it and started again.

To our astonishment the set worked perfectly. We put it aside and awaited Abe's return. When he came, complete with horse blanket, we relieved him of fifteen quid.

"Thank 'ee very much sir" he cried. "Bin a silly old set 'e 'ave."

"Abe" I said, "how come the set's so clean?"

"Arr, I washed un in a bucket of water from the river. I likes everythin' clean, see."

When he'd gone I stood thinking. Then I tossed the money into the tin and spoke to Steve. "Gets odder" I said, "do you reckon it's simple-mindedness, or perhaps a mental problem?"

"Dunno" he said, "but I hope you'll improve."

A Devilish Toshiba

Our next customer was a woman of about thirty. She sprang in with a water-melon grin and a huge red handbag.

"I'm Mangie" she said, "Melody Mangie. And I want you to take the devil out of my television."

I looked around and behind her. "Where is it?" I asked.

"In my telly" she said brightly.

"I mean where's the set?"

"My hosband has it" she smiled.

I looked towards the shelf where we keep the asprins.

"Right" I said, "where's your hosband – er – your husband?"

Just then an old, bent fellow came in, half dragging the set to us. She patted his head as he passed.

I lifted the set on to the bench and waved them good bye. "There didn't used to be people like that about" I said to Steven. "When I was young you had to buy *Beano* to see them."

The set was a Toshiba 215T8B. We plugged it in and it spluttered and smelled as the e.h.t. came up to reveal line collapse. When we'd dismantled it our noses took us to plug 570, where pin seven sat in a little volcano of soot. Once we'd cleaned it all off and remade the connection there was an excellent picture.

Rupert's Satellite Receiver

Rupert Rudd then brought in his Amstrad SRD500 satellite receiver, which was dead except for a slight flicker in the display area and a clicking from the power board. A check on the 23V line showed that it was pulsing between 12V and 5V in sympathy with the clicking. We worked back to IC1 (UC3842): when this had been removed there was no short and the 23V line had been restored to health. A new chip put matters right.

Gladys's TX10

Gladys Club was our next visitor. She's a heavyweight who works in the foundry. Instead of calling people and things be their names she thinks up a different expletive each time.

She was carrying her Ferguson TX10 set as though it was an empty cardboard box. In her most choice way she

explained that it was buggering about.

In fact it was tripping, and it gave us quite a tough time. Eventually we found a barely visible pinhole in the mica washer that goes with the line output transistor.

A Matsui 2180TT

We'd not seen our next customer before. He walked in with a Matsui 2180TT colour set. I breathed a sigh of relief: he looked absolutely normal.

"It's dead, dead, dead" he announced.

I looked at him, not the set. "Name?" I asked.

"Waugh, Waugh, Waugh" he said.

I waved the back of my hand and off he went, leaving me in peace to pull his set on to the bench. I went straight to the overvoltage protection avalanche diode, which at any rate proves that I read the Letters page! Sure enough it had departed this life. But I couldn't find any reason for its failure. So I started the set up via the variac, watching it like a hawk. It behaved perfectly. After soak testing it for a couple of days we returned it to Mr Waugh. "A tenner" we said.

"Faulty part, part, part?" he asked.

"Yup, yup, yup" I replied.

It was back within an hour. "What's up with it this time?" I asked.

"Dead, dead, dead" he said.

The diode had gone again. This time I replaced the STR58041 chopper chip as well, to be sure. I then soak tested it day and night for three days. Yet again Mr Waugh took it and brought it back almost at once.

Why was it blowing diodes for Mr Waugh but not for us? What was different between Mr Waugh's living room and our workshop? Temperature for one thing we reasoned. Our workshop is cooler than the average living room. So we unboxed the set yet again and checked every possible suspect while warming it with our hairdryer, starting with the line output transistor. It took us some time to get to the BD131 transistor associated with the chopper circuit. When we did we found that it read normally when cool, and even when moderately heated, but when warmed a little more it produced a solid base-collector short-circuit. A replacement finally cured the trouble.

It was another loser for us. We'd charged him a nominal sum in the first place, and could hardly charge him again despite the hours of work his set had cost us.

The Councillor

As Mr Waugh finally departed, Councillor Glorie rushed in with his Goodmans 2185T 20in. set. "It's out of order" he shouted, as though we were a meeting. When he'd finished I called Steven over.

"You do this one, will you? I don't feel up to it."

"They're no trouble" he said.

"It's dead" I commented.

The standby light came on all right at power up, but it went out at switch on and the set remained dead. Half an hour later Steven had the set working a treat. I asked him what the matter had been?

"Same as usual" he breezed. "R104 (270kΩ) in the start-up feed was open-circuit. R105 and R106 often go high in value too, but in this set they're all right."

The door opened slowly and Mr Waugh, Waugh, Waugh peered around it.

"Oh no, no, no!" I shrieked.

"It's all right, all right, all right" he said, picking up his gloves from the counter. "I forgot these, these, these."

The Las Vegas CES '95

George Cole

This year's Consumer Electronics Show at Las Vegas, held in early January, was the largest ever: the exhibition area covered 440,000 sq. ft (equivalent to 28 football fields) and over 40,000 products were on show, including many new digital formats.

High Density CDs

One of the highlights of the show was the new High Density CD (HDCD) developed by Philips and Sony. The system was mentioned in Teletopics, February (page 250). To recap briefly, the system increases the CD data capacity by a factor of five. This is achieved by reducing the pit size and track pitch and using a red laser (wavelength 635nm). In addition a variable bit encoding system, whose rates range from one to 10Mbits/sec, is used. There are also plans to develop, with 3M, a dual-layer version that will hold ten times as much data as today's CDs.

The Sharp QT-V1 portable Video CD Player.

HDCD technology will form the basis of a new family of CDs, including high density CD-ROMs and Digital Video Discs (DVDs). The latter are designed for movie storage, and I got a chance to see the system in action. A Philips-Sony DVD holds around 135-145 minutes of MPEG-2 encoded video – exact length depends on the sound encoding. This is sufficient for 97 per cent of movie releases.

DVD was developed to meet a 'wish list' drawn up by the Hollywood studios. They wanted a CD that offered the following features: the disc to store a feature-length movie; superior picture quality; multi-channel sound; multi-language sound tracks; multiple aspect ratios; copy protection; and an electronic lockout system that enables parents to stop children watching specific scenes or discs. This is quite a tall order, but DVD appears to have achieved these aims. Picture quality is superior to that provided by the VHS and LaserDisc systems. Users have a choice of 4:3 pan and scan, 4:3 letterbox or 16:9 widescreen formats. There's digital stereo sound with a data rate of 128 or 192kbits/sec, also 5·1-channel digital Surround sound with a 384kbits/sec data rate, multi-channel sound tracks and English plus local language sound tracks. Copy protection can be provided for the entire disc or specific 'tracks'. And there's a lock-out system.

These DVDs can be pressed in a conventional CD pressing plant, though a modified laser cutter is required and the mastering process is slightly more expensive. Current error-correction technology is used and, despite the smaller pit size, the discs are in general not affected by dirt, dust, shock and vibration. The DVDs on show were placed inside protective caddies: full production versions will be stored in jewel boxes, like currents CDs. DVD decks will be able to play existing audio and Video CDs.

Two DVD titles were demonstrated, *Sleepless in Seattle* and *In the Line of Fire*. These movies were chosen because of their different encoding requirements. The first task is to assess the video content for difficulty rating: more sophisticated encoding is required where there's a lot of fast-moving action, as in *Line of Fire*. The type of sound encoding also has to be selected (stereo and/or 5·1 channels), along with the number of languages and subtitles. This gives the total bit requirement which, in the case of *Line of Fire*, comes to 3·58Gbytes. With *Sleepless*, which is relatively sedate, it comes to 2·92Gbytes. It's then a question of assigning the correct bit rate for each scene – fast-action shots require a much faster bit rate than still sections. These DVDs can store up to 3·7Gbytes of data.

A large-screen TV set with a bit-rate meter perched on top was used for the demonstrations. This enabled us to see how the bit rate altered during the course of the movie. *Line of Fire* had an average bit rate of around 3·3Mbits/sec. There were also split-screen demonstrations that compared DVD with VHS, LaserDisc and D1 digital tape. The results were very impressive – DVD outshone them all. In another demonstration a 60-minute HDTV programme stored on a DVD disc was shown: the picture quality was amazing.

There seems to be some disagreement between Sony and Philips over the introduction of the DVD however. Philips feels that DVD players and discs will be very expensive, and that for at least five-eight years after its launch the system will be a speciality product, like LaserDisc. Sony thinks that DVD will be an affordably-priced, mass-market product from the start – it plans to launch DVD machines next year, though no price indications were given.

There's competition for this DVD format in the form of a rival version developed by Toshiba, supported by Time Warner. Smaller pits and a finer laser beam are again used, but the potential advantage is that the discs can be played on both sides. A number of Hollywood studios are reported to be backing the Toshiba system. The disadvantage, according to Sony and Philips, is that the production of two-sided discs is more costly and more time consuming. Toshiba's system was not on show at CES '95.

GoldStar also demonstrated a couple of high density CDs. One was a double-density disc that stores 148 minutes of MPEG-1 video, using a 670nm laser. The other was a quadruple density CD that stores 135 minutes of MPEG-2 video, using a 635nm laser and a variable bit rate of 1·4-5·6Mbits/sec. Its picture quality was far from being up to DVD stan-

dard however. I doubt whether GoldStar's high density systems will be seen in the shops.

Video CD

Despite all the excitement about DVD there were still plenty of Video CD systems around. Panasonic and Technics showed several players. The SL-VP50 is a portable unit that links up with a TV set or monitor, the SL-VM500 a five-disc CD changer and the SC-V5650 a stereo system. Aiwa's NSX-1000V is a Video CD mini system while Sharp's QT-V1 is a portable Video CD with stereo sound. Marantz demonstrated a double-disc player, Model VCD500.

Multimedia

Philips announced that some 8-900,000 CDi players have now been sold worldwide, with about 60 per cent of sales in Europe and 40 per cent in the USA. The new Philips CDi PC card, which converts a 486 PC into a CDi deck, was being demonstrated. It includes a quadruple-speed CD-ROM drive and is expected to sell for around £500 in the UK.

GoldStar showed the GDI-1000 CDi deck, which has a built-in digital video cartridge, and a prototype portable CDi machine with a 6in. LCD screen.

There were rumours that Philips will be announcing a CDi upgrade this year, using the new PowerPC RISC processor.

Philips and Ardent Records demonstrated a new type of compact disc, called AudioVisual CD, which combines audio CD and CD-ROM data on a disc. The CD-ROM data is stored in the disc's lead-in track section and is ignored by music CD players. Apple Mac CD-ROM drives read the data however, producing text, graphics and other information.

The Panasonic R E A L 300 Interactive Multiplayer, Model FZ-10.

Panasonic unveiled the FZ-10 3DO deck, a newly-designed version of the FZ-1. It includes a memory-management system that tells you whether there's enough memory space to store a game or other files. GoldStar unveiled the GPA-101M 3DO deck. Panasonic and GoldStar both showed MPEG decoders for 3DO decks. Panasonic's one was expensive (around £200) and requires its own power source. Creative Labs showed a 3DO PC card priced at around £270.

TV Developments

Thomson and Sun Microsystems announced Open TV, an operating system for interactive TV. It enables cable, telecommunications, satellite and other broadcast network operators to send interactive material via existing networks to set-top decoders. Open TV is platform-independent and could be used for billing and transaction purposes.

VCRs equipped with Gemstar's Index Plus system can, at the touch of a button, display on the screen programme-related information such as programme identification, sports statistics during a game and similar items.

3D-TV systems were a feature this year. A system developed by Sanyo doesn't require viewers to wear glasses to see the 3D effects. It was shown using 4, 6 and 10in. displays. The system uses a double-lenticular screen to separate the images from two rear liquid-crystal projectors into right and left components, creating the impression of depth. It works well, though you have to keep your head still to see the effects. The 3DX system converts any rear-projection set to produce a 3D-TV display. It uses an optical adaptor which fits over the RGB outputs, dividing the image into two. Users wear glasses to see the effects. The price will be around £330.

Many Americans are worried about violence on TV. There's a proposal that future sets should incorporate a V-chip. The idea is that an electronic warning signal will be transmitted along with any programme that contains very violent scenes. When this signal is detected the V-chip will switch the set off. Intelvision was promoting a system called C-chip. This enables parents to program a TV set so that it switches off at certain times of the day or when a particular programme is being broadcast. According to Intelevision the C-chip would cost around £130.

Also on show were electronic viewing guides that take the place of paper TV guides. One system, StarSight, enables the viewer to display various information on his screen, including a channel schedule. Simply by pressing a button the user can also select programmes for recording: the VCR automatically switches on and tapes the right channel at the appropriate time. It relies on programme data that's transmitted during the vertical blanking interval (VBI) and can be stored in a TV set or VCR. Samsung and Daewoo are to launch StarSight-equipped VCRs. A rival format, Videoguide, works in a similar way though its data is sent to viewers via a radio link and a £70 add-on box is required. Both services cost around £3 a month to use.

Satellite TV

America's first digital satellite system, called DSS (Digital Satellite Service), was launched last summer. It's run by RCA/Thomson, which produces the hardware, with Hughes DirectTV and USSB (US Satellite Broadcasting) who provide the programming. The service has proved to be very popular – over 600,000 receiving systems were shipped last year. DSS uses MPEG-2 video and currently offers 175 channels, including sports, movie and pay-per-view channels. Two satellites are used – a third is expected to be launched later this year. The RCA receiving

system consists of an 18in. dish and a digital receiver, the price being around £470. Subscription costs vary between about £5-£23 a month.

Video Developments

Gemstar showed its Index Plus system, which is due to be launched in the USA and several European countries this autumn. It's designed to make VCRs operate more like CD players, using a chip and proprietory software to store details of programmes that have been recorded. When the user of an Index Plus equipped VCR inserts a tape, an on-screen display lists its contents. The user then selects the programme he wants and the VCR finds it. The system relies on information that's transmitted during the VBI. In cases where this information isn't transmitted during normal broadcast hours, Gemstar has arrangements with local stations to transmit it at night: the data can then be downloaded into VCRs which use it to find out the programmes recorded that day.

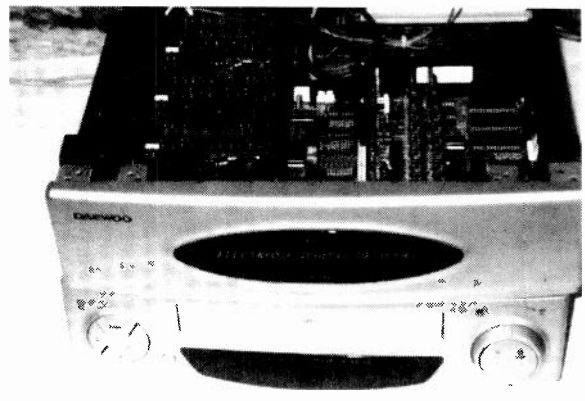
Index Plus can number each tape automatically, and can produce a list of the programmes stored on each cassette (there's enough on-board memory for 400 programmes). The system can also be used with video programmes, to enable the user to select say a recipe from a cookery tape or a track from a music tape, or with live TV broadcasts to call up the programme title, channel number and the running time, or to obtain additional information about the programme such as an actor's biography or sports results. ABC plans to transmit such programme data.

An easy record system enables programmes to be recorded by simply selecting them on screen then pressing a button. Companies planning to launch Index Plus VCRs include RCA/Thomson, Panasonic, JVC, Hitachi, Sanyo, Mitsubishi and Sharp.

Gemstar was also promoting iPlus, which enables viewers to use Video Plus codes to record advertising material broadcast at night.

Arista Technologies showed a system, called Commercial Brake, that can bypass advertisements recorded on tape. A black frame is transmitted at the beginning and end of commercial brakes: Commercial Brake places electronic markers at these points then stores a playback map in memory. When a marker is detected during tape playback the sound is muted, the screen turns blue and the VCR goes into the fast forward mode: at the end of the brake the VCR returns to normal playback operation. The process takes five to ten seconds. Special algorithms are used to distinguish between a commercial brake and the screen going black during a scene transition. Arista is to launch an add-on unit, priced at around £133, this spring. The technology has been licensed to RCA/Thomson, which expects to launch VCRs with the system built in later this year.

Daewoo showed an electronic delivery system called EMC3 (Entertainment Made Convenient, Controllable, Choice) which is intended to deliver video programmes to viewers' homes at high speed, taking around five minutes to send a 100-minute movie. The EDD-1000 is a modified VHS deck which records the programmes received at the normal standard VHS speed then plays them back at 1/20th speed. It uses a special capstan system that stops and starts the tape during playback to supply packets of digital data. Unfortunately we were unable to see this system in action as some of Daewoo's equipment was damaged in transit.



The Daewoo Electronic Digital Delivery System.

Other Developments

Sony showed the Digital Video Cassette (DVC), which is designed for both domestic and professional use. There are two tape sizes: the larger holds up to four and a half hours' of video; a smaller one, holding an hour of video, is intended for camcorder users.

Pioneer showed the first LaserDisc title to use Dolby's AC3 digital Surround sound encoding system. It offers 5·1 channels (left front, centre, right front, left surround, right surround and sub-bass). The disc also stores a mono digital track and a stereo f.m. track.

Casio demonstrated the LT70P, a video phone system designed for use with conventional analogue telephone lines. It sends and receives audio and video signals and works with a TV set or PC. Video images can be in either normal (124 x 112 pixels) or high-resolution (512 x 224 pixels) form. The unit has a built-in video camera and can transmit images from a camcorder, VCR, video printer or PC. Price is around £850.

Casio also showed a digital still video camera, Model QV10, which can hold up to 96 colour images on a PCMCIA card. It has an electronic shutter, a self-timer and a 1·8in. LCD viewfinder. Four AA-size alkaline batteries provide the power and the prince is around £466. Chinon's digital camera, the ESC (Electronic Still Camera), has a x3 zoom and stores up to five super high-resolution (640 and 480 pixels) images per Mbyte of RAM. It will be launched this autumn at around £667.

Aiwa's PC-V466 is a combined 486 PC and 14in. TV set. It includes a CD-ROM drive and costs around £1,900. Compaq's Pressario 920 includes a 486 PC and a TV tuner. It can also accept video signals from a VCR, a camcorder or a LaserDisc player.

Econologic showed Telemate, which offers 'No see TV'. It enables radio listeners to hear live TV broadcasts. The battery-powered unit receives television sound and transmits it on the a.m./f.m. bands to a radio receiver which should be within twelve feet. Price is around £46.

There were many games systems at the Show. Atari had an add-on CD player for its 64-bit Jaguar Games system. The player can be used for audio CDs as well as Jaguar games and costs around £100. Sega demonstrated its Saturn 32-bit CD-ROM system, which also supports MPEG-1. Nintendo's Virtual Boy is a 32-bit virtual reality system that uses twin LCD displays.

Prices

Prices quoted in pounds in this article are approximate equivalents of the dollar prices, to serve as a guide. Unless otherwise indicated, the equipment is not available in the UK. CES is the leading exhibition world wide for the presentation of new consumer electronics systems and products.

Camcorner

Reports from David C Woodnott

Sanyo VMD6P

The customer's method of removing the cassette when his camcorder failed to eject it had damaged the mechanism. We had to straighten the supply reel shaft and realign it.

The supply reel table can sometimes be responsible for poor rewind with this model, causing tape spillage etc. The problem can usually be cured by removing the reel table and gently pressing the plastic assembly on a flat surface. You often find that the parts have separated slightly, with the result that the reel sticks.

This particular machine's loading rings were out of sync. They are made of a plastic material that has a certain amount of 'give'. Realignment can very often be carried out with little dismantling, by releasing the circlip from one of the loading ring timing gears, resetting the timing then replacing the circlip. In this case however the loading gear was damaged and had to be replaced. **D.C.W.**

Sharp VLC7590H

The E-E and playback pictures were fine but there were no recorded pictures (sound o.k.). A quick check showed that the REC 5V supply was missing at the head amplifier. The REC High signal was present at pin 71 of the syscon microcontroller chip IC801 when the trigger button was pressed: it goes direct to pin 5 of Q935 (REC SW buffer/inverter), but the switch remained off. As there should be a direct link between IC801 and Q935, the next step was a continuity check on the print. This revealed a condition that's becoming very common of late, corroded print caused by a leaky capacitor. There were two offending capacitors in this case, C945 and C946 (both 22µF, 35V), in the power supply. The damaged print runs directly between the pins of these capacitors. As the print had disappeared, a link had to be fitted between suitable points. This restored the unit to normal working order. **D.C.W.**

Sony CCDTR45E

The customer's complaint was that this camcorder refused to load a tape and that there was a 'knocking' noise from the mechanism when it was last used. Inspection of the mechanism revealed that guide TG9 was disconnected from the take-up coaster assembly, being free to take up any position it wanted to. All that was necessary to restore the unit to normal operation was to fit a new circlip. The noise was caused by a cracked gear that forms the lower part of the take-up reel assembly. **D.C.W.**

Panasonic NVM40B

As received this full-sized VHS machine wouldn't power up or perform any function. There was a cassette stuck in it, in the laced-up position. The failure had apparently occurred when the mains supply was disconnected with the machine in the record pause condition. After that nothing would work.

We started off by using an external source to power the loading motor so that the cassette could be removed. Then, after a general inspection, we were surprised to find that on powering up everything worked. All the mechanical functions that is, including record and play and all the camera functions, but there was no clock display. The camera's digital modes all worked. So we put the camera into the record pause mode and disconnected the mains input. When we powered up again there was no response. The only way to restore the functions was to power the loading motor until the point was reached where the tape guides were just out of their loaded positions.

So there were two apparent faults. What was the connection? A study of the syscon control chip and its various inputs etc. didn't immediately reveal any connection. So more from desperation than anything else we decided to replace the mode encoder switch. This failed to cure the faults of course. Maybe we'd overlooked something simple? The syscon chip produces key-scan output pulses at pins 1-7, 126 and 127. They are fed to the VCR operation controls, returning to the chip at pins 97-101. The mode switch is similarly scanned via this matrix, not having its own dedicated syscon chip input pins. We noticed that in the stop mode condition the key-scan pulses at pin 98 differed from those at the other input pins (97, 99-101). This was the only oddity that showed up. As various checks in the area of the scan lines failed to reveal anything amiss it increasingly looked as though the syscon chip itself (IC6004) was the cause of the faults. But with only one input line showing a problem and everything else working fine? We were reluctant to replace this 128-pin chip, but doing so cured our odd combination of faults. **D.C.W.**

JVC GRA1E

The complaint was that when a recorded sequence was played back there were gaps in the recording. Also that the machine made a whirring noise when loading a tape or selecting record or pause. What was happening was that during times when the capstan motor is under mechacon instead of servo control, i.e. between stop and play or record and pause, it was being driven at a higher than normal speed. Thus correct joins between sections of the recorded sequence were not possible – many feet of the tape were 'whizzed' though each time.

It took us a long time to find the culprit, which was Q115. This transistor is part of the capstan drive circuit and was leaky between its emitter and base, causing excessive drive to the capstan motor in the mechacon-control mode. Confusion was caused by the fact that once servo control was established there was normal playback until a mode change occurred. **D.C.W.**

Sony CCDTR750E

After being dropped this camcorder wouldn't record or playback in colour. E-E colour was fine, and all the functions worked. Why only loss of colour in these modes? In this model some of the chroma circuitry is on sub-panel PJ-61P, which had become detached from its connecting socket on the main PCB. Normal service was restored after repairs to the chroma PCB connector. **D.C.W.**

Canon E60E

A 'clicking' noise came from the lens unit when going from telephoto to wide angle. We discovered that a tiny plastic clip within the macro button assembly had fractured. Fitting a replacement zoom ring cured the fault. **D.C.W.**

Servicing the ITT Monoprint B Chassis

Chris Watton

The next chassis we'll look at in this series is the Monoprint B. It forms part of a chassis evolution following the Compact 80R (see last month). While the basic concept is the same, there are many differences in the way in which it's implemented. Instead of a discrete component chopper supply, the Monoprint B chassis uses a TEA2162 chip (IC701) to drive the chopper transistor (this time a BU908). As before, a pulse-width modulated drive is obtained from the secondary side of the circuit, this time from the TDA8371 sync/timebase generator chip IC601. The field output chip is a TDA3653A.

A word of warning before we go any further. At about this time (roughly 1986-7) ITT produced quite a number of similar chassis, including the Compact B and Compact D, to drive different tubes. Though the basic concept remains the same, in particular with a chopper circuit that drives the line output transistor from a secondary winding on the transformer, there are many important differences in circuit detail, e.g. the use of different chips. In some, including the Compact B and Monoprint B-FS, the chopper drive chip is a TEA2165.

We'll now return to the Monoprint B chassis to see how the power supply works. A simplified block/circuit diagram to illustrate the principle of operation is shown in Fig. 1.

Power Supply Operation

Two chips are involved, the driver chip IC701 (TEA2162) and the sync/timebase generator chip IC601 (TDA8371). Thus although the drive comes from IC601, IC701 contains an oscillator to provide short-duration pulses as the chopper drive at switch on. A start-up supply is obtained from the mains input circuit: this is fed via R701 and R708 (R655 in some similar chassis such as the Compact B) to D701 which charges C711. When the voltage at pin 16 of IC701 reaches about 10V an internal switch operates, charging C702 to about 1V. At this level, narrow output pulses are produced at pin 14 to start driving the chopper transistor T701. D711 will then rectify the pulses appearing across the primary-side secondary winding on the chopper transformer Tr701, increasing the voltage across C711. The width of the output pulses at pin 14 increases, until the voltage across C702 has risen to 1·8V. At this point pulses from IC601 should be available at pin 6, via the pulse coupling transformer Tr702, to take over the chopper drive action.

If there's no drive from IC601 the start sequence will be repeated. This provides an important fault-finding clue. With repeated start-ups the h.t. voltage will be at only around a quarter of its normal running level of 115V. In normal operation IC601 receives a 12V supply (at pin 19) from the line output stage, via D603. This means that IC601 also requires a start-up supply. This is derived from the 16V output from the chopper transformer via transistor T601, which supplies about 8V at its emitter. When the 12V supply from the line output stage rises above 9V or so T601 switches off, its emitter voltage then exceeding its base voltage. T601 also provides the supply to IC601 when the set is in the standby condition.

Back to IC701. The oscillator within this chip free runs at about 14·5kHz, providing pulses to drive the chopper transistor only during the start-up period or in the event of loss of the drive from IC601. The latter will occur if there's an overload condition: IC701 then produces a burst-mode output to try to restart the set. When there's a pulse-width modulated drive signal at pin 6 of IC701 the internal oscillator runs in sync with the line oscillator in IC601 and plays no part in the chopper drive. Differentiation is incorporated in the feed to pin 6 of IC701 to provide 1V peak-to-peak positive- and negative-going drive pulses.

If the drive at the base of T701 is open-circuit there will be no supply for IC601. IC701 will then operate in the start-up mode. A squarewave output should be seen at pin 14 but it will be in the burst mode, interrupted periodically at about 100ms.

For test purposes the power supply can be run separately from the line output stage. To do this disconnect the line output transistor's collector and use a 60W bulb as a dummy load, or alternatively connect the bulb to the collector of the line output transistor and short its base to its emitter.

Protection

Over-voltage and excess-current protection are incorporated. The current passed by the chopper transistor is monitored by R721. One side of this resistor is connected to T701's emitter while the other side is linked via R707 to pin 11 of IC701. The excess-current trip operates in two modes. The width of the output pulses at pin 14 of IC701 is reduced when the voltage at pin 11 reaches –1·3V, limiting the output voltages produced by the power supply. This happens with a short-term overload. With a heavy overload, such as a short in the line output stage, the voltage at pin 11 of IC701 will rise to –1·6V and the output at pin 14 will be cut off. A new start-up will then be attempted.

Over-voltage protection is provided by monitoring the voltage at pin e of the chopper transformer. This is linked to pin 11 of IC701 via R714. An excessive negative voltage will remove the output from IC701 in the same way as with an excess-current condition.

Standby Operation

Sets with remote control have standby switching. In the standby mode 5V from the tuner control unit is fed via D611 to the bases of transistors T602 and T603. As a result the output pulse from IC601 is very narrow and the chopper drive is likewise reduced. The power supply produces much reduced outputs in this mode.

Supply Lines

The chopper circuit and the line output stage produce various supplies. These are as follows:

(1) 115V h.t. produced by the chopper circuit.

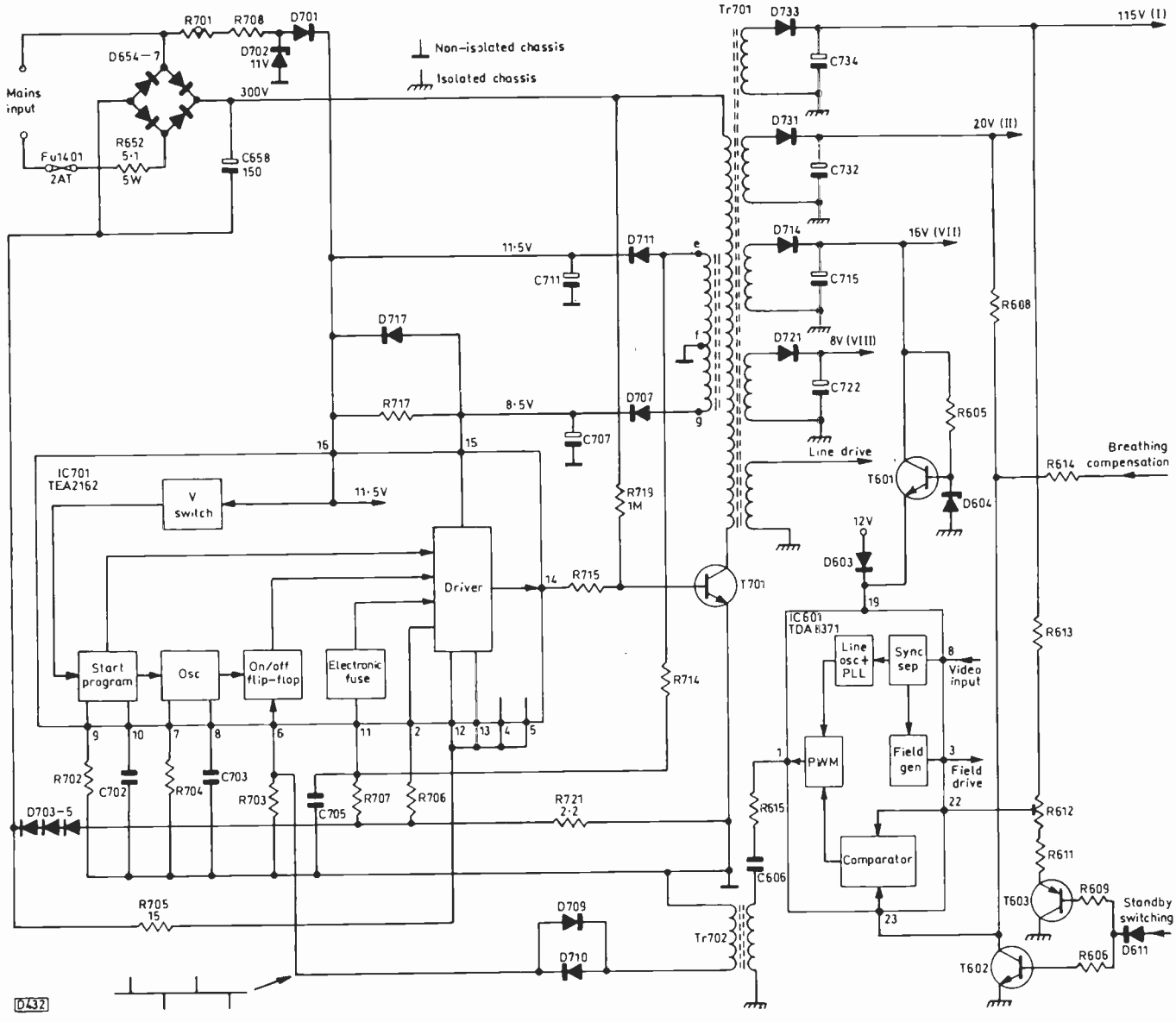


Fig. 1: Simplified block/circuit diagram showing how the chopper power supply and the standby switching system in the ITT Monoprint B chassis operate.

(II) 20V produced by the chopper circuit.

(III) 26V produced by the line output stage.

(V) 12V produced by the line output stage, regulated by IC501 (μA7812).

(VI) 150V produced by the line output stage.

(VII) 16V produced by the chopper circuit.

(VIII) 8V produced by the chopper circuit.

(IX) 5V derived from the 16V line via regulator IC1404 (L78M05).

(X) 5V derived from the 8V line via regulator IC1405 (TDD1605S).

Timebases

The line output stage is a simple affair: as the chassis is designed to drive 90° tubes there's no EW correction. Pin 7 of the line output transformer is the source of the 150V supply, pin 8 is the source of the 26V supply and pin 9 the source of the 12V supply. Pin 6 provides a 70V pulse output. The transformer also produces the c.r.t. heater, e.h.t. and focus voltages. The first anode supply is tapped from the earthy end of the focus control on the c.r.t base panel.

Supply III, 26V, is used to power the TDA3653A field output chip IC401, at pin 9. This chip's drive waveform comes from pin 3 of the TDA8371 sync/timebase generator chip IC601, being fed to pins 1 and 3. The field output appears at pin 5, the chassis return path for the scan current being via the 1,000μF scan coupling capacitor C407 and R407 (1·2Ω). Most field faults are caused by the chip itself: dry-joints can be responsible for its failure.

Signals Section

A new tuner/i.f. module is used in this chassis, type 5829 0341. It's in a smaller can compared to earlier modules used in the Compact series chassis and has fewer active connections. The audio level is not variable as it can be taken via the scart socket for recording purposes. Volume adjustment is provided at a later stage. After the tuner there's an SL1430 SAWF driver chip (IC161), a TDA4427A i.f. chip (IC201) and a U829B sound detector chip (IC202). The

main pin connections to the module are as follows:

Pin 7: 0-30V for tuning.

Pin 14: 12V input.

Pin 23: 12V input.

Pin 24: Composite video output.

Pin 26: A.F.C. output

Pin 29: A.F.C. on/off.

Pin 31: Audio output.

Pin 32: Audio muting input (from pin 18 of IC601 via D601).

Audio Channel

The audio output from the tuner/i.f. can is taken to buffer transistor T301, then to pins 1 and 3 of the scart socket and pin 4 of the TDA8196 chip IC301, which is responsible for audio input selection and volume control (at pin 6 from the main control chip IC1402). The voltage at pin 3, again from the main control chip, carries out source switching. A TDA1905 chip (IC302) is the audio output device: the signal input is at pin 8, the output at pin 1 and the supply (20V) at pin 2.

Video Channel

The video signal from the tuner/i.f. can is taken via C3601 to pin 3 of the TEA2014 video switching chip IC3601. This receives 12V at pin 7. Pin 2 is the output to the scart socket, pin 6 the output to the colour decoder and sync circuits and pin 8 the input from the scart socket. Pin 5 controls the switching. As with the audio switching the source is pin 32 of IC1402, via transistor T1415. The video input to the sync/timebase generator chip IC601 is at pin 8 while the input to the colour decoder module goes via connector CD3.

Different colour decoder panels are used in these sets, with either a TDA3565 or TDA3561 chip. The connections are the same however: CD1 sandcastle pulse (from pin 20 of IC601); CD3 video input; CD4 12V; CD11 beam current limiting (derived from pin 5 of the LOPT); DC1 brightness control; DC2 contrast control; DC3 colour control. Pins DT1-3 of the other connector are the blue, green and red outputs to the c.r.t. base panel, where the output stages and adjustment presets are mounted. This is quite straightforward, faults usually being confined to transistor failure or presets becoming noisy.

Grey scale/drive adjustment is as follows. First, for decoder 6911 30 31 (TDA3565 chip). Turn all black-level and drive presets to maximum; join together test pins 401/2/3; adjust the brightness for 5V at pin DC4 of the decoder; turn the colour control to minimum; adjust the first anode control until a barely visible line appears. Adjust the black-level presets as required for equal brightness with all three beams, but ensure that at least one of the presets remains at the maximum position. Finally remove the links from the test pins and set the drive controls for neutral white tones. With decoder 6911 30 33 (TDA3561 chip) again set all the controls on the c.r.t. base panel to maximum, then connect pin TP910 to chassis, link TP401 and TP402, adjust the brightness for 6·8V at DC4 on the decoder. Then carry out the procedure outlined above.

Control System

An SAA1296A chip (IC1402) is used to decode the remote control commands, provide standby switching, carry out the usual customer controls (brightness etc.), drive the LED unit and provide full tuning control with band switching (this latter feature is not used with UK sets of course). The chip is backed by an MDA2061/2062 memory chip.

Checks can be carried out at some of the SAA1296A chip's pins for fault-finding purposes. IR remote control signals are picked up by D1401, amplified by IC1401 (TBA2800) and fed to pin 12 of IC1402. Other pins that can be checked are as follows:

Pin 1: 4MHz clock.

Pin 4: Reset pulse.

Pin 5: Standby control output (high for standby).

Pin 10: Contrast control output.

Pin 11: Brightness control output.

Pin 13: PWM output for tuning voltage control. The feed is to transistor T1420 then T1421.

Pins 14-19, 21-23, 28, 38, 39: Local keypad and display drives.

Pin 24: A.F.C on/off.

Pin 27: 5V input.

Pin 32: AV output (high sets the receiver to scart inputs).

Pin 33: Colour control output.

Pin 34: Volume control output.

Pin 36: Scart switching input (high for the AV condition).

Pin 40: 5V input.

Faults in this area are usually confined to the keypad. Checks can be carried out by connecting a 100Ω resistor across the suspect portion or between the relevant pins of the chip. A resistor connected between pins 15 and 38 for example should produce decreased sound volume, while connecting it between pins 16 and 39 should increase the volume.

The standby control pin (5) is connected to the bases of transistors T602 and T603 (see Fig. 1). When the standby output is high, T602 switches on and the chopper drive pulses at pin 1 of IC601 are only 3·5µs wide. This reduced drive lowers the output voltages produced by the chopper circuit. The high output from IC1402 switches T603 off: the purpose of this arrangement is to reduce the output voltages slowly. In normal operation pin 5 of IC1402 is low, T602 is off and T603 is on.

To Follow

The next article in this series will deal with the Digivision 3 chassis. A faults list for the various chassis will be included.

CD Player Casebook

Reports from Mike Leach and Savio DaCosta

Pioneer XDZ65M

We were told that this midi system had previously taken a long while to read discs. It had then stopped working completely. On test I found that it would load a disc and then do nothing at all. When it had been stripped down I saw that the laser assembly had jammed itself at the end of the worm gear at the centre of the disc. I took the mechanism apart, cleaned and serviced the worm gear, fitted a new belt etc. then put the lot back together again. The machine now worked, but the laser took several seconds to focus on the disc. I then made the mistake of dismissing this as possible laser wear and returned the machine to its owner.

It came back a week later, with the same symptoms and the laser again jammed up. Everything came out again, but this time I checked the continuity of the leaf switch against the worm gear in case there was a problem here. The switch was o.k. I then carried out a check at plug CN202, where the two connections from the switch go into the main board. There was definite continuity on the ohms range. So I switched on and bunged in a disc. Again the laser took several seconds to realise that a disc was present, but while it sat there doing nothing I could hear that the sled motor was still running. How come? The end-stop switch was o.k. – I'd checked it twice! What's going on?

I could see that the main CD board had been out before, as some of the screws that hold it to the chassis were missing. All was revealed when I took it out: in his infinite wisdom someone had seen fit to desolder one of CN202's pins, thereby disconnecting the end-stop switch. Thus although I was getting a continuity reading on the component side of the board, the information from the switch was not getting back to the microcontroller chip. Hence the sled motor continuing to run when the laser was sitting at the start of a disc. After resoldering this pin the laser read the disc immediately and all was well again. **M.L.**

Yamaha CD3

This player's tray wouldn't open. I took the top off and found that the loading motor, after I'd removed the belt, tried to spin very slowly. The cause of the fault was soon traced to two of the loading motor drive transistors, TR20 and TR22. When two new 2SA934 transistors had been fitted the tray opened normally. **M.L.**

Aiwa DXZ7000M

This machine, part of a separates system, wouldn't read discs. The turntable rotated and the laser squeaked nicely but the TOC wasn't read. As cleaning didn't improve matters I dived in, wrongly, and replaced the BA6296 tracking drive chip. This made no difference. The laser still squeaked, and I'm sure that a rude word appeared in the display as I desperately looked for the track information! Fortunately my next hunch was correct: after replacing the CXA1082 servo processor chip the machine read the discs all right.

This was by no means the end of the story however. The machine started to play, but after a few seconds the sound muted briefly then returned. It continued to do this with every disc I tried. All was well when the CXD1167Q signal processor chip had been replaced, but it was a pretty expensive job. I packed it all up, feeling good, then saw the ticket that said "estimate first". . . There must be other ways of putting bread on the table. Ideas anybody?! **M.L.**

Sony HCDH70/1200/1500

These mini compos use the same CD assembly. A common problem you get with them is failure of the tray to close because the belt is weak. **S.DaC.**

Philips CD460

The tray wouldn't open, though it would close. We found that the BC337 transistor on the tray drive PCB at the front was open-circuit. **S.DaC.**

Sony Discman D2/22

This machine wouldn't play. When a disc was inserted there was a scratching noise as the machine attempted to play it. The cause of the problem was clear enough: the plastic MD cover around the turntable holder had warped. All that was required was a new cover. How did this happen? The owner had left the unit out in strong sunlight, though the operating manual tells you clearly not to expose such units to heat. Fortunately the laser wasn't affected. **S.DaC.**

Technics SLXP7

The disc rotated but there was no LCD indication and no sound. The main processor chip IC401 controls both these functions. As lifting the mute control pin 32 brought the sound back we replaced the chip – it took a large magnifier and most of a morning. When we'd done this the LCD and sound returned. **S.DaC.**

Sony CDPH3600

This player was part of an audio system. It would come on but didn't do anything else. We found that IC101 was faulty – the 7V supply was missing. Replacing it didn't make much difference, and the new chip got hot. A resistance check between pin 1 of the chip and chassis produced an unusually low reading of 6Ω. Removing CN101 increased the resistance reading. IC102 turned out to be faulty, a replacement restoring the player to life. **S.DaC.**

Technics SLPJ30

This machine would focus on the disc but the spindle didn't move. I thought that the motor might be faulty, but this possibility was ruled out by the fact that it's a direct-drive type. A visual inspection revealed that the AN8370S optical servo chip looked brown on top. When a replacement was fitted the player worked. The chip must have been cooking away slowly, as the customer said that the player had been operating intermittently. **S.DaC.**

1000's 50,000

Thousands of semiconductors I.C's etc.
of video parts, heads, belt kits, etc.
of remote controls, etc. etc.
over 50,000 database records to help find the difficult
video parts quickly. Stock availability & price in seconds

We compete on **QUALITY** – We compete on **SERVICE**
We will not compromise and yet our prices are often less.

.....and look at the special offers (strictly while stocks last)

BU208A	X5	£4.50	BUT11AF	X5	£3.25	3V29 etc. Belt kit	X5	£4.50
BU508A	X5	£3.60	BU426A	X5	£3.75	3V35/36 etc. Belt kit	X5	£4.25
BU508AF	X5	£5.00	TDA4601	X2	£2.55	VT11E etc. Belt kit	X5	£5.50
BUT11A	X5	£2.25	TDA3654	X2	£2.50	Standard video sensor lamp	X10	£2.50
Philips type 1.2 volt Back up battery				X5	£4.50	Standard video sensor lamp + plug	X10	£4.00
Philips type 2.4 volt Back up battery				X5	£8.75	Thorn TX9/10 Remote control	each	£7.49
Scart – Scart lead 1.5m Fully wired				X2	£2.90	Thorn TX10 Green spot LOPTX	each	£14.95

.....and now ask for a full price list.

(please add £1.00 handling all + VAT)

Satellite PSU Repair/Refurb kits

Experience in one of the largest repair centres has shown that all repairs to Power supply units require special treatment with not only the obviously faulty parts being replaced but a number of others also changed to ensure a satisfactory repair. Experience shows that up to 50% of all power supply repairs 'bounce' unless the correct procedure and the correct precautionary changes to certain components are made.

At last 4 repair kits are available to cover the majority of all Amstrad and Pace receivers each with a simple to understand instruction sheet to guide you through the correct way of repairing and refurbishing satellite receiver power supply units.

	MANUFACTURERS	MACHINE NO.		PRICE
SATKIT1	PACE	PRD800	PRD900	£6.95
SATKIT2	PACE	SS9000	SS9200	£6.95
		SS9010	SS9210	
		SS9020	SS9220	
SATKIT3	AMSTRAD	SRD510	SRD520	£6.95
SATKIT4	AMSTRAD	SRD500		£6.95

all + £1.00 handling and + VAT

IMPORTANT ANNOUNCEMENT

ALL SATELLITE RECEIVERS purchased before *MAY 1994*

It is almost certain that if you purchased your satellite receiver before May 1994 you will be unable to receive all the projected channels when they become available on ASTRA 1D neither will you be able to receive the lower two channels on ASTRA 1C. The lower two channels on ASTRA 1D are Filmnet Movies (H - 10.921) and RTL-5 (V - 10.934). These are broadcasting now. If you wish to receive these two channels now and the projected possible 16 channels on ASTRA 1D when it is launched later this year, you will need to purchase extra equipment. The SUPER 'D'CONVERTOR is a clever, low cost frequency convertor which can be purchased now. Millions of satellite receivers will need converting in Europe so it is good advice to buy now while stocks are readily available.

Can I receive

Method 1
1) Purchase an enhanced satellite receiver with tuning range of 950 – 2050 MHz
2) Purchase an LNB with a conversion frequency of 9.75 GHz
3) Book an engineer to install the equipment

TOTAL COST *AROUND £200*

Method 2
1) Purchase a *SUPER* 'D'convertor
2) Install the *SUPER* 'D'convertor – *All by yourself.*

TOTAL COST *EXACTLY £29.95*

What is a SUPER 'D'convertor ?

The super 'D'convertor is a small box (110mm x 60mm x 50mm) which is inserted into the down lead from the satellite dish at the rear of the receiver (no power supply is required). A suitable connecting lead is supplied together with end user simple instructions. At the flick of a switch or in most cases a touch on the remote control, channels on ASTRA 1D can be tuned in when available. The bottom 2 channels on ASTRA 1C which up to now you may not have been able to tune in, will be immediately available.

Personal callers welcome or dispatched same day - Payment by PO's or Credit Card. Allow 7 days for cheques
Send £31.95 to include Post & Handling.

Economic Devices

PHONE (0902) 773122 FAX (0902) 29052

32 Temple Street, Wolverhampton WV2 4AN, United Kingdom
International Phone + + 44 902 773122 Fax + + 44 902 29052
Also available – D2mac Decoders – RTL Decoders – Secam/PAL Transcoders – A/B Switches
Tone Switches – Multiswitches – Please phone for current prices.
Larger Quantity Trade Enquiries Welcomed.

Fax Technology

Geoff Lewis, B.A., M.Sc., I.Eng.

The history of image transmission (facsimile) goes back a long time. Although the concept was first described by Alexander Bell in 1843, it didn't become a practical system until the late 1920s, when 'wire photographs' became available via the news agencies. It wasn't until 1972 that the CCITT (International Telegraph and Telephone Consultative Committee) confirmed the first standard, for what became known as Group 1 machines. Four years later the CCITT confirmed the Group 2 standard. But the system remained technology driven and wasn't popular as a means of business communication. In spite of the relatively low demand, the CCITT issued the Group 3 standard in 1980. Then, in line with the development of digital technology for telecommunications purposes and the assumed need for an Integrated Services Digital Network (ISDN), the CCITT defined the Group 4 standard in 1984. The idea was to give the system greatly enhanced capabilities.

During the mid-Eighties there was considerable convergence between the telecommunications, broadcasting and computer industries. This coincided with a rapid expansion in the use of VLSI (very large scale integrated) semiconductor technology, the appearance of low-cost microprocessor chips and improvements in the transmission quality provided by the fax carrier medium – analogue telephone lines.

At this stage Group 3 and 4 systems were developing in parallel for different applications. Group 3 machines with new features and faster, better transmission characteristics were developed while the Group 4 standard, which has still to be fully implemented, struggled to find a niche market. Their development has not been helped by the fact that to this day Group 4 terminals are only about fifty per cent faster than the best Group 3 units. Thus Group 3 machines are the market leader at present, using technology that's user/subscriber driven.

While automated Group 3 business machines are now available at around £1,000, machines suitable for domestic and small-business use can be obtained for less than £300 –including VAT and one-year on-site maintenance.

At least three per cent of UK homes with a telephone are now equipped with a fax machine. In the USA and Japan over twelve per cent of such homes have fax. This suggests that there are considerable opportunities in the UK for fax sales and service through radio and TV traders.

Present fax systems can transmit photographic and documentary information over standard telephone lines, local area networks and via radio and satellite links.

How the System Works

The information in a document that's to be transmitted by fax usually consists of dark markings on a white background. It can be analysed for transmission by segmenting the document into areas that are small enough to be able to resolve the finest detail. This is done by using a light beam to scan the document sequentially in a series of very narrow strips. The magnitude of the light reflected from each picture element (pel or pixel) is then converted into an electrical signal. Since fax terminals are transceivers (transmitter-receivers), the signal can produce an accurate facsimile of the original document either locally or at a distance.

Aspect Ratio

The fax doesn't have to be the same size as the original, and some terminals have the ability to enlarge or reduce a document. To avoid distortion, the aspect ratio of the page should remain constant. Aspect ratio compatibility is referred to as the factor or index of co-operation (FOC or IOC respectively): this is based on the ratio of the scan line length to the vertical scanning density (line depth, i.e. vertical resolution). FOC equals the effective scan length (actual length plus five per cent to accommodate a phasing signal) multiplied by the vertical scan density. Since the IOC ratio was defined in terms of the original drum-scanned systems, IOC = FOC/π. If terminals that work together have the same ratio, the shape of a document will be retained even though the actual reproduced size may differ.

Fax Transmission and Reception

The drum scanning system used in earlier machines has been superseded by a flat-bed technique: the document is moved over an illuminated window slit, the reflected light being focused on to a CCD array that consists of up to 3,500 cells. This results in a digital grey scale that represents the dark and light areas along a whole line. It's stored temporarily in a semiconductor memory. Since each pixel signal can be generated in about 2µsec, while to change and transmit a complete line signal takes about 140µsec, there's ample time for signal coding and companding.

The signal thus generated is modulated on to a suitable carrier, then filtered to ensure that its bandwidth lies within the spectrum of a telephone channel (300-3,400Hz).

The type of modulation used varies with different Groups. In general, to avoid early obsolescence the operation of each Group is compatible with terminals of a lower Group. A line amplifier is used at the terminal's output to provide the correct signal level and impedance matching with the transmission medium.

A terminal's receiver section is the obverse of the transmission section. The received fax signal is amplified then filtered to remove any line noise. It's then demodulated to restore the baseband signal. This is passed to a marking amplifier which drives the fax printing mechanism.

Microprocessor Control

Use of a microprocessor to control a fax terminal has numerous advantages. These include computer fax, encryption for added security, auto dialling and answering for unattended operation, transmission of the same fax to several receivers simultaneously, and polling – this allows a terminal to call for a fax from a distant terminal after identifying itself.

Fig. 1 shows in block diagram form the arrangement of a modern multi-feature, microprocessor-controlled terminal. The microprocessor is generally part of a VLSI chip that also contains a dual-port RAM to allow simultaneous read

and write (i.e. input and output) operations, serial and parallel interface ports, bus-control logic and monitor circuitry. This item, combined with a few standard CMOS chips and other VLSI application specific integrated circuits (ASIC devices), provides an economical, small-sized terminal.

The use of both serial and parallel ports with integral

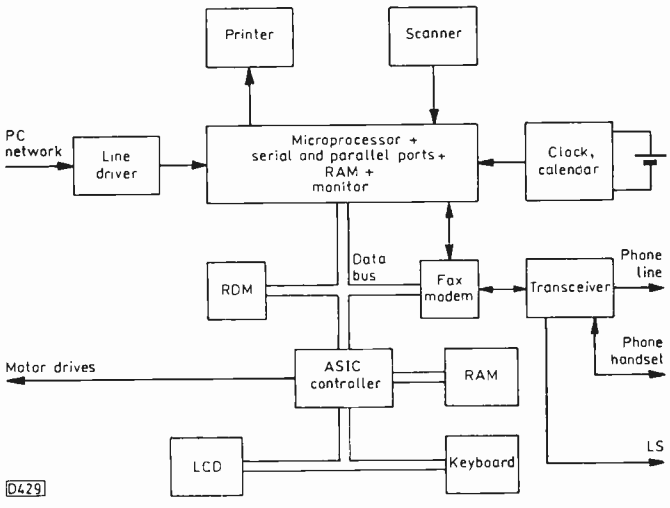


Fig. 1: Block diagram of a modern multi-feature, microprocessor-controlled fax terminal.

control enables the basic system to be expanded to produce a full-feature machine. As you can see from Fig. 1, a line driver coupled to one of the serial ports enables the terminal to form part of a PC-controlled local area network (LAN). The printer, scanner and fax modem are linked to other serial ports. The modem is also coupled to the parallel data bus to enable it to operate from the scanner, the LAN or the memory, giving provision for unattended transmission and reception. The real-time clock circuit provides time and date signals and is supported by a float-charged back-up battery.

The fax modem is designed for Group 3 operation, but is in addition compatible with Group 2 standards. Switching between the standards is controlled by the 'handshaking protocol' during the normal dial-up procedure.

The interface with the telephone network is provided by the transceiver. It also provides analogue filtering, impedance matching and line isolation. In a combined phone/fax machine this section also carries the handset interface and a drive for a small loudspeaker to give an indication to the user that a fax transmission is in progress.

The ROM contains the terminal protocol and control information and the instructions for control of the stepper motors that drive the printer, paper feed and guillotine. The RAM stores the machine identity codes, the database of commonly used numbers and any other user programmable data.

An LCD that can display short messages also shows the time and the called/calling numbers. The keypad is used to enter fax numbers and other database information, also for manual control of the terminal.

The ASIC chip provides the most cost-effective way of controlling the various features that are driven via the parallel data bus.

Printing Techniques

Many different printing techniques are in use. The most popular include an electrostatic method which is similar to that used by office photocopiers; laser, ink jet or bubble-jet printing; and, in virtually all low-cost machines, thermal printing.

In a typical electrostatic printer styli attached to a flexible belt are driven across plain paper, leaving a pattern of charges on it. The styli voltage varies between 600V for black and –450V for white. The charged paper is passed over a magnetic roller that bristles with magnetised iron particles which hold, in the spaces between the bristles, a black toner powder. Positively charged areas of the paper attract the powder while negatively charged areas repel it. The deposit thus forms a facsimile of the original document. A permanent bond is achieved by passing the paper over a heated roller.

Low-cost machines use a special thermosensitive paper that discolours when its temperature exceeds about 70°C, full black being obtained at around 110°C. The paper is passed over an array of minute resistive heating elements that use thin-film technology. As a result there is little thermal inertia in the element heating and they can respond to a rapidly varying signal. One end of each element is held at just below a critical voltage level, where zero signal voltage produces no mark on the paper. This makes maximum use of the signal voltage, which varies the temperature of the paper between about 60°C and 110°C. A copy is thus produced with varying tonal shades that accord with the grey scale of the original document. As the images produced by this method tend to fade with time, they should not be regarded as a permanent record.

A thermal transfer technique can also be used to copy on to plain paper. This uses a base film that holds a special meltable ink which is transferred to the copy paper by heated thermal heads. Colour printing is also possible with

Table 1: Group 3 standard parameters

Transmission speed:	9 secs* up to one minute
Image signal:	Digital
Modulation:	Differential PSK (DPSK)
Carrier frequency:	1·8kHz
Coding standard:	Modified Huffman
Redundancy reduction:	READ or MMR
Handshake signals:	300bits/sec FSK
Vertical resolution:	Standard 3·85 lines/mm, fine 7·7 lines/mm, super fine 15·4 lines/mm
Horizontal resolution:	Standard 8 pels/mm, fine 1,728 pels/line (A4), super fine 3,456 pels/line (A4)
Modem speeds:	Standard 2·4/4·8/7·2/9·6kbits/sec; high grade 12/14·4kbits/sec; near future 19·2/28·8kbits/sec

*Maximum rate for peer-to-peer communication.

this technique, by successively transferring coloured inks (yellow, cyan and magenta): the overlay can produce a wide range of colours.

Image Coding

At minimum resolution (see Table 1) a Group 3 terminal produces about 30 pels/sq. mm, an A4 page containing rather more than 1·9 million pixels. If these had all to be transmitted a very efficient coding system would have to be used to minimise the transmission time and/or the bandwidth required. A study of a typical test document however has shown that there is considerable redundancy, which can be eliminated by the use of suitable coding. There are two possibilities here.

First, many sections of each line scan are continuously white, holding no useful information to print. Skipping these white spaces can produce a horizontal economy that's known as one-dimensional coding. This technique provides the least compression but the highest error immunity.

Secondly, each line scan has on average a high correlation with both of its neighbours. This fact can be exploited by transmitting only information on how the current line differs from the previous one, thus producing a vertical economy.

Use of both horizontal and vertical coding (two-dimensional) is called Relevant Element Address Designate (READ) coding. It can reduce the transmission time by a factor of ten or more. Because one error can affect several lines, the error immunity is rather lower than with one-dimensional coding. This is offset by the considerably higher compression ratio achieved.

Run-length and Huffman Coding

Statistical histograms of black and white pixel runs with test pages show that black runs have a peak probability of approximately 0·15 for runs of two to four pixels, the spread extending beyond 100. The corresponding values for white runs have a flatter statistical distribution, peaking at about two to nine pixels with a probability of about 0·05 but with the spread extending beyond 1,000. Run-length coding, which is suitable for handling such redundancy, is based on the Huffman code tree illustrated in Fig. 2. This is derived from the following algorithm:

(1) Arrange messages in descending order of probability.

(2) Add two smallest values to produce new combined probability.

(3) Let higher probability path = 1, lower path = 0.

(4) Does probability total = 1·0?

(5) If no, go to 2; if yes go to 6.

(6) Read code word paths from root to branches.

The example shown in Fig. 2 works out as follows:

Symbol	m1	m2	m3	m4	m5	m6
Probability	0·3	0·2	0·15	0·13	0·12	0·1

With a Huffman coded message m1 = 11, m2 = 00, m3 = 101, m4 = 100, m5 = 011 and m6 = 010.

This procedure results in the most probable message being allocated the shortest code, with each code word being derived by tracing a path through the tree structure.

Huffman coding lends itself to further modification (modified Huffman), in which the new run-length coding produces a significant data compression.

In practice the code words are held in a ROM look-up table, with access via a run-length input. The bit patterns so obtained provide unique decoding, and because no code word produces a prefix for any other one the start and end of each is easily and accurately determined.

There could be up to 1,728 different run lengths with a standard A4 line of 1,728 pels. This is effectively reduced to 91 white and 91 black by modifications to the Huffman coding. The code words are arranged into groups of 64

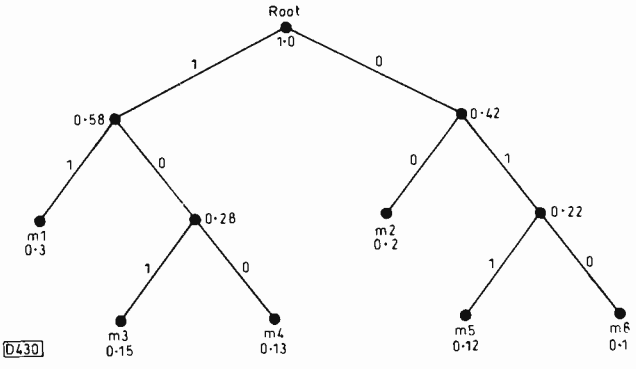


Fig. 2: Huffman code tree.

pels, with a run of 63 or less being represented by a single code word ranging from two to twelve bits. Greater run lengths are split into two code words, one representing the multiple of 64 and the other a terminating code to define the actual run length: this double code word has a maximum length of thirteen bits. Line synchronism is achieved by ending each scan line with a unique End Of Line (EOL) code word that consists of eleven zeros followed by a single one.

Modified READ coding uses modified Huffman run-length coding for the first line of a page, then comparing the following lines on a pixel by pixel basis to determine the difference to be used as the signal for transmission.

Modified Modified READ (MMR) coding, which is a pure two-dimensional coding system, can give a greater degree of data compression by assuming that the first line is all white then deriving the differences by using this as a reference. The test page statistics also show the line-to-line correlation for transitions between black and white and vice versa. About fifty per cent of the transitions on any line fall directly beneath a similar transition on the previous line. Further, twenty five per cent of the transitions occur within one pixel of a similar transition on the previous line. Thus about seventy five per cent of all transitions occur within ±1 pixel of a similar transition. MMR takes advantage of this vertical and horizontal redundancy by storing the previous line as a reference and continually referring back to it as the system encodes and decodes the next line scan. But because an error created on one line is propagated throughout the rest of the page, MMR is used only with relatively error-free, low-noise transmission networks.

Error Protection

Huffman coding is sensitive to bit errors since a single error can create a false run-length code. The EOL code forms a trap against the propagation of such errors. Because two-dimensional coding is more error prone, with

a Group 3 terminal every fourth line is transmitted with one-dimensional coding. This enables the EOL signals to restrict the error spread.

Some up-market Group 3 terminals employ standard forward error correction (FEC). This enables two-dimensional coding without the EOL signal to be used throughout, improving the data compression.

A form of half duplex selective repeat, called Automatic Repeat Request (ARQ), can be used to provide further error protection. Since the fax image data is transmitted in numbered frames, when the receiver detects a frame with an error it can generate an automatic request for that frame only to be repeated.

Compression Factors

Data compression factors of 20:1 can fairly easily be achieved by using the techniques described above. Documents that contain significant grey scales or colours however can produce a large number of short run-length codes, thus effectively introducing data expansion. This is resolved by introducing an uncompressed mode, in which the image is transmitted in bit format rather than Huffman code. The switch between these modes may be automatic within a document or set up at the start of a transmission.

Operating Protocol

The communication sequence between fax terminals is divided into five stages, as follows:

(1) The calling terminal establishes a link to the called unit by transmitting the appropriate telephone number and then identifying itself by transmitting a single 1·8kHz tone. The called terminal responds, replying with a single 2·1kHz tone. This not only establishes the link via the telephone network but also signals to a combined phone/fax terminal that the system is now in the fax mode.

(2) The called terminal then identifies its operating parameters and Group, using digital signalling at a rate of 300bits/sec with frequency shift keying (FSK) modulation. The calling terminal responds at 300bits/sec, then sends a test signal at its highest bit rate (14·4 or 9·6kbits/sec) to determine the line quality and the signal-to-noise ratio (SNR). If the signal quality is poor, the system reverts to a lower transmission rate. The called terminal accepts these parameters by signalling agreement at 300bits/sec.

(3) Document transmission then takes place at the agreed data rate, using Differential Phase Shift Keying (DPSK) modulation, with end-of-page signalling at 300bits/sec. At this stage any ARQ signals can be transmitted for error correction, again at 300bits/sec.

(4) Both the called and the calling terminals exchange signals at 300bits/sec to arrange for the transmission of any further pages or frame repeats to correct errors.

(5) If no further transmission is required the calling terminal initiates the line disconnect process, again at 300bits/sec.

Duplex Operation

Some multi-feature machines can operate in the full duplex mode, i.e. they can transmit one fax while receiving another. This is achieved by using the lower and upper halves of the transmission band to signal in opposite directions. The majority of terminals operate in only the half duplex mode however, with signalling restricted to the upper half of the spectrum.

Operating Problems

Problems can arise because the Public Switch Telephone Network (PSTN), which was designed for voice communications, is not always able to cope with digital signals.

Each device designed for connection to the telephone network has a rating that's described as the Ringing Equivalence Number (REN). It represents the loading on the line current. As more devices are added to a single line in parallel, the line current to each is reduced proportionally. A standard telephone generally has a REN = 1, a full-feature Group 3 fax machine a REN = 3. To ensure that the line current isn't overloaded, the maximum REN at any customer termination shouldn't exceed 4. If it does, the system operation can be uncertain.

A wide range of features is incorporated in current Group 3 terminals. Since the operation of the terminals is largely determined by the software used, different manufacturers may implement these features in different ways. This can give rise to apparent intermittent faults with operation between terminals of different manufacture.

The electronic circuitry in fax machines, consisting mainly of ASIC and microprocessor chips, is very reliable. As with VCRs however these machines contain a number of motors and other electromechanical devices that are rather less reliable. The motors are usually of the stepper type, being pulse driven. Protection sensors are incorporated in various sensitive circuits such as motors, the print head and scanner. Under fault conditions these will generate shut-down signals.

A noisy line can cause fax faults. This can be checked readily via the telephone or by using the machine in the local photocopier mode

As an aid to fault finding a defective machine can be operated off-line and back-to-back with a known good unit, preferably of the same type.

BT has developed a FaxTester which is designed around a PC that emulates a fax terminal. Because of its cost however such a unit is unlikely to be a feature of the usual

CORRECTION

Recharging Dry Cells

A couple of corrections are required to the article on this subject published in our September 1994 issue. First the cells in Figs. 1 and 2 are shown connected the wrong way round. Secondly IC2 (ZN1034) requires a 5V supply (maximum) at pins 4 and 5. This could be obtained from a 7805 regulator, but the cheapest solution is to use a zener diode. Fig. 1 shows the circuit changes required to implement this option.

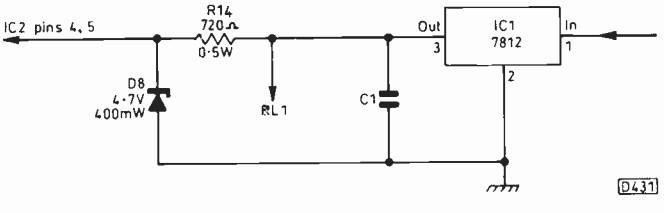


Fig. 1: Circuit changes required, using a zener diode, to obtain the correct supply voltage for IC2. Add R14 and D8.

Satellite Receiver Servicing

Jack Armstrong

The following notes are based on information contained in *Satellite Secrets Revealed!*, a 256-page book which is available at £19.95 (including postage and packing) from Davenham Satellite Systems, 1 Firths Fields, Davenham, Northwich, Cheshire CW9 8JB (telephone 0606 49 085). The book is a clearly presented guide to satellite receiving equipment installation, fault diagnosis and servicing.

The Amstrad SRD510

Many of the problems with this receiver are caused by overheating. For optimum reliability, ensure that the receiver is not installed in a manner that impedes the ventilation.

The power supply connector can cause problems with this receiver, also with the SRD520, 540, 550. It goes high-resistance. Evidence can be seen when an encrypted channel is selected: the message "Please Wait" appears on the screen. Tap the receiver and the message changes through various shades of grey or moves about on the screen. Wiggling the connector will prove the point. My remedy is to solder a wire between the corner of the metal screening box at the front of the power supply and the pin marked '0V' just to the right of the card reader.

This will cure the following symptoms: (1) Will not respond to remote control commands. (2) Red and green LEDs flash when the receiver is warm. (3) The power supply squeals intermittently. (4) The receiver goes off intermittently. (5) The decoder won't work/card invalid indication (intermittent). Probably other symptoms too: the problem is that anything can happen when the supply to the microcontroller chip falls below 5V.

After fitting the wire be sure to adjust RV600 for 5V at the third pin from the front of the power supply connector.

It's well known that R612 or R613 (both 47kΩ) going open-circuit is a common cause of a dead SRD510. The basic cause of the problem is to do with the voltage rather than the wattage rating of these resistors. Amstrad suggests uprating them from 2W to 3W, which improves matters because the latter can withstand voltage surges better. I find it best to fit 0·75W, 350V resistors, type MFR5-47k, from Farnell. I've never known one of these to fail.

A large mains surge will melt the T1·25A fuse. Such surges can also cause 'remote control lock-out'. The official modification is to reduce the value of the surge suppression capacitor from 1µF to 0·22µF. This cures the symptom rather than the cause, which is a fault in the domestic wiring or spikes caused by industrial equipment. Don't fit a higher rated fuse.

The power supply won't start up if C612 has failed. Fit a 220µF, 25V, 105° replacement.

If any of the fusible resistors R604, R610 (both 2·2Ω) and R609 (4·7Ω) has gone open-circuit you will need to replace IC600 (UC3842) and TR600 (BUT11AF or MJF18004).

C611 (1µF) should be uprated to a 10µF, 50V, 105° low-ESR type. Farnell has a suitable component, order number 108848.

D607 can go short-circuit. Replace it with the higher-rated BZB95B from Farnell.

C54, a 100nF capacitor that sits next to the power supply connector on the main board, can overheat and go open-circuit with consequent loss of the picture. The low video level can create faint, grey pictures or a blank screen. Similar symptoms can be caused by C55 (10µF) which is located next to the daughter board: it stands upright.

The Pace SS9000 Series

This receiver also appeared as the Ferguson SRV1, the Grundig GIRD2000, the Bush IRD150 and the Philips STU801/05R. The later, upgraded 90-channel SS9200 sppeared as the Nokia SAT1500, the Grundig GIRD3000, the Maspro SRE350S and many others. D2MAC models based on the Pace MRD920 share the chassis layout. A circuit diagram for the SS9200 IRD should serve all your needs with these various models.

Overheating because of poor ventilation is again a problem. The electrolytics dry out, causing a variety of symptoms including a dead receiver.

If one of these receivers comes in for repair, replace C9 (1µF, 50V) before you connect it to the mains supply. This electrolytic capacitor is next to the very large C7. Because it sits next to a hot 100kΩ resistor and an equally hot transistor it dries out. If the power supply tries to start up with C9 old and cold several components will often blow. If the fuse has melted, don't just try another as more components are likely to be damaged.

Here's how to tackle a dead power supply. First replace C9 and C11 (1µF, 16V). C11 doesn't cause damage but does cause a whistling noise and severe radiated interference. Check the bridge rectifier diodes D1-D4 for shorts and replace as necessary. Check D1 again: if the reading across it is low in both directions remove Q1 and try again. If D1 still measures low both ways remove transformer T2. If this doesn't clear the low readings across D1 remove C7. Replace whichever item caused the low readings.

Replace R1 (4·7Ω, 2W) if it has gone high in value or looks cracked. Check all diodes (except D7) on the primary side of the power supply for shorts and replace as necessary. Replace R12 (4·7Ω fusible) and R13 (0·22 fusible) if they have gone high in value. As R13 is in the current

sensing circuit, it will prevent power supply start-up if high in value.

Use fine copper braid, not a desoldering pump, to remove solder – the pads and tracks are easily damaged. Solder wick from RS or Farnell is excellent for the purpose. Replacements for all components that were originally mounted flat against the board should be mounted in the same way or you will crack the tracks.

It should now be safe to connect the receiver to the mains supply, observing the usual precautions.

If the standby LED lights very dimly, the tuner lugs have probably fractured their earth pads. If the power supply trips, with the LEDs flashing, check the value of R13. Also check R11 (4·7Ω), D9 and the 100Ω surface-mounted resistor which is underneath (R5).

If the power supply goes bang, you missed something mentioned above. If it fails to do anything there may be cracked tracks: Q1's pads are especially vulnerable and cracks can be invisible, so measure for continuity. If the power supply still doesn't start. replace U23 (TDA8380).

If the standby and timer LEDs light but nothing else happens the microcontroller chip U4 or the EEPROM U3 may be faulty.

Failure of C7 (47µF, 400V) will produce hum from the speaker and ripple on the picture.

A picture that's obscured by heavy lines which vary in appearance from one channel to the next and may be present only when the receiver is hot or cold is a clear sign that C416 within the tuner is faulty. Replace it with a 2·2µF tantalum bead capacitor. Take care as the tracks and pads are flimsy and easy to destroy.

If you obtain a blank raster after replacing the tuner you may find that one or more tracks near the tuner or near the white, board-mounted pillars is cracked. Check with the decoder in place as 60-channel models don't have automatic video routing through the decoder.

Help Wanted

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

Wanted: Is there an alternative audio/control head that can be used in the Salora SV8600 VCR? The original is no longer available from NCS. Please fax any information on a suitable substitute to Maurice on 01466 794 357 during normal working hours. Any information received will be made available to other readers through the magazine.

Wanted: For restoration of early TV sets, an Emiscope 3/2 7in. tube, 0·1µF e.h.t. capacitors and a LOPT for the Bush TV22 of 1950. P. Atkinson, 27 Lydd Road, Camber, E. Sussex TN31 7RJ. 01797 227 163.

Wanted: £1 coin mechanism/inserts for TV timer meters, e.g. Smiths 4001 series or Coinmechs TV Timer Mk II. E. Longton, HTVR, 47/49 Back Victoria Street, Fleetwood, Lancashire. 01253 778 338.

Wanted: Service manual or circuit diagram for the Telequipment D32 scope. Circuit diagram for the BT Freeway remote phone. P. Martin, 29 Rosemary Gardens, Hereford HR1 1UW. 0432 277 032.

Wanted: Mains transformer for the Telequipment S61 scope. part no. 120-0993-00. R.J. Buckman, 79B Bourne Avenue, Windsor, Berks SL4 3JR. 01753 840 621.

Wanted: Control PCB ref. no. RE630TC, used in Saisho and Samsung microwave ovens, or the control i.c. RE630TC M95153. R. Morris, 24 Wootton Green Lane, Balsall Common, Coventry CV7 7EZ. 0676 533 060.

Wanted: Service manual or circuit diagram (photocopy would do) for the Pioneer CT-F9191 stereo cassette deck. Joe Pierce, Ross, Dromcollogher, Co. Limerick, Ireland.

Wanted: TDA1104SP or later type TDA1106 for the Panasonic U2 chassis. Stan Crook, 42 Cranfield Crescent, Cuffley, Herts EN6 4EA. 0707 874 933.

Wanted: TA127A battery converter for the Ferguson TX90 chassis, *ERT* service sheets, any information on CCTV cameras and accessories, and PCBs or part completed projects from *Television*. Peter Redpath, 47 Corbett Road, Waterlooville, Hants PO7 5TA. 0705 253 595.

Wanted: Complete deck for an NEC N9014K VCR. Also video camera lead for the JVC GXN5E camera. A. Clifford, Flat 23F, Troutbeck Crescent, Blackpool FY4 4SX.

Wanted: Tuner/i.f. module for a Loeweopta Profi T28 colour set (chassis type 110.C9). W.H. Hough, Teleservice, 225 Fleetwood Road, Little Bispham, Blackpool, Lancs FY5 1RA. 01253 868 736.

Wanted: Manual (or photocopy) for the Telequipment D83 scope. Mark Hubbard, 17 West Way, Luton LU2 8DZ.

Wanted: Teletext adaptor (code OPK-203) for the Sony Model KV2762UB, or parts supplier for this. Peter Hanley, 31 Main Street, Gorebridge EH23 4BX. 0875 820 692.

Wanted: I.F. panel or AN239Q i.c. for the Panasonic Model TC361GM (chassis type PBX-M7A2). B.L. Excell, Excell TV & Video, 354 Nacton Road, Ipswich, Suffolk IP3 9NA. 01473 720 943.

Wanted: Timebase panel (part no. 1-581-594-13) for the Sony CVM1330UB (similar to the KV1330UB). Also T503 VBT, part no. 1435 4008-00. Paul Berthey, 43 Breach Road, Marlpool, Heanor, Derbyshire DE75 7NL. 0773 765 258 (evenings).

Wanted: Scrap or surplus Toshiba V110B VCR or complete drum assembly. John Taylor, 14 Lastigar, Westray, Orkney KW17 2DJ.

Wanted: Tuner/i.f. section for the Seleco 25.SS369 TV receiver. D. Furness, Reeder TV, 103 Lidget Street, Lindley, Huddersfield HD3 3JR. 0484 650 365.

Wanted: D.C. converter module CD09 for the Sony SLC9 VCR, or a scrap machine. Martin J. Loach, 82 Honey Bottom Lane, Dry Sandford, Abingdon, Oxon OX13 6BX. 01865 735 821.

Wanted: Service manuals or circuit diagrams (photocopies will do) for the Sharp RG950 car cassette tuner and AD-20X car power booster. Also can anyone supply the UK address of Teac Corporation? E.T. Plumb, 44 Railway Road, Downham Market, Norfolk PE38 9EB. 01366 384 099.

Wanted: STK043 stereo amplifier chip for the Sharp SM1122H chassis and an MCA640 chip (made by Tesla) used in the Harwood Model TF2604P. G. Wright, Kimberly Electrics, Ludchurch, Narberth, Pembrokeshire SA67 8JE. 083483 280.

For disposal: Philips N1502 VCR and a Shibaden SV610 reel-to-reel VCR (2in. tape), both with original instruction books, also some Philips cassettes and one reel of 2in. tape. Working condition unknown. Free to anyone who will collect. Write with phone number to Mick Spooner, 6 Morpeth Close, Reading, Berks RG2 7UH.

Long-distance Television

Roger Bunney

A letter from Ryn Muntjewerff best sums up terrestrial DX-TV reception in this part of the globe during December: ". . there's nothing to write about, all bands are dead, just some flutters now and then." In sum, a dead month to end a less than productive year. We can but hope for better things in 1995.

Meanwhile however the Sporadic E season in Australia is well under way. Robert Copeman in Melbourne has written to tell us of his unique multi-hop reception of f.m. radio station NBC Panguna, Papua New Guinea, at 100·1MHz. The station transmits at just 100W e.r.p. Reception occurred on December 4th at 2001-2018 hours local time. Robert also mentions that ch. E31 Community TV stations are now in operation at Sydney (CTS-31), Melbourne (MCT-31), Brisbane (BRIZ-31) and Adelaide (ACE-31).

Aidan Murphy (Ireland) mentions another possible record for v.h.f. reception. While tuning through the 144MHz band on May 13th last year Tony Allen (EI4DIB) heard, at 2325 GMT, VO1OR calling CQ on f.m., peaking to S5. Though VO1OR was operating via satellite F020 it appears that Tony received the 144MHz uplink signal direct, at over 2,000 miles. He is trying to establish by which propagation mode the signal arrived in Ireland. SpE has been dismissed, and current thought is that the signal was reflected from a "high-flying object". The report was published in the October/November issue of the *Irish Radio Transmitters Society Newsletter*.

Finally, Andrew Sykes has been trying to identify the Russian caption shown on page 184 in the January issue. He translates the lettering to read "experimental prediction" (top) and "mechanical waveform expected prediction" (around the circle). That's a literal translation: can anyone improve on it?

Satellite Sightings

Orion 1 was seen testing at its 37·5°W slot on December 24th. A subsequent check produced several carriers but no pictures or test pattern. Bear this satellite in mind: it will offer many transatlantic signals in the Ku band.

Fred Hartley (Hayes) reminds us that Intelsat 506 (50°W) and 513 (53°W) both provide Ku-band signals. There's a regular CNBC programme feed to Europe via 506, at 11·635GHz (vertical, with 6·6MHz audio subcarrier). Because of the satellite's inclined orbit the signal level varies. According to Fred the best time to try is around 1300 hours. Operation via 513 is more intermittent, but check at 12·570GHz if you're passing by!

December's two main news events were the Algerian aircraft hijack and the Russian intervention in Chechnya. Coverage of the hijack was deliberately curtailed. Despite a careful check on the Clarke Belt and the most likely source of a live uplink from the airport, nothing was seen until the late afternoon when a 'locked-off' shot of the plane, from a distant camera, was seen via the Reuters transponder at 13°E. This shot appeared several times then, as dusk approached, several flashes and smoke were seen around the aircraft, obviously as the rescue was taking place. The waiting TV media were subsequently offered 'exclusif' TF1 pictures, but the rescue was first seen via Reuters!

Unlike the Gulf War there was no invitation to the media circus to attend the Grozny battle. Most sent reports from Moscow, though several teams remained and there was at least one SNG truck that sent reports to the West via Eutelsat F3 at 16°E (Telecom band). The signals were noisy, in part because the uplink was via a satellite whose footprint was at the fringe there. There were both 625-line PAL and 525-line NTSC transmissions via the link.

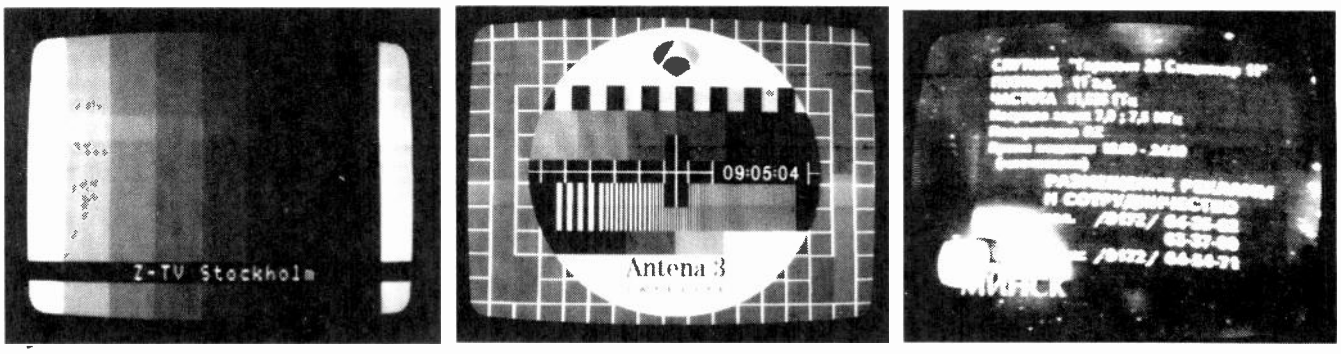
The EBU's Sarajevo link via Intelsat 603 (34·5°W) was again in operation, at the usual 10·996GHz. The signal is generally poor when received with a 1m dish, and seems to appear only when there's something new. On previous occasions a test pattern has been transmitted throughout the day.

News Items

Norway: Sad news has been received via the BDXC. The Norwegian Band I transmitters are to be taken out of service progressively, to be replaced by either Band III or u.h.f. transmitters. No time scale for the exercise has been announced. The Bagn, Hemnes and Gamlesveten ch. E3 transmitters are to be closed initially. All have been old friends during the SpE season.

Denmark: Sydvest-Jylland has changed from ch. E6 to E5; Horsens and Ringkeobing have both changed from ch. E5 to E6.

Switzerland: Niederhorn ch. E12 has closed to allow DAB



Left: Z-TV Stockholm via the Sirius satellite at 5·2°E – the 12·092GHz transponder with RHC polarisation. Centre: Antena 3 test pattern via Hispasat at 30°W. 12·671GHz with horizontal polarisation. Both photographs from Berry Habekotte, The Netherlands. Right: TV Minsk from Gorizont 26 at 11°W. 11·526GHz with RHC polarisation.

tests. The service has been moved to ch. E53 (42kW horizontal). The new S-Plus transmitters are as follows:

Ausserberg	E26 1·1kW	Monte Morello 1	E68 8kW
Bantiger	E43 92kW	Mont Pelerinch	E54 12kW
Chamossaire	E64 2·5kW	Neiderhorn	E65 46kW
Gebidem	E60 10kW	Ravoire 1	E62 10kW
Haute Nendaz	E66 11kW		

Polarisation horizontal in all cases.

Russia: Commercial network TV3 opened in December, offering a third national terrestrial service (in addition to the Ostankino and Russian Channel networks).

Nigeria: Commercial TV has arrived with Desmims TV and Clapperboard TV on-air in Lagos, Minaj TV in Ubusi and Glaxay TV in Ibadung. Several MMD systems are also in operation.

France: La Cinquieme is the channel now using the 0600-1900 time slot in the fifth terrestrial TV network. It has replaced the La Cinq channel, sharing the network with ARTE. The France 2 terrestrial transmitters are gradually being equipped for Nicam sound – the first one was Paris Tour Eiffel. Check out text pages 260 and 261 on TF1 for the latest news on stereo programmes and transmitters.

UK: The Croydon-based company MASE has recently introduced its WaveLan and WavePoint LAN (local area networking) wireless systems which provide radio instead of cable communications links between desks, computers etc. in office complexes. Ranges between work stations and the master transceiver are typically up to 180m, using omnidirectional aerials. MASE is shortly to introduce a directional aerial system to link buildings on different sites at distances up to 4km. Frequencies used are within the 2·4GHz range, just below those used by standard MMDS equipment. Could a dish and a slightly retuned MMDS receiver make hacking into office communications possible?

MMDS

Apart from limited use in Ireland and Moscow, MMDS (Microwave Multipoint Distribution Service) has not so far been exploited in Europe. The technique is used in Ireland to enable those in shielded areas to be provided with good reception. Transmissions are at about 2·5GHz from a local high site. Several companies are offering scrambled TV services via MMD in Moscow, using programmes obtained from European satellite channels.

MMD is extensively used in North America however, particularly in built-up areas. The 2·5GHz band transmissions are picked up via either a compact Yagi array or a small dish, with down-conversion to v.h.f. or u.h.f. at the aerial, the receiver having an addressable decoder and control unit. The equipment is widely available and generally inexpensive.

The authorities in some countries in the Middle East are now pushing MMD as a way of ensuring that only approved services are received. An MMD system has been established in Amman, Jordan, and the Saudi Arabian authorities are considering MMD for the larger towns.

MMD was adopted in Amman because the city is built across fifteen hills and cabling would be both expensive and difficult. The Jordanian Radio and TV Corporation service is being provided from four sites initially, as follows: Broadcast Centre eight channels within 2504·25-2684·75MHz, Suweileh eight channels within 2311·25-2491·75MHz, Taj eight channels within 2325·25-2484·75MHz, Amra eight channels within 2574·25-2656·75MHz.

At such high frequencies transmission is via line-of-site paths, usable signals being available at up to 20 miles or more. With the type of mass-produced equipment available in the USA, the aerial provides a gain of around 20dB and the wideband downconverter block a gain of 30dB, its output being at 220-420MHz (above Band III to avoid causing interference). The set-top converter usually incorporates a decoder, providing an output for the main TV receiver on a suitable u.h.f. channel.

Typical costs in Jordan are $20 for the aerial, $70 for a block down-converter and $130 for a set-top decoder/converter with remote control. A subscription for six channels costs $20 a month.

I'd be interested in hearing from anyone with experience of MMDS operation and reception.

Satellite Receiving Equipment

Echosphere Corporation has just released the updated LT-730 Plus receiver, with 200 channel capability, a 3·5dB threshold, a 950-2,050MHz tuner and 22kHz LNB switching. Weak-signal reception is enhanced by threshold extension and related variable bandwidth settings. I have been using the LT-730 (without the Plus) and can recom-

mend it for 'DXing' use. The only inconvenience is the lack of decoder looping. As a specialised receiver the LT-730 Plus and its matching AP750 dish positioner has a competitive price and is worth considering if you are into sat-zapping and use a small dish. For further information contact Echostar International, Schuilenburglaan 5a, 7604 BJ Almeo, Holland or alternatively your local friendly satellite distributor or phone 0171 321 0814.

NKM Electronik GmbH, PO Box 1705, 79507 Lorrach, Germany has introduced the Digitex 'ultra low threshold video demodulator'. It's a digitally assisted extended demodulator that produces clear, saturated colours without smearing. There are two versions. The basic model at DM1696 takes the threshold down to 2·2dB while the 'extended super feedback' version at DM1948 takes it even lower to 1·4dB. Both prices include VAT. The demodulator has to be installed within the receiver – NKM can advise on this. The units have extruded aluminium cases and the build quality is of a very high order – I have one of the company's sync inserter units and can confirm the attention given to detail.

A UK-made D/D2MAC decoder is available from Satellite Communications, Warrington (09125 262 259) for only £139 plus VAT. It has a single Eurocrypt smart card slot and is totally automatic in operation – the suppliers include a six-station card.

Satellite News

A new Spanish-language channel, Tele Noticas, is now available from Intelsat K (21·5°W) at 11·532GHz V. The signal is in 525-line NTSC form but reappears on the Hispasat (30°W) Antena Tres transponder in 625-line PAL form. TV Erotica may soon be on air via a Eutelsat transponder at 16°E: it's likely to use Eurocrypt.

Increased satellite TV services are planned for India: the expectation is that up to sixty channels will be available within five years, using compression technology.

The European News Exchange (ENEX) is establishing a digital network across Europe to reduce the need for large dishes. Operation will be from Luxembourg via Eutelsat II F4 (7°E).

Orbit Communications has taken four 12MHz bandwidth Ku band transponders aboard the new Intelsat 704 craft at 66°E. So sat-zappers can look forward to 50dBW signal levels throughout the UK and most of Ireland. Unfortunately the channels, up to twenty eight within the bandwidth, will be digitally compressed.

Thge BBC/Pearson channel offering news and information is now in operation via Eutelsat II F1, in the clear and for 24 hours a day. For those in the Pacific area, Intelsat 703 is now in operation at 177°E, offering TV services (including AFRTS) in the C and Ku bands.

Speculation continues in Australia over the prospects for the new PAY-TV services, which use both MMDS and satellite distribution. Two film channels, *Showtime* and *Encore*, started in January: they are to be joined by a sports channel shortly. The subscription-financed operation should be available to ninety per cent of the population by early spring.

Answer to Test Case 387

– see page 328 –

What a Wally! Technocrat will henceforth be known as Technoprat because of his abysmal lack of JVC product knowledge and his failure to bring more than five brain cells to bear on the JVC HRD520 VCR's tracking problem.

The first problem he encountered, the lack of a clock display with, instead, a single bar indication and failure to operate, could have been resolved by the shop salesman or a quick look at page 9 of the user's instruction book (repeated in the service manual!) without bothering those busy people at JVC. The machine was in the child-lock mode. You have to dwell for a second or two on the remote control unit's operate key to wake up the machine. System control feature, not fault, TC!

The tracking fault was a very minor one, puzzling though it seemed to TC at the time, and could have been quickly resolved by taking a close look at the bottom (CTL) section of the audio/control/erase (ACE) head stack. A tiny deposit of dirt or tape debris stuck to it. The deposit was insufficient to block pulse capture from a well-recorded tape completely, or to prevent weak pulses being recorded. These weak pulses were able to trigger the level-detector in a good VCR with a clean ACE head. But when the JVC machine was used to make a recording then play it back, the dirty head couldn't produce sufficient pulse amplitude to operate either the servo PLL or the tape-timing counter reliably.

Ferguson Service Briefs

TELEVISION

ICC6 Chassis – Model C51F

Picture bounce: This effect can occur with some sets in which the value of RV02 differs from the correct 1MΩ. The symptom is linked to picture content, the fault appearing because transistor TP06 on the teletext panel is not biased correctly. To eliminate the problem, ensure that RV02 is a 1MΩ, surface-mounted resistor. Part no. is 902565000. The resistor is a 1W carbon film type with a 5 per cent tolerance rating.

ICC7 Chassis

Field foldover: This problem usually appears after replacement of the TDA8178F field output chip IF01 because of field collapse. The cause is a 4·7Ω surface-mounted resistor going high in value. This device is marked as Link J238 and is not shown in the circuit diagram. It's in the 65V feed to pin 3 of IF01. Part no. is 41081600.

The fact that this resistor has gone high in value will not noticeably affect the voltage reading obtained at pin 3 of IF01.

Other possible causes of field foldover were mentioned on page 625 of the July 1994 issue of *Television*.

VCRs

R2000 Chassis – Hi-Fi Models

Interference on Hi-Fi playback sound: The interference can best be described as a crackle that results in loss of audio quality. It coincides with audio source toggling between stereo and normal. Carry out the following adjustment to the drop-out detector level to improve the digital tracking system's sensitivity for Hi-Fi sound reproduction: adjust PL26 during playback for a voltage reading of 3·6V ±0·1V at pin 5 of BL35. PL26 and BL35 are on the Hi-Fi PCB.

R2000 CAT 1 – Models FV61LV and FV62LV

Intermittent audio erase: The following changes should be made in addition to fitting the bias oscillator update kit (part no. 00X6723001):

(1) Delete RT13 and jumper J137 on the servo PCB.

(2) Connect an insulated soft wire between the collector of TX17 on the main PCB and the junction of J137 and RT102 on the servo PCB.

R3000 Chassis – Models FV70B, FV71LV, FV72LV and FV74LVX

Remote control lock-out: The effectiveness of the remote control system can be reduced or completely eliminated when these VCRs are used with certain TV receivers and the two units are linked via an r.f. lead. The cure is to fit two 2·2nF, 250V capacitors (CP12 and CP13), connected in series, between the non-fused input side of mains filter choke LP01 and chassis. It's important to note that these capacitors must be safety rated devices: only the specified Ferguson components should be fitted, part no. 10078890.

Cassette flap mechanism failure: The following modification should be carried out in cases where there is repeated failure of the cassette flap mechanism, resulting in retention of the cassette within the machine. Remove the spring that's attached to the cassette door locking lever. This is on the right-hand side of the cassette housing assembly. See Fig. 1.

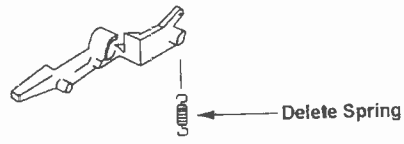


Fig. 1.

TV Fault Finding

Reports from Philip Blundell, AMIEEIE, Michael Dranfield, Owen Green, David A. Chaplin, Keith Evans, J. LeJeune, Chris Watton, J.R. Lunniss, John Hepworth, J.K. Potts, Gregory C. Foster, John Edwards and David Belmont

Tatung 165 Chassis

This set was stuck in standby. Because QR06 (BF391) had gone short-circuit, the 25V memory supply voltage had increased and the microcontroller chip had died. R007 and R011 (both 3·9kΩ) were also open-circuit. When the 25V supply had been restored and a new microcontroller chip had been fitted everything seemed to be fine – except that programme position one kept losing its memory. A phone call to Tatung Technical was needed. The nice man suggested adding a 10µF, 35V capacitor across RR34 (5·6kΩ). This solved the problem. **P.B.**

Akura CX10 (Nikkai Baby 10)

If you get the dead set symptom, sometimes intermittent, check D410 (FR604) in the line output stage. We now stock this component but have in the past successfully used two RGP30K diodes in parallel. Makes a change from replacing IC402! Another weakness in these sets is the mains bridge rectifier. If in doubt, replace this item – it can fail intermittently. **M.Dr.**

Samsung CI5913W

This set produced an intermittent line-frequency whistle. The fault disappeared when the set's back was removed, but we found that the fault could be made permanent by carefully propping up the chassis. After some careful probing with a plastic trimming tool we came to C406, which is in the EW modulator circuit. It was touching the line output transistor's heatsink, causing an h.f. whistle. Repositioning C406 cured the fault. **M.Dr.**

Alba CTV55

This 14in. portable produced a very smeary picture. It looked as if the fault might be in the luminance signal processing chip, but a quick check showed that the voltage at the collectors of the RGB output transistors was only 100V. Tracing the source of the supply back, we came to the small green choke L501 which had 100V at one end and 200V at the other. It was open-circuit, a replacement 330µH choke from a scrap set curing the fault. I wonder where the 100V was coming from? **M.Dr.**

Osume 1464

If the 2SD1554 line output transistor has failed, always replace both C910 (10µF) and C909 (47µF) in the power supply. Failure to do so will result in the h.t. voltage rising to about 300V instead of 110V. The arc over from the e.h.t. cavity is frightening! **M.Dr.**

Ferguson TX9 Chassis

This set led us a right dance. After replacing the fuse we found that the line output transformer would scream very loudly then blow the fuse again. We naturally suspected a leavy load in the line output stage, but the fault persisted after replacing just about everything in this area. We eventually found that the set would work when the EW loading coil L77 was disconnected. This proved that the line frequency was miles out. The cause of the fault turned out to be the 1kΩ line hold control RV206, which was open-circuit. **M.Dr.**

Sharp C3720H

Because of the comprehensive safety/trip circuitry incorporated in many sets, such as this one, fault finding is impossible without a manual. At switch on the e.h.t. came up then the set tripped back into standby. After checking on many possibilities we found that there was no supply at the field output chip. Both D502 and R521 in the 24V supply were faulty. Thus in the event of field collapse the set is switched back to standby in approximately two seconds. **M.Dr.**

Loewe ART S24 (C9000 Chassis)

After checking for short-circuits we resoldered the open-circuit fusible resistor R504, which is in series with the h.t. feed to the line output stage. Resistance checks also revealed an open-circuit 315mA fuse in the line timebase, leading to our discovery that the line output transformer was faulty.

Once the picture and sound had been restored we discovered that there was lack of height, about an inch at the top of the picture. We traced the cause to faults in the 27V supply – there are no height or linearity controls in this set. The 2,200µF, 35V reservoir capacitor C656 and the BD139 series regulator transistor T658 had to be replaced. **O.G.**

Ferguson TX10 Chassis

Sound o.k. but no picture was the complaint with one of these sets. The voltage readings in the line timebase were all normal, so this one was going to be different. I then noticed that the tube's heaters were not alight. The heater supply was present, and there was heater continuity. You've probably guessed what was wrong by now: there was a crack on the tube PCB, where the tube base heater pin is soldered to it – but the crack was not very obvious. **O.G.**

Hitachi CPT2174 (G6P Chassis)

Varying sound level, sometimes up to full volume, was the complaint with this set. It behaved impeccably on the bench for the best part of a week however. Tapping and freezing made no difference, and no dry-joints were revealed by a visual inspection.

A few days later, ten minutes after switching on, the fault was very active. A check on the stabilised 12V supply then showed that it was varying between 12V and 13·4V, the

volume rising and falling in sympathy. Zener diode ZD791 (HZ11LC2) in Q791's base circuit was the cause of the trouble. It was hidden beneath a large blob of glue. After fitting a replacement a soak test confirmed that the set was now o.k. **D.A.C.**

Ferguson TX89 Chassis

When switched on from cold this set produced a pulsating white raster with a hum from the speaker. Within seconds the picture would begin to appear, the pulsations started to abate, the hum died away and normal sound could be heard from the speaker. After thirty seconds or so the set worked normally. The fault would not show up again until the set had been left switched off for at least six hours.

After much testing and component swapping we found that an area on the component side of the PCB, in the vicinity of R100 and C90, was conductive. This allowed current leakage between the isolated and non-isolated sections of the chassis. When warm the resistance reading was 5MΩ, falling to 150kΩ when the set was cold. No spillage could be seen, but the leakage had gone once the board had been cleaned. **D.A.C.**

Harwood CTV14881R

The picture had serrated edges which became slightly less pronounced when the set had warmed up. C611 (220µF, 25V) in the power supply had falled in value to 130µF, a replacement producing perfectly smooth contours. **D.A.C.**

Ferguson TX90 Chassis

When this set was switched on the speaker produced a loud buzz: operation of the volume control made no difference, and although the e.h.t. was present there was no raster. The cause of all this was eventually traced to a hairline crack in the print that goes to one of the legs of C181 (2,200µF), which is the reservoir capacitor for the 18V supply. **D.A.C.**

Philips CTX-E Chassis

This portable produced no results. Since the line output transistor is driven by a secondary winding on the chopper transformer, the TDA2577 sync/timebase generator chip produces the drive for the chopper circuit. A check at pin 16 showed that the 9V supply was missing. The two 27kΩ, 2·5W resistors in series with the feed, R3394 and R3395, were both open-circuit. As everything else checked out all right (no shorts) a couple of replacements were fitted. The set then worked a treat. **D.A.C.**

Ferguson TX100 Chassis

There was no sound or raster. Checks showed that the power supply was working all right, with the correct 119V and 20V outputs. But the line driver stage didn't receive its regulated 15V supply because IC9 (MC78M15CT) was dry-jointed. A clean up and resolder brought the set back to life. **D.A.C.**

Sharp CV2123H

Although the power relay clicked on and off in sympathy with the standby command this set wouldn't come out of standby. A quick check showed that there was h.t. across the mains rectifier's reservoir capacitor, but the STR41090 switch-mode power chip wasn't performing. After eliminating the possibility of shorts in the line output stage and across the secondary supplies a new STR41090 was fitted. This restored normal operation. **K.E.**

Philips CP110 Chassis

After replacing the memory back-up battery we found that this set exhibited fault symptoms we've not come across before with the CP110 chassis. When we depressed the mains on/off switch the power supply could be heard firing up, but this was not accompanied by the usual healthy e.h.t. rustle. The display segments were all illuminated, showing 88, and a faint raster with reduced height and width appeared. The lower half of the raster was noticeably darker, which seemed to indicate severe power supply hum. Neither sound nor picture were evident.

Normal operation was restored when the battery was removed. So we came to the conclusion that there must be a faulty component that connected it to the 6V supply and the system microcontroller/memory chip. Isolating diode D6901 proved to be the culprit. **K.E.**

Tashiko 20E912 (Jackson Chassis)

This stranger greeted us with a blank raster and flyback lines: the brightness and contrast controls had no effect. Sound was present however, so we assumed that a video signal was present somewhere. A quick check around the RGB output stages on the tube's base panel indicated that the cause of the fault lay farther back down the signal paths. At this stage the TDA3330 colour decoder chip loomed large as a suspect. A replacement restored the correct picture display. **K.E.**

Ferguson B14R (TX80 Chassis)

A fault you can get with these sets is a blank screen with no on-screen graphics. The cause is leakage in the PCB material around the data and clock lines between the microcontroller chip and other chips under its command. Cleaning with a good aerosol safety solvent followed by a thorough drying out will usually restore normal operation. **J.LeJ.**

Panasonic TX2 (Alpha 1 Chassis)

This set came in because the line output transformer was defective. After replacing it we found that the set worked but the line output stage made a shrieking noise and the picture verticals were ragged. This was our fault: the single-turn white wire around the transformer's limb had been connected to chassis in reverse phase. There's a mark on one of the wires to indicate that it should be connected to a similarly marked solder point on the chassis. But because of component density in the area this is difficult to see. **J.LeJ.**

Ferguson A10R (TX80 Chassis)

This receiver suffered from bad intercarrier buzz. It was intermittent to start with but later became constant. We eventually traced the cause to the 6MHz ceramic filter QI02 which is adjacent to the M52038SP chip IL01 beneath a screening can. **J.LeJ.**

Panasonic TC2213 (U3W Chassis)

The symptom complained about was a dark picture. There was also slight field foldover at the bottom of the screen. Before checking the electrolytics I should have measured

the supply rail voltages, because the 12V line was low at only 9·2V. The 12V regulator transistor Q552 was open-circuit, the regulator's output voltage being provided by the parallel current-sharing resistor R571. **C.W.**

Mitsubishi CT29B2STX

If the line output transistor has gone short-circuit it's likely that the h.t. is too high. In this event replace R961 (150kΩ), C906 (47µF, 50V) and IC950. **J.L.**

Sanyo CTP6114

This set wouldn't start. It would sometimes just sit there with the standby light on, while at other times it seemed to be tripping. There was no overload however. A check on the 5V supply showed that it was missing, so the microcontroller chip couldn't control the power supply. We found that T319 had an open-circuit primary winding. Sanyo recommends that the value of R319 is changed from 100Ω to 680Ω. **J.H.**

Mitsubishi CT2531BM (Euro 4 Chassis)

Apart from a high-pitched whistle this set was dead. Checks on the line output transistor showed that it was short-circuit all round, and a replacement immediately bit the dust. A new STR59041 chopper chip brought the set to life, but the picture had an odd look to it: I can only describe this by saying that the top half of the screen looked as though it had been scribbled over. After a minute the scribble disappeared, then I realised that I couldn't see the MTV logo in the corner of the screen. The h.t. was found to be at 198V instead of 155V. Further checks in the power supply revealed that C908 (10µF, 100V) had fallen in value to around 3µF. Replacing this finally restored normal operation. R903, R910 and R917 were all-dry-jointed as well. **J.H.**

Amstrad TVR1

These units can be dead or intermittently dead should C1507 be low in value. Checking this first can save a lot of time. **J.H.**

Matsui 2180TT/Saisho FST212T

This set was dead because the STR58041 chopper chip was faulty. Another repairer had given up and claimed that spares are not available. The STR58041 is available almost anywhere. **J.H.**

Hitachi C14-P218 (G7P Mk 2 Chassis)

This set was stuck in standby. As I didn't have a manual for it I carried out a few quick resistance checks. R902 (82kΩ) was open-circuit, a replacement putting matters right. **J.H.**

Hinari CT16

The first suspect if one of these sets is dead or intermittently dead is the ERD29-06 rectifier diode D552. It's situated behind the line output transformer. **J.K.P.**

NEI 1451TX

This set would start up and work for days or not work at all. We eventually traced the cause to R802, a posistor that had broken internally. The part no. is 28002001. **J.K.P.**

Philips CF1 Chassis

The problem with this set was failure of the BUT11AF line output transistor after a few hours despite resoldering the line output and line driver transformers. It was becoming an expensive one! After much examination of the board we found that R3503 (220Ω) was dry-jointed. It's connected to the collector of the line driver transistor. **G.C.F.**

Grundig CUC220 Chassis

There was sound and a raster but no luminance or chrominance. The supply to the TDA3560 colour decoder chip was o.k. and the waveforms in this area were all correct. We eventually found that the cause of the fault was D2536 (1N4148) in the beam limiter circuit. Check it out of circuit for low reverse resistance. **G.C.F.**

Triumph CTV8209

This portable wouldn't tune to the lower group A channels: group B and higher channels were not affected. The cause of this unusual fault was eventually traced to R157 (2·2MΩ) which was open-circuit. **G.F.C.**

Nokia FX6332 (Euromono Chassis)

The complaint was of no sound or vision. On test we found that the standby LED didn't light up and that although the e.h.t. started to rise at switch on it ceased after a couple of seconds. The cause of the trouble was eventually traced to OC44 (1,000µF, 16V) in the 8V supply. **G.C.F.**

Hitachi CPT2660 (Salora J Chassis)

After about ten minutes the screen's brightness would suddenly increase, with the contrast and brightness controls having no effect. It seemed as though there was no beam limiting, and I found that the slightest movement of the main board above the tube base, with the main board in its normal vertical position, made the fault come and go. The cause was dry-joints where the metal screen adjacent to the RGB output stages is soldered to the board. The screen also provides earth continuity. Scraping the metal clean and resoldering it cured the fault. **J.E.**

Toshiba 2505DB

Field collapse was the complaint with this set. A new TA8739P field ramp generator/EW correction chip (IC371) was required. **J.E.**

Sony KVDX21TU

This set came in dead. It sprang to life when a new 2SD1941 line output transistor had been fitted, but there was field collapse. A new TDA8170 chip (IC502) produced full height, but with severe EW distortion. This time IC1501 (TEA2031A) had to be replaced. It transpired that water had been spilt into the set. **J.E.**

Sony KV2704

The basic complaint with this set was of intermittent operation – intermittent starting, going off and coming back on at random, and brightness and volume variations. Apparently it would sometimes work for weeks with no problems. Luck was on my side (for a change) when I soon found that

pins 1 and 2 of the chopper transformer T602 on panel F2 were badly dry-jointed. I then found that three of the eight front panel function switches (board H1) had seized. This is quite a common fault now, accounting for various function fault symptoms. For reliability all eight switches were renewed – part no. 1-553-363-11. To complete the job I gave the power supply panel a good going over with the soldering iron. **J.E.**

Philips KT3 Chassis

This set would work normally for days. It would then suddenly trip two or three times, followed by line pulling then shut down. It was the line pulling that gave us the clue. A new TDA2571 sync/line generator chip put matters right. **J.E.**

B and O LX2800

The fault description that came with this giant of a set was too weird to contemplate. So after a struggle to get it on to the bench I hesitantly switched on. There was field roll and no line sync. The TDA1940 timebase generator chip 26IC5 was defective and was quite hot to touch. A replacement restored the picture. **J.E.**

Ferguson TX9 Chassis

There was no colour with this set and a note attached to it mentioned that the TDA3560 colour decoder chip had been replaced. There was a chroma output at pin 28, which feeds the delay line circuit, but only noisy, low-amplitude signals were being fed back to pins 21 and 22 of the chip. Slight adjustment of the 470Ω delay line balance preset produced colour, but only for a split second. The preset was open-circuit between its slider and one leg. A replacement restored the colour, with 300mV chroma inputs back to the chip. **J.E.**

Mitsubishi CT2217TX

This set was dead because R700 (2·2Ω) was open-circuit, something that's quite common with this model. As no other obvious faults were present a new resistor was fitted. The set then came to life, the only thing noticeably wrong being missing segments in the channel indicator display. A new SN29764N display decoder chip solved that problem. The set then decided to go in and out of standby at random. I didn't panic, honest, but when I touched the SAA5010 decoder chip on the teletext board it burnt my finger! A replacement from a scrap set put matters right, at last. **J.E.**

Matsui 1455

The usual cause of field collapse (a very bright white line) is loss of the 12V supply to the multi-function chip IC202: zener diode D219 goes short-circuit. **D.B.**

Hitachi C25-P819 (G7P Mk 2 Chassis)

For loss of tuning check whether R138 (10kΩ) is open-circuit. It feeds the 33V regulator ZD101. **D.B.**

Sanyo CBP2180

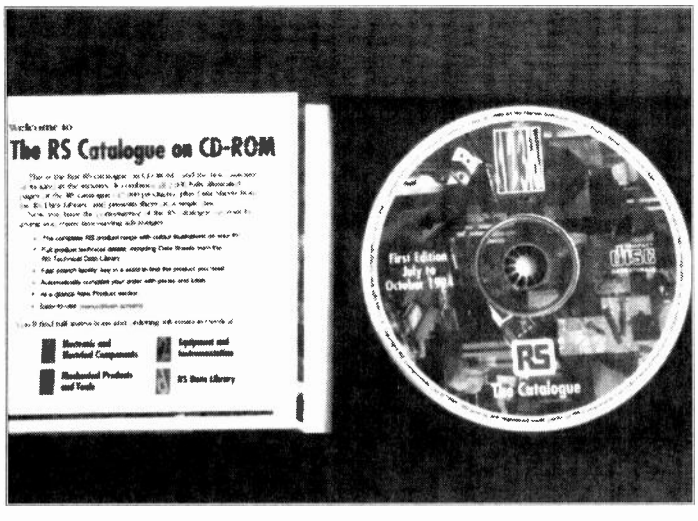
"Went bang with a puff of smoke" said the customer. We found that the degaussing posistor had burnt out and melted, and that the mains fuse had blown. Replacing these items put matters right. **D.B.**

The RS CD-ROM Catalogue

David Botto

The printed version of the RS Components catalogue consists of three hefty A4-size books. Recently RS launched a CD-ROM disc on which you will find everything that's in those three books plus the complete RS data library. The disc is packed with 6Gbytes of compressed data, including over 10,000 full colour illustrations.

RS Components distributes over 600,000 copies of its printed catalogue three times a year. At present more than 47,000 different products are listed. In addition a new products magazine is sent out every two months. The catalogue is very well organised, but because of the immense range of products included it can still take time to locate the item you need. Hence the CD-ROM catalogue: the fast search facility enables you to key in a word to find what you need, while easy-to-use, menu-driven screens eliminate time-wasting searches.



The RS CD-ROM Catalogue

RS Components had received many requests for a CD-ROM version of its catalogue. A survey of customers then revealed that many had PCs equipped with CD-ROM drives. Appreciating the advantages of fast access to the mass of data and applications, RS set about producing its first CD-ROM based 'electronic catalogue'

Don't worry if your PC isn't equipped with a CD-ROM drive – it's easy to fit one and is not expensive (a forthcoming article will describe how to fit a dual-speed CD-ROM drive and sound card to your PC). There was a considerable drop in CD-ROM drive prices last year, and a drive is rapidly becoming an essential piece of PC hardware.

Requirements

To use the RS Components CD-ROM catalogue you'll need an IBM-compatible PC installed with an operating system such as DOS or DROS. You'll also require Windows 3.1 or Windows for Workgroups, a mouse and a dual-speed CD-ROM drive. For best results the PC should have a 486 microprocessor and 8Mbytes of RAM. A Super VGA video adaptor and a colour monitor able to display at least 800 x 600 pixels and 256 colours are also required.

The program will work with a 386 processor and 4Mbytes of RAM, but runs more slowly. You can also use a monochrome monitor with a VGA video adaptor, but you then lose many of the program's advantages. PCs that use a 286 or earlier microprocessor will not run the program.

Installation

Insert the disc in your CD drive. The instructions say that it can be installed from DOS or Windows, but my copy refused to install from DOS. It loaded easily from Windows however (the RS catalogue uses standard Windows facilities such as scroll bars and window sizing).

Start Windows and select 'File/Run' from the program manager. Type in "d:\setup.exe. (If the drive letter of your CD drive is different, type it in instead of 'd'.) A blue screen appears and you are then offered three ways of installing the program. If your PC has a 486 processor and plenty of RAM, use the low setting that will take up 1,333Kbytes of your hard disc space. If the program runs slowly, change to the medium setting. This needs 4,701Kbytes of disc space. I found that this second setting worked best with my PC. If you have a slow PC or a slow CD drive, use the high setting that requires 8,748Kbytes of hard disc space.

You then follow a series of simple on-screen instructions to install the program. Restart Windows and you'll find that a new Window headed RS Electronic Catalogue has appeared. It contains four icons which are labelled 'Customise font size', 'RS Electronic Catalogue', 'Tutorial' and 'Set up'.

Tutorial

It's a good idea to start by double-clicking on the Tutorial icon. Six headings then appear on the screen. These are Quick Tour, a demonstration that explains how to find, view then order when presented with a choice of three scientific calculators; View new products; Search by product type; Search by stock/part number; Search by word; and How to order. Go through all these headings to make sure that you master the program. Once you have done this you're ready to use the catalogue and all new CD-ROM issues as they appear. Pressing an on-screen exit button takes you back to the RS Electronic Catalogue Window.

Use

Now press the RS Electronic Catalogue icon to start the program. The main menu has four big buttons on the left-hand side marked P (products), S (services), O (order history) and T (tutorial). A smaller exit button also appears. To the right of the screen there are two small buttons labelled 'New products' and 'Presentation'.

Click on the Presentation button and a large clock appears. Music will be heard if you have a sound card. There follows a short audio/visual program that describes RS Compo-

nents and the facilities it offers to the trade. You are taken back to the main menu when the presentation has finished.

When you click on P a new screen display presents several options in the form of buttons at the left of the screen. Select and click on the appropriate one – for example the product type search button. This produces a four-column display, with the left-hand column showing all the catalogue sections. Click on the required section and various subsections will appear in the second column. Select the one you want and the third column displays the product groups. Click on the required group and all the products in the group appear in the fourth column.

Next select one of two buttons at the bottom of the screen. The one that's marked 'View' brings up the full catalogue detail for the selected product – a description, picture and price table for all the stock items to which the picture appears. Double click on the RS stock number or the price and you can order the product.

Up to three buttons may appear at the top left-hand side of the screen. These are for additional information on the product, for associated products and for a technical data sheet if one is available. The data sheet includes drawings and a circuit diagram – it's the same data sheet you'll find in the printed version.

Virtual Page Facility

After you've searched for and located products, select 'Virtual Page'. Full-colour pictures of the products appear. Double click on one picture. This brings up the full catalogue details. You'll also get a description plus a price table for all the stock items to which the picture refers.

Word Search

To use this facility enter a word in the search string box. Select 'New' search and matching product descriptions appear. You may then get a display of a large number of items. Enter a word to narrow the search. Click on the and/or/not buttons that appear. You can then view the information or display Virtual Page to find out the product type. 'Order' can be selected to insert the item into the on-screen order form automatically.

Search by Number

If you know the RS stock number of the part you want, enter it to go straight to the item. If you don't know the complete number enter part of it to display all the products that match. You can then choose View, Virtual Page or Order.

In a similar way you can order by manufacturer's part number. If you know only part of it, key this in followed by "*". All matching products are then displayed with their RS stock numbers. Order as before.

The user part number search enables you to cross-reference your own part number to the RS stock number. Find the RS stock number first, click on the 'Add-to' button, and key in your own part number. For future orders simply type in your own reference number to order the product.

Order Form

Click on this button and you're taken directly to the order form screen. You will then see any items that you have already ordered and can add others to complete the order. Prices and totals appear automatically. Click on 'New' to start a new order form, or on 'Open' to examine a previous order. Use the 'Edit' buttons to enter your address, delivery address and invoice address on the form. Once these have been entered they remain permanently available on order forms unless you should need to change any of the details. When your order is complete, print it out ready for posting or faxing.

New Products

You can choose from a menu of new products under the headings books and training, cables and connectors, computers and communication, electrical products, electronic components, equipment, mechanical products, semiconductors and opto-electronics, tools and storage, test and measurement. Click on 'View' and virtual pages, containing comprehensive product information, are displayed. 'Run' gives a continuing display while 'Pause' halts this as required.

Button Icons

Some useful button icons are provided. Press the on-screen question mark 'Help' button and a separate help window appears. Another button enables you to customise the screen displays. Two more buttons enable you to 'Title' or 'Cascade' the windows. Press the title button and the virtual page is displayed on the left-hand side of the screen with two product type selector buttons at the right. Another button closes the current window. Use the 'Pin' button and the pin symbol changes, as if the pin has been pushed in, maintaining the window. Click on the pin button again and the window disappears.

Selecting the 'Customise Font Size' button from the RS Component window display before loading the program enables you to adjust the size of the text display. I couldn't get the Font Size facility to work with my PC however.

Conclusion

The RS CD-ROM is an excellent idea and the company is to be congratulated on producing its electronic catalogue. Components and other items can be found and ordered speedily, greatly reducing the time spent dealing with the dreaded paper work. This means more time devoted to servicing and increased profits per engineer.

By the time that this article appears RS Components' number two CD-ROM catalogue will be available. Account holders can order it in the same way as they order the printed RS catalogue. The RS Technical Helpline is available to answer any questions about the CD-ROM program.

My thanks to Andrew Fisher, RS Components' Electronic Catalogue Manager, for providing a copy of the CD-ROM catalogue and much technical information.

Published on the third Wednesday of each month by Reed Business Publishing Ltd., Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. **Filmsetting** by Wace Publication Imaging, 2-4 Powerscroft Road, Sidcup, Kent DA14 5DT. **Printed** in England by BPCC Magazines Division, Carlisle Web Offset, Cumbria. **Distributed** by Marketforce (UK) Ltd., 247 Tottenham Court Road, London W1P 0AU (071 261 5555). **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 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.

ELECTRONIC TEST EQUIPMENT

PROMAX

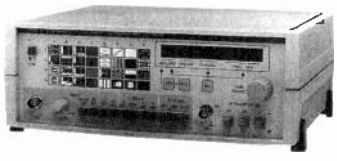
Audio - Video - Television - Satellite TV - Telecomunications

The manufacturer who cares about quality & features rather than being lowest in price !

Audio Analyser
Model AA-930

Multi-function meter. Measures distorsion, wow & flutter, stereo power, signal levels in & out; generates audio test signals. Features include large clearly marked analogue meters. Performs the work of many individual instruments. £ 490

Television Pattern Generator
Model GV-698/11

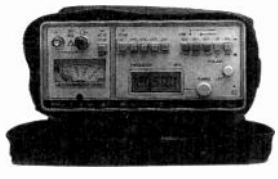


32 patterns, 32 internal memories. PAL/NTSC/SECAM standards, with I, B, G, H, M, M, N, D & K, NICAM, teletext all in one instrument.
Optional on screen logotype. (Other pattern generators available from £ 210). £ 1428

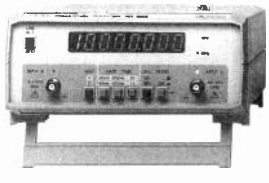
Television Pattern Generator
Model GV-298

Compact high performance generator, RF and video outputs. Frequency range same as GV-698/11, 37 to 865 MHz. Circle pattern included. £ 433

TV & Satellite Level Meter
Model MC-360

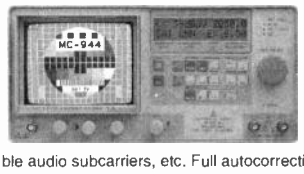


Ideal instrument for the professional installer of FM/TV aerials and satellite TV dishes. Covers 48 to 856 MHz and 950 to 2050 MHz. Lighweight, compact and rechargeable battery operated. £ 654



Frequency counters Models FD-250 & FD-252

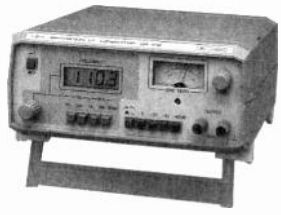
FD-250 covers 20 Hz to 160 MHz and FD-252 covers same plus, 100 MHz to 2.4 GHz. Large L.E.D. display. Wide performance at low cost. £ 153 & £ 206



TV & Satellite Level Meter
Model MC-944

This meter has everything for the top flight instaler of aerials, dishes, CCTV, MATV, SMATV and others systems. Features include TV monitor, spectrum analyser, sync pulse, teletext, printer output, 99 memories, tuneable audio subcarriers, etc. Full autocorrection for superb, unequalled accuracy!. RS-232 as standard. £ 1895

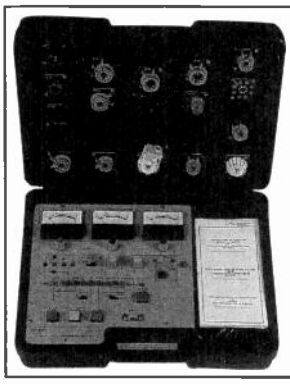
Low Distortion Low Frequency Generator
Model GB-212



20 Hz to 200 kHz, harmonic distortion 0.02 % maximum over audio band. Frequency counter resolution ashigh as 0.1 Hz. 600 ohms impedance. Output level attenuation range 60 dB, with analogue meter for setting accuracy. Excellent output level flatness. £ 219

Functions Generators
Models GF-230 & GF-232

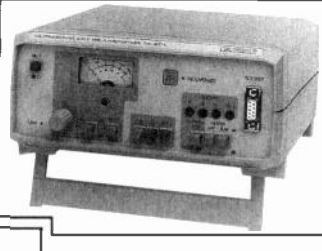
Two versions available: 0.1 z to 1 MHz and 0.2 Hz to 2 MHz. Producing sine, triangular and square waveforms, with variable symmetry. Excellent performance. £ 153 & £ 206



CRT Rejuvenator
Model TA-903

Similar to TA-901, but has three meters to monitor cathode current. Special technique allows repeated rejuvenation of CRT. Supplied in attache style case, for easy field and workshop use. £ 498

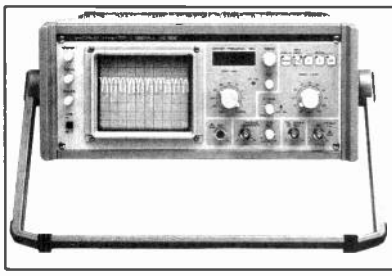
CRT Rejuvenator
Model TA-901



An essential tool for every TV workshop. Promax have made many thousands. Supplied complete with a set of base adaptors. £ 235

TV/FM Level Meter
Model MC-160B

The aerial installers best friend. Calibrated for accurate signal level measurements. Digital frequency display ensures correct signal selection and identification.
Built-in demodulator for easy station ident, and audible tone foreasy positioning. This meter is light in weight, but has outstanding technical features. £ 354



R.F. Spectrum Analyser
Model AE-566

1 to 1000 MHz, with 950 MHz to 1750 MHz option. Built-in tracking generator. Offers spanwidths from 1 MHz to 1000 MHz. Includes normalizer. This analyser is ideal for production and educational applications, as well as R+D. £ 2800

PROMAX

The company has been producing test equipment in Spain for over thirty years, earning a strong reputation for excellent engineering, quality performance at budget prices. The equipment is supported by Alban Electronics from their St Albans facility. These products are suitable for only professional and educational applications.

VISA

Prices shown exclude VAT, but includes UK delivery.
Most items available for immediate despatch.

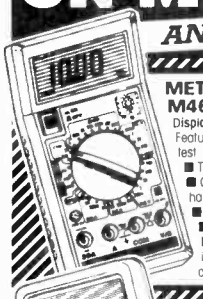
ACCESS

ALBAN ELECTRONIC LIMITED
4 - St Albans Enterprises Centre - Long Spring
Porters Wood - St Albans - Hertfordshire - AL3 6EN
Tel: 0727 832266 - Fax: 0727 810546

FANTASTIC SAVINGS ON METERS

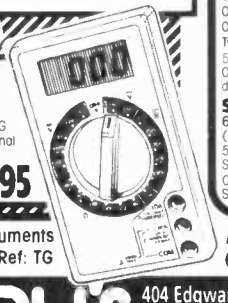
ALL PRICES INCLUDE VAT

AND MORE !!!



METEX 4½ DIGIT DMM M4630 ■ 30 Range 4½ Digit Display 17mm ■ 0.05% Accuracy. Features: ■ 5 range capacitance test ■ 5 ohms ranges to 20M ■ Transistor and Diode Test ■ Continuity LED and buzzer ■ Data hold switch ■ 5-ranges AC/DC Volts ■ AC/DC current to 20 Amps ■ With leads, battery, instructions and hard case **£49.95**

TL34 ■ 33 Range ■ 3½ digit 24mm Large Display Features ■ 5 Capacitance ranges ■ 6 resistance ranges to 20M ohm ■ Diode and transistor test ■ 5 AC/DC volts ranges Basic 0.5% accuracy ■ 5 ranges AC/DC current to 20 Amps ■ With leads battery and tions **£27.95**



MX190 ■ **19 Range 3½ Digit** Features ■ AC/DC Volts (0.7%) ■ 0-10 ADC current ■ 0/2K/2MEG ohmresistance ■ Diode test ■ Signal injector function ■ With leads, battery and instructions **£13.95**

TEST METERS

Satellite Finder ■ Easy to use kit **£29.95**

Professional Satellite F/S meter **£89.95**

LCR Meter ■ 3½Digit ■ 7 Cap ■ 6 inductance ■ 7 resistance ranges **£67.95**

Capacitance Meter ■ 3½ Digit ■ 9 ranges ■18mm LCD display **£62.95**

Digital Lux Meter ■ 3 ranges ■ 3½ digit LCD ■ Data hold, output terminal **£62.95**

Sound Level Meter ■ 40 to 120 db ■ Two ranges **£46.95**

Analogue Clamp Meter ■ 0/300 amps ■ AC 5 ranges ■ 0/750 VAC 0/75v DC ■ 0/200 K OHM **£32.95**

Digital Clamp Meter ■ 3½Digit ■ 11 ranges incl temperature ■ Data hold etc **£56.95**

AC/DC Current Clamp ■ 0/2000 amps AC/DC two ranges for use with Dmm's **£51.95**

Temperature Measurement ■ Dual input 3½ Digit °c/°f with thermocouple (XI) **£41.95**

BENCH INSTRUMENTS

Digital LED Capacitance autorange bench meter 0.1% **£93.00**

LCR bridge **£126.00**

7 Digit frequency counter 10HZ to 200MHZ **£87.00**

POWER SUPPLIES

†single meter *twin meter

0/24v dc 0/3amps †**£74.00**

0/24v dc 0/5amps †**£88.00**

0/30v dc 0/3 amps ***£140.00**

Twin version ***£260.00**

5-15v dc 0/4 amps †**£52.95**

0/30v DC 0/2½ Amps digital display **£99.95**

SIGNAL SOURCES 220/240v AC

6 Range RF Gen 100 KHZ to 150 MHZ (350MHZ Harmonics) **£122.00**

5- range Audio Gen 10HZ to 1 MHZ Sine/square **£119.00**

0.5HZ to 500KHZ Function Gen Sine/Sq/Triang **£124.00**

Full details send for instruments info pack (SAE 36p UK) Ref: TG

ALL PRICES INCLUDE VAT
OPEN 6 DAYS A WEEK

HENRY'S AUDIO ELECTRONICS
(Reg. Prop. Cubegate Ltd)

404 Edgware Rd, London W2 1ED
Tel: 071-724 3564/071-258 1831
Fax: 071-724 0322
Discounts for quantity and education

Access VISA Switch

WE HAVE THE WIDEST CHOICE OF USED OSCILLOSCOPES IN THE COUNTRY

TEKTRONIX 7000 SERIES OSCILLOSCOPES
AVAILABLE FROM £200. Plug-ins sold separately.

TEKTRONIX 2245A 4 Channel 100MHz Cursor etc. £1000
TEKTRONIX 2246A 4 Channel 100MHz Cursor Voltmeter etc £1250
TEKTRONIX 475 Dual Trace 200MHz Delay Sweep £500
TEKTRONIX 465 Dual Trace 100MHz Delay Sweep £400
TEKTRONIX SC504 Dual Trace 80MHz in TM503B £500
IWATSU SS571 1C 4 Channel 100MHz Delay Sweep with DMM £500
TRIO 2100 4 Channel 100MHz Delay Sweep £400
TRIO CS2070 4 Channel 70MHz Delay Sweep £450
TEKTRONIX 2215 Dual Trace 60MHz Delay Sweep £450
KIKUSUI COS5060TM 3 Channel 60 MHz Delay Sweep £400
HITACHI V650F Dual Trace 60MHz Delay Sweep £350
PHILIPS PM3217 Dual Trace 50MHz Delay Sweep £400
GOULD OS1100 Dual Trace 30MHz Delay Sweep £240
GOULD OS300 Dual Trace 20MHz £200
TRIO CS1566A Dual Trace 20MHz £200
GOULD OS250B Dual Trace 15MHz £125
HITACHI VC6045 2 Channel 40 MS/s Digital Storage Cursors £1100
LE CROY 9400 Dual Trace 125MHz Digital Storage £1000
GOULD OS4000 Dual Trace 10MHz Digital Storage £200

THIS IS JUST A SAMPLE - MANY OTHERS AVAILABLE

HEWLETT PACKARD 1740A OSCILLOSCOPES
100MHz Dual Trace, Delay Sweep For only £350

MARCONI 2018 Synth AM/FM Sig Gen 80KHz-520MHz £700
H.P. 8640B Sig Gen 20Hz-1024MHz £1000
H.P. 8620C Sweep Oscillator with 86245A 5.9-12.4GHz £400
SYSTRON DONNER 1702 Syn Sig Gen 100Hz-1GHz £600
RACAL 9081 Synthesized AM/FM Sig Gen 5-520MHz £500
FARNELL SSG520 Synth AM/FM Sig Gen 10-520MHz £400
MARCONI TF2015 AM/FM Sig Gen 10-520MHz £200
MARCONI TF2015 with Synch TF217 (Lock box) £350
PHILIPS PM5326 AM/FM Sig Gen 100KHz-100MHz £300
H.P. 8690B Microwave Sweep Osc 26.5-40GHz £300
H.R. SMITH ANTENNA type 12-602-4 £2000
H.P. 436A Power Meter with sensor £1000
RACAL INSTRUMENTATION REORDER type Store 4DN £500
H.P. 3575A Gain Phase Meter 1Hz-13MHz £400
H.P. 3312A Func Gen 0.1Hz-13MHz AM/FM, Sweep, Sin/Sq/Tri £400
MARCONI TF2337 Automatic Distortion Meter £200
SAYROSA Automatic Modulation Meter type 252B £125
TEKTRONIX CPS250 Triper Output PSU 2x20V0.5A Var. 5V2A Fixed £225
TEKTRONIX CFG250 Func Gen 0.2Hz-2MHz Sine/Sq/Tri/TTL £180
TEKTRONIX CDM250 Digital Multimeter 3½ digit Led £180

SPECTRUM ANALYSERS

H.P. 853 with 8559A 0.01-21GHz £4500
H.P. 3580A Led 5Hz-50KHz £1000
ANRITSU MS62B with Trac Gen 10KHz-1700MHz £1500
POLARAD 6411 10MHz-18GHz £1500
ANDO AC8281 with AC8211 1700MHz £1500
H.P. 182 with 8558B 100KHz-1500MHz £1500
H.P. 141T with 8558 & 8552B 500KHz-1250MHz £1200
H.P. 141T with 8553B & 8552A 1KHz-10MHz £800
MARCONI TF2370 30Hz-110MHz £1000
H.P 8443 Tracking Generators. Available from £300
HP. 141T Main Frames only. Good Tubes £225

H.P. 3456A DVM 6½ digit DC/True RMS AC/Res. HPIB £600
EIP/DANA 351D M/wave Freq Counter 20Hz-18GHz £500
H.P. 5341A Frequency Counter 50MHz-1.5GHz LED £300
MARCONI 2435 Digital Frequency Meter 2GHz £400
RACAL 1998 Freq Counter 1.3GHz (Opts G/P8 & High Stab £900
RACAL/DANA 1991 Counter/Timer 160MHz 9 digit £800
MARCONI 2437 Counter/Timer DC-100MHz 8 digit £175
MARCONI 2431A Freq Counter 10Hz-200MHz 8 digit £150
MARCONI 2430A Frequency Counter 10Hz-80MHz 8 digit £125
RACAL 9918 Frequency Counter 10Hz-520MHz 9 digit £200
RACAL 9913 Frequency Meter 10Hz-200MHz 8 digit £125
RACAL 9911 Frequency Meter 10Hz-120MHz 7 digit £100
RACAL 9905 Universal Counter/Timer DC-200MHz 8 digit £150
RACAL 9904 Universal Counter/Timer DC-50MHz 7 digit £175
RACAL 9901 Universal Counter/Timer DC-50MHz 6 digit £100
DATRON 1061A 6½ digit Autocal Multimeter True RMS AC/Current £850
H.P. 3490A 5 digit Multimeter AC/DC/Ohms £200
H. 3435A 3½ digit M/M AC/DC/Ohms/Current, Led £100
PHILIPS PM2534 Multi Func DMM 3½/2-6½ digit GPIB/EEE £450
SOLARTRON 7150 6½/2-3½ digit DMM with IEEE £400
SOLARTRON 7045 4½ digit Multimeter Volts/Amps/Ohms £80
WAYNE KERR B905 Automatic Precision Bridge 0.05% £900
MARCONI TF2700 Universal Bridge. Bat Op from £150
MARCONI TF1313A Universal LCR Bridge 0.1% £125
WAYNE KERR B424 Digital Component Meter LCR £200
HEATHKIT IB RLC Bridge £60
BRADLEY 192 Oscilloscope Calibrator £600
WILTRON 560 Scaler Network Analyser with Detectors £1000
H.P. 5005A Signature Multimeter £250
FARNELL H30/100 0-30V, 0-100A, Metered £800
FARNELL TVS70Mk2 70V 5A/35V 10A, Metered £300
FARNELL B30/10 30V 10A, Variable £200
FARNELL L30E 0-30V, 0-5A, Metered £125
MARCONI (WEIR) TF2154 0-30V 1A, 0-15V 2A, 0-7.5V 4A Metered £60
H.P. 0516A 0-3Kv, 0-6MA, Metered £150
BRANDENBURG Model 472R ± 2KV Metered £200
FEEDBACK FG600 Sine/Sq/Tri 0.01Hz-100KHz £60
LYONS PG71N Pulse Gen PRF 1Hz-5MHz 10 nanosecs £75
FARNELL PG101 Pulse Gen 100nSecs 10MHz (1Sec 1Hz) £125
LINDOS LA1 Mk2B Audio Analyser £500
UNAOHM EP501 Audio Analyser £350
PHILIPS PM5518 Colour TV Pattern Generator £1250
RADFORD LD04 Low FDistortion Oscillator £300
RADFORD LDM52 Low Distortion Measuring Set £300

NEW EQUIPMENT

HAMEG OSCOPE HM100S Triple Trace 100MHz Delay Tbase £847
HAMEG OSCOPE HM604 Dual Trace 60MHz Delay Sweep £653
HAMEG OSCOPE HM203 7 Dual Trace 20MHz Comp Tester £362
HAMEG OSCOPE HM205 3 Dual Trace 20MHz Digital Storage £653
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 £119
METEOR 600 FREQUENCY COUNTER 600MHz £145
METEOR 1000 FREQUENCY COUNTER 1 GHz £189
JUPITOR 500 FUNCTION GEN 0.1Hz-500KHz Sine/Sq/Tri £119
ORION COLOUR BAR GENERATOR Pal/TV/Video £229
All other Black Star Equipment available

OSCILLOSCOPE PROBES

Switchable × 1 / × 10 (P&P £3) £12

Used Equipment - Guaranteed. Manuals supplied if possible.
This is a VERY SMALL SAMPLE OF STOCK. SAE or Telephone for list. 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)

Access VISA

TUBES

Hundreds and hundreds of NEW tubes at greatly reduced prices. Some *less* than regunned price

14" narrow neck tube	£39
34JBU10X Sony	£109
36EAM	£79
3708B22	£39
37-573	£39
41EAM	£79
AXM42-001	£39
420EFB22	£29
420ERB22	£39
AXT42-001	£25
51EAK	£109
51-540	£99
51EAL	£69
51JFC	£79
51JRU40X	£64
51-427	£69
51EAM	£74
51EBV	£79
59EAF	£129
59EAK	£109
59EAS	£109
59ECF	£129
66EAF	£139
66ECF	£159

Ring Irene or Jane with your tube number for latest price and availability

Access **Carriage and VAT extra** VISA

EXPRESS TV

The Mill, Mill Lane, RUGELEY, Staffs WS15 2JW

Tel: 0889-577600

Fax: 0889-575600

B.K. TEST

B.K. Electronics, Suppliers of Test Equipment Excellence

B.K. TEST
The Test Equipment Division of
B.K. Electronics

Unit 1 Comet Way, Southend-On-Sea, Essex, SS2 6TR.
Tel.: 0702-527572 Fax: 0702-420243

FOUR-IN-ONE INSTRUMENT MODEL MX-9000

All in one bench test instrument with frequency counter, autoranging digital multimeter, 3 D.C. power supplies (2 fixed & 1 variable) and function generator, integrated into one compact and lightweight unit with full overload protection. Ideal for use in laboratories, education, production lines or research and development environments with its simple and easy operation.

FREQUENCY COUNTER
Range: 1Hz - 100MHz
Display: 8 Digit LED

FUNCTION GENERATOR
Output Waveforms:
Square, Pulse, Triangle, Skewed Pulse, Sine, TTL Level Square
Frequency: 0.02Hz - 2MHz
Output: 0.1Vpp - 20Vpp

Please Note:- It is not possible to list all of this instrument's functions and specifications above. A detailed leaflet is available on request.

Price:
£353.00 + £61.78 V.A.T.

DIGITAL MULTIMETER
3½ Digit LCD Display
Auto/Manual Ranging
Measurement:

DC V:	1000V Max
AC V:	750V Max
DC A:	10A Max
AC A:	10A Max
Resistance:	2MOhm Max

POWER SUPPLY
3½ Digit LCD Display
Triple Output:
0 - 50V Variable, 0.5A Max
15V, 1A (Fixed)
5V, 2A (Fixed)
Full Over Current Protection

Multifunction Meter
PC Compatible, Metex M3850

The Metex M3850 is excellent value for money and is packed with so many features that only a few can be included here. The M3850 is an autoranging DMM, but also includes a frequency counter, thermometer, capacitance meter, logic probe, diode check and transistor hFE. Also, the M3850 can communicate with a PC using the software and leads provided. The M3850 is suppied complete with a carry case, test leads and a manual.

DC Volts	0 - 1000V
AC Volts	0 - 750V
DC Current	0 - 20A
AC Current	0 - 20A
Resistance	0 - 40M
Capacitance	0 - 400uF
Frequency	5Hz - 40MHz
Temperature	-40 - +1200 C

Price: £99.00 + £17.33 V.A.T.

OTHER HAND HELDS

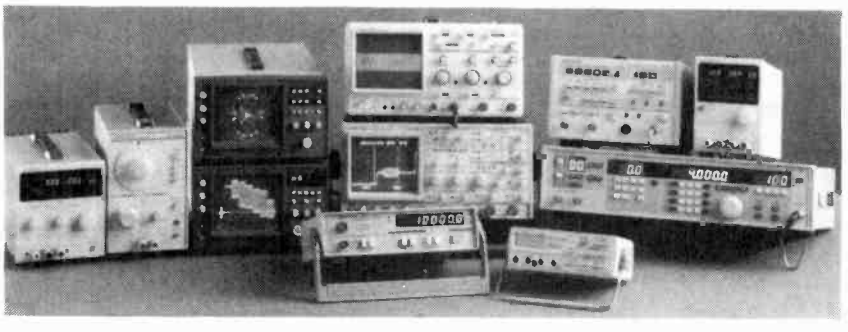
CAPACITANCE METER DM9023
9 Ranges 0pf (with set zero) to 20,000uF ★ Large, 3 5 Digit, 18mm LCD Display
Price: £57.90 - £10.13 V.A.T.

LCR METER LCR195
3 5 Digit LCD Display ★ 7 Capacitance Ranges 0 - 200uF ★ 6 Inductance Ranges 0 - 200H ★ 7 Resistance Ranges 0 - 200MOhm.
Price: £57.90 - £10.13 V.A.T.

FREQUENCY COUNTER (SAGE) SC130
5Hz - 1.3GHz ★ 8 Digit LCD ★ High Sensitivity ★ Freq.-Period-Count-RPM-Min-Max-Average-Difference ★ Data Hold ★ High Accuracy.
Price: £109.00 + £19.08 V.A.T.

MICROWAVE OVEN LEAKAGE DETECTOR PY-13
Complete with Probe ★ Detects microwave leakage around doors and seals ★ Positive indication of Leak with Meter Level Indication. **Price: £34.00 + £5.95 V.A.T.**

KENWOOD
TEST & MEASURING INSTRUMENTS



FM-AM Signal Generators ★ Colour Pattern Generators ★ Video Signal Analyser ★ Video Timing Analyser ★ Video Noise Meter ★ Distortion Meter ★ Waveform Monitors ★ Vectorscopes ★ Audio Generators ★ Wow and Flutter Meters ★ Electronic Voltmeters ★ Digital Multimeters ★ Function Generators ★ Frequency Counters ★ Bus Analyser ★ Resistance Attenuator ★ Oscilloscopes ★ Fully Programmable Digital Storage Oscilloscopes ★ Regulated D.C. Power Supplies

The following is just part of the vast range of Kenwood equipment, all of which is available from B.K. Electronics. A full catalogue and price list is available on request.

OSCILLOSCOPES
CS 1305 5MHz, 1 Channel, Low Cost
CS 4025 20MHz, 2 Channel, General Purpose
CS 4035 40MHz, 2 Channel, High Brightness, General Purpose
CS 5260 60MHz 3 Channel, 8 Trace, High Performance with Cursors (PAL & NTSC) Synch. Circuit
CS 6040 150MHz, 4 Channel, 10 Trace, High Performance, Multi-featured
DCS 8200 50MHz Real - 20Ms/s Digital 2 Channel

WAVEFORM MONITORS & VECTORSCOPES
CV 1255 Vectorscope PAL
CV 1245 Waveform Monitor PAL
(NTSC Versions of above are available. POA.)

SIGNAL GENERATOR
SG 5110 100KHz - 110MHz AM/FM Standard RF Generator (FM Stereo)

COLOUR GENERATORS
CG 932 PAL Colour Pattern Generator. Video & RF O Ps, Calibrated & Adjustable Levels, Interlaced and Progressive Scanning, Full Range of Patterns
CG 922 Battery Portable PAL Pattern Generator, Video, RF and Sound Outputs, Full range of Patterns.

AUDIO GENERATORS
AG203A 10Hz to 1MHz Low Distortion (0.1%) Audio Generator, Sine & Square Wave

DON'T FORGET - THERE ARE OVER 100 KENWOOD MODELS

AUDIO GENERATORS (Cont.)
AG252 10Hz to 1MHz Ultra Low Distortion 0.004%, Full Attenuator O/P

ELECTRONIC MILLIVOLTMETERS
VT 171 AC Millivolt Meter, 1mV - 300V
VT 176 Dual AC Millivolt Meter, 0.3mV - 100V

GENERAL PURPOSE
DL 711 3.5 Digit Auto Bench / Portable Multimeter. Approx 3000 hrs Battery
FG 273 Sweep Function Generator, 0.2Hz - 2MHz
FG 758 Frequency Counter 1.3GHz

POWER SUPPLIES
PD 35-10 0 to 35 Volts, 0 to 10 Amps
PR 19-3A 0 to 18 Volts, 0 to 3 Amps
PS 20-54 0 to 20 Volts, 0 to 54 Amps

KENWOOD PRICE LIST

CO 1305	**£210.00** +	**£36.75 V.A.T.**
CS 4025	**£359.00** +	**£62.83 V.A.T.**
CS 4035	**£565.00** +	**£98.88 V.A.T.**
CS 5260	**£1,195.00** +	**£209.13 V.A.T.**
CS 6040	**£2,395.00** +	**£419.13 V.A.T.**
DCS 8200	**£2,499.00** +	**£437.33 V.A.T.**
CV1255	**£2,249.00** +	**£393.58 V.A.T.**
CV 1245	**£1,599.00** +	**£279.83 V.A.T.**
SG 5110	**£1,825.00** +	**£319.38 V.A.T.**
CG 932	**£735.00** +	**£128.63 V.A.T.**
CG 922	**£445.00** +	**£77.88 V.A.T.**
AG 203A	**£195.00** +	**£34.13 V.A.T.**
AG 252	**£399.00** +	**£69.83 V.A.T.**
VT 171	**£235.00** +	**£41.13 V.A.T.**
VT 176	**£475.00** +	**£83.13 V.A.T.**
DL 711	**£149.00** +	**£26.08 V.A.T.**
FG 273	**£450.00** +	**£78.75 V.A.T.**
FC 758	**£555.00** +	**£97.13 V.A.T.**
PD 35-10	**£645.00** +	**£112.88 V.A.T.**
PR 18-3A	**£235.00** +	**£41.13 V.A.T.**
PS 20-54	**£1,610.00** +	**£281.75 V.A.T.**

U.K. POST PAID. Export enquiries welcome. Visa / Mastercard or cheque with order, payable B.K. Electronics. Official Orders welcome form Govt. Depts., Colleges, PLCs etc. Technical leaflets and price list for the complete range are available on request. Credit card orders are accepted by post, phone and fax.
Despatch is subject to payment clearance (10 days for cheques).

VISA

A4 DTP MONITORS Brand new, 300 DPI. Complete with diagram but no interface details.(so you will have to work it out!) Bargain at just £12.99 each!!!!

OPD MONITORS 9" mono monitor, fully cased complete with raster board, switched mode psu etc. CGA/TTL input (15way D), IEC mains. £15.99 ref DEC23. Price including kit to convert to composite monitor for CCTV use etc is £21.99 ref DEC24

LOW COST LASER NIGHT SIGHT just £79!!! Cheaper version of our £245 Cyclops model, works ok in low light levels or in complete darkness with the built in Laser. ref 95/79 (please allow about 1 month delivery for these due to import difficulties)

PC CONTROLLED 4 CHANNEL TIMER Control (on/off times etc) up to 4 items (8A 240v each) with this kit. Complete with Software, relays, PCB etc. £25.99 Ref 95/26

LOW COST RADAR DETECTOR Built and tested pocket radar detector, ideal for picking up speed traps etc. Why pay £70 or more? ours is just £24.99 ref 95/25.

COMPLETE PC 300 WATT UPS SYSTEM Top of the range UPS system providing protection for your computer system and valuable software against mains power fluctuations and cuts. New and boxed, UK made Provides up to 5 mins running time in the event of complete power failure to allow you to run your system down correctly. **SALE PRICE just £119.00.**

RACAL MODEM BONANZA! 1 Racal MPS1223 1200/75 modem, telephone lead, mains lead, manual and comms software, the cheapest way onto the net! all this for just £13 ref DEC13.

HOW LOW ARE YOUR FLOPPIES? 3.5" (1.44) unbranded. We have sold 100,000+ so ok! Pack of 50 £24.99 ref DEC16

BRITISH TELECOMM MULTIMETERS SA9083 These are 'returns' so they may have faults but look ok. Complete with new leads and leather case. Price for two meters & 1 case is £10 ref DEC89.

6mw LASER POINTER. Supplied in kit form, complete with power adjuster, 1-5mw, and beam divergence adjuster. Runs on 2 AAA batteries. Produces thin red beam ideal for levels, gun sights, experiments etc. Cheapest in the UK! just £39.95 ref DEC49

SHOP WOBBLERS! Small assemblies designed to take D size batteries and 'wobble' cardboard model signs about in shop windows! £3.99 Ref SEP4P2.

RADIO PAGERS Brand new, UK made pocket pagers clearance price is just £4.99 each 100x40x15mm packed with bits! Ref SEP5.

BULL TENS UNIT Fully built and tested TENS (Transcutaneous Electrical Nerve Stimulation) unit, complete with electrodes and full instructions. TENS is used for the relief of pain etc in up to 70% of sufferers. Drug free pain relief, safe and easy to use, can be used in conjunction with analgesics etc. £49 Ref TEN/1

STEREO MICROSCOPE 155X195MM, up to 600mm high, so items up to 10" will fit under lense Rack and pinion focusing, 6 interchangeable rotating object lenses, interchangeable eye pieces, +scaled eyepiece for accurate measuring etc. Powerful low voltage illumination system with green filter and variable intensity, 100mm black/white + ground glass stage plate, 70mm swivel mirror, adjustabe eyepieces (both focus and width). Magnification range 4.6-100.8, field of view 39-2.4mm). Price is £299 for complete setup. Ref 95/300.

3D 36MM CAMERA SYSTEM Complete kit to convert a standard 35mm camera into a 3D version!, enable you to take 3D colour slides with your own camera! Kit contains a prism assembly for the front of your existing lense, a sample 3D slide, a 3D slide viewer and 2 different lense mounts 49mm and 52mm, (other sizes available from photo shops at about £3 ea) all you need is standard slide film. Price for the complete kit is £29.99 ref 95/30.

COMPUTER RS232 TERMINALS. (LiBERTY) Excellent quality modem units,(like wyse 50,s) 2xRS232, 20 function keys, 50 thro to 38,400 baud, menu driven port, screen, cursor, and keyboard setup menus (18 menu's). £29 REF NOV4.

OMRON TEMPERATURE CONTROLLERS (E5C2). Brand new controllers, adjustable from -50 deg C to +1,200 deg C using graduated dial, 2% accuracy, thermocouple input, long life relay output .3A 240v o/p contacts. Perfect for exactly controlling a temperature, Normal trade £50+, ours £15. Ref E5C2.

ELECTRIC MOTOR BONANZA! 110x60mm. Brand new precision, cap start (or spin to start), virtually silent and features a moving outer case that acts as a fly wheel. Because of their unusual design we think that 2 of these in a tube with some homemade fan blades could form the basis for a wind tunnel etc. Clearance price is just £4.99 FOR A PAIR! (note- these will have to be wired in series for 240v operation Ref NOV1.

MOTOR NO 2 BARGAIN 110x90mm. Similar to the above motor but more suitable for mounting vertically (ie turntable etc). Again you will have to wire 2 in series for 240v use. Bargain price is just £4.99 FOR A PAIR!! Ref NOV3.

OMRON ELECTRONIC INTERVAL TIMERS.

Minature adjustable timers, 4 pole c/o output 3A 240v,

HY1230S, 12vDC adjustable from 0-30 secs. £9.99
HY1210M, 12vDC adjustable from 0-10 mins. £9.99
HY1260M, 12vDC adjustable from 0-60 mins. £9.99
HY2460M, 24vAC adjustable from 0-60 mins. £5.99
HY241S, 24vAC adjustable from 0-1 secs. £5.99
HY2460S, 24vAC adjustable from 0-60 secs, £5.99
HY243H, 24vAC adjustable from 0-3 hours. £8.99
HY2401S, 240v adjustable from 0-1 secs. £9.99
HY2405S, 240v adjustable from 0-5 secs. £9.99
HY24060m, 240v adjustable from 0-60 mins. £12.99

PC PAL VGA TO TV CONVERTER Converts a colour TV into a basic VGA screen. Complete with built in psu, lead and s/ware. £49.95. Ideal for laptops or a cheap upgrade.

EMERGENCY LIGHTING UNIT Complete unit with 2 double bulb floodlights, built in charger and auto switch. Fully cased. 6v 8AH lead acid req'd. (secondhand) £4 ref MAG4P11.

GUIDED MISSILE WIRE. 4,200 metre reel of ultra thin 4 core insulated cable, 28lbs breaking strain, less than 1mm thick! Ideal alarms, intercoms, fishing, dolls house's etc. £14.99 ref MAG15P5

300v PANEL METER 70X60X50MM, AC, 90 degree scale. Good quality meter. £5.99 ref MAG 6P14. Ideal for monitoring mains etc.

ASTEC SWITCHED MODE PSU BM41012 Gives +5 @ 3.75A, +12@1.5A, -12@.4A. 230/110, cased, BM41012. £5.99 ref AUG6P3.

TORRODIAL TX 30-0-30 480VA, Perfect for Mosfet amplifiers etc. 120mm dia 55mm thick. £18.99 ref APR19.

AUTO SUNCHARGER 155x300mm solar panel with diode and 3 metre lead fitted with a cigar plug. 12v 2watt. £9.99 ea ref AUG10P3.

FLOPPY DISCS DSDD Top quality 5.25" discs, these have been written to once and are unused. Pack of 20 is £4 ref AUG4P1.

ECLATRON FLASH TUBE As used in police car flashing lights etc, full spec supplied, 60-100 flashes a min. £9.99 ref APR10P5.

24v AC 96WATT Cased power supply. New. £13.99 ref APR14.

MILITARY SPEC GEIGER COUNTERS Unused anstraightfrom Her majesty's forces. £50 ref MAG 50P3.

STETHOSCOPE Fully functioning stethoscope, ideal for listening to hearts, pipes, motors etc. £6 ref MAR6P6.

OUTDOOR SOLAR PATH LIGHT Captures sunlight during the day and automatically switches on a built in lamp at dusk. Complete with sealed lead acid battery etc. £19.99 ref MAR20P1.

ALARM VERSION Of above unit comes with built in alarm and pir to deter intruders. Good value at just £24.99 ref MAR25P4.

CARETAKER VOLUMETRIC Alarm, will cover the whole of the ground floor against forcred entry. Includes mains power supply and integral battery backup. Powerful internal sounder, will take external bell if req'd. Retail £150+, ours? £49.99 ref MAR50P1.

TELEPHONE CABLE White 6 core 100m reel complete with a pack of 100 clips. Ideal 'phone extns etc. £7.99 ref MAR8P3.

MICRODRIVE STRIPPER Small cased tape drives ideal for stripping, lots of useful goodies including a smart case, and lots of components. £2 each ref JUN2P3.

SOLAR POWER LAB SPECIAL You get TWO 6"x6" 6v 130mA solar cells, 4 LED's, wire, buzzer, switch plus 1 relay or motor. Superb value kit just £5.99 REF: MAG6P8

SOLID STATE RELAYS Will switch 25A mains. Input 3.5-26v DC 57x43x21mm with terminal screws £3.99 REF MAG4P10

300DPI A4 DTP MONITOR Brand new but shop soiled so hence bargain price! TTL/ECL inputs, 15" landscape, 1200x1664 pixel complete with circuit diag to help you interface with your projects. JUST £14.99. REF JUN15P2.

BUGGING TAPE RECORDER Small voice activated recorder, uses micro cassette complete with headphones. £28.99 ref MAR29P1.

ULTRAMINI BUG MIC 6mmx3.5mm made by AKG, 5-12v electret condenser. Cost £12 ea, Ours? just four for £9.99 REF MAG10P2.

RGB/CGA/EGA/TTL COLOUR MONITORS 12" in good condition. Back anodised metal case. £79 each REF JUN79

ANSWER PHONES Returns with 2 faults, we give you the bits for 1 fault, you have to find the other yourself. BT Response 200's £18 ea REF MAG18P1. PSU £5 ref MAG5P12.

SWITCHED MODE PSU ex equip, 60w +5v @5A, -5v@.5A, +12v@2A,-12v@.5A 120/220v cased 245x88x55mm IEC input socket £6.99 REF MAG7P1

PLUG IN PSU 9V 200mA DC £2.99 each REF MAG3P9

PLUG IN ACORN PSU 19v AC 14w , £2.99 REF MAG3P10

POWER SUPPLY fully cased with mains and o/p leads 17v DC 900mA output. Bargain price £5.99 ref MAG6P9

ACORN ARCHIMEDES PSU +5v @ 4.4A on/off sw uncased, selectable mains input, 145x100x45mm £7 REF MAG7P2

GEIGER COUNTER KIT Low cost professional twin tube, complete with PCB and components. Now only £19 REF AUG19.

9v DC POWER SUPPLY Standard plug in type 150ma 9v DC with lead and DC power plug. price for two is £2.99 ref AUG3P4.

AA NICAD PACK encapsulated pack of 8 AA nicad batteries (tagged) ex equip, 55x32x32mm. £3 a pack. REF MAG3P11

13.8V 1.9A psu cased with leads. Just £9.99 REF MAG10P3

PPC MODEM CARDS. These are high spec plug in cards made for the Amstrad laptop computers. 2400 baud dial up unit complete with leads. Clearance price is £5 **REF: MAG5P1**

INFRA RED REMOTE CONTROLLERS Originally made for hi spec satellite equipment but perfect for all sorts of remote control projects. Our clearance price is just £2 **REF: MAG2**

200 WATT INVERTER Converts 10-15v DC into either 110v or 240v AC. Fully cased 115x36x156mm, complete with heavy duty power lead, cigar plug, AC outlet socket. Auto overload shutdown, auto short circuit shut down, auto input over voltage shutdown, auto input under voltage shut down (with audible alarm), auto temp control, unit shuts down if overheated and sounds audible alarm. Fused reversed polarity protected. output frequency within 2%, voltage within 10%. A extremely well built unit at an excellent price. Just £64.99 ref AUG65.

UNIVERSAL SPEED CONTROLLER KIT Designed by us for the C5 motor but ok for any 12v motor up to 30A. Complete with PCB etc. A heat sink may be required. £17.00 **REF: MAG17**

MAINSCABLE Precut black 2 core 2 metre lengths ideal for repairs, projects etc. 50 metres for £1.99 ref AUG2P7.

COMPUTER COMMUNICATIONS PACK Kit contains 100m of 6 core cable, 100 cable clips, 2 line drivers with RS232 interfaces and all connectors etc. Ideal low cost method of communicating between PC's over a long distance. Complete kit £8.99.

MINI CYCLOPS PIR 52x62x40mm runs on PP3 battery complete with shrill sounder. Cheap protection at only £5.99 ref MAR6P4.

ELECTRIC MOTOR KIT Comprehensive educational kit includes all you need to build an electric motor. £9.99 ref MAR10P4.

VIDEO SENDER UNIT. Transmits both audio and video signals from either a video camera, video recorder, TV or Computer etc to any standard TV set in a 100' range! (tune TV to a spare channel) 12v DC op. Price is £15 **REF: MAG15** 12v psu is £5 extra **REF: MAG5P2**

***FM CORDLESS MICROPHONE** Small hand held unit with a 500' range! 2 transmit power levels. Reqs PP3 9v battery. Tuneable to any FM receiver. Price is £15 **REF: MAG15P1**

LOW COST WALKIE TALKIES Pair of battery operated units with a range of about 200'. Ideal for garden use or as an educational toy. Price is £8 a pair **REF: MAG 8P1** 2 x PP3 req'd.

***MINATURE RADIO TRANSCEIVERS** A pair of walkie talkies with a range of up to 2 km in open country. Units measure 22x52x155mm. Including cases and earp'ces. 2xPP3 req'd. £30.00 pr. **REF: MAG30**

COMPOSITE VIDEO KIT. Converts composite video into separate H sync, V sync, and video. 12v DC. £8.00 **REF: MAG8P2.**

LQ3500 PRINTER ASSEMBLIES Made by Amstrad they are entire mechanical printer assemblies including printhead, stepper motors etc etc In fact everything bar the case and electronics, a good stripper! £5 **REF: MAG5P3** or 2 for £8 **REF: MAG8P3**

LED PACK of 100 standard red 5m leds £5 **REF MAG5P4**

UNIVERSAL PC POWER SUPPLY complete with flyleads, switch, fan etc. Two types available 150w at £15 REF:MAG15P2 (23x23x23mm) and 200w at £20 REF: MAG20P3 (23x23x23mm)

***FM TRANSMITTER** housed in a standard working 13A adapter!! the bug runs directly off the mains so lasts forever! why pay £700? or price is £26 REF: MAG26 Transmits to any FM radio.

***FM BUG KIT** New design with PCB embedded coil for extra stability. Works to any FM radio. 9v battery req'd. £5 REF: MAG5P5

***FM BUG BUILT AND TESTED** superior design to kit. Supplied to detective agencies. 9v battery req'd. £14 REF: MAG14

TALKING COIN BOX STRIPPER originally made to retail at £79 each, these units are designed to convert an ordinary phone into a payphone. The units have the locks missing and sometimes broken hinges. However they can be adapted for their original use or used for something else?? Price is just £3 **REF: MAG3P1**

TOP QUALITY SPEAKERS Made for HI FI televisions these are 10 watt 4R Jap made 4" round with large shielded magnets. Good quality. £2 each **REF: MAG2P4** or 4 for £6 **REF: MAG6P2**

TWEETERS 2" diameter good quality tweeter 140R (ok with the above speaker) 2 for £2 **REF: MAG2P5** or 4 for £3 **REF: MAG3P4**

AT KEYBOARDS Made by Apricot these quality keyboards need just a small mod to run on any AT, they work perfectly but you will have to put up with 1 or 2 foreign keycaps! Price £6 **REF: MAG6P3**

HEADPHONES Ex Virgin Atlantic. 8 pairs for £2 **REF: MAG2P8**

DOS PACKS Microsoft version 3.3 or higher complete with all manuals or price just £5 **REF: MAG5P8** Worth it just for the very comprehensive manual! 5 25" only.

DOS PACK Microsoft version 5 Original software but no manuals hence only £5.99. 3.5" only.

PIR DETECTOR Made by famous UK alarm manufacturer these are hi spec, long range internal units. 12v operation. Slight marks on case and unboxed (although brand new) £8 **REF: MAG8P5**

MOBILE CAR PHONE £5.99 Well almost! complete in car phone excluding the box of electronics normally hidden under seat. Can be made to illuminate with 12v also has built in light sensor so display only illuminates when dark. Totally convincing! REF: MAG6P6

ALARM BEACONS Zenon strobe made to mount on an external bell box but could be used for caravans etc. 12v operation. Just connect up and it flashes regularly) £5 REF: MAG5P11

6"X12" AMORPHOUS SOLAR PANEL 12v 155x310mm 130mA. Bargain price just £5.99 ea REF MAG6P12.

FIBRE OPTIC CABLE BUMPER PACK 10 metres for £4.99 ref MAG5P13 ideal for experimenters! 30 m for £12.99 ref MAG13P1

HEATSINKS (finned) TO220, designed to mount vertically on a pcb 50x40x25mm you can have a pack of 4 for £1 ref JUN1P11.

INFRARED LASER NIGHT SCOPES

Image intensifier complete with hand grip attachment with built in adjustable laser lamp for zero light conditions. Supplied with Pentax 42mm camera mount and normal eye piece. 1.6kg, uses 1xPP3, 3xAA's Please allow us about 1 month for delivery on this product due to import problems ! £245+Vat

NEW HIGH POWER LASERS

15mW, Helium neon, 3 switchable wavelengths .63um, 1.15um, 3.39um (2 of them are infrared) 500:1 polarizer built in so good for holography. Supplied complete with mains power supply. 790x65mm. Use with EXTREME CAUTION AND QUALIFIED GUIDANCE. £349+Vat.

WE BUY SURPLUS STOCK FOR CASH

1995 100 PAGE CATALOGUE NOW AVAILABLE, 45P STAMP OR FREE WITH ORDER.

3FT X 1FT 10WATT SOLAR PANELS
14.5v/700mA
£44.95

(PLUS £2.00 SPECIAL PACKAGING CHARGE)

TOP QUALITY **AMORPHOUS SILICON CELLS** HAVE ALMOST A TIMELESS LIFESPAN WITH AN INFINITE NUMBER OF POSSIBLE APPLICATIONS, SOME OF WHICH MAY BE CAR BATTERY CHARGING, FOR USE ON BOATS OR CARAVANS, OR ANYWHERE A PORTABLE 12V SUPPLY IS REQUIRED.

PORTABLE RADIATION DETECTOR

WITH NEW COMPUTER INTERFACE.

£59.00

A Hand held personal Gamma and X Ray detector. This unit contains two Geiger Tubes, has a 4 digit LCD display with a Piezo speaker, giving an audio visual indication. The unit detects high energy electromagnetic quanta with an energy from 30K eV to over 1.2M eV and a measuring range of 5-9999 UR/h or 10-99990 Nr/h. Supplied complete with handbook. Ref. **NOV 18.**

*SOME OF OUR PRODUCTS MAY BE UNLICENSABLE IN THE UK

BULL ELECTRICAL

250 PORTLAND ROAD HOVE SUSSEX
BN3 5QT (ESTABLISHED 50 YEARS)

MAIL ORDER TERMS: CASH PO OR CHEQUE WITH ORDER PLUS £3.00 POST PLUS VAT.

PLEASE ALLOW 7 - 10 DAYS FOR DELIVERY

TELEPHONE ORDERS WELCOME

TEL: 01273 203500
FAX: 01273 323077

VISA

SUPERSCREEN

SERVING THE N. EAST, YORKSHIRE & SCOTLAND

FOR THE BEST DEALS IN WORKING OR OFF THE PILE TVs & VIDEOS – LARGE STOCKS, GREAT DEALS

CONTACT MIKE FOR LATEST STOCK & PRICES

STOP PRESS

OPENING SHORTLY IN

SCOTLAND

SCOTTISH TRADERS PHONE FOR INFORMATION

SUPERSCREEN

5 REDESDALE COURT, FOREST GROVE, RIVERSIDE PARK IND ESTATE, MIDDLESBROUGH, CLEVELAND

TEL: 01642 250850 or 01831 715423

REPO WHOLESALE

DAISY WORKS, 345 STOCKPORT ROAD LONGSIGHT, MANCHESTER M13 0LF

0161-273-2854/274-3409/Fax 273-4486

GOOD SELECTION OF VARIOUS MAKES OF T.V. AND VIDEO

FST - TEXT - REMOTES - BASICS - VIDS

– NEW HANDSETS IN STOCK –

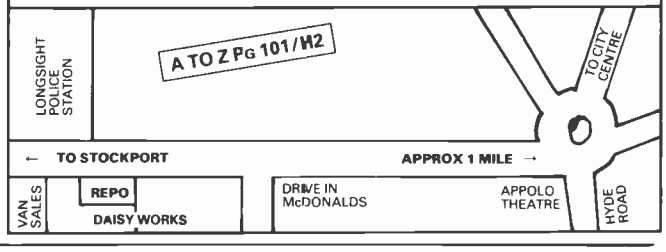
★ Serviced and Ready to Sell ★

★ "As they come" Complete ★

★ "Direct from Source" full loads ★

No order too small – If you are new to the business call in and let us help you

CHEQUE/CASH/ACCESS/VISA/AMEX ETC.



EAST LONDON WHOLESALE CENTRE

NEW TO LONDON!

EX-RENTAL COLOUR TV's AND VIDEO RECORDERS

Tel: 0171 538 0306

OPEN
MONDAY TO FRIDAY 9 am to 5.30 pm
SATURDAY 9 am to 1 pm

WORKING COLOUR TELEVISIONS

- BASIC FROM £14
- REMOTE CONTROL FROM £25
- TELETEXT FROM £35

WORKING VHS VIDEO RECORDERS

- TOP LOADING FROM £35
- FRONT LOADING FROM £45

WHY NOT COME TO SEE US AT UNIT 16, BOW ENTERPRISE PARK, CRANWELL CLOSE BOW, LONDON E3 3 QY

SWITCH ON TO 'B' GRADE AT PRICES SECOND TO NONE

	WAS	NOW
14" Remote Portables	85	80
14" Teletext Portables	105	100
14" Fastext Portables	115	110
20" Remote CTVs	110	105
20" Teletext CTVs	125	115
20" Fastext CTVs	135	125
21" Fastext CTVs	145	135
20" Nicam Fastext	160	145
21" Nicam Fastext	175	160

All stock tested & working and boxed with remote & instructions

CONTAINER LOADS OF GENUINE CLEAN FAULTY RETURNS ARRIVING EVERY WEEK. T.V. VIDEO, HI-FI, RAD/CASS, C.D.'S, CAMCORDERS, COMPUTERS, PERSONAL STEREO'S ETC, ETC....

GOGGLEBOX

DISCOUNT ELECTRICAL WAREHOUSE

TEL: LEEDS 0532-310359

ASK FOR ROBERT

ALL ABOVE PRICES PLUS VAT AT 17.5%

C.T.V.

UNIT 5, THE PHOENIX BUILDING, RUSHOCK TRADING ESTATE, DROITWICH ROAD, NEAR KIDDERMINSTER
TELEPHONE: 0299-251522
0836-585829/0860-809673 (24HR)

SUPPLIERS OF HIGH QUALITY
EX-RENTAL TELEVISIONS AND VIDEOS
LARGE STOCKS ALWAYS AVAILABLE
ALL AT COMPETITIVE PRICES
Also available: 'B' Grade Products, Audio, and Complete Range of Televisions and Videos
OPEN: MON-FRI – 9.30-5.30

TEL: 0299-251522
0836-585829/0860-809673 (24HR)
Fax: 0299-251543 EXPORT ENQUIRIES WELCOME

WILTSGROVE LTD

28-29 RIVER STREET, DIGBETH
BIRMINGHAM B5 5SA
TEL: 021 772-2733 FAX: 021 766-6100

HIGH QUALITY EX-RENTAL THORN AND GRANADA STOCK *PLUS* GRADED STOCK AUDIO, TVs, VCR etc.
RING IN FOR PRICES

FREE DELIVERY FOR MOST AREAS OF UK

NOW AVAILABLE
GRADED STOCK — MAJOR BRAND
Complete with original boxed, handset and instruction book — Good as new
Latest Nicam, Fastext, Prologic
ALMOST HALF PRICE OF RETAIL

★★★ STAR BUY ★★★
FERGUSON 59L5 SPEAKERS (with stands) £14.95 per pair

NEW *Definition* BRAND
PORTABLE 14' REMOTE TV
ON SCREEN DISPLAY,
VHF/UHF TUNER,
12 MONTHS (Parts) GUARANTEE etc.
GUARANTEED LOWEST PRICE
1,000s of TV & Video Spares also available
SPECIAL PRICE £99.95

EXPORT ENQUIRIES WELCOME
ALL STOCK SUBJECT TO AVAILABILITY, VAT & CARRIAGE

VISION CARE

RECONDITIONED WORKING STOCK

VIDEO		TELEVISION	
Top Loading VCR	£30.00	Basic CTVs	from £15.00
Front Loaders with R/C	£40.00	Remote CTVs	from £25.00
Twin Speed VCR with R/C	£55.00	Teletext CTVs	from £35.00
Ferguson FV11R/3V55	£65.00	FSTs	from £65.00

NOW AVAILABLE GRANADA AND THORN EX RENTAL STOCK

NOW AVAILABLE Graded Stock Major Brand Latest Nicam, Fastext, Prologic

NEW 14" Remote Control Portable CTV 12 months (Parts) Guarantee £99.95

E-180 EXTRA GRADE VIDEO TAPE (min 50) £0.79

Self adhesive black ash vinyl 15m x 450mm for TV cabinets etc £14.50

Branded 'B' grade now available

SHARP, GOLDSTAR, HITACHI, AKURA, TOSHIBA, etc
★★ CAMCORDERS NOW AVAILABLE ★★

WE HAVE NOW MOVED TO OUR NEW ADDRESS:
UNIT 21, DEACON WAY, SCOURS LANE, TILEHURST, READING, BERKSHIRE RG3 6AZ
TEL: 0734 420251 and 0734 420555

OPEN MONDAY TO FRIDAY 9am-5.30pm
EXPORT ENQUIRIES WELCOME
All stock subject to availability, VAT and carriage

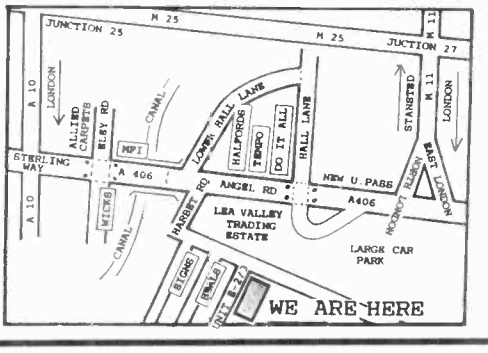
APPROVED TELEPRICE DISTRIBUTOR

HST DISTRIBUTORS LONDON

Suppliers of high quality
THORN EX-RENTAL STOCK
Direct from source

PHONE FOR DELIVERY DAYS ON
081 803 0505

UNIT E2/3, Stonehill Business Park, Lea Valley Trading Estate, ANGEL ROAD, LONDON N18 3LD



COLOURTRADE

ESTABLISHED 1973 – WHOLESALE ONLY

NEW 'B' GRADE

Major Brands ONLY TV's – Video – Audio.
Microwaves, Satellite Receivers, Decoders

COMPLETE BOXED – WITH STAND – HANDSET – BOOK ETC

MINT LATEST NICAM FASTEXT F.S.T.

FERGUSON

FULL RANGE – ALL CURRENT MODELS OF TV-VIDEO IN STOCK

NATION-WIDE NEXT DAY DELIVERY SERVICE – VISITORS BY APPOINTMENT

Phone 021-359 7020

FAX 021-359 6344

221-222 BRIDGE ST WEST, HOCKLEY,
BIRMINGHAM B19 2HU – JUST OFF M6-J6

VISA AMERICAN EXPRESS

WE HAVE EVERYTHING YOU WANT!!

TV's, VIDEO, Hi Fi, Ghetto Blasters, WALKMANS,
Portable CD's, Stack Systems etc.
NEW, RETURNS, 'B' GRADE, EX-RENTAL.

F.S.T. TV from £80 working
F.S.T. Text from £90 working
Nicam TV from £120 working
Boxed F.S.T. from £100 (depending on make)

Slim front loading video, off the pile £20 Working front loading video from £45

Centre deck, Video Plus, Latest models JVC, Philips, Toshiba, all boxed from only £110

Standard CTV's, off the pile, from £5 Text TV, off the pile, from £25

Mini/Micro system with CD from £35 boxed makes include Pioneer, Sanyo, Kenwood, Aiwa etc. HiFi Midi Systems from £15!!

SPECIALS: Walkmans from £7, Twin ST/RAD/Cass, boxed, £12
ST/RAD/Cass, boxed, £8. Car radios from £12.

Brand new Microwaves, boxed, ½ retail price.

FREE!! Coffee, Tea, Pop, Bacon/Sausage/Egg Sandwich, Loud Music
Bring plenty of money! Please, no overnight queuing!
All Prices Subject to VAT

BESCO LTD

Walker House, 16 Bottomley Street, Manchester Road,
Bradford BD5 7LJ. Tel: 01274 308186

Open Mon/Fri 9 to 5, Sat 9 to 4, Sunday by Appointment
Few minutes end of M62/M606.

CENTRAL TV
WHOLESALE DISTRIBUTOR

Attention All Traders

If you are looking for Serious Deals on TV, Video, Sat Audio, Camcorders

CALL US NOW!

0181 807 4090 – 0121 772 1591

We Got Everything

Min Order 1 to 1000

CENTRAL TV WHOLESALE DISTRIBUTION LTD

London contact: Joshi
Eley Estate, Nobel Road, Edmonton N18
Tel: 0181-807 4090
Fax: 0181-884 1314

Birmingham contact: Mick
369 Stratford Road, Sparkhill, Birmingham B11
Tel: 0121-772 1591
Fax: 0121-766 6383

CENTREVISION

CENTREVISION HOUSE
SLOPER ROAD · LECKWITH · CARDIFF · CF1 8AB
Fax: 01222 344218

100's OF WORKING TV's IN STOCK

FST FASTEXT NICAM
TV's WORKING ON DISPLAY READY FOR DIRECT RE-SALE

PHILIPS, SHARP, SANYO, TOSHIBA
HITACHI, SALORA, FERGUSON

SO DON'T DELAY
PHONE 01222 344754

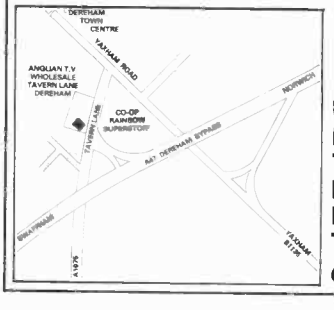
EAST ANGLIA'S PREMIER WHOLESALER

A.T.V.

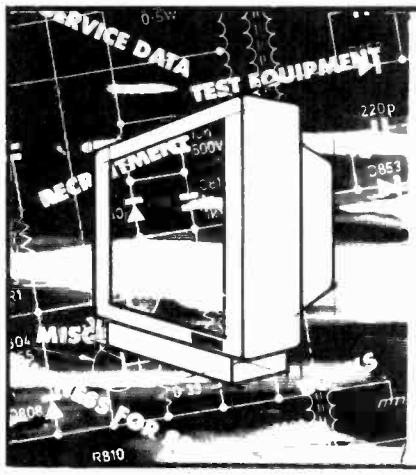
FST ★ FASTEST PORTABLES ★ REMOTES

Stock arriving regularly

EX-RENTAL TV & VCRs
TOP QUALITY STOCK
BEST POSSIBLE PRICES
RING FOR DETAILS (0362) 691611
DIRECT LOADS AVAILABLE – DELIVERY SERVICE
EXPORT ENQUIRIES WELCOME



ANGLIAN T.V. WHOLESALE
Unit 4
Brecklands Business Centre
Tavern Lane
East Dereham
Norfolk NR19 1PX
Tel/Fax: (0362) 691611
OPEN MON-FRI 10am–5pm



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 £13.50 per single column centimetre (minimum 4 cm). Classified advertisements £2.00 per word (minimum 20 words), 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 to sent to The Television Classified, 11th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

PHONE 0181-652 8339 FAX 0181-652 8931

TV/VIDEO/SATELLITE/ HI-FI FAULT GUIDES & SERVICE SHEETS

FRYERNS

Most makes covered old and new. This service offers technical advice and cure plus Schematic diagram all for the price of £3.50

Add £1.50 Post/Packing & Handling for 1 Item. 2 Items or More Post & Packing Free

Access and Visa Fax Service

Phone **01268 558938**

Anytime 7 days a week

4 Pincey Mead, Basildon, Essex SS13 3EW
Fax: 01268 475548

SERVICE INFORMATION

CIRCUITS and SERVICE MANUALS FROM 1930s - 1990s: radios, amps, radiograms, tuners, CDs, TVs, videos, cassette radios, ICE etc.
LARGE QUANTITY USED TV & VIDEO PANELS.
BACK COPIES PW, & TV MAG.
Give details of your needs to:

DAVE WILLIAMS
India Lodge, Horsefair Green, Thorne, Doncaster, South Yorks DN8 5EE
Tel/Fax: 01405 814548

SERVICE MANUAL BOOKS

Professionally Produced with the Manufacturers Full Co-operation

Satellite Servicing 1993-94	£79.00
New Edition. Covers 316 Models. ISBN: 0 898598 05 3	
Satellite Servicing 1991-92	£69.00
Covers 251 Models. ISBN: 0 951 3897 8 5	
Satellite Servicing 1987-90	£59.00
Covers 127 Models. ISBN: 0 9513897 6 9	
Television Servicing 1993-94	£89.00
New Edition. Covers 629 Models. ISBN: 1 898598 03 7	
Television Servicing 1991-92	£89.00
Covers 307 Models. ISBN: 0 9513897 7 7	
Television Servicing 1989-90	£69.00
Covers 463 Models. ISBN: 0 9513897 1 8	
Television Servicing 1987-88	£59.00
Limited Reprint Now Available. ISBN: 0 9513897 0 X	
Video Servicing 1991-92	£195.00
Three Volume Set. Covers 322 Models. ISBN: 0 9513897 9 3	
Video Servicing 1989-90	£99.00
Limited Number Available. Was £145. ISBN: 0 898598 04 5	

ALL BOOKS CONTAIN
Circuit Diagrams, Scope Readings, Voltage Tables, Part No's, Alignments & Adjustments, Trouble Shooting Guides.

Send For Brochure Listing Models
All Prices Include UK Post, Packing & Ins.

Interest Free Credit on orders over £150
(From £30 Per Month). RING FOR DETAILS.

U-VIEW
Technical Publishers

4 South Parade Bawtry Doncaster Yorkshire England DN10 6JH
Tel: 01302 719997 Fax: 01302 719995

SERVICE MANUALS

We have what is probably the largest range of Service Information available anywhere.

From the Earliest Valve Wireless to the Latest Video Recorders. Colour Televisions, Test Gear, Audio, Computers, Amateur Radio, in fact practically anything.

Originals or Photostats as available.

Also available. Our FREE catalogue detailing Hundreds of Technical Books and Repair Guides available.

STOP PRESS

Now Available. Our Service Manuals Index on P.C. Disc (3.5") for use on your Computer. Just £3.50 with FREE everlasting Updates. Order MP-285.

Mauritron Technical Services (5TV),
8 Cherry Tree Road, Chinnor, Oxon OX9 4QY
Tel: 01844-351694 Fax: 01844-352554

Please forward your latest catalogue for which I enclose 2 x 1st Class Stamps. or £3.50 for the Technical Books Catalogue plus Manuals Index on PC Disc(s).

NAME_____

Address_____

_____

_____

_____POSTCODE_____

SERVICE MANUALS

For most U.K. European, Far East & USA makes

Thousands of different models available

Prices (Stock Items):–

VCR, VCP, Camcorder, TV/Vid –	£13.50
CTV, Colour Monitor, Camera –	£8.50
MTV, Mono Monitor, SAT, MWV –	£6.00

Add P/P £1.50 for first item then 50p for each additional item – no VAT

Cheque/PO with order only please.

D-TEC
PO BOX 1171, FERNDOWN, DORSET BH22 9YG
Tel: 0202 870656

FIX IT KWIK!!!

After many requests for further servicing information **E.C.S.** has now produced the **KWIK TIPS** range of technical publications for the TV & video engineer.

KWIK TIPS TELEVISION covering a broad range of makes, models & chassis & containing a unique collection of over **2500** television fault solutions.
ISBN 1 898394 00 8 First edition now available – **only £13.95**

KWIK TIPS VIDEO is ideal for dealing with those video "nasties", a superb collection of over **2000** video faults from a wide spectrum of manufacturers.
ISBN 1 898394 01 6 First edition now available – **only £10.95**

Chassis & equivalent identification made easy with the **E.C.S. Television & video equivalents, TV model to chassis guide & camcorder equivalents** A massive **4500** entries brought together in 1 book.
ISBN 1 898394 02 4 First edition now available – **only £4.95**

Now in their 12th Edition with thousands of copies sold worldwide the **E.C.S. Television, Video, CD satellite & camcorder indexes** contain over **9200** references listed in 12 years of television magazine.
Price **per full set** (indexes listed above) – **only £14.75**

E.C.S.
Technical publishing

31 PRENTON ROAD WEST, PRENTON, BIRKENHEAD, MERSEYSIDE L42 9PY

Please add **£1.75** p&p to total (europe **£2.75**, r.o.w please enquire).

TECHNICAL BOOKS

A selection from our range of books for the repair trade

TELEVISION CHASSIS GUIDE
Full cross reference for all models.
Order MP-18. £6.00

TELEVISION EQUIVALENTS
Lists models which are the same.
Order MP-150. £6.00

FAULT LISTS FOR TELEVISIONS
Hundreds of specific faults for dozens of different makes and models.
Order MP-205. £7.00

TELETEXT REPAIR MANUAL
Covers SAA range of boards.
Order MP-38. £7.00

TELEVISION REMOTE CONTROL CIRCUITS
Dozens of Diagrams on many remotes
Order MP-167. £10.00

TV POWER SUPPLY CIRCUITS
Dozens of P.S. circuit stages.
Order MP-219. £10.00

SCART EUROCONNECTOR SYSTEM
Comprehensive details of the system.
Order MP-21. £3.00

P.C. HARD DISC DRIVE REFERENCE MANUAL
Comprehensive Drive Details.
Order MP-84. £5.00

P.C. DIAGNOSTICS SOFTWARE
Dozens of programs to aid you in diagnostics of PC's and Drives etc. 2 sets of 7 x 3.5" Discs per set.
Set 1. Order MP-250. £12.50
Set 2. Order MP-251. £12.50

VIDEO RECORDER AND CAMCORDER EQUIVALENTS
Full Cross-reference guides.
Makes A-J. Order MP-218. £6.00
Makes K-Z. Order MP-219. £6.00

FAULT LISTINGS FOR VIDEO
Lists Hundreds of Faults for dozens of makes and models.
Volume 1. MP-206. £7.00
Volume 2. MP-228. £7.00

VHS VIDEO RECORDER PRINCIPLES
Detailed guide on how it works.
Order MP-68. £4.00

VIDEO TEST JIG
Special cassette lets you operate the machine in test mode.
Order VTJ. £15.00

VIDEO HEAD CLEANING KIT
Special kit with comprehensive instructions on how to service heads.
Order VHCK. £5.00

VIDEO RECORDER FAULTS
Unique repair guide for beginners
Order MP-5. £3.00

WIRE ANTENNAS FOR H.F. OPERATORS
THE Aerial book for Amateurs.
Order MP-243. £5.95

REEL TO REEL TAPE RECORDER SERVICING
Theory and circuits for repairs.
Order MP-201. £4.95

TRANSISTOR RADIO REPAIR GUIDE
Comprehensive servicing charts.
Order MP-7. £1.95

RECORDER PLAYER SPEED DISC
Get your phonograph up to speed.
Order MP-8. £0.95

SWITCH MODE POWER SUPPLY I.C. TYPE TDA-4600
Circuitry and operation explained.
Order MP-37. £6.00

VOLTAGE REGULATORS, STABILISERS & POWER SUPPLIES
Identification and specifications.
Order MP-9. £3.00

CMOS DATABOOK
Pinouts and circuits for 4000 series.
Order MP-10. £5.00

TTL DATABOOK
Pinouts and circuits for 7400 series.
Order MP-24. £5.00

TRANSISTOR EQUIVALENTS
Includes details on testing them.
Order MP-24. £3.00

OFFICE EQUIPMENT EQUIVALENTS
Photocopiers & Fax machines covered.
Order MP-200. £6.00

TELEPHONE CODE LOCATION GUIDE
Find the Town from the Phone Code.
Order MP-19. £4.00

MANUFACTURERS EQUIVALENTS
What makes are the same.
Order MP-220. £3.00

The above selection are just a few of the Hundreds of Unique Repair and Data Guides shown in our FREE catalogue – Yours for the asking. Sent FREE with all orders or send 2 x 1st class stamps for your copy TODAY!

Order TODAY using Access/Visa for immediate despatch.
All order plus £2.94 Post and Packing. (Overseas £5.00)

MAURITRON TECHNICAL SERVICES (6TV1)
8 Cherry Tree Road, Chinnor, Oxfordshire OX9 4QY
Tel: 0844-351694. Fax: 0844-352554

SERVICE MANUALS

1830's TO 1994 BRITISH - FOREIGN

We Have the worlds Largest Selection of Manuals

SELECTED TITLES

So many titles, it's criminal!

VCR/CAMERA EQUIV'S & CHASSIS
Chassis & Equivalents Guide £4.00

CTV/SATELLITE EQUIV'S & CHASSIS
Chassis & Equivalents Guide £4.00

DATA REF GUIDE 5th Edn.
Contains all the above plus Audio, Mono TV, Test Equip, CD's etc.. £9.95

CTV SERVICING BY KING
G.King's 2nd Edn. Trade Standard £16.95

***NEW*SERVICING CD PLAYERS**
Problem solving bench companion £25.00

BUY/SELL & SERVICING USED TV's, VCR's OR CD'S (Pocket Books) £9.95 each

CTV CIRCUIT COLLECTIONS

Alba/Bush	£29	Ams'd/Fid'ity	£25	B&O	£25
Decca	£29	GEC	£25	Grundig	£45
Hitachi	£55	ITT/Nokia	£45	Matsui	£45
Mitsubishi	£45	Philips	£89	Rediffusion	£25
Sanyo	£35	Sony	£74	Toshiba	£43

SEE CATALOGUE FOR FULL LIST

DATA LIBRARY

HOW IT WORKS IN 3 EASY STEPS

STEP 1: You pay a joining fee of £69.95 (the annual renewal charge is £25), & tell us what service manual you want. We'll send it to you, usually by return.
STEP 2: When you want another manual, just return your current one with £4.95, for exchange & handling, and tell us what manual you want in exchange.
STEP 3: Repeat "Step 2" as often as required!

Your joining fee of £69.95 also includes:-

Your First 12 Months Membership
Technical Help Line
All STREE Newsletters
Data Reference Guide


We also offer any 20 manuals for £190
Order them as required, there is no time-limit & postage is included
This offer is open to non-Library members

***NEW*EUROPEAN SCRAMBLING SYSTEMS 4th Edn.** £32.00
John McCormac's latest update of his best selling book, showing how to beat the Videocrypt and build your own decoder!

PRACT' TV REPAIRS 2nd Edn. £16.95
Update of worlds most successful general repair guide. Now includes Nicam & Fastext.

***NEW*SOFTWARE ENGINEERS P/B**
System development, maintenance & repair are fully explained in depth £12.95

ABOUT TIS & INFOTECH

We started out as 'Ause-Enterprises' in 1971 as a partnership between several Electronic Writers and an independent Publishing Co..

In 1980 we bought-out STREE (Society for Television, Radio and Electronic Engineers) and a Electrical Manual Supplier. We have since grown into, not only, the largest supplier of Service Manuals/Circuits, Repair data & Technical books, but now run a Service Manual Library and even a PC Games Library.

TECHNICAL INFORMATION SERVICES
76 CHURCH STREET, LARKHALL, LANARKSHIRE, ML9 1HE
TEL. (0698) 883334/888343
FAX. (0698) 884825
SEND A LARGE S.A.E. FOR YOUR FREE CATALOGUE
PLEASE ADD £2.00 POST & PACKING TO ANY ORDER

RECRUITMENT

BBC RESOURCES

We are looking for someone to join the small Conference and Office Technical Facilities (COTFacs) team, providing a maintenance service for technical audio/video equipment used in offices, viewing and conference rooms in West London premises. Responsibilities include location and repair of faults, installation and interconnection of equipment, operating equipment for viewings, safety checking and performance/acceptance testing.

Broadcast Technician

Television Studio Production Resources

Desirably, you will be qualified to BTEC National Diploma/Certificate level in Electronics; alternatively, you will have several years' experience in appropriate service work. You will have the ability to locate and remedy faults effectively, and a knowledge of line-up techniques with both analogue and digital equipment. You will have a good understanding of the relevant safety procedures and normal colour vision is essential. You will also have good interpersonal skills and an awareness of customer needs.

The section operates on the basis of long day shifts, including work on Saturdays.

Offered on a continuing contract. Salary in the range £13.5K – £16.5K according to qualifications and experience. Based West London.

For an application form send a **postcard** (quote ref. 17661/TL) to **BBC Recruitment Services, PO Box 7000, London W12 7ZY. Tel: 0181–749 7000 Minicom 0181–752 5151** by March 2nd.

Application forms to be returned by March 7th.

WORKING FOR EQUALITY OF OPPORTUNITY

EXPERIENCED ENGINEER

Required For

TV/Video Hi Fi, Full or Part time Engineers welcome

Ask for Paul on

01734 667267 (Day)
01734 864444 (Eve)

TRAINING

TECHNICAL TRAINING

Do you get enough of the calibre that you require?

Would you like more help?

From Theory, Principles & Fault Finding through to Product Knowledge for Sales staff, We can help.

Let me know the type of equipment and the training package that would suit you best...

Give me a call now

John Carrington

Tel: 01773 743245

TRAINING

Learn all aspects of broadcast technology by low cost video cassette course.
Direct practical approach with active demos on all tapes. Complete with printed textbooks.
Residential training courses available

Contact
Warriston Broadcast Training Centre, Ballplay Road, Moffat, DG10 9JU
Tel: 0683 20943

START YOUR OWN MOBILE COMMUNICATIONS BUISNESS

Our unique independently written manual gives you all the information you need to start full or part time along side your existing business.
Include confidential trade suppliers telephone numbers, available now at only £2.95 postage paid cheques / PO :

Global Media Communications (TV)
1a Park Place, Leeds LS1 2RU.

FOR SALE

COLOUR SOUND

NORTHERN IRELAND

Wholesale Unit

66 High Street Bangor (0242) 453000

Now disposing of all Thorn stock also some B Grade.

Export Enquiries Welcome

LOW PRICED
EX RENTAL
TV's VIDEOS
SATELLITE
Call Bill on
081 549 4339
South London Television Ltd.
Now At
9 Vant Road, Tooting SW17

TUNERS FOR PACE SATELLITES

PRD 800 7.5 GHZ C75 G01	£17.45
PRD 800 + 2 GHZ 221, 2077	£28.20
PRD 900 2 GHZ 221, 2177	£32.90
9000 Series Tuner Kits	£26.00
9000 Series Original repaired Direct replacement	£19.45
Remotes for PRD 800	£8.75

CALDER COMPONENTS
127A Westgate, Heckmondwike,
West Yorkshire WF16 0EW
Tel/Fax: (01924) 411089

Prices Inc VAT. Free Post & Packing. Cheques with Order

LNB 10.0 GHZ IDB £18.95
9.75 GHZ IDB £18.95
21 PIN SCART LEADS 1.5M – FULLY WIRED 99P EACH FOR 10
4-WAY UNIVERSAL R/C, REPLACES UP TO 8 R/C £13.50
ASTRA ID CONVERTORS £14.99
ALL NEW STOCK, ALL PRICES + VAT + CARRIAGE
H.S. WHOLESALE
125–127 QUEEN STREET, WITHERNSEA HU19 2DJ
TEL: 0964 614439 FAX: 0964 614439

SERVICE MANUALS
– Have you turned work away for want of a Service Manual?
– Have you ever bought a Service Manual and never use it more than once?
– Then why not join
"THE MANUALS LIBRARY"
For details and Membership Application Form Write, Phone or Fax
HARVEY ELECTRONICS
43 Loop Road, Beachley, Chepstow, Gwent. NP6 7HE
Tel: 0291-623086 Fax: 0291-628786
VISA. ACCESS accepted

VALVES & VALVE HI-FI WANTED FOR CASH

(KT88, PX4, PX25 £45) (DA100 £75)
(EL34, EL37 £10)
(ECC81/CV4024, CV4004, ECC83 £3)
Valves must be Mullard/GEC, West European to achieve the price.
Gerrard 301 £60: Quad II complete system £200
Ask for our free wanted list. Prompt & courteous service. Visitors by appointment only (we are a very busy Export Warehouse).
BILLINGTON EXPORT LTD
TEL 01403 784961
FAX 01403 783519

SPARES & COMPS

TRANSFORMERS

TUBES

LINEAGE

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel: 0494 814317.

OCHRE MILL Technical Services, Grundig TV spares for most models to 1985, fast, friendly, helpful, sensible prices. Gt Lype Farm, Charlton, near Malmesbury, Wilts SN16 9DR. Tel: 0666 823228.

AVO MULTIMETER Model 8, £45.00. 500 volt megers £30.00. Prices plus VAT and p&p. Send SAE for lists of Surplus Instruments and Scopes etc. A. C. Electronics, 17 Apleton Grove, Leeds LS9 9EN. Tel: 0532 496048.

VIDEOCRYPT DECODER Service sheet with smartcard contact details Eurocrypt card interface £12.00. E.M.O., Ramsbottom, Lancs BL0 9AG. Tel: 0706 823036.

TEKTRONIC OSCILLOSCOPE Dual channel storage £240 o.n.o. AVO model 8 Multimeter £25. Tel: 01543 450347.

B&K 467 CRT Restorer Analyser 3 metres with 6 base adaptors £180. Tel: 0151 639 90019.

LCT-910A CRT rejuvenator, Philips PM3110 oscilloscope, quantity colour and b/w tubes, various TV spares, television magazines and manuals Tel 0353 860182

PHILIPS PM5508 Pattern Generator, leader LCT 910A CRT rejuvenator, Philips PM3110 oscilloscope, quantity colour and b/w tubes, various TV spares, television magazines and manuals. Tel: 01353 860182.

ADVERTISERS' INDEX

CAR RADIO SECURITY DECODING SOFTWARE

The most comprehensive software package ever from only £275+VAT

This package is fully upgradeable to any model of radio currently on our radio decoding list. Please phone for comprehensive radio decoding list and free demonstration disc (3½")

Upgrades will even cover the latest radios on the market. We can supply/design a package to decode any radio that you choose. Updated software available absolutely free.

Package comprises models including:–
Ford, Philips, Blaupunkt, Clarion, Pioneer, Panasonic, Grundig, Hitachi, Volvo, J.V.C. In fact over 50 models covered including Ford RDS V1 & V2, Grundig SC303

Interface & all necessary probes for connection to the radios are also supplied. Installed in seconds, no modification to your computer required.

Features:–
Fully IBM or compatible, to run on all computers including lap tops, note books and even palm tops. Requires graphics capability for P.C.B. layouts. Runs from parallel port of LPT1.

1. Full user friendly menu's
2. Help screens with P.C.B. layouts for exact positioning of probes
3. Help screens to show you exactly how to enter the codes after decoding the radio
4. Error messages to advise possible fault occurrences (e.g. incorrectly fitted probe)
5. Adjustable for either b&w or colour monitors (Useful for notebooks, laptops etc.)
6. Fully reprograms blank or corrupted eeproms (using internal database)
7. Customised with your company details
8. Security coded with your choice of code to stop unauthorised access
9. Runs from C drive
10. Keeps a record of all codes (date, time, make, model)
11. Fully upgradeable

Upgrades:– Check this out?
Memphis SQR 88, CDP09, Bremen, Atlanta, Montreux, Symphony, Koln, Philadelphia, Toronto, Montreal, Paris, Peugeot PF3, Vauxhall CD300, SC202, Berlin, Frankfurt, Barcelona, Stockholm, Kingston, Nashville, Woodstock, and many many more. POA.

RADIO DECODING SERVICE:–
WE COVER ALL MODELS STARTING FROM £10.00 + CARRIAGE (£4.20 EACH WAY) + VAT. That's only £16.69 or £21.62. If we arrange collection, all you have to do is make sure it's boxed and adequately protected.

Eeprom re-programming service:–
All eeproms are decoded for as little as £5.00 including VAT.
Please send all eeproms in a padded envelope, to stop damage.

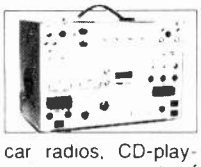
CDH ELECTRONICS, leading the way – not following

Our warehouse is only 24 x 30 sq ft but it's not the size that counts, it's how you use it!

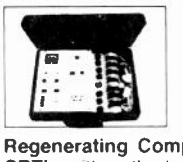
3 Common Walk, Huntington, Cannock, Staffs. WS12 4NB
Tel: 0543 572 523 VAT Reg No 636 876 011

MÜTER · AT2 · BMR95 · BMR700

AT 2, Audi-Multi-Tester, 16 test-circuits for loudspeakers, tuners, amplifiers, headphones, tape recorders, mikes, boosters,

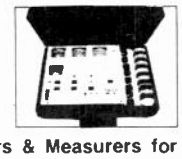


car radios, CD-players, measurment of millivolt, drift, watt, performance, with generator, radio, signal tracer/injector, 13 volt supply etc.



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: 353 75 48275 and 48532. Fax: 353 75 71031.
New Zealand: TDON Ltd., Onehunga, Auckland. Tel. 6 68-9 07, Fax 668-4 99.
Germany: Ulrich Müter, Oer-Erkenschwick, Fax (0 23 68) 5 70 17.

Microwave Oven Component Parts

Guaranteed Quality **Guaranteed Products** **Competitive Price**

AWI Ltd, 29 Manner's View, Dodnor Ind Estate, Newport, Isle of Wight, PO30 5FA
Tel (01983) 520121 Fax: (01983) 520122

JOULE A-400

ADVANCED CAR RADIO DECODER/RE-PROGRAMMER

Features:

Plugs directly into your IBM or compatible computer. Remove the baseplate from the radio, place the probe onto the PCB and the security code is instantly displayed. Changing the code or even fully re-programming is just as easy.

ABSOLUTELY NO MODIFICATIONS TO YOUR COMPUTER ARE REQUIRED

The A-400 can use either Comms 1 or Comms 2, connected via the serial lead supplied.
Two levels of password protection (user selectable) to prevent unauthorised use.
Each decode is recorded and may be accessed at any time, again, to prevent unauthorised use.
Operates from 12 volts, either from mains (via any mains adapter) for bench use or, via vehicle cigarette lighter socket, for on site use.
Easy to use software includes on-screen PCB layouts for probe location, very detailed help screens and information on how to enter codes into the radio once the set has been decoded.
Supplied complete with connecting lead, purpose designed probes and a comprehensive instruction manual.

Technical help line available to all registered users.

We will supply a starter kit, ready for use, that will decode most Philips, Ford, Blaupunkt, JVC, Hitachi, Volvo and Toyota radios for £375.00 + VAT.

We also write software to decode the more sophisticated RDS models and can supply at very competitive prices.
Currently the A-400 can decode most makes of radio, covering 166 models with more being added weekly.

PHONE NOW FOR OUR FREE DEMONSTRATION DISK AND INFORMATION PACK, OR WHY NOT VISIT US AT OUR BRAND NEW 4000 sq. ft. FACTORY

ELECTRONIC SOUND SYSTEMS

Hilton Road, Aycliffe Industrial Estate, Newton Aycliffe, Co. Durham DL5 6EN.
Tel. Sales: 0325 301007 Fax: 0325 300189 Mobile: 0860 221 099

MARCONI COMPACT L.N.B.
1.DB £25
10.7 TO 11.7GHZ

Switched Mode Trans 3112. 338. 32642 Ferguson £1
Philips switched mode tranformers for K40 £5

SATELLITE RECEIVERS — New Ferguson BSB Chassis with Tuner, Modulator etc £10
Hand Set £1.50 £4 Post

33V33, 3V37 BATTERY £10
Postage £5

TX100 HAND SET (785) £10
Power Supply 0-15 Volts 0-30 Volts 3 Amps with Meters £34
Post £5

SMALL SATELLITE TUNERS (950 to 1750 MHz). I.F. frequency 4000MH ..... £9.00 each
VHF/UHF S.BAND TUNER £3.00
DAM MAINS CHASSIS AMSTRAD MONITOR C £10
UNIVERSAL TRIPLER. NEW TYPE £4.00
VIDEO LEADS 40p
AMSTRAD Line O.P. Transistors with Diode 2SD/453 ..... £1.00
VIDEO LAMPS. Long Lead 24p
HITACHI & GEC FRAME. Thick Film £6.00
FIDELITY SPLIT DIODE ..... FCC2215AE....£20 ..... FCC2015BE....£10 ..... FCC2215BE....£10
K30 FRONT PANEL TEL-TEX TYPE £5.00
NEW G11 LINE OP PANEL £8.00
PHILIPS YEARS AHEAD
THE CREDIT CARD CALCULATOR Solar Powered £3.75
NEW PHILIPS SBC 1833 Solar & Battery Powered Calculator £8.00
THORN PANEL TX9 REC & REMOTE PANELS with Mains Trans £5.00
TX10 REC & REMOTE PANELS with Mains Trans £5.00
TX100 FRONT PANEL £5.00
TX10 TUBE BASE ON PANEL £3.00
TX9 IF £2.00
THORN PANEL No.515-353, 548.02. 565-01. 509/102, 515/173, 508/161 ..... £5.00
THORN TX STEREO SOUND O.P. PANEL (I.C. TA7227P) £1.00
THORN VIDEO AERIAL AMP 01 M4-597-001 ..... £6.00
ULTRASONIC TRANSDUCER 15p

AMSTRAD MODULATOR SAT 510 £3

A.A.A. BATTERIES – 24 for £1

VIDEO AMSTRAD (L,C,D Types) HANDSETS
(HOME MARKET) £4.00
(EXPORT) £2.50
WILL WORK IN HOME MARKET

SEND FOR DATA D2 MAC SATELLITE RECEIVER £35 (£5 Post)

6.000 and 4.600 4.700 £3

PB500 Panic and Button Transmitter 180MHz £1.00
G11 CAP 250V. 470M £1.35

LEADS
Scart to Scart all pin connected £2.00
1½ meters

New Eprom for converting Ferguson BSB Receivers to D2 MAC and PAL – 99 channel is tunable and each one can be put into memory – also has menu. £20
PAL panel (to convert to PAL) £20
SEND FOR DATA

TELEPHONE BATTERY SANYO 3.6V 250/MA – £2

VARTA 3.5V 280 M/A £3.00

FEEDHORN FOR OFFSET ANTENNA £8.00

HITACHI U/V HAND SET VIDEO £10

Gas Soldering Irons **New Type £10.00**
Variety Nickel Cadmium Batteries from Telephone Type to Sub-C.50p per cell. Mainly in packs of 6 to 8.

HITACHI UHF-VHF SMALL TUNER
ET598A £5.00
ET595A £5.00

GREY OR BLACK £1.50
5AMP MAINS LEAD WITH PLUG SOCKET FOR TEST EQUIPMENT ETC.

06D4-025-001 Mains input choke for TX9 £4

THORN M494B1 on Remote Panel £5

TX100 REMOTE PANEL No.56413IC M293B/and SAA5012 £10 etc

NICAM UNIT — Ferguson made for ICC5 Chassis — circuit diagram and can be converted to most sets — **£15.**
TOSHIBA Nicam panel & IF export only has the Toshiba chip set **£7.00**

LARGE Foacs pots. Fits Pye, GEC, ITT, Decca **75p**

6251 FRAME O/P THICK FILM HITACHI GEC £9.00
THICK FILM HITACHI HM9205A £4.00

Hitachi Lopt 2435062 ..... £10
LOPT
Hitachi 2433274 ..... £10
Ferguson 2435121 TX85-TX86 ..... £8
TX 9 Remote Panels £5
TX 10 Remote Panels £5
TX 100 Remote Panels IC M293B1-SAA5012 ..... £10
TX 100 Remote Panels with Stand-by Battery and ICs £10
TX 85 – 86 – 89 – 90 – 98 – 99 – 100 Tuners £4
Orion Modulator Video MDLK 6B513A £2.50
Hitachi Mains Switch with Stand-by 50p
Scart to 4 Phone Leads 1½m £2.50
SXT2302234 Sat Tuner with Base Band Min £4

BSB SAT/REC NEW. CHASSIS, TUNER AND MOD £5 + Post £3

PHILIPS NEW TYPE U/V HANDSET £10

G11 LOPT Panel £4.00
G11 Tip Switch £20.00
G11 IF Panel £3.00

G8 Push Button Unit £2.00
G8 Con/Panel New Back Type £4.00

Have you got Acid Rain in your garden? PH METER £5.00

Post £5 Actuator Antennmotor **£15.00**

LATEST VIDEO
For Latest Philips, GEC, Pye and Hitachi. Front panel with memory chip and push button and pots and LED's **£6.00 NEW**

FERGUSON YELLOW SPOT
TX100 NEW CHASSIS
£12 £5 Post

LNC 11GHZ NOKIA – LNB FOR OFFSET DISH £13.00
ELECTROMAGNETIC POLARIZER 10.95 – 12.75 GHZ £9.00
11GHZ LOW NOISE BLOCK DOWN CONVERTER SCE 975 MADE BY MASPRO £14.00

5 Mixed AMSTRAD VIDEO MOTORS **£5.00**

SATELLITE TUNER UNIT 2427611 with Base Band, Video Out £8.00

TX10 8 way button unit £8.00
24v O 24v 3Amp MAINS TRANSFORMER £3.00

TX100 FRONT PANEL £5 8 Button

SUPER HIGH CAPACITY BATTERY VA310 £10

VPT ADAPTOR VA354 FERGUSON £5.00

PHILIPS UNIVERSAL BATTERY TESTER SBC 1695 £3.00

VIDEO CONTROL I.C.'s
ORION OEC 7005B, OEC 9009, OEC 0015C, OEC 9005
AMSTRAD 14DN513, 14DN728
£2 EACH

REGULATED PWR. SUP. 500M/A 1.5V 12V DC switched + & – **£5.00**

MADE BY PLESSEY – MADE IN ENGLAND
New public telephone exchange original price cost £299.00
Network exchange line
(at home or in a small business) has two telephones and cables and NS5107 control unit
SPECIAL PRICE £40
Send for data

RGB SIGNAL CONVERTER VA341
In black metal case and mains power supply built in
£20.00

PULSE CAPACITOR 20 for a £1 mixed (1500V to 2KV)

56420A 20A/600V THYRISTOR **£1.75**

ITT BG2032-642A TRIPLER £5.00

TERE 7-008A – 115-B-2010
ECC-2885PLE TEEF 1-030A
UHF, VHF TUNER – SMALL TYPE
£4 EACH

BRIDGE RECTIFIERS – MIXED 10 FOR £1

TVK 186-5 TRIPLER TVK 76-5
£1.50 EACH

TX100 SWITCH MODE TRANS 5157/48 £5
AND 00D4252001
06D3082001

STEREO SOLAR RADIO VHF AND MW **£10.00**

TX100 and TX90 (Chassis Type or Print Type)
8 Push Button Unit with Adjustable Pots **£2.50**

3V33 HAND SET £10

12 Volt Relays 20p with D/P changeover

LEAD SCART TO D PLUG 50p

BRIDGES RECTIFIER
Mixed BR-31 to 34
2 Amp to 5 Amp
8 for £1.00

1 METRE SCART LEAD £1.00

BURGLAR ALARM USE INFRA RED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY

POWER SUPPLY KIT 0.28 volts 1½ amps with 2 meters £12
Printed circuit board and components

MODULATOR KIT £5
5v to 12v for all cameras etc

2433752 £20
2432984
2432871
2432301
2435016
2433952
2434393
2432211
T9048A
DST858243
TFB3069D
K4 L.O.P.T
K40
2433452
2432904
2434451 £14

£15 EACH

SPLIT-DIODE
2433752 £15
TX100 Green Spot £15.00
TX100 Yellow Spot L.O.P.T. £10.00
TX90 White Spot L.O.P.T. £15.00
Split Diode 110° £12.50
Orion 65-3M
GEC 85-9793-6
TX9 Thorn 2432101-2 £5

2434141 EACH
2434492 £10
2434493

DST81N243
TFB4023AD £10.00
MSH1FPT131 £12.00
MSH1FBW27 £12.00
DST186N243 £10.00
3220029 £10.00

TOSHIBA
DST 186N243 £10
TFB-4023AD £10
CP90 Philips Split Diode £10.00
2435141 £15
2432491 £10
2435065 £15

36761
36881
2692120/10
37051
CTK Lopt
36212
33651
36072
36362
36482
36761
36831
36832
36833
36921/79
36922/79

TX85
2435701
2434393
2435016
2435014
£10
2436797
2434494
£15

TRANSFORMERS
24357/01 £10
2435012 £10
FERGUSON 47005481 £10
AMSTRAD TVR3
LPTS £10
TFB3069D EQU
TFB4009AN

AT2636/00 AT2076/55
AT2648/11 AT2076/71T
AT2655 RCC ST CT3325
AT2076/35 OT2041
AT2076/38 FB165KA Orion
AT2076/51 2076/51
CVC 820 2432461 2433451
CVC 800

TUNER UNITS
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
UF2-B31 Fidelity V/Cap U/Unit £6.00
UHF-VHF V/Caps on panel £3.00
HITACHI 20 Turn Pot 40p
U321 ca panel £6.00
U/V 615 £10.00
U/V 656 £10.00

SHARP MSH1FCF09
£10 EACH
0004-235
002-01
FIT MOST SETS
New Thorn Hand Set
Type u/v (£10)

VIDEO MOTOR for VT568 type VC62DDR £8.00
AMP TUNER IF for VT568 Hitachi & GEC £9.00

U/V 6, DIODE TRIPLERS £2.00

4600 TO 8600 AMSTRAD VIDEO HAND SET WITH LCD £10

NICAM MKII KIT MODULE £20.00 with data

Burglar Alarm Has time delay to set £2
Mains Transformer £4.00
240v in 110V to 120v out
1 amp post £3

SATELLITE TUNER
950MHz-1750MHz £5.00

TTT PANEL
CMC 301 CMC 113 CMC 302
CMC 115 CMC £5.00 303 CMC 96/4

BRIDGE RECTIFIERS
10 FOR £1.00
4 Amp for Video Power Supply

SEL ITT
IFB254F/2 Front Panel
£15.00

DECCA — GEC — ITT
6 push button **£5.00**

BURGLAR ALARM £2.00 with siren 9 VOLT

25 Way Plug and Socket with Case £1.50

PHILIPS HAND SET G11 TEXT ULTRASONIC £10
G11 HAND SET ULTRASONIC £10
PHILIPS RC5 EASY CONTROL £10

INFRA RED DETECTOR
(for outside use) with Time Control & Distance Control £12
Sensitivity Adjustment Control
Night Adjustment Time Delay Adjustment

SENDZ COMPONENTS
0702 338894
(To order see back page)

FERGUSON SAT HAND SET
SR D1
SR D2 £2
SR D3
SR D4

FERGUSON ICC5 STEREO O.P. PANEL ICs TDA8405 TDA8421 TBA1204 £10

Ferguson White Spot Line O/P Trans	£8
FERGUSON CHASSIS	
New	
TX 100	£15.00
TX80	£15.00
TX 99	£30.00
TX 98 VHF/UHF	£15.00
TX 90 Push Button Chassis 14"	£15.00
TX 10 Metal Chassis	£15.00
PP on each chassis £5.00	
Quartz Halogen 500w, 240v. For outdoor lamps	£1.00
Plastic Front with Flap 8.900	£3.00
Clock Display Panel 8.900	£5.00
TX 100 FST Chassis LOPT No 260482	£20.00
£5 Post	
Sharp Tuner & IF 1810587 PAL1 UK	£3.00
Tuner IF UE30-BO 3 Amstrad	£3.00
10 Mixed Tube Bases All New Types	£1.00
SFE 6 Meg. Filter	25p
CDA 6 MHz Filter	25p
SFE 5.5 MHz Filter	25p
455 Filters	25p
480 Filters	25p
Ferguson Red Spot LOPTS	£8
Ferguson Green Spot LOPTS	£10
Ferguson Y260482 FST LOPTS	£10
Ferguson Tuners	
TX 90 to TX100	£4
U/V 615	£10.00 each
U/V 616	
Tuners Nat. Pan. Small UHF/VHF	£3.00
U321 – U341 – U342 – U343 – U344 Tuners	each £5.00
U 411 Tuner	£5.00 each
U 412	
LNB'S MARCONI	
Ex Rental Black Cap	£2.00
No Guarantee	
Bridge Rectifiers	10 for £1.00
Matsumi Miniature Infra Red Receiver	£1.00
Turntable Satelite Modulator TV	£1.00
Sound 5.5 MHz MPM 1000T	£1.00
Sound 6.0 MHz MPM 1040	£1.00
FEROX	
RF Filter Clamp for Coax Cable	50p
Circuit for detecting R.F. Send for Circuit using clamp	£1
Ferguson Switch Mode Transformer TX85, TX86, TX100	each £3.50
ICC5 Ferguson Switch Mod Trans 3112-338-32642	£4.00
12v DC and 24v DC power supply regulated	£2.00
Philips Text Decoder K40	£8.00
ICC5 Tube Base on panel	
ICC5 Decoder panel	each £5.00
KT3/k30 T/Text Hand Set	£8.00
KT3K30 Full Remote	£15.00
Pye & Philips handset KT3-K30 chassis No. RC5150-RC5176-RC5071-RC5177. Special Price	£13.00
RC400E KT3 and Teletex	£12.00
TX10 Hand Set Text	£12.50
TX9 with Text	£12.50
TX9 & TX10 button print	£1.00
TX10 Focus Pots	£4.00
Mains Stand By Switch with Coil	£1.00
Nicam Boards Texas Instruments MkII	£15.00
Toshiba Nicam Board	£6.00
Ferguson Nicam Board	£15.00
Text-Type Replace Hand Set for Philips KT3-K30, K4 etc	£6.00
Thorn Handsets 9000-9600-TX9-TX10-TX100 Text and NonText	£10.00
Philips RC5171 (Handset)	£8.00
Sanyo Magnatron Type 2M218H	£10.00
1992 to 1993 Mod. Orion Video Hand Set with LCD	£5

Samsung & Orion Video decks with heads	£16.00
TV & Video hand set	£2.00
Orion TV and video hand set	£2.00
B.Sky.B VHF to IF Block Converter	£1.00
10 Panels Ferguson Mixed from TX9 to ICC5	£20.00
TV Aerial Ring Type	40p
TX100 Remote Hand Sets	£6.00
ITT-Nokia Tuner IF RF-IF-Module 5829 02 58	£6.00
SEL-ITT HF-Module 2 UK 5828-04-10	£6.00
Amstrad-Double Decker Switch Mode POWER SUPPLY	£5.00
Amstrad-Long Chassis and short Chassis Power supply	£4.00
Models 1991/1992	
BU 208A, BU 508A, BU 508D, BU 508AF, BU 508DF, BU 808DF	£1.00 each
BU 801	60p
2SD 1398	£1.00
2SD 1428	£1.00
2SD 1556	£1.00
2SD 1844	£1.00
TDA 2600	£1.50
TX90 Mains Transformer	£10.00
TDA 3560	£2.00
TDA 3654	90p
TDA 3653AQ	£1.00
TDA 3562A	£1.00
STR 4211	£6.00
STR 6020	£6.00
STR 6602D	£4.00
01 M4-412-001-RU1 8 WayPre sets for TX10-TX100	£3.00
Philips Handsets RC 5353	
RC5300	£8.00
RC 5176	each
RC5177	
Philips 36832 2A LOPT.	£15.00
2433274 LOPT	£12.00
Line Transformers Green Spot	
White Spot	£10.00
Blue Spot	
Yellow Spot	
FERGUSON	
KT3-K30 Tripler	£5.00
U/V Tripler	£4.00
Grundig Tripler with Focus Pot	£7.00
BG 2087-642-1005 Triplers	£7.00
BG 2032-642-3002	£7.00
PERDIO PV 1188 Hand sets	£3.00
HANDSETS	
Amstrad Export	£3.00
Amstrad U/V	£3.00
Amstrad 6800	£4.00
Amstrad 6000	£15.00
Amstrad 4700	£5.00
Amstrad 4600	£3.00
IQ081 GEC	£3.00
FERGUSON	Hand sets
BSB	£1.50
ICC5	£5.00
IK2000	£5.00
IK7000	£5.00
SRD 2	£1.00
SRD 3	£1.00
T780	£2.00
SRD 4	£1.00
TX85 – TX8 Ferguson	£10

PANASONIC TV Video Handset 1993 models with door- 3 types	£7.00 each
ORION	Hand set
LCD Video Easy Programmer	£10.00
RC18	£3.00
PHILIPS U/V Handset TV/VCR/TXT Remote RC 5903	£12.00
ORION	Hand set
Video RC44	£3.00
Video RC07	£3.00
LCD	
PANASONIC-TV	Original
Handsets for models: TC1632, TC1642, TC2232 TX2034, TX2044, TX2200 TX2234, TX2244, TX2300 TX2636, TX3300, RC201 replaces TNQ1411/2	
£8.00 each	
TOSHIBA	Hand sets
CT 9511	£5.00
CT 9234	Hand sets
CT 9455	
CT 2233	
CT 938	
CT 9268A	
CT 9384	
CT 9194	
CT 9296	
CT 9186	
CT 9187A	
£3.00 each	
AMSTRAD Long Chassis Display Panel 1992/1993	£4.00
Amstrad Tuner UE33-B01	£3.00
TX10 Focus Units	6 for £10.00
Conversion Kit ITT Teletext	£8.00
Burglar Alarm Siren 12 Volt	50p
Amstrad 6000 Head with motor LP	£10.00
Good Lower Drum	£3.00
HITACHI sets etc	
STR454	£2.00
STR6020	£6.00
S2000AF line o.p.	£1.00
2SC940	£1.00
BU105/04	80p
BU108	£1.00
BU124	50p
BU126	80p
BU180a	65p
BU204	60p
BU205	75p
BU206	£1.00
BU207	£1.00
BU208	80p
BU208A	£1.50
BU208D	90p
BU222	£1.00
BU326	£1.00
BU407	60p
BU508A	90p
BU508AF	£1.00
BU508D	80p
BU705	£1.00
BU806A	£1.00
BU807	£1.00
BU808DFI	£1.00
BU826	£1.00
BUK454/600	£1.00
BU824	50p
BUT11	50p
BUT11AF	£1.00
BUT13 600V-28A	£1.00
BUT18AF	£1.00

BUW84	60p
BYW20-08-9	£1.00
BYW95	10p
BUX39 25A-150V	£1.00
BUX84	50p
BUY49	20p
BUK444/800	£2.00
BUK445/600	£2.00
BUK454/600	£2.00
TDA3047	£1.00
TDA3048	£3.00
TDA3083	£2.00
TDA3190	£1.00
TDA3301	£3.00
TDA3505	£3.00
TDA3506	£3.00
TDA3561	£3.00
TDA3560	£4.00
TDA3561A	£3.00
TDA3566	£3.50
TDA3564	£4.00
TDA3565	£3.00
TDA3581	£3.00
TDA3590	£3.00
TDA3591	£1.00
TDA3592A	£3.00
TDA3650	£7.00
TDA3651	£3.00
TDA3651AQ	£3.50
TDA3652	£3.50
TDA3653AQ	£2.00
TDA3654	£1.00
TDA3654Q	£2.00
TDA3710	£3.50
TDA3800	£4.00
TDA3803A	£4.00
TDA3180	£2.00
TDA4260	50p
TDA4501	£3.00
TDA4505NE	£3.00
TDA4420	£2.00
TDA4439	£2.00
TDA4600	£3.00
TDA4601	£2.00
TDA8190	£3.00
TDA8703	£3.00
TDA8349	£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
TEA2029C	£3.00
IK7 ST6391 B1	£3.00
ST 6393 B1/1M	£3.00
BYX10	10p
BYX38/300	25p
BYX55/350	10p
BYX55/600 (Bead)	10p
BYT71/600	15p
BYV95B	10p
BYV95C	12p
BYV96D	10p
BYZ106	10p
BPW41	15p
BYW56 2A/1000vG11	8p
BYW29/50	15p
BYW95C	10p
2SC3795	30p
2SC3973B	30p
2SC4313	£1.00
2SC7350	15p
2SD180 TO3 80v/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
2SD1398	£1.00
2SD1415	£1.00
2SD1427	£1.00
2SD1432	£1.00
2SD1453	£1.00
2SD1556	£1.00
2SD1576	£1.00
2SD1577	£2.00
2SD1878	£1.00
AAA Batteries (handset type)	5p each

SEND FOR "SECTION 2"
Please send SAE