

MAY 1995

£2.20

TELEVISION

W32 \$3.95
TELEVISION
MAY 1995
CC
OF
35748
600583532009 050795 3
Copyright © 1995 Reed Business Publications

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

A REED BUSINESS PUBLICATION

**Servicing the
Hitachi
CPT1471/1473**

**Sony CCDF450
Fault Guide**

**Satellite Receiver
Servicing Notes**

**Tube Testers
and Testing**

**Digital TV Demo
VCR Clinic
TV Fault Finding**

Installing a CD-ROM Drive



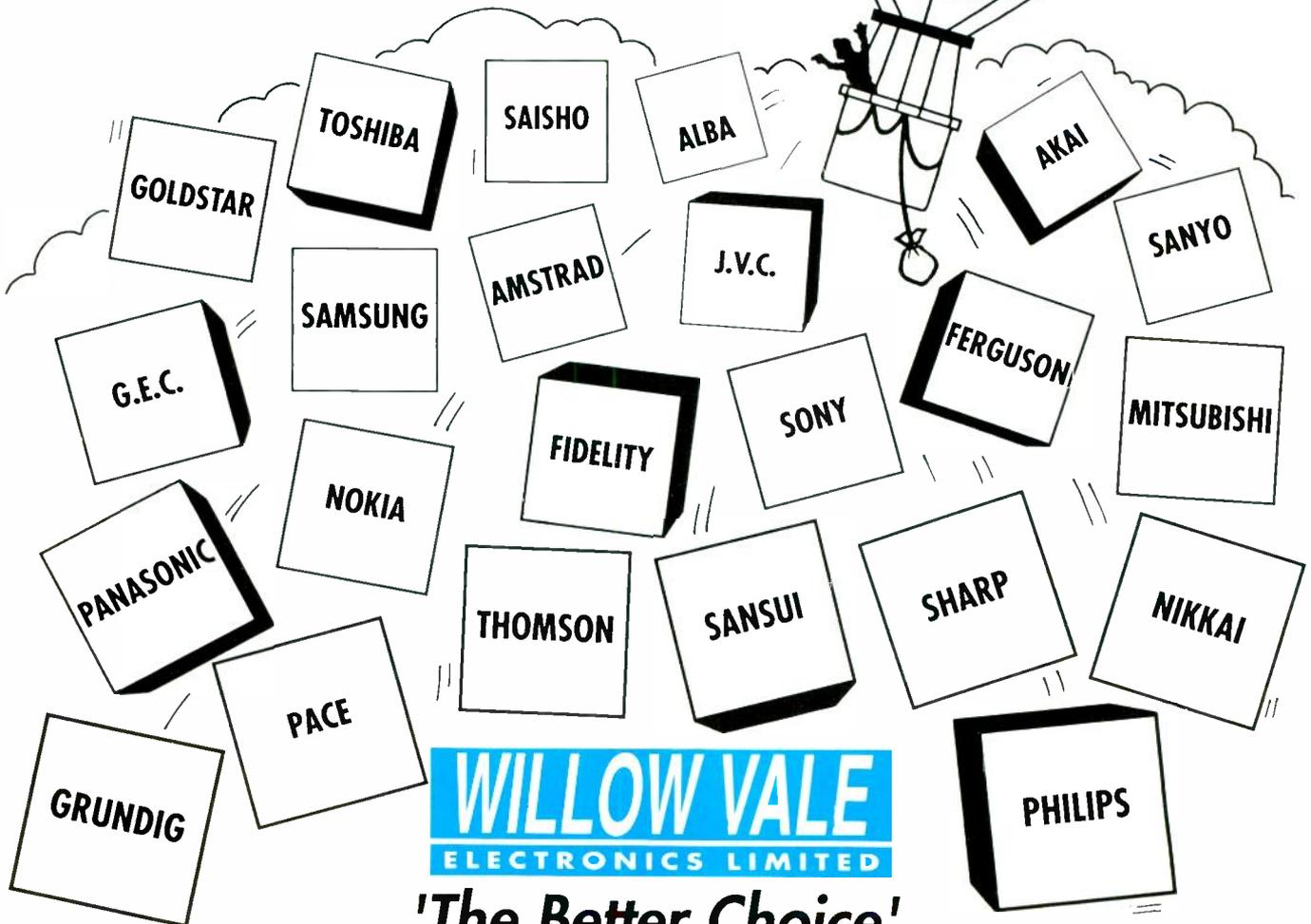
WILLOW VALE ELECTRONICS LIMITED

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 knowledgeable staff.



WILLOW VALE
ELECTRONICS LIMITED

'The Better Choice'

Reading (01734) 876444 Manchester (0161) 682 1415

TELEVISION

MAY 1995

On Sale

April 19th

Vol. 45, No. 7

Issue 535

472 Servicing the Hitachi CPT1471/1473 John Coombes

Fault notes on these popular 14in. colour sets, with a circuit description of the power supply.

474 Dealing with UHF Interference from Satellite Receivers J.LeJeune

Interference that's introduced when a satellite receiver is added to the domestic TV/AV installation has become a significant problem. Causes and steps to take to overcome it.

478 Fault Notes on the Sony CCDF450 Keith T. Keeton

A summary of fault conditions experienced with this camcorder.

480 Notes on the Grundig GRD150/250 Jack Armstrong

On one or two early faults that you may encounter and Grundig's servicing policy with these new receivers.

482 Summer of '75 Brian Storm

Just twenty years ago Brian was unleashed on the domestic TV scene. The sorts of problems you had to deal with as a field service engineer in those days.

489 Installing a CD-ROM Drive, Part 1 David Botto

A CD-ROM drive is becoming an essential PC feature and is easy to install. Adding a sound card is also worthwhile.

494 Tube Testers and Testing Les Austin

How tubes operate, what causes loss of emission/degraded performance and how tubes are tested.

499 Terrestrial Digital TV Demonstration Eugene Trundle

NTL recently gave a public demonstration of its terrestrial digital TV system, with four channels transmitted and received in a

single, standard analogue channel bandwidth. Eugene was there to assess the system's performance.

500 Satellite Notes

Servicing guidance on satellite receivers.

506 Inside the Ferguson ICC9 Chassis, Part 3 Mark Paul

Operation of the video signal processing and colour decoder sections, also the timebases including the unusual line driver stage. Concludes with guidance on fault finding.

REGULAR FEATURES

Camcorner.....	468
Help Wanted.....	488
Leader.....	465
Letters.....	470
Long-distance Television.....	496
Next Month in Television.....	479
Teletopics.....	466
Test Case 389.....	481
TV Fault Finding.....	484
VCR Clinic.....	502
What a Life!.....	476

The June issue will be published on May 17th

COPYRIGHT

© Reed Business Publishing Ltd., 1995. Copyright in all drawings, photographs and articles published in *Television* is fully protected and reproduction or imitation in whole or in part is expressly forbidden. All reasonable precautions are taken by *Television* to ensure that the advice and data given to readers are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it.

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 477.

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 473.

ISSN 0032-647X

GRANDATA LTD

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

Telephone: 0181-900 2329 Fax: 0181-903 6126

TRANSISTORS / LINEAR ICs

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price		
AA32	9p	BD246A	50p	BFY64	25p	MJ15004	300p	2N1613	24p	3.276	115p	BR84D	37p	6502A	360p	AN7156	240p	HA13108	350p
AC107	40p	BD265	45p	BFY90	45p	MJ2501	100p	2N1711	24p	4.0	110p	2A/400V	43p	6502C	930p	AN7168	200p	HA13412	600p
AC125	30p	BD267	45p	BLV48	85p	MJ2551	55p	2N1893	30p	5.0	130p	BR860	43p	6502D	280p	AN7176	180p	HA13432	400p
AC126	30p	BD269	45p	BR100	100p	MJ3000	100p	2N1922	50p	10.0	140p	2A/200V	43p	6502E	210p	AN7222	75p	HA13754	250p
AC127	30p	BD278	50p	BR103	37p	MJ3001	100p	2N2218A	24p	11.0	250p	BR880	43p	6802	220p	AN7254	150p	ICL7660	650p
AC128	40p	BD311	100p	BR303	30p	MJE29A	30p	2N2219	24p	12.0	120p	2A/800V	24p	680	50p	AN7256	250p	ICL7660	650p
AC141K	45p	BD314	100p	BS574	33p	MJE30A	30p	2N2221	24p	14.756	200p	BR32	43p	36808	50p	AN7310	60p	KA2100	150p
AC176	22p	BD315	150p	BXS20	15p	MJE340	25p	2N2222	23p	15.0	160p	2A/200V	43p	6809	50p	AN7311	90p	KA2130	150p
AC178	48p	BD317	150p	BT100A	70p	MJE350	80p	2N2359	15p	24.0	250p	BR34	43p	6810	150p	AN7410	150p	KA2206	150p
AC199	48p	BD318	150p	BT106	80p	MPS20	30p	2N2484	15p			2A/400V	43p	6815	150p	AY3-1015	150p	KA2209	125p
AF125	50p	BD361	60p	BT119	100p	MPSA05	15p	2N2934	20p			2A/600V	80p	6821	290p	AY3-1350	450p	KA2212	80p
AF139	30p	BD362	60p	BT146	99p	MPSA06	15p	2N2935	20p			BR62	80p	6845	200p	AY3-8910	360p	KA2213	130p
AF239	30p	BD370	30p	BTY79	140p	MPSA13	15p	2N2936	18p	7805	25p	6A/200V	72p	6850	90p	AY3-8912	400p	KA2214	150p
BB1058	18p	BD371	30p	BU105	80p	MPSA20	15p	2N2937	18p	7806	25p	BR64	72p	8085A	30p	BA301	55p	KA2261	100p
BB2058	18p	BD380	50p	BU108	100p	MPSA42	15p	2N2939	28p	7808	25p	6A/400V	72p	8085B	30p	BA310	20p	KA2283	100p
BC107	8p	BD433	28p	BU109	80p	MPSA43	15p	2N3033	18p	7812	25p	BR251	150p	8088	48p	BA313	60p	KA2284	100p
BC108	8p	BD434	30p	BU110	90p	MPSA70	15p	2N3054	40p	7815	25p	25A/100V	165p	8156	30p	BA333	80p	KA2284	100p
BC109	8p	BD435	31p	BU111	100p	MPSA92	20p	2N3055	38p	7818	25p	BR252	165p	8224	240p	BA401	60p	KA2401	150p
BC109C	10p	BD436	30p	BU124	60p	MPSA93	20p	2N3055H	50p	7824	25p	25A/200V	185p	8226	240p	BA402	50p	KA2412	350p
BC140	20p	BD437	28p	BU126	85p	MR610	35p	2N3442	85p	7905	25p	BR254	200p	8250	75p	BA511	145p	KA2912	125p
BC141	20p	BD438	28p	BU180	100p	MR656	35p	2N3742	9p	7906	30p	25A/400V	240p	8251	200p	BA514	160p	KA2914A	300p
BC142	20p	BD439	40p	BU184	100p	OC28	35p	2N3783	9p	7908	30p	GR253	160p	8253	160p	BA516	160p	LA1130	240p
BC143	20p	BD440	40p	BU204	65p	OC29	250p	2N3744	9p	7912	30p	25A/600V	200p	8257	220p	BA521	100p	LA1150	150p
BC147	8p	BD441	40p	BU205	70p	OC35	35p	2N3745	9p	7915	30p	BR258	240p	8271	340p	BA524	240p	LA1185	150p
BC149	8p	BD533	30p	BU206	100p	OC36	250p	2N3706	9p	7918	30p	25A/800V	185p	8279	270p	BA526	180p	LA1201	75p
BC159	8p	BD534	38p	BU208	70p	OC45	50p	2N3787	9p	7924	30p	BR351	185p	8283	400p	BA527	95p	LA1210	140p
BC160	30p	BD535	38p	BU208A	75p	OC200	180p	2N3710	12p	78L05	24p	35V/100V	200p	8284	440p	BA532	100p	LA1222	80p
BC172	30p	BD536	38p	BU208AT	200p	OC208	38p	2N3711	12p	78L08	24p	35V/200V	200p	8285	250p	BA534	220p	LA1230	130p
BC177	14p	BD538	40p	BU209	90p	R2010B	130p	2N3771	85p	78L12	24p	35V/200V	200p	8288	65p	BA536	150p	LA1364	200p
BC178	14p	BD643	50p	BU225	120p	S2000A3	175p	2N3772	90p	78L15	24p	BR354	220p	8748	700p	BA546	160p	LA1365	120p
BC179	14p	BD645	50p	BU226	120p	S2000AF	175p	2N3773	100p	78L18	24p	35V/400V	260p	8755	800p	BA612	120p	LA1368	220p
BC182	7p	BD647	50p	BU312	100p	S2055AF	200p	2N3799	18p	78L24	24p	BR356	230p	8756	95p	BA656	110p	LA1385	170p
BC182L	7p	BD649	50p	BU313	100p	S2055AF	200p	2N3819	29p	79053	35p	35V/600V	260p	8758	110p	BA658	350p	LA2000	150p
BC183	7p	BD675	40p	BU326A	55p	S2800M	72p	2N3906	11p	79L08	35p	BR359	260p	8759	140p	BA664	400p	LA2101	270p
BC183L	7p	BD676	40p	BU406	60p	S2800M	72p	2N3906	11p	79L12	35p	35V/800V	260p	8760	160p	BA685	400p	LA2200	190p
BC184	7p	BD677	38p	BU406D	85p	TIP29	22p	2N4401	25p	79L15	35p	BY164 1.5A	40p	AN203	210p	BA1310	160p	LA3160	120p
BC184L	7p	BD678	40p	BU407	75p	TIP29A	22p	2N4402	25p	LM309K	100p	100V	40p	AN210	160p	BA1330	120p	LA3210	65p
BC212	7p	BD679	40p	BU407D	75p	TIP29C	22p	2N4403	25p	LM317T	100p	BY176 1.5A	40p	AN214Q	170p	BA1360	160p	LA3301	110p
BC212L	7p	BD680	40p	BU408	75p	TIP29E	40p	2N5061	20p	LM323K	350p	800V	40p	AN228	280p	BA1423	220p	LA3361	100p
BC213	7p	BD681	45p	BU408D	75p	TIP30C	25p	2N5062	20p	79H08K	800p			AN252	150p	BA5101	350p	LA3375	300p
BC213L	7p	BD682	45p	BU409	85p	TIP31A	22p	2N5241	500p	79H12K	700p			AN259	250p	BA5102	140p	LA4030	180p
BC214	7p	BD705	50p	BU426A	70p	TIP31C	22p	2N5246	45p	79H20K	800p			TIC206D	60p	AN262	140p	LA4031	140p
BC214L	7p	BD707	50p	BU500	100p	TIP32	24p	2N6254	30p					AN271	230p	BA5402	180p	LA4032	140p
BC237	7p	BD709	50p	BU505	90p	TIP32A	21p	2N5256	30p					AN274	250p	BA5408	180p	LA4051	160p
BC237L	7p	BD710	50p	BU505D	90p	TIP32B	21p	2N5448	30p					AN278	250p	BA5408	180p	LA4100	250p
BC239	7p	BD736	50p	BU505DF	90p	TIP33	50p	2N6107	40p					AN303	250p	BA6118	250p	LA4101	80p
BC300	20p	BD826	50p	BU506	100p	TIP33C	60p	2N6129	40p					AN304	350p	BA6208	175p	LA4102	100p
BC301	20p	BD828	50p	BU506D	70p	TIP34	50p	2N6385	120p					AN315	210p	BA6209	85p	LA4110	120p
BC302	20p	BD839	55p	BU506DF	120p	TIP34C	60p	2N64C3	160p					AN316	350p	BA6304	120p	LA4120	270p
BC303	20p	BD897	50p	BU508A	70p	TIP35C	65p							AN360	100p	BA6305	140p	LA4140	180p
BC303L	20p	BD908	50p	BU508AF	70p	TIP36C	65p							AN366	140p	BA6410	150p	LA4142	80p
BC327	7p	BD977	50p	BU508D	75p	TIP41A	22p							AN366	150p	BA6411	250p	LA4182	160p
BC328	7p	BDX33	60p	BU508DF	115p	TIP41C	22p							AN610	160p	BA6993	150p	LA4190	300p
BC337	7p	BDX65	80p	BU508V	110p	TIP42A	22p							AN3312	350p	BA7001	150p	LA4192	140p
BC338	7p	BDW24	55p	BU508VF	100p	TIP42C	22p							AN3821K	60p	BA7004	200p	LA4200	130p
BC441	28p	BDW93	50p	BU526	75p	TIP47	40p							AN3822K	60p	BA7007	200p	LA4201	120p
BC442	28p	BDW94	50p	BU536	100p	TIP48	40p							AN390K	30p	BA7021	200p	LA4260	230p
BC477	18p	BDY32	100p	BU546	125p	TIP50	60p							AN391K	400p	BA7022	350p	LA4261	300p
BC516	22p	BF137	30p	BU568	120p	TIP51	80p							AN5025	250p	BA7751LS	150p	LA4270	130p
BC537	25p	BF167	30p	BU626	120p	TIP52	80p							AN5033	400p	BA7752	250p	LA4420	140p
BC546	8p	BF181	18p	BU705	130p	TIP54	85p							AN5132	250p	BA7755	150p	LA4422	130p
BC547	8p	BF183	20p	BU706DF	175p	TIP105	65p							AN5150	400p	BA7787AS	155p	LA4430	130p
BC548	8p	BF195	7p	BU707	100p	TIP106	65p							AN5151	60p	CA3011	150p	LA4440	150p
BC549	8p	BF199	8p	BU801	70p	TIP107	65p							AN5215	100p	CA3048	190p	LA4445	150p
BC550	8p	BF200	16p	BU806	70p	TIP110	40p							AN5256	150p	CA3052	170p	LA4460	120p
BC556	8p	BF225	30p	BU807	60p	TIP111	40p							AN5262	175p	CA3054	95p	LA4461	120p
BC557	7p	BF240	16p	BU902	110p	TIP112	35p							AN5265	80p	CA3085	135p	LA4500	200p
BC558	7p	BF245	25p	BU903	110p	TIP112H	50p							AN5352	800p	CA3088E	200p	LA4505	220p
BC559	7p	BF254	15p	BU920	100p	TIP115	65p							AN5351	450p	CA3089</			

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 as replacement parts.

Access & Visa Card accepted



LINEARICs / JAPANESE TRANSISTORS

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	TD41574	125p	TD43586	750p	TD48170	170p
LM730	45p	STK443	700p	STK5431	550p	STR30120	400p	TA8132AN	200p	TD41576	170p	TD43590	300p	TD48172	250p
LM723	40p	STK457	470p	STK5434	570p	STR30123	450p	TA8205	250p	TD41578A	210p	TD43591	360p	TD48173	280p
LM741DIL	18p	STK459	560p	STK5436	500p	STR30125	550p	TA8210	300p	TD41579	200p	TD43592A	350p	TD48174	300p
LM741MET	45p	STK460	600p	STK5441	400p	STR30130	250p	TA8215	300p	TD41596	200p	TD43640	350p	TD48175	300p
LM747	55p	STK461	620p	STK5451	390p	STR40090	350p	TA8216H	375p	TD41598	250p	TD43651	200p	TD48178	400p
LM1889	30p	STK463	950p	STK5461	500p	STR41090	400p	TA8220	250p	TD41620	275p	TD43652	500p	TD48185	300p
LM1894N	200p	STK465	720p	STK5462	500p	STR44115	550p	TA8251N	550p	TD41670A	230p	TD43653	150p	TD48191	425p
LM3900	40p	STK501	500p	STK5464	300p	STR45111	550p	TA8218N	550p	TD41675	250p	TD43653	150p	TD48192	275p
LM3909	100p	STK561	450p	STK5466	500p	STR50020	450p	TA8219	300p	TD41701	250p	TD43654	90p	TD48192	275p
LM3914	160p	STK563	415p	STK5467	400p	STR50092	550p	TA8220S	40p	TD41701	250p	TD43670	300p	TD48196	150p
LM3915	160p	STK563	500p	STK5468	300p	STR50103A	260p	TA8239E	70p	TD41870A	200p	TD43724	500p	TD48214E	225p
LM3916	160p	STK563	500p	STK5471	330p	STR50113	260p	TA8250	120p	TD41872A	275p	TD43724	500p	TD48215E	300p
L200	200p	STK770	400p	STK5473	380p	STR50115	500p	TA8250	100p	TD41905	80p	TD43730	400p	TD48304	350p
M4918B1	500p	STK772B	480p	STK5476	350p	STR50141	500p	TA8250	100p	TD41905A	80p	TD43740	400p	TD48304	350p
M49481	700p	STK780	575p	STK5478	380p	STR50213	500p	TA8250	100p	TD41908A	90p	TD43740	400p	TD48305	600p
M5015P	320p	STK1039	460p	STK5479	300p	STR50213	500p	TA8250	100p	TD41910	225p	TD43750	400p	TD48340	200p
M50117P	500p	STK1040	640p	STK5481	520p	STR50304	500p	TA8250	100p	TD41910	225p	TD43750	400p	TD48340	200p
M5019P	425p	STK1042	800p	STK5482	500p	STR50341	500p	TA8250	100p	TD41910	225p	TD43750	400p	TD48340	200p
M50784	300p	STK1050	650p	STK5483	440p	STR5041	500p	TA8250	100p	TD41910	225p	TD43750	400p	TD48340	200p
M50786	500p	STK1060	700p	STK5485	450p	STR5041	500p	TA8250	100p	TD41910	225p	TD43750	400p	TD48340	200p
M50790	600p	STK1070	850p	STK5488	480p	STR5041	500p	TA8250	100p	TD41910	225p	TD43750	400p	TD48340	200p
M51161	300p	STK1080	940p	STK5490	450p	STR6001	525p	TA8250	100p	TD41910	225p	TD43750	400p	TD48340	200p
M51381P	200p	STK2025	620p	STK5632	450p	STR61001	550p	TC5020	200p	TD42005	150p	TD43825	225p	TD48421	500p
M51387P	200p	STK2025	620p	STK5632	450p	STR61001	550p	TC5081AP	80p	TD42006	170p	TD43840	300p	TD48425	500p
M51544	150p	STK2029	480p	STK5633	450p	STR61145	600p	TC9148	100p	TD42007	190p	TD43840	300p	TD48425	500p
M51848	150p	STK2038	700p	STK6316	300p	STRD1206	600p	TC9125BP	410p	TD42008	160p	TD43845	325p	TD48433	600p
M54523P	200p	STK2048	950p	STK6324B	500p	STRD1406	600p	TC9134	750p	TD42009	100p	TD43856	400p	TD48440	300p
M54563P	200p	STK2110	550p	STK6431	850p	STRD1706	450p	TC9142	320p	TD42010	150p	TD43857	250p	TD48442	200p
M54844	500p	STK2125	580p	STK6722	725p	STRD1806	400p	TC9143	300p	TD42010	150p	TD43950	325p	TD48443	350p
M5491	250p	STK2139	600p	STK6918	600p	STRD1818	400p	TC9145	150p	TD42030	80p	TD44050	150p	TD48451	400p
M51518	200p	STK2139	675p	STK6922	900p	STRD1818	400p	TC9148	150p	TD42030	80p	TD44050	150p	TD48451	400p
MB3712	140p	STK2155	900p	STK6922	900p	STRD4412	500p	TC149	225p	TD42048	600p	TD44100	225p	TD48453	350p
MB3713	130p	STK2230	470p	STK6932	525p	STRD4512	400p	TC9150	425p	TD42054M	110p	TD44180	145p	TD48490	500p
MB3714	270p	STK2240	740p	STK6962	275p	TA7054	190p	TC9152	425p	TD42107	250p	TD44190	180p	TD48702	275p
MB3715	250p	STK2250	650p	STK6972	490p	TA7061	115p	TC9153	300p	TD42148	350p	TD44200	360p	TD48703	500p
MB3722	280p	STK3041	370p	STK6981B	600p	TA7066	120p	TC9156	300p	TD42151	375p	TD44280	320p	TD48708	900p
MB3730	160p	STK3042	160p	STK6982	600p	TA7069	120p	TC9157	275p	TD42172	275p	TD44312	400p	TD48712	400p
MB3731	220p	STK3044	500p	STK7216	420p	TA7119	150p	TC9164	400p	TD42220	200p	TD44290	200p	TD48945	400p
MB3756	160p	STK3062	500p	STK7217	400p	TA7120	150p	TC9172P	300p	TD42270	250p	TD44400	175p	TD48980	550p
MB3759	200p	STK3082	550p	STK7225	500p	TA7137	60p	TC91940	100p	TD42320	80p	TD44420	120p	TD49403	180p
MB8719	360p	STK31021I	530p	STK7226	600p	TA7140	100p	TC91940	100p	TD42320	80p	TD44421	300p	TD49503	150p
MC1455	45p	STK31521	300p	STK7251	500p	TA7157	100p	TC91940	100p	TD42503	200p	TD44426	170p	TD49513	300p
MC1490	65p	STK31521	300p	STK7251	500p	TA7157	100p	TC91940	100p	TD42503	200p	TD44426	170p	TD49513	300p
MC3401	45p	STK4017	400p	STK7309	400p	TA7200	120p	TC91940	100p	TD42503	200p	TD44426	170p	TD49513	300p
NE555	20p	STK4019	480p	STK7310	470p	TA7205	110p	TC91940	100p	TD42506	500p	TD44437	300p	TEA1009	100p
NE556	40p	STK4021	380p	STK7348	400p	TA7207	150p	TC91940	100p	TD42510	450p	TD44439	220p	TEA1017	280p
NE558	80p	STK40241I	550p	STK7356	425p	TA7208	125p	TC91940	100p	TD42514A	500p	TD44440	180p	TEA1019	130p
NE565	110p	STK4025	530p	STK7358	450p	TA7214	220p	TC91940	100p	TD42515	450p	TD44442	240p	TEA1024	150p
NE567	110p	STK4026	480p	STK7402	600p	TA7217	145p	TC91940	100p	TD42530	450p	TD44443	250p	TEA1045	300p
NE571	290p	STK4028	550p	STK7404	400p	TA7220	140p	TC91940	100p	TD42532	120p	TD44452	250p	TEA1045	300p
NE592	85p	STK40321I	510p	STK7406	650p	TA7222	90p	TC91940	100p	TD42540	85p	TD44452	250p	TEA1067	150p
NE5532P	140p	STK4036	470p	STK7408	675p	TA7223	210p	TC91940	100p	TD42541	120p	TD44452	250p	TEA1080P	170p
SA11906	300p	STK4038	680p	STK7410	900p	TA7225	300p	TC91940	100p	TD42542	110p	TD44453	275p	TEA1087	40p
SA11910	450p	STK40401	650p	STK7554	600p	TA7226	290p	TC91940	100p	TD42543	210p	TD44480	280p	TEA1101	425p
SA11911	450p	STK40421I	800p	STK7561	650p	TA7227	170p	TC91940	100p	TD42545	120p	TD44482	300p	TEA1130	65p
SA11924	250p	STK4044	800p	STK7562	1000p	TA7230	240p	TC91940	100p	TD42546A	200p	TD44555	400p	TEA1131	150p
SA11925	250p	STK4046	950p	STK7563	800p	TA7232	95p	TC91940	100p	TD42549	300p	TD44555	400p	TEA1200	275p
SA11975	350p	STK4048	1280p	STK8050	750p	TA7233	120p	TC91940	100p	TD42559	175p	TD44502	500p	TEA2014A	80p
SA11976	350p	STK4060	510p	STK8250	500p	TA7237	300p	TC91940	100p	TD42562	130p	TD44503	300p	TEA2018A	200p
SA1250	280p	STK4065	650p	STK8260	1200p	TA7238	400p	TC91940	100p	TD42565	225p	TD44505	300p	TEA2114	200p
SA1251	380p	STK4101	500p	STK8280	1850p	TA7240	160p	TC91940	100p	TD42558	500p	TD44510	270p	TEA2117	450p
SA1274	280p	STK4101	500p	STK8310	1850p	TA7241	160p	TC91940	100p	TD42562	120p	TD44510	270p	TEA5114A	200p
SA1293	550p	STK4112	500p	STK734101I	500p	TA7242	190p	TC91940	100p	TD42577A	200p	TD44516	370p	TL431	45p
SA3004	400p	STK4121	480p	STK73605	375p	TA7243	320p	TC91940	100p	TD42578A	200p	TD44557	450p	TL061	40p
SA5000	200p	STK4122	560p	STR370	300p	TA7245	225p	TC91940	100p	TD42579A	250p	TD44560	270p	TL064	80p
SA5010	220p	STK4131	600p	STR371	400p	TA7246	220p	TC91940	100p	TD42582	130p	TD44600	140p	TL071	38p
SA5012	400p	STK41321I	600p	STR380	350p	TA7269	260p	TC91940	100p	TD42590	170p	TD44601	160p	TL074	80p
SA5020	350p	STK41411I	600p	STR381	400p	TA7270	260p	TC91940	100p	TD42592A	110p	TD44601	160p	TL074	80p
SA5030	440p	STK4142	530p	STR383	410p	TA7271	220p	TC91940	100p	TD42594	300p	TD44605	220p	TL084	70p
SA5040A	280p	STK4151	680p	STR384	350p	TA7272	260p	TC91940	100p	TD42595	200p	TD44610	370p	TMS100A041	400p
SA5040B	400p	STK4152	650p	STR384	350p	TA7273	300p	TC91940	100p	TD42600	250p	TD44660	370p	TMS100NLP200	200p
SA5050	650p	STK4161	650p	STR450	520p	TA7274	210p	TC91940	100p	TD42611A	100p	TD44800			

JAPANESE TRANSISTORS

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	2SC2757	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	200p	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	2SD855	40p	2SD1308	80p	2SD1877	250p
2SA1491	300p	2SC1060	70p	2SC1775	10p	2SC2298	35p	2SC2786	20p	2SC3303	100p	2SC3987	220p	2SD858	250p	2SD1310	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	2SC1809	100p	2SC2308	10p	2SC2791	500p	2SC3307	600p	2SC4006	100p	2SD864	200p	2SD1313	1000p	2SD1884	300p
2SA1535	175p	2SC1096	40p	2SC1879	40p	2SC2312	300p	2SC2792	300p	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
2SB560	25p	2SC1114	415p	2SC1819	70p	2SC2320	10p	2SC2810	360p	2SC3323	480p	2SC4106	200p	2SD870	190p	2SD1348	65p	2SD1911	300p
2SB561	50p	2SC1115	280p	2SC1826	60p	2SC2324	120p	2SC2812	40p	2SC3327	60p	2SC4123	450p	2SD871	300p	2SD1350	150p	2SD1913	50p
2SB562	25p	2SC1116	290p	2SC1827	60p	2SC2329	480p	2SC2814	40p	2SC3331	25p	2SC4124	250p	2SD879	60p	2SD1376	125p	2SD1929	60p
2SB566	90p	2SC1124	270p	2SC1829	500p	2SC2331	50p	2SC2824	75p	2SC3333	120p	2SC4169	60p	2SD880	40p	2SD1379	100p	2SD1939	75p
2SB595	55p	2SC1161	110p	2SC1833	40p	2SC2333	200p	2SC2825	900p	2SC3345	100p	2SC4236	550p	2SD882	25p	2SD1380	100p	2SD1941	500p
2SB596	50p	2SC1162	30p	2SC1834	50p	2SC2334	80p	2SC2826	200p	2SC3352	200p	2SC4237	650p	2SD892A	100p	2SD1384	50p	2SD1959	280p
2SB598	30p	2SC1164	600p	2SC1844	50p	2SC2335	75p	2SC2827	200p	2SC3353	280p	2SC4242	170p	2SD894	35p	2SD1390	350p	2SD1961	50p
2SB600	500p	2SC1165	750p	2SC1845	15p	2SC2337	80p	2SC2827	200p	2SC3353	280p	2SC4242	170p	2SD894	35p	2SD1390	350p	2SD1961	50p
2SB646	40p	2SC1166	100p	2SC1846	35p	2SC2344	150p	2SC2832	300p	2SC3355	50p	2SC4301	550p	2SD895	200p	2SD1391	250p	2SD1978	50p
2SB647	20p	2SC1170	180p	2SC1847	45p	2SC2347	45p	2SC2834	40p	2SC3356	120p	2SC4372	275p	2SD896	200p	2SD1392	150p	2SD1984	450p
2SB648	45p	2SC1172	150p	2SC1855	85p	2SC2353	120p	2SC2837	250p	2SC3358	50p	2SC4769	300p	2SD900	400p	2SD1395	150p	2SD2012	50p
2SB649	35p	2SC1173	40p	2SC1856	25p	2SC2360	120p	2SC2839	40p	2SC3361	50p	2SD198	140p	2SD905	450p	2SD1396	120p	2SD2125	225p
2SB688	90p	2SC1195	210p	2SC1865	700p	2SC2361	150p	2SC2853	70p	2SC3376	300p	2SD199	195p	2SD916	130p	2SD1397	120p	2SD2333	300p
2SB703	90p	2SC1212	35p	2SC1870	700p	2SC2362	50p	2SC2857	120p	2SC3377	50p	2SD200	180p	2SD917	300p	2SD1398	120p	2SD2348	425p
2SB705	200p	2SC1213	15p	2SC1875	220p	2SC2366	280p	2SC2878	20p	2SC3378	120p	2SD201	260p	2SD921	320p	2SD1399	300p	2SD2349	425p
2SB707	200p	2SC1214	15p	2SC1881	70p	2SC2369	100p	2SC2879	3200p	2SC3383	80p	2SD205	190p	2SD923	360p	2SD1400	280p	2SD2350	425p
2SB716	20p	2SC1215	25p	2SC1890	15p	2SC2371	25p	2SC2883	60p	2SC3387	550p	2SD313	25p	2SD946	120p	2SD1402	150p	2SD2356	700p
2SB718	60p	2SC1216	200p	2SC1904	125p	2SC2373	210p	2SC2898	200p	2SC3393	80p	2SD315	75p	2SD947	100p	2SD1406	60p	2SD2374	60p
2SB727	200p	2SC1222	15p	2SC1906	15p	2SC2383	50p	2SC2899	50p	2SC3399	50p	2SD325	30p	2SD950	300p	2SD1407	60p	2SD2375	280p
2SB754	90p	2SC1226	75p	2SC1907	20p	2SC2389	45p	2SC2909	60p	2SC3400	35p	2SD330	65p	2SD951	290p	2SD1408	125p	2SD2376	220p
2SB755	310p	2SC1252	850p	2SC1909	250p	2SC2407	110p	2SC2911	80p	2SC3401	50p	2SD348	300p	2SD957A	520p	2SD1409	170p	2SD2377	350p
2SB772	25p	2SC1278	110p	2SC1913	90p	2SC2408	120p	2SC2912	120p	2SC3402	40p	2SD357	40p	2SD958	60p	2SD1412	75p	2SD2379	225p
2SB774	50p	2SC1279	30p	2SC1921	15p	2SC2412K	50p	2SC2921	650p	2SC3409	400p	2SD358	40p	2SD965	35p	2SD1413	60p	2SD2380	75p
2SB775	100p	2SC1306	90p	2SC1923	10p	2SC2440	200p	2SC2922	480p	2SC3412	800p	2SD371	240p	2SD970	170p	2SD1415	190p	2SD2381	60p
2SB791	280p	2SC1308K	350p	2SC1929	180p	2SC2458	10p	2SC2928	550p	2SC3416	30p	2SD380	650p	2SD973	60p	2SD1417	125p	2SD2382	60p
2SB795	60p	2SC1312	110p	2SC1940	110p	2SC2459	50p	2SC2929	280p	2SC3417	90p	2SD381	50p	2SD973A	70p	2SD1426	260p	2SD2383	60p
2SB825	135p	2SC1317	15p	2SC1941	27p	2SC2470	65p	2SC2934	75p	2SC3419	120p	2SD385	150p	2SD985	120p	2SD1426	260p	2SD2384	60p
2SB861	110p	2SC1318	10p	2SC1942	350p	2SC2481	120p	2SC2937	250p	2SC3420	80p	2SD389	60p	2SD986	120p	2SD1427	180p	2SD2385	60p
2SB882	180p	2SC1325	400p	2SC1944	350p	2SC2482	20p	2SC2938	235p	2SC3422	75p	2SD400	14p	2SD1012	40p	2SD1428	220p	2SD2386	60p
2SB886	90p	2SC1327	20p	2SC1945	350p	2SC2483	120p	2SC2939	400p	2SC3423	60p	2SD401	50p	2SD1020	120p	2SD1429	410p	2SD2387	60p
2SB890	180p	2SC1328	15p	2SC1946	1500p	2SC2484	185p	2SC2944	300p	2SC3446	150p	2SD402	120p	2SD1021	40p	2SD1430	280p	2SD2388	60p
2SB951	190p	2SC1342	15p	2SC1947	450p	2SC2491	200p	2SC2958	50p	2SC3447	200p	2SD415	55p	2SD1022	400p	2SD1431	400p	2SD2389	60p
2SB1009	110p	2SC1345	15p	2SC1957	70p	2SC2495	1900p	2SC2962	800p	2SC3456	200p	2SD424	350p	2SD1024	130p	2SD1432	400p	2SD2390	60p
2SB1077	180p	2SC1346	100p	2SC1959	10p	2SC2498	50p	2SC2973	160p	2SC3457	125p	2SD428	150p	2SD1030	75p	2SD1433	750p	2SD2391	60p
2SB1109	100p	2SC1358	270p	2SC1967	1300p	2SC2499	50p	2SC2979	160p	2SC3457	125p	2SD428	150p	2SD1030	75p	2SD1433	750p	2SD2391	60p
2SC182	75p	2SC1359	15p	2SC1969	160p	2SC2500	25p	2SC2987	250p	2SC3459	180p	2SD429	150p	2SD1031	70p	2SD1434	140p	2SD2392	60p
2SC372	25p	2SC1360	70p	2SC1970	100p	2SC2502	200p	2SC2988	150p	2SC3460	180p	2SD438	35p	2SD1046	200p	2SD1439	165p	2SD2393	60p
2SC380	10p	2SC1364	25p	2SC1971	400p	2SC2505	60p	2SC2995	60p	2SC3461	350p	2SD467	15p	2SD1047	180p	2SD1441	280p	2SD2394	60p
2SC382	50p	2SC1383	25p	2SC1972	600p	2SC2527	300p	2SC2999	50p	2SC3466	225p	2SD468	15p	2SD1051	130p	2SD1445	200p	2SD2395	60p
2SC388A	60p	2SC1384	20p	2SC1973	150p	2SC2534	150p	2SC3001	1400p	2SC3468	70p	2SD471	20p	2SD1060	130p	2SD1450	60p	2SD2396	60p
2SC394	60p	2SC1393	20p	2SC1983	75p	2SC2535	300p	2SC3012	300p	2SC3481	300p	2SD525	50p	2SD1062	150p	2SD1451	260p	2SD2397	60p
2SC403	25p	2SC1394	15p	2SC1984	150p	2SC2538	100p	2SC3019	320p	2SC3482	275p	2SD526	70p	2SD1063	200p	2SD1452	350p	2SD2398	60p
2SC454	15p	2SC1398	55p	2SC1985	100p	2SC2540	1900p	2SC3025	500p	2SC3486	275p	2SD545	18p	2SD1064	250p	2SD1453	140p	2SD2399	60p
2SC458	10p	2SC1400	50p	2SC1986	100p	2SC2542	300p	2SC3026	550p	2SC3502	100p	2SD549	120p	2SD1065	160p	2SD1455	250p	2SD2400	60p
2SC460	10p	2SC1403	500p	2SC2001	15p	2SC2545	55p	2SC3030	300p	2SC3503	50p	2SD551	300p	2SD1066	150p	2SD1457	165p	2SD2401	60p
2SC461	15p	2SC1407	550p	2SC2002	15p	2SC2546	25p	2SC3037	125p	2SC3504	120p	2SD555	500p	2SD1071	450p	2SD1459	120p	2SD2402	60p
2SC495	45p	2SC1413	150p	2SC2003	20p	2SC2547	65p	2SC3038	125p	2SC3505	240p	2SD560	50p	2SD1073	350p	2SD1468	60p	2SD2403	60p
2SC496	25p	2SC1419	50p	2SC															

VCR BELT KITS / REPLACEMENT VIDEO LAMPS

Model	Price	Model	Price	Model	Price	Model	Price
HRD520, 600, 620, 637, 641, 650, 830 HRD540, 550, 580, 660, 860, 960, HR55800	95p 130p	VR6010, VR9010 VR6020, VR6022, VR6023, VR6028, VR7730 VR6024 VR6520, VR6540, VR6560 VR6710, VR6720, VR6735, VR8720 VR6720, VR6730, VR6760, VR6775, VR6780	70p 75p 75p 90p 130p 160p	Models & Description	Order Code	Price	
KENWOOD KV901 KV903	70p 90p	SAISHO VR2000, VHL3 VR3800	90p 75p	UNIVERSAL VIDEO LAMP 9V 80mV (310mm WIRES)	VL01	25p	
LOEWE OC11, OC40 OC410, OC420, OC440, OC460 OC50, OC55, OC60, OC65, OC70, OC76	95p 130p 120p	SALORA SV8500 SV8600 SV8000 SV8100 SV8500, SV8520, SV9500 SV7400, SV8400, SV8420, SV8550 SV8700, SV8710, SV8750, SV9700 SV6800, 6900, 8810, 8820, 8870, 8910, 8920, 8970 SV8600, 8620, 8700, 8720, 8830, 9600, 9810	90p 95p 120p 60p 150p 120p 95p 130p	PANASONIC VIDEO LAMPS	VL02	35p	
LOGIK VR955	180p	SAMSUNG SV716, 717, V1616, V1621, V1626, VX616, VX617, VX619, VX626, VX627, VX629 85p V8520, 510, 510, 616, 617, 619, 620, 626, 627, 629, V1610, 520, 611, 616, 621, 626, VX510, 520 VB900, VB910, V1900, V1910 PX980, 981, 982, SE9001, SV9001, SVX307, 319, 322, VB770, 8220, 8225, V1770, 790, 8220, 8225, VK8220, VPX31, VX200, VV750, 8220, 8225 SVX301, 303, 305, SX7301, VB710, 971, V1730, 710, VX712, VX720, 730, 970, 971, 972 VX9880	100p 150p 120p 60p 150p 120p 95p 130p	SHARP VIDEO LAMPS	VL02	35p	
LUXOR 9245, 9251 9252 9253 9254 9255 9256 9270, 9271, 9273, 9274 9272, 9280 9281, 9284, 9285, 9292, VR3701, 3721, 3731, 3761, 3781	130p 140p 140p 100p 130p 130p 115p 140p 95p	SHARP VC200, 384, 385, 386, 388, 390, 9300, 9500, 9700 VC7300, VC7700, VC7750, VC7800, VC7900 VC8300 VC300, 387, 471, 473, 481, 482, 483, 486, 488, 496, 8481 VC402, 500, 571, 573, 581, 582, 583, 584, 585, VCSF3 VC600, 551, 682, 684, 685, 693, 783, VCF63, VC6V3 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, VCS1000, VCT310, 410, VCT1314, VCT3312	100p 110 100p 95p 220p 90p 150p 110p 110p 100p 150p 80p 70p 80p 118p	HITACHI 5381682 (VT63, VT64) VIDEO LAMPS	VL04	135p	
MATSUI VX850	75p	SHARP VHR2100, VHR2300, VHR2500, VHR2700 VHR3100, 3300, 3310, 3400, 3700, 3800, VHRD500, 700 VHR4100, 4150, 4200, 4300, 4350, 4770, 5100, 5200, 5300, 5350, 5700, 7100, 7200, 7500, 7510, 7540, 7800, 7810, 8100, 8200, 8250, 8500, VHRD4400, 4410, 4500, 4600, 4610, 4710, 4890, 6700	100p 110 100p 95p 220p 90p 150p 110p 110p 100p 150p 80p 70p 80p 118p	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	
MITSUBISHI HS200 HS300, 301, 302, 307, 310, 337, 338, 347, 349, 411, 412, 421, HSB10, 20, 30, HSE10, 20, 30, 70 HS303, HS304, HS306, HS307, HS330, HS400, HS700 HS318, HS319, HS410	200p 150p 150p 130p	SIEMENS FM350, FM352, FM355 FM484, FM485 FM391, FM392, FM394, FM462 FM461, FM464, FM468, FM561 FM361, FM382, FM363, FM364	60p 55p 100p 150p 120p	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	
N.E.C. NB30, NB31, NB32, NB33 NB95 PVC2300, PVC2400 DX1000, 1600, 2000, 3000, N9012, 9013, 9014, 9016, 9033, 9034, 9053, 9054, 9055, 9066, 9110, 9120, 9510, 9520, 9530, 9610	100p 80p 180p 95p	SHARP VC200, 384, 385, 386, 388, 390, 9300, 9500, 9700 VC7300, VC7700, VC7750, VC7800, VC7900 VC8300 VC300, 387, 471, 473, 481, 482, 483, 486, 488, 496, 8481 VC402, 500, 571, 573, 581, 582, 583, 584, 585, VCSF3 VC600, 551, 682, 684, 685, 693, 783, VCF63, VC6V3 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, VCS1000, VCT310, 410, VCT1314, VCT3312	100p 80p 180p 95p 220p 90p 150p 110p 110p 100p 150p 80p 70p 80p 118p	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	
NATIONAL PANASONIC NV300, NV332, NV333, NV340, NV366 NV777, NV788 NV2000, NV2010, NV3000 NV7000, NV7200, NV7800 NV8600, NV8610, NV8620 NV230, 250, 280, 430, 431, 433, 450, 460, 465, 470, 730, 770, 810, 870, 890, AG1000, 1050 NV370, NV380, NV480, NV630, NV780, NV830, NV850 NV600, NV688, AG6010, AG6015 NVG7, 10, 12, 14, 15, 18, 30, 130, 400, NVH70	125p 100p 130p 95p 145p 125p 100p 110p 70p	SONY SLC6, SLJ10, SLT8ME SLC5, SLC7, SLJ7, SLJ9 SLC9, SL8000, SL8080, SLT50 SL8000E, SL8080E, SL8200, SL8600 SLV255	140p 140p 165p 175p 95p	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	
NORDMENDE V100, V140 V1000M, 1005M, 1205, 1215, 1235, 1245, 1305, 1403, 1405, V1500P, 1503, 1505K, 1805K, 2000D, 2405, 2500H, 3000H V3405H, 3105, 4405H, 5000, 8005, 900, 905 V1001, 1005, 1015, 1025, 1035, 1041, 1085, 1065, 1105, 3005, 304, 5005, 502, 503 V101, V102, V103, V112, V141, V142, V301, V302 V110, V333 V1500T, V2000B, V2000P, V400H V250, V480, V9460, V20035542, V20035543 V300, V303, V380 V500	70p 80p 80p 90p 110p 95p 130p 75p 75p	SONY SLC6, SLJ10, SLT8ME SLC5, SLC7, SLJ7, SLJ9 SLC9, SL8000, SL8080, SLT50 SL8000E, SL8080E, SL8200, SL8600 SLV255	140p 140p 165p 175p 95p	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	
ORION COMB115000, 16000, NEVHM, TVP2300R, 900MVH1012, VH1030, 1040, 1060, 1070, 1100, 1120, 1440, 1500, 1660, 1800, 2150, 2308, 2400, 2500, 2600, 2700, 2960, 300, 368, 368, 362, 4010, 4015, 4016, 4020, 4300, 5010, 5015, 530, 535, 536, 630, 636, 640, 730, 735, VP220, 225, 245, VR1032, 2966, 2980, 821, 925, VXL256 NEVHL, VCP, VH1204, 2004, 2204, 3050, 3060, 4008, 400, 4012, 412, 512, 600, 665, 744, 774, 7905, 800, 820, 900, 974, VP200, VR2949, 2956, 2957, VXL20 VC150, 180, VH1000, 200, 201, 205, 212, 250, 254, 288, 300, 303, 3030, 312, 33, 3312, 404, 555, 700, 704, 708, 712, 770, 780, 844, 900, VHF2, VHS VH1, VHZ2	30p 30p 80p 90p 110p 80p 150p	SONY SLC6, SLJ10, SLT8ME SLC5, SLC7, SLJ7, SLJ9 SLC9, SL8000, SL8080, SLT50 SL8000E, SL8080E, SL8200, SL8600 SLV255	140p 140p 165p 175p 95p	GRANADA (VHSAY3), SHARP (VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700)	VL08	60p	
PHILIPS VR6460, VR6920 VR6540 DV186, 286, 291, 292, 468, 471, 562, 571, 761, VR201, 202, VR200V1, 200V2, 20RW7, 25B01, 25B02, 302, 303, 305, VR300V2, 35B02, 35B03, 635B7, 715B4, 715B5, 715B8, VR865B2, 915B2, 925B3, VR8180, 6185, 6285, 6290, 6291, 6293, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, 6676, 6760, VR655B4, 865B1, 925B3 VR8442, VR8542 VR2025, VR2560 VR445B9, BR445B920, VR445B922, BR8843 VR8548, VR6648, VR49SB820, VR644869S	170p 100 100 85p 100p 100p 100p 110p	THOMSON SV1000, V410, 430, 450, 510, 520, 530, 540, 620, 630, 640, 4240, SV5540 TX8000, V309, V357, VK411 V1850, V322, 343, 351, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, 5500, 6000, 8564 V320, V321, V323, V326, V4200, V4300 V333 V340 V4100, VK308, VK309, VK410 VK300, VK301, VK302, VK303, VK305, VK3301 VK312	100p 75p 70p 70p 75p 90p 90p 65p 100p 90p 120p 135p 65p	PANASONIC MODE SWITCHES			
SABA VR6420, 6435, 6440, 6460, 6480, 8620, 8770, 7200, 8420, 2A10, 70, 2B20, 3B20, 4A10, 4B20, 6A10, 6A70, 6B20, 8B20 VR6004, 6005, 6011, 6014, 7004, 7011, 7014, 8011, 8014, BERLIN VR2000, VR6000, VR6012, VR7000, VR7720, PV8608 VR5005, VHR7000 VR6006, 6007, 6008, 6009, 6015, 9016, 9018, 8038, 7006, 7007, 7016, 7018, 9006	65p 90p 135p 135p 85p 100p 100p	TOSHIBA V55, V57 V33, V31, V51, V53, V9600, V9680 V61, V63, V65, V66, V67 VD808, VD80D, V71, 73, 74, 75, 81, 83, 85, 86 V108, V109, V199, V209, V609 V91G, V95G	85p 85p 150p 120p 120p 115p	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 MZ366960J2	IT01 IT02
GOLDSTAR	VXP0521	IT17
HITACHI	6861471 6861482 6886971	IT03 IT04 IT05
JVC/ FERGUSON	PU 48967B PU 51380 PU 51402A PU 55373 PU 55374	IT06 IT07 IT08 IT09 IT10
NATIONAL PANASONIC	VXP 0329 VXP 0343 VXP 0344 VXP 0401 VXP 0433 VXP 0463 VXP 0521 VXP 0581	IT11 IT12 IT13 IT14 IT15 IT16 IT17 IT18
SANYO	1430662T15620	IT19
SHARP	NIDL005GEZZ NIDL006GEZZ NPLY0107GEZZ	IT20 IT21 IT22

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

GRANDATA LTD
Tel: 0181-900 2329
Fax: 0181-903 6126

VIDEO SERVICE KITS

AMSTRAD	
VCR700	
Contents	
BELT SET, PINCH ROLLER, REEL IDLER, VIDEO LAMP	£5.50
Order Code: SK41	
FERGUSON & JVC	
3V42/43	
HRD455/HRD725	
Contents	
BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND	£17.50
Order Code: SK37	
Economy Kit Contents	
BELT SET, PINCH ROLLER, SUPPLY CLUTCH, TAKE UP CLUTCH	£9.50
Order Code: SK38	
3V58/59/64/65	
HRD170/180/210/230/300/320/370/400/430/530/700/750	
HRSS5000	
Contents	
BELT SET, PINCH ROLLER, IDLER ARM, TENSION BAND	£8.50
Order Code: SK44	
3V29/3V30	
HR7200/7300/7350	
Contents	
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES	£6.00
Order Code: SK05	
3V35/36/38/39/49	
HRD110/111/120/225	
Contents	
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES	£5.50
Order Code: SK04	
3V31/3V42	
HR7600/7610/7650/7655	
Contents	
BELT SET, T.U. REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T.U. CLUTCH, T.U. IDLER, TENSION BAND, VIDEO LAMP	£12.00
Order Code: SK33	
Economy Kit Contents	
BELT SET, T.U. REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T.U. CLUTCH	£5.50
Order Code: SK34	
3V35/36/38/39/49	
HRD110/111/120/121/225	
Contents	
BELT SET, T.U. REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T.U. CLUTCH, T.U. IDLER, REEL IDLER, TENSION BAND	£10.50
Order Code: SK35	
Economy Kit Contents	
BELT SET, T.U. REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T.U. CLUTCH, T.U. IDLER TYRE, REEL IDLER TYRE	£5.80
Order Code: SK36	
3V29/3V30	
HR7200/7300/7350	
Contents	
BELT SET, T.U. REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T.U. CLUTCH, T.U. IDLER, TENSION BAND, VIDEO LAMP	£11.00
Order Code: SK31	
Economy Kit Contents	
BELT SET, T.U. REEL IDLER TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T.U. IDLER TYRE, T.U. CLUTCH	£5.10
Order Code: SK32	
3V44/45/48/53/54/55/57	
HRP50/HRD140/150/158/160	
HRD250/257/565/566/755	
Contents	
BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND	£13.00
Order Code: SK57	
Economy Kit Contents	
BELT SET, PINCH ROLLER	£5.00
Order Code: SK58	
FVHP15/618/620/622/710/711/715/716/720/721/722/725/730/830/840	
Contents	
BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND	£12.50
Order Code: SK68	
Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER TYRE	£3.60
Order Code: SK69	
HITACHI	
VT11/VT33	
Contents	
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES	£6.00
Order Code: SK08	

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	
BELT SET, T.U. REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, FF/REW IDLER, CLUTCH PLATE, TENSION BAND	£14.00
Order Code: SK45	
Economy Kit Contents	
BELT SET, PINCH ROLLER, FF/REW IDLER	£4.50
Order Code: SK46	
VT52/61/62/63/64/65/85/86/640	
Contents	
BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND	£14.00
Order Code: SK49	
Economy Kit Contents	
BELT SET, PINCH ROLLER, FF/REW IDLER	£3.25
Order Code: SK50	
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	£11.50
Order Code: SK52	
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	£14.00
Order Code: SK51	
PANASONIC	
NV2000/NV2010	
Contents	
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES	£6.25
Order Code: SK03	
Economy Kit Contents	
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES	£5.50
Order Code: SK02	
NV300/NV330/NV333/NV340/NV366	
Contents	
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRE	£5.50
Order Code: SK01	
NV2000/NV2010	
Contents	
BELT SET, PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP	£8.00
Order Code: SK13	
Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER TYRE, PULLEY TYRE	£4.50
Order Code: SK14	
NV7000/NV7200/NV7800	
Contents	
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND	£8.50
Order Code: SK11	
Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER TYRE, CLUTCH TYRE	£4.20
Order Code: SK12	
NV300/NV330/NV333/NV340/NV366	
Contents	
BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND	£7.50
Order Code: SK15	
Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER TYRE, PLAY IDLER TYRE	£4.00
Order Code: SK16	
NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG16/NVG18/NVG30/NVG120/NVG130/NVG400/NVH65 (PX/AC)/AG1810 (PK)	
Contents	
LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TENSION BAND	£8.00
Order Code: SK27	
Economy Kit Contents	
LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TYRE	£4.00
Order Code: SK28	
NV332	
Contents	
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW TYRE	£12.00
Order Code: SK29	
Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER TYRE	£5.10
Order Code: SK30	
NV230/250/260/280/430/450/460/470/650/810/890/AG1200PK/AG1500PK	
Contents	
BELT SET, PINCH ROLLER, IDLER, TENSION BAND	£6.00
Order Code: SK23	
Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER TYRE	£3.50
Order Code: SK24	
NV600/NV688	
Contents	
BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND	£12.00
Order Code: SK25	
Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER TYRE, FF/REW IDLER TYRE	£6.00
Order Code: SK26	
NV730/NV770	
Contents	
SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND	£6.50
Order Code: SK19	
Economy Kit Contents	
SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER TYRE	£4.00
Order Code: SK20	
NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK	
Contents	
BELT SET, PINCH ROLLER, IDLER, TENSION BAND	£6.00
Order Code: SK21	
Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER TYRE	£3.00
Order Code: SK22	
NV777/NV788	
Contents	
BELT SET, PINCH ROLLER, IDLER UNIT, TENSION BAND	£7.00
Order Code: SK17	
Economy Kit Contents	
BELT SET, PINCH ROLLER, IDLER TYRE	£4.00
Order Code: SK18	

VIDEO SERVICE KITS (Cont.)

SHARP	
VC381	
Contents	
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND, VIDEO LAMP	£9.00
Order Code: SK47	
Economy Kit Contents	
BELT SET, PINCH ROLLER, REEL IDLER TYRE	£4.75
Order Code: SK48	
VC500/VC571/VC581/VC582/VC583/VC584/VC5F3	
Contents	
BELT SET, PINCH ROLLER, REEL IDLER, TENSION BAND	£9.50
Order Code: SK60	
Economy Kit Contents	
BELT SET, PINCH ROLLER, REEL IDLER	£6.50
Order Code: SK61	
VC781/VC7810/VC7822/VC785/VC786/VC793/VC800/VCA100/VCA102/VCA104/VCA202	
Contents	
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND	£13.50
Order Code: SK64	
Economy Kit Contents	
BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE	£6.25
Order Code: SK65	
VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700	
Contents	
BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND	£13.50
Order Code: SK62	
Economy Kit Contents	
BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE	£6.00
Order Code: SK63	

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		
180p		
REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES		
Replaces Ferguson Part Nos: 00E6-066-001, 2.4V		
200p		
Used on: 3V35, 3V56, 3V58, 3V65		

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	1600p	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	1500p	LOT16
TELEFUNKEN AT1	1450p	LOT17
TELEFUNKEN EO	1400p	LOT18
SALORA FM0218B	1600p	LOT19
NORMENDE 5255	1600p	LOT20
ITT CVC 1150/1	1500p	LOT21
ITT COMPACT 80	1500p	LOT22
FE TX100 GREEN	1450p	LOT23
HINARI CT4/5 5113	1500p	LOT24
SELECO 6320410	1600p	LOT25
BLAUPUNKT 8667	1600p	LOT26
ITT COMPACT B1	1450p	LOT27
ITT CT3326 MUL	1500p	LOT28
ITT D066/37 EQ	1600p	LOT29
ITT 3546 EQ	1500p	LOT30
LUXOR 5810110	1600p	LOT31
SABA 849380920	1600p	LOT32
HITACHI 2434141 CP	1450p	LOT33
FE TX100 110 D	1700p	LOT34
HANTAREX 28021	1600p	LOT35
SHARP C3700 EQ	1600p	LOT36
HITACHI 2432981 CP	1500p	LOT37
FERGUSON 00D3-508-002	1650p	LOT38
Fits Chassis TX99 41cm + 51cm		
Used On: 51K2, 51J8, 51J7, 41H3, 41H3, 41H2, 51K3		
PANASONIC TLF14567F	1850p	LOT39
Used On: TC2043, TC2243, TX300		
PANASONIC TLF14568F	1850p	LOT40
Used On: TX2231, TX2244		
PANASONIC TLF14584F	2350p	LOT41
Used On: TC2210, TC2160, TX1752, TX2112		
TX2112, TX2162, TXC22		
PANASONIC TLF14586F	2350p	LOT42
TC1651, TC2051, TC2061, TC2253, TC2263, TX5500		
HINARI	1600p	LOT43
Used On: CT15		
HITACHI 2434274	1250p	LOT44
CPT2174, CPT2176, CPT2178, 2434274		
We stock line output transformers for over 100 different models. Please ring 0181-900 2329 for more information.		

IDLERS & PULLEYS REPLACEMENT

AKAI	VS1-2, VS4-5, VS15	FF-REW IDLER	M132773	400p
	VS3, 6, 12, 56, 58, 59			
	VS1-2, VS4-5, VS15	T-UP IDLER	BV327815	500p
	VS1, 6, 12, 58, 59			
	V9700	IDLER	BV231979	600p
	VS126, 126, 155	IDLER ASSY	M2368600J2	900p
	VS166, 240, 244, 245, 247, 248, 250, 512, 515, 516			
	VS22, 38, 105, 112, 115, 116, 205, 220			
	VP7100, VS9300	T-UP IDLER	PU47752	£4.50
	VS9500, VS9800			
	VP7100, VS9300	UNLOADING IDLER	PU46381	£4.00
	VS9500, VS9800	REW IDLER	PU46380	500p
	VP7100, VS9300			
	VS9500, VS9800			
	VS1, 3, 4, 9, 12	IDLER REEL TABLE	BV336667	£5.00
	VS15, 58		BR347731	450p
	VS23, 35, 37, 53, 55	CLUTCH	ML373043	1100p
	VS66, 75, VS477			
	V9700	FF IDLER	BV321761	£3.20
	VS700	REW IDLER	W321762	£4.25
AMSTRAD				
	VCR7000	IDLER	150280	£1.50
	TVR1, VCR4500	CLUTCH	150873	£1.75
	VCR4600, VCS200, 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		300p
	VCR4700	(TAPE CREASING)		
	MOD KIT TAPE CREASING FOR AMSTRAD			
	VCR4500, 4600, 4700			
FERGUSON				
	3V00, 3V01, 3V16	T-UP IDLER	PU47752	£4.50
	3V22, 3292, 8900, 8901, 8904, 8906			
	3V18, 3V22	T-UP IDLER	PU49290	£5.50
	8903, 8909, 8912, 8922			
	3V23, 3V29, 3V30	REEL IDLER	PU48867	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	PU56374	200p
	3V39, 3V49, 8943, 8944			
	3V35, 3V36, 3V38	T-UP CLUTCH	PU55373	150p
	3V39, 3V49, 8943, 8944			
	3V58, 3V59, 3V64	IDLER ARM	PU88645	£2.25
	3V65, FV10, FV11, FV12, FV13, FV14, FV20, FV21, FV22, FV26			
	FV30, FV32, FV33, 8950, VCV11			
	3V42, 3V43	CLUTCH ASSY	PU55822	1200p
	3V43, 3V44, 3V45	CLUTCH ASSY	PU57658	1050p
	3V48, 3V53, 3V54, 3V55, 3V57, 8947, 8948			
	3V42, 3V43, 3V44	T-UP CLUTCH	PU56043-1-4	240p
	3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948			
	3V42, 3V43, 3V44	SUPPORT CLUTCH	PU56044-1-5	160p
	3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8947, 8948			
	3V00, 3V01, 3V16	LOADING IDLER	PU43681	£4.00
	3V22, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922			
	3V00, 3V01, 3V16	REW IDLER	PU46380	500p
	3292, 8900, 8901, 8904, 8906			
	3V16, 3V22, 8902	IDLER	PU49281	£1.70
	8909, 8912, 8922			
FSHNER				
	FVH420, 520, 530	FF-REW PULLEY	H1638531	80p
	FVHP615, 618, 620	COMP IDLER ASSY	F11430420400300	£220p
	FVHP622, 710, 711, FVHP720, 721, 722, FVHP725, 730, 810			
	FVHP40, 905, 906, FVHP908, 910, 911, FVHP915, 916, 918			
	FVHP615, 618, 620	GEAR IDLER ASSY	F11430490400900	380p
	FVHP622, 710, 711, FVHP720, 721, 722			
	FVHP725, 730, 810, FVHP940			
	FVHP615, 618, 620	REEL T-UP ASSY	F11430410400900	£5.50
	FVHP662, 710, 711, FVHP720, 721, 722			
	FVHP725, 730, 810, FVHP940			
	FVHP905, 906, 908	GEAR IDLER ASSY	F11430490402400	275p
	FVHP910, 911, 915, FVHP916, 918			
	FVHP975, 980, 990	IDLER	F11430420400700	300p
	FVHP989, 5000, 5005			
	FVHP500, 5075, 5100			
	FVH40, 55, 140	REEL DRIVE ROLLER		£6.00
	FVHP1, 10, 20			
	FVHP975, 980, 990	CLUTCH	F12430510404200	£9.50
	FVHP420, 520, 530	IDLER		£2.80
	FVHP420, 520, 530	TAKE UP IDLER		290p
	FVHP990	LOADING GEAR		90p
	VBS3500	REEL DRIVE PULLEY		£3.20
	VBS3500	IDLER		250p
	VBS7000	REW IDLER		95p
GOLDSTAR				
	GHV1221, 1232, 1240	CLUTCH GEAR	435038A	£2.50
	GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000,			
	GHV8200, 8210, 8215, GHV91, VCP4100, 4130			
	GHV1221, 1232, 1240	IDLER		110p
	GHV1241, 1242, 1243, GHV1244, 1245, 1246, GHV1247, 1248, 8000,			
	GHV8200, 8210, 8215, GHV91, VCP4100, 4130			
HINARI				
	VXL2, VXL20	REEL IDLER	40000009	110p
	VXL2	IDLER		110p
	VXL4, VXL35	CLUTCH		£2.75
	VXL4, VXL35	CLUTCH		£5.50
	VXL4, VXL12, VXL25	LIMITER POST		£1.30
	VXL30, VXL35, VTV300			
	VXL6, VXL6	CLUTCH		£3.75
	VXL5, VXL6	GEAR HOLDER		£3.50
	VXL7, VXL8, VXL9	CLUTCH		£3.80
HTACHI				
	VT11-33, VT83-64	CLUTCH ASSY	6879515	£7.50
	VT14, 17, 19, 38, 37, 36, 88, 34, 35, 38, 52, 61			
	62, 65, 85, 330, 640, VT185			
	VT120, 220, 100, 110	CLUTCH ASSY	6886824	£7.50
	111, 113, 115, 118, 200			
	125, 128, 130, 125, 138, 145, 150, 175, 225, 250,			
	255, 258, 260, VT130			
	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	6861471	250p
	VT680, 6900, 9700, 9900			
	VT9300-9500, 6500	PLAY IDLER	6861482	230p
	VT680, 6900, 9700			
	VT 9900			
	VT9300-9500, 9700	IDLER	681505	230p
	VT9900, 6500, 680, 6800	IDLER	687043	£3.80
	VT11-33, VT83-64	FF-REW IDLER	6886371	125p
	VT14, 16S, 17, 19, 34, VT35, 38, 39, 52, 61, 62			
	VT65, 85, 88, 88, 330, 640			
	VT1000, 110, 111, 113	FF-REW ARM	6886792	240p
	VT115, 118, 119, 120, 125, 128, 130, 138, 145, 150			
	VT175, 220, 225, 250, 255, 258, 260, VT130			
	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			
	VT538, 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	6896961	£3.25
	VT414, 415, 418, 420, 425, 426, 428, 430, 431, 435			
	VT438, 450, 498, 510, 518, 520, 525, 526, 530, 535			
	VT538, 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, 6900, 6800	FS-BRAKE	6861505	230p
VT9700, 9900			
MITSUBI			
OUTPUT MODULE HM 6251		£5.50	
OUTPUT MODULE HM 6232		£8	
JVC			
HR300, 3660, 4100	T-UP IDLER SML	PU43280	£5.50
HR200, 7600, 7650	T-UP CLUTCH	PU53462A	£220p
HR7655, 7300, 7350, 7610			
HR7200, 7300, 7350	REEL IDLER	PU48867	175p
HR7600, 7610, 7650, 7655, 7700			
HR7600, 7610, 7650	ROLLER ASSY	PU49042A	350p
HR7655, 7700			
HR300, 3660, 4100	T-UP IDLER LRG	PU47752	£4.50
HR200, 7600, 7650	T-UP IDLER	PU51402A	1000p
HRD110, HRD120, 121, 122	T-UP CLUTCH	PU55373	150p
HRD225, HRD111, HRD111, HR7300, 7350, 7610, HRD120, 121, 122			
HRD110, HRD120, 121, 122	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	PU55822	1200p
HRD140, 150, 157, 158	CLUTCH MECH	PU57658	1050p
HRD160, 250, 257, 565, 566, 755, HRP50	REW IDLER	PU46380	500p
HR3200, HRS330			
HR3660, HR4100			
HRD140, 150, 157, 158	TAKE UP CLUTCH	PU56043-4	240p
HRD160, 250, 257, 455, 565, 566, 725, 755, HRP50			
HRD180, 190, 197, 198	TAKE UP CLUTCH	PU56044-1-5	160p
HRD180, 250, 257, 455, 565, 566, 725, 755, HRP50			
MATSU			
VX730, 735, 750, 755	CLUTCH	850A00005	£20p
VX810, 820, 850, 880, 990			
VX730, 735, 750, 755	LIMITED POST LEVER ASSY		£1.30
VX770, 800, 810, 880			
VX980			
VX800A, VX900	IDLER REEL		£1.50
VX800A, VX820	REEL UNIT CLUTCH		280p
MITSUBISHI			
HS306, 307, 318, 319, HS400, 410, 710	GEAR ASSY	522800201	£6.25
HS327, 338, 347, 348	IDLER	552801701	325p
HS411, 412, 421, HS810, HS820, HS830, HSE10, HSE20, HSE30, HSE70			
HS306, 307, 318, 319	IDLER	641C34301	£2.00
HS400, 410, 710			
HS347, 348, 412	IDLER	522902001	£3.00
HS410, 412, 421, HS810, HSE10, HSE20, HSE30, HSE70			
HS337, 338, 411, 421	IDLER	552801801	320p
HS200	TAKE UP IDLER (LARGE)		£4.50
HS200	UNLOADING IDLER		£4.00
HS200	REW IDLER		£6.00
HS306, 307, 318, 319	SUPPLY REEL		

REMOTE CONTROLS

Description	Order Code	Price	Description	Order Code	Price
GRUNDIG			PHILIPS (continued)		
TP160E	RC 107	900p	RC38	RC 301	800p
TP200, TP300	RC 380	800p	KT3 TEXT	RC 5301	750p
TP400	RC 401	800p	RC5352	RC 5352	800p
TP590-600	RC 600	850p	RC5375	RC 5375	850p
TP390, TP610	RC 610	850p	RC5 STANDARD	RC 5534	850p
TP621	RC 621	850p	RC5901	RC 5901	850p
TP630, TP650	RC 650	850p	RC5903	RC 5903	800p
TP660	RC 660	850p			
TP661	RC 661	850p	SABA		
HITACHI			T6772	RC 149	900p
CLE800-CLE830	RC 140M	850p	TC319-320	RC 328	875p
A617402/655602	RC 192	875p	TC356	RC 356	875p
A512120/230	RC 900	800p	TC358	RC 358	850p
A514790	RC 901	850p	TC360	RC 360	800p
A5088470	RC 902	800p	TC365	RC 365	800p
A518612	RC903	900p			
SCL002	RC904	850p	SALORA		
C2096	RC 905	850p	SERIES L	RC 190	875p
A511940	RC 906	800p	86173	RC 882	850p
655602H	RC 907	850p	SANYO		
ITT			RC218, RC222, RC228, RC238	RC 140M	850p
IFB13, 14, 15	RC 143	875p	JXGE	RC 878	850p
FS4	RC 148	850p	JXDE	RC 884	850p
RG305	RC 305	825p	VHR2300	RC 890	850p
RG306	RC 306	825p	RC628	RC 865	900p
FS9/1-10/1	RC 307	850p	SHARP		
VS5 RUK	RC 308	825p	G0121CESA, 123CESA, 204, 251	RC 140M	850p
VS4-1	RC 310	850p	SIEMENS		
MULTICONTROL (17C20)	RC 311	800p	FC616	RC 130	850p
KORTING			FC631	RC 132	850p
18279, 18396, 18460, 18521 SE	RC 108	850p	FC742	RC 164	900p
40540 VTS	RC 108	900p	SONY		
LOEWE			RM604, RM605, RM606	RC 140	850p
DC11	RC 146	850p	32 CHANNEL	RC 140M	850p
MATSUI			RM613	RC 141	850p
010270601	RC 889	850p	RM632, RM636	RC 160	850p
VX770	RC 892	850p	TATUNG		
METZ			FXA	RC 877	850p
JAVA COLOR (6890)	RC 166	850p	RC70	RC 883	750p
COLOR (7156)	RC 183	850p	FX70 FASTTEXT	RC 894	850p
JAVA (7180)	RC 184	850p	TELEFUNKEN		
MITSUBISHI			FB632	RC 632 ST	850p
939P/03607, 939P/03609	RC 140M	850p	FB639	RC 639 ST	850p
NOKIA			THORN/FERGUSON		
SATELLITE	RC 550	850p	3V35-42	RC 342	750p
NORDMENDE			3V31-32	RC 344	800p
TC2336	RC 351N	850p	3V57-58	RC 628	800p
CMC1, TC3519	RC 356	875p	TX10 TEXT	RC 732	650p
OCEANIC			TX10 STEREO TEXT	RC 738	650p
390C9500	RC 339	900p	TX9-90-100	RC 740	700p
ORION			3V55, FV11	RC 783	900p
RC53	RC 892	850p	TX100 FASTTEXT	RC 785	700p
PANASONIC			TX100 STEREO FASTTEXT	RC 789	700p
EUR51200	RC 200	800p	PROFESSIONAL	RC 790	700p
TC2200	RC 201	850p	TOSHIBA		
VSQ0357/NV730	RC 202	875p	CT937	RC 950	850p
TNQ1621	RC 203	900p	CT9117	RC 951	800p
PHILCO			201R4B	RC 952	800p
CARVEL, CONCORDE,	RC 108	850p			
MERCURY, TELESTAR					
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	700p			

VCR ALIGNMENT KIT

CONTAINS:

SET OF 7 HEAD & TAPE PATH ALIGNERS	SET OF 8 ALLEN KEYS
* RCA TYPE AUDIO & CONTROL HEAD POSITIONING TOOL	* 0.77mm
* RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS	* 0.90mm
* RCA TYPE BACK TENSION TOOL	* 1.27mm
* TENSION ADJUSTMENT TOOL FOR VARIOUS USES	* 1.50mm
* VCR ADJUSTMENT TOOL	* 2.00mm
	* 2.40mm
	* 3.00mm

3 Reversible Screwdrivers
Spring Hook

Grasp Pliers
Micro Screwdriver

VCR Head Extractor

Order Code: TOOL10 Price: 3000p

FUSES

Value	TIME LAG (20mm)		QUICK BLOW (20mm)	
	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, Hlnari, 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, Hlnari, Marguant, Omega, Protex, Schneider, SEG, Senra, Sliptom, 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: 0181-900 2329 Fax: 0181-903 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 PRD900, PRD900	SATPSU1	650p
PACE SS9000, 9200, 9010, 9020, 9220	SATPSU2	650p
AMSTRAD SRD510, SRD520	SATPSU3	650p
AMSTRAD SRD500	SATPSU4	650p

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 NVHD100, NVHD101, NVHF100 NVSD	4600p 3100p 1400p
	AG7330, AG7350, AG7355, AG7450 NVFS100	5000p 5000p
N.E.C.	D5600	3500p
SANYO	TL51000P, TLS1001P, TLS1100 VHR7800, VHR7810, VHR8000SP, VHR8801SP, VHRD4800	3100p 3100p
SHARP	VCH80, VCH81, VFH815 VCA33, VCA36, VCA43, VCA44, VCA46, VCA49	2800p 1500p
	VCA55, VCA63	2200p
SONY	SLV656, SLV715, SLV757, SLV777, SLV815, SLV825 SLV353UB CCDF340E, CCDV500E, CCDV90E, CCDV95E, CCDSP5E	4600p 3200p 4800p

Original Video Heads

MAKE	MODELS	PRICE
NATIONAL PANASONIC	NVG20, NVG21, NVG22, NVG25 NVG25, NVG28, NVG200, NVD48 PART NO: VEH0343	3000p
	NVG33, NVG45, NVG46, NVL23 NVL25, NVL28 PART NO: VEH0417	2900p
	NVJ30, NVHJ33, NVL20, NVL21, NVG30, NVG31, NVG40, NVG130 PART NO: VEH0416	2700p

Audio Control Head

AMSTRAD ORIGINAL NO: 150751
Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4600MKII, 470C, FUNAI V52, VCR4300, 4800, 5200, 5600, 6600, VIP3000, 5C00
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, OMEGA, PROFEX, SCHNEIDER, 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 Auxiliary 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 1450p + VAT

Replacement Video Cassette Housings

MAKE	MODELS	CODE	PRICE
AKAI	VS35, VS53, VS55, VS56, VS75	CH18	2600p
GRANADA	VHSDP1 VHSYJ2	CH05 CH01	1100p 2600p
GOLDSTAR	GHV1290P, 1291P, 1295P, 940A, 73401, GSE1295P, GSE1891P, 20001Q, 20051Q, VCP4200, 4300, 4301, 4305, VCP4306, 4311, 4315, 4316, 4320, 4321, 4325 GHV51, 1221, 1232, 1240, 1241, 1242, 1244, 1246, 1248, GHV8000, 8200	CH25 CH26	2000p 2900p
FERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951, 1V35, 3V36, 3V49, HRD110, 111, 120, 121, 225 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD140, 141, 150, 157, 158, 160, 250, HHD257, 455, 565, 566, 725, 755 8948, 8950, FV10B, 12L, 13H, 14T, 20B, 21R, 22L, 26, 395, HRD230, 430, 530 3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRD370 FV31R HRD515, 520, 527, 540, 550, 580, 600, 610, 620, 660, 670, HRD830, 840, 850, 360, 4050, 6600, FV37H HRD540, 580, 830, 860, 910, 960, HRD970, HRDX20, FERGUSON FV57H	CH01 CH02 CH03 CH04 CH19 CH20 CH27	2600p 2600p 2600p 2600p 4300p 2400p 2400p
I.T.T.	VR3605, VR3905 VR3916, 3926, 3946, 3948, 3975, 3986, 3995, 3997, 6948 VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH01 CH02 CH02	2600p 2600p 2600p
NATIONAL PANASONIC	NV730	CH06	4300p
N.E.C.	N830EG, N831EG, N832, N833G N895	CH01 CH02	2600p 2600p
PHILIPS	CASSETTE LIFT ASSEMBLY (69120366) DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 6285, VR6290, 6290, 6293, 6362, 6367, 6393, 6467, 6468, 6470, VR6561, 6670, 6760, 6761, 6870, 6970 VR6443 VR6448 49S86	CH05 CH22 CH23 CH24	1100p 2900p 2500p 2500p
SHARP	VCA100, VCH851, VCH852 VCA103, 103GV, 106, 106GVM, 254GVM VCS211, 244, 5055, 605, VCB230, VCD806G, 810G, VCT212, 310, 410G, 610	CH22 CH23 CH24	2900p 2500p 2500p
TELEFUNKEN	VR2970	CH02	2600p
THOMSON	V320, 321, 323, 326, 4200, 4300 V342, 343, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, V5500, 6000, 8540	CH01 CH02	2600p 2600p
TOSHIBA	V55, V57 V65, V66	CH01 CH02	2600p 2600p

Service Aids

DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER	75ML	SP01	140p
SWITCH CLEANER	176ML	SP02	150p
SILICONE GREASE	200ML	SP02	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	SP16	160p
COLDKLENE	250ML	SP12	160p
EXCEL POLISH 80	250ML	SP12	150p
ADHESIVE 120	400ML	SP19	190p
LABEL REMOVER 130	200ML	SP26	240p
REFURB 140	400ML	SP2	240p
TUBE SILICON GREASE	50 GRAMMES	SP1	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		SP23	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) 15 WATT 240 VAC (XS15W 240V) 25 WATT SPARE ELEMENT 15 WATT SPARE ELEMENT	S101 S102 S103 S104	900p 900p 450p 450p
SOLDERING STAND & SPONGES SOLDERING STAND (MADE BY ANTEX) SPARE SPONGE	S108 S109	350p 55p
SOLDER 18 SWG 500 GRAMMES 20 SWG 500 GRAMMES 22 SWG 500 GRAMMES	S110 S111 S112	500p 650p 700p
DESOLDERING AIDS SOLDER MOP STANDARD GAUGE 1.2mm x 1.5M SOLDER MOP 1.2mm x 10M DESOLDERING PUMP SPARE NOZZLE	S107 S113 S105 S106	70p 400p 320p 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 1044P	550p	STK 7253	450p	2SK 793	400p
HA 13408	350p	TDA 2030H	100p	2SK 956	1400p
IRFBC40	400p	TEA 2319	200p	2SK 1023	550p
L727	200p	TMP 47C434N	1250p	2SK 1342	750p
L8210	250p	SAA 1300	200p	2SK 1358	600p
MC 3423P	100p	2SA 1340	55p	68000	500p
MJ 15015	250p	2SC 3788	60p	82S147	450p
MJ 15016	350p	2SC 3385	350p		

GRANDATA LTD
Tel: 0181-900 2329
Fax: 0181-903 6126

ELC EAST LONDON COMPONENTS
AUDIO TELEVISION VIDEO
COMPONENTS AT VERY KEEN PRICES
 TEL 0181-472 4871 FAX 0181-503 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, LOGI,
MATSUI, ORION, PANASONIC, SAISHO,
SHARP AND MANY MORE

VIDEO SPARES.

VIDEO IDLERS, CLUTCHES
BELT KITS, PINCH ROLLERS
BACK UP BATTERIES, TV
SWITCHES, CD SPIN MOTORS
FAULT FINDING BOOKS
EQUIVALENT BOOKS
JAPANESE TRANSISTORS
RESONATORS, THERMISTORS
HITACHI TH902 £2.00
96009 TRIPPLERS £1.30
UNIVERSAL £4.99
WITH FOCUS £7.99
POWER SUPPLY MOD KITS

ASTRA D Converter
£17.99

Satellite Finder Kit
PG-753
£29.99



RF PLUG &
SOCKET

ELC EAST LONDON COMPONENTS
63 PLASHET GROVE, EAST HAM,
LONDON E6 1AD. TEL: 0181 472 4871

two minutes walk from Upton Park Tube Station

VISIT OUR SHOP

OPEN MON-SAT 9AM-7PM

100's OF TOOLS, COMPONENTS,
INSTRUMENTS, REPAIR KITS,

BOOKS & CABLES TO CHOOSE FROM

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	AN3822K	7.99	LA7835	1.99	STK5730	6.00	TDA1510	3.50
CT2570E	1420	AN5151	6.99	ME42901	2.60	STK6962	5.80	TDA1515	2.50
CT2870	1440B	AN5435	2.50	M51393AP	4.50	STK7216	7.00	TDA1516	4.00
ALBA	1440	AN5015	2.99	M49481	8.50	STK7226	8.50	TDA1513	1.00
CTV14RS	1465	AN5521	2.99	M49481	8.50	STK7308	4.25	TDA1520	4.00
AMSTRAD	1480A	AN5900	1.50	M54840A-84	11.00	STK7348	4.50	TDA1521	3.50
CTV2200	1499	AN7161	3.40	M54543L	2.99	STK7356	9.00	TDA1522	3.99
CTV2210	1499	AN7171	2.60	M54546L	2.99	STK73410	6.99	TDA1523	3.99
CTV2210	1499	BA1718	1.99	M54548L	4.25	STR3125	5.99	TDA1701	4.25
CTV2210	1499	BA3402	3.99	M54549L	4.50	STR4211	5.99	TDA1707	10.00
CTV2210	1499	BA5209	2.50	M54549L	4.50	STR4211	5.99	TDA1908	1.00
BUSH	1499	BA6109	1.80	M54549L	4.50	STR4211	5.99	TDA1909	1.00
2020T	1499	BA6121	2.99	M54549L	4.50	STR4211	5.99	TDA2005	1.30
FIDELITY	1499	BA6222	1.99	M54549L	4.50	STR4211	5.99	TDA2030	1.30
ZK2000	14.50	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2170	3.00
ZK3000	12.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2170	3.00
FERGUSON	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2578A	2.50
TX85-96	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2578A	2.50
REDSPDT	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2600	5.75
WHITE	14.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2600	5.75
HITACHI	13.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2653A	3.50
TX99	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3330	7.00
TX100	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3505	4.00
FST	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3561	3.00
BLUESPOT	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
GREEN	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
YELLOW	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
GOLDSTAR	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CT14282	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
HINARI	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CT4/5	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CTV140	12.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
HITACHI	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT1446	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT1455	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT1476	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT1493	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT1646	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2028	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2036	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2048	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2078	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2084	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2087	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2174	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2176	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2178	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2238	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2248	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2276	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2278	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CPT2476	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
ITT	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CT2613	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CT3306	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CT3325	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CT3425	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CT3835	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
ST3487	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
ST35467	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
TX2613	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
TX3327	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
TX3447	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
TX3835	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
COM B	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
DIGI 1-3	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
MONOPRINT	9.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CV2552	9.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
LOEWE OPTA	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
ART 1	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
CLAS M 124	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
PROF S 28	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
STUDIO 1	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
STUDIO S 28	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00
STUDIO T 28	16.99	BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3562	3.00

AN5151	6.99	LA7835	1.99	STK5730	6.00	TDA1510	3.50
AN5435	2.50	ME42901	2.60	STK6962	5.80	TDA1515	2.50
AN5015	2.99	M51393AP	4.50	STK7216	7.00	TDA1516	4.00
AN5521	2.99	M49481	8.50	STK7226	8.50	TDA1513	1.00
AN5900	1.50	M54840A-84	11.00	STK7308	4.25	TDA1520	4.00
AN7161	3.40	M54543L	2.99	STK7348	4.50	TDA1521	3.50
AN7171	2.60	M54543L	2.99	STK7356	9.00	TDA1522	3.99
BA1718	1.99	M54546L	2.99	STK73410	6.99	TDA1523	3.99
BA3402	3.99	M54548L	4.25	STR3125	5.99	TDA1701	4.25
BA5209	2.50	M54549L	4.50	STR4211	5.99	TDA1707	10.00
BA6109	1.80	M54549L	4.50	STR4211	5.99	TDA1908	1.00
BA6121	2.99	M54549L	4.50	STR4211	5.99	TDA1909	1.00
BA6222	1.99	M54549L	4.50	STR4211	5.99	TDA2005	1.30
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2030	1.30
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2170	3.00
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2170	3.00
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2578A	2.50
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2578A	2.50
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2600	5.75
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2600	5.75
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA2653A	3.50
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3330	7.00
BA6229	2.80	M54549L	4.50	STR4211	5.99	TDA3505	4.00
BA6229	2.80	M54549L	4.50	STR4211	5.99	T	

TELEVISION



REED
BUSINESS
PUBLISHING

A Plethora of Channels

The TV options presented to viewers could before long be quite different from those to which we have become accustomed. We have got used to a growing number of channels being available in one way or another, along with other video sources, but to date the channel viewing options have been around ten or so rather than in the hundreds. The situation could change quite quickly, with say 500 or so channels on offer. This is what the move from analogue to digital transmission technology will mean.

Between now and the first half of 1997 three all-digital Astra satellites (1E-1G) will be launched, with a total of 56 transponders. Each of these will be able to transmit four-ten channels depending on the picture quality required – anything from VHS to widescreen, high definition. According to Astra's parent company SES, 90 per cent of the capacity of these all-digital satellites has already been taken on contract or is under offer. Eutelsat's Hot Bird 1, which can be used for analogue or digital transmissions, has now been successfully launched. At least half of its sixteen transponders are expected to be used for digital broadcasting. Hot Bird 2 is due to follow in August 1996, offering more channels.

The mass of channels in prospect will not be aimed at us from the satellite orbit alone. The technology is now with us to transfer from analogue to digital terrestrial broadcasting. On the same four-ten channel basis, this presents the prospect of 16-40 channels coming down the feeder instead of

four. It's possible that once things get moving analogue broadcasting will be phased out quite quickly, say in ten years. After all, people are now used to changing/upgrading their domestic electronic equipment regularly, and we have already seen the successful phase-out of 405-line v.h.f. transmissions. Although there was much concern in the Sixties as to whether sufficient time was being allocated to this, in practice the period of v.h.f./u.h.f. duplication could, with little public inconvenience, have been brought to an end sooner.

Wideband cable offers another means of supplying hundreds of channels to the home, while computer networks promise all sorts of services.

Digital TV decoder boxes are likely to be inexpensive since the digital processing circuitry required can be standardised and incorporated in a couple of dedicated chips. Teletext and Nicam have proved that digital decoding is inexpensive. Such boxes will be relatively less expensive than the Band III converters that people were happy to buy in the Fifties. The only thing that might add a bit to the cost could be conditional access/scrambling requirements. There is currently much debate in broadcasting circles about the best way of going about this.

The only problem of course is what to do with all these channels and how to make them pay. It seems however that big money is already being committed to the multi-channel future – according to SES most of the deals already agreed for its three digital satellites run for ten years.

Two types of service in particular are being considered. The first is referred to as "near video-on-demand". As many as sixty channels at a time would be allocated to the top ten films, with each film appearing on six channels with staggered starting times so that the viewer would never be much more than twenty minutes from the start of a particular film. The other type of service, referred to as multiplexing, would be similar: programmes would be repeated in different order on several channels to increase viewing opportunities. If all this seems to be a bit of a waste, well yes! But if no one can think of a better way of profitably filling the channel capacity that technology is about to present us with, then something like this is what we are likely to get.

The implications of all this are considerable. Will it be feasible for multi-channel transmissions, cable delivery and all the various video and computer options to co-exist economically? Will some go to the wall, become reserved for highly specialist use or simply be left unused? This involves difficult decisions for broadcasters and information/programme providers. Some are already hedging their bets by backing more than one form of service provision. The outcome will depend on what turns out to be most convenient for the public. Whoever gets this right will come out a winner. At present the technology is roaring ahead of service provision. When, as now, the situation is technology rather than demand driven there is always the possibility of burnt fingers.

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 NP82C2 chassis used in the Hitachi Models CPT1471/1473.

See servicing article on pages 472-3.

Teletopics

JVC's Dynamic Drum

JVC has developed a new, dynamic head drum for the VHS format. Dynamic means that its angle of inclination can be shifted by a fixed extent plus or minus from the standard inclination to provide various features. These include almost noiseless forward and reverse variable-speed search, narrower recording tracks for higher density recording to give a longer playing time, and endless recording – when the tape reaches the end, recording continues automatically in the reverse direction.

The basic idea is shown in Fig. 1. With a conventional head drum the lower drum section is fixed to the base: with the DD system it's separated, as shown. A computer-controlled motor, linked to the drum inclination screw via a gear, can shift the drum's inclination angle and thus the angle of the heads with respect to the tape.

JVC has also developed a 'three-dimensional super

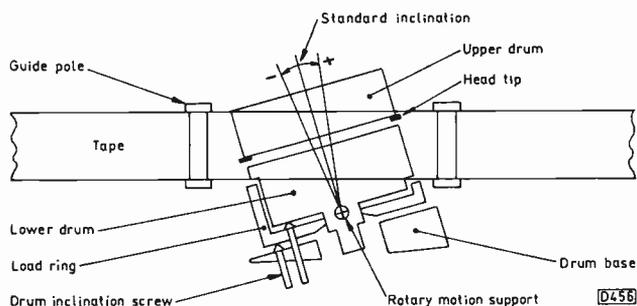


Fig. 1: JVC's dynamic VHS drum assembly.

colour' system to eliminate chroma shift during playback, and a 'best-tuning' system that optimises the record and playback quality in accordance with the tape characteristics and compensates for head ageing. JVC says that this latter system is simple and inexpensive and can be incorporated in all types of VHS deck.

JVC has to date revealed few details of possible uses of the dynamic drum, but there's a possibility that it could form part of a digital VHS system.

Channel 5

As the time approaches (May 2nd) when applications for the Channel 5 franchise have to be received, the ITC has announced changes that will increase the coverage to 66 per cent and interest amongst prospective bidders seems to be on the increase. The ITC has obtained permission to use nineteen more transmitter sites – international agreement was required because of possible interference caused by the proposed service. The extra transmitter sites include Winter Hill, which serves a large part of the north west including Manchester and Liverpool. Agreement has also been reached to change the Croydon and Sutton Coldfield Channel 5 polarisation, which means that viewers in the London and West Midlands areas would not require a differently polarised aerial. The ITC hopes that the Channel 5 service will start not later than January 1st 1997.

There are at present two declared bidders: a consortium that includes Pearson, MAI and Luxembourg-based CLT; and another that brings together the Mirror Group and NBC.

A group that includes BSkyB, TCI (Telecommunications Inc.) and Granada looks very likely to bid. Other consortia are being formed by Virgin with Associated Newspapers, and the Canadian-owned international broadcaster CanWest. Yorkshire-Tyne Tees TV is expected to joint one of the groups. The membership of some of these consortia remains fluid as negotiations between potential members continue.

DVDs and CDs (Various!)

Philips and Sony gave the first public demonstration of a dual-layer (to increase storage capacity) disc system, developed with 3M, at the International Tape Association conference in California during March. A standard-density disc with an extra information layer in it was used. Since then there have been demonstrations of Philips' high-density CD system, developed with Sony, at a convention in Paris, at the CeBIT computer fair in Hanover and at Philips' Redhill, Surrey research laboratories. We will be reporting on the Redhill demonstration in a later issue. At CeBIT Philips and Sony demonstrated the two-layer system playing audio only on a modified CDi machine, and MPEG-2 video with a single-layer disc using an engineering prototype player.

Philips has also unveiled a strategy for the development of CD systems. The company feels that its two-layer discs, with each layer holding 3.7Gbytes of data, will be available from the start of DVD marketing. This is expected to be some time next year. The different layers are read by adjusting the laser system lens. Recordable single-layer HDCDs could be available by 1998, for data storage and digital video recording. Initially there will be a CD-RAM version of the CD-ROM, with a high-density version that can store 3.7Gbytes of data expected to follow in 1997/8. These discs will be based on phase-change technology, enabling them to be used and reused like a floppy disc.

Meanwhile Toshiba has announced that volume production of its DVD discs and players will start in mid-1996. A DVD division has been set up to work on both read only and re-recordable versions of the technology. Zenith, the only remaining major US-owned TV manufacturer, has announced that it will launch DVD players using the Toshiba technology next year.

TDK has launched its CD-RXG discs, which can record up to 45 minutes of audio but not video. CD players that can record as well as play are due for release by several companies including Kenwood. The blank CD-RXG discs will sell for about £15 while recorder-players are expected to be available for about £500. The CD-RXG discs are similar to professional CD-R discs: they differ in including a code to indicate that they are for consumer use and a serial copy management system to prevent multiple copying.

Philips is to launch mini CDi systems and a TV/CDi combi unit later this year.

Philips Media is to distribute Sony Video CDs produced by OmniMedia. According to Philips over 1,000 Video CD titles are now available world wide, two hundred of them being available in the UK.

Satellite TV

BSkyB has won its case against a supplier who offered pirated smart cards and devices known as interfaces or blockers, which are designed to turn on Sky cards and prevent Sky from turning them off. The supplier was given six-month prison sentence, a two-year suspended sentence on condition that he no longer becomes involved with BSkyB products, and was ordered to pay Sky's legal costs

and pay all profits made from his illegal activities.

BSkyB is planning to launch a multi-million pound digital TV service with up to 120 channels. It could be in operation, via the Astra satellites to be launched this autumn and early next year, some time in 1996. Detailed research and planning has already been carried out. There are several ideas for filling this mass of channels. One is to adopt multiplexing – transmitting channels at different times to increase viewing opportunities. A problem remains in that conditional access/encryption standards would need to be harmonised across Europe, something that's the cause of a certain amount of debate at present.

According to SES, owner of the Astra satellites, over 56 million TV households were able to receive one or more Astra channels at the end of 1994. This is 35 per cent of the 160 million TV households in the 22 European countries within the Astra footprint. The UK figure is given as 4.82 million households (20 per cent), with 15 per cent using dishes, the remainder being linked via cable.

In conjunction with Eutelsat, Satellite Solutions (UK) Ltd., 1 Hartburn Close, Crow Lane Industrial Park, Northampton NN3 9UE (01604 787 888) is offering all trade installers and retailers a free Hotbird upgrade. It will enable those in the trade to purchase an 80cm pole- or wall-mount black mesh dish with two high-performance enhanced LNBs for the price of a standard 60cm system. The dish includes a dual-clamp arrangement to allow reception of the Astra satellites at 19.2°E and the Eutelsat Hotbird at 13°E.

BBC's Digital TV Demonstration

The BBC has, following the recent NTL presentation, demonstrated a widescreen terrestrial digital TV system. Four programmes were transmitted in digital form from Crystal Palace, in a single 7MHz channel bandwidth. They were received at the BBC's White City building. Motion-compensated hybrid DCT encoding was used for the 16:9 widescreen, 625-line/50Hz interlaced field pictures. This is similar to the MPEG-2 standard. Audio was MPEG-1 layer 2. The video rate for each programme was 4.54Mbits/sec, the audio bit rate being 256kbits/sec. Channel 28 was used for the demonstration, with a maximum e.r.p. of 5kW.

The BBC proposes a system which transmits 16:9 aspect ratio pictures for widescreen sets and uses a format converter to produce 14:9 aspect ratio pictures for viewers with 4:3 aspect ratio sets. Research has established that 14:9 is much more acceptable with 4:3 aspect ratio screens. The BBC has already introduced widescreen production capability in one of its major studios.

The proposed BBC terrestrial digital TV service could offer an average of twelve extra channels (compared with analogue transmission) – the number would vary around the UK. A service could start at the end of next year, though various technical and regulatory issues would need to be resolved first.

The BBC also demonstrated a five-channel surround-sound system and an electronic screen guide.

NTL's Aspirations

NTL is negotiating with other UK and European manufacturers to establish a digital terrestrial TV (DTT) system that could be sold worldwide. It feels that a large market will develop as analogue transmissions come to be replaced with digital TV services.

NTL is also after the BBC's UK transmission network. It has commissioned a report from corporate finance advisers

Price Waterhouse to present the case for privatisation of the BBC's network, suggesting that this would avoid unfair competition and increase efficiency, with cost savings of some £15m a year. It naturally argues that NTL should be allowed to bid for the network.

The PC Market

According to GfK Marketing Services 3.3 million homes in the UK had at least one personal computer at the end of September 1994. Over 3,000 UK households a day bought a PC in 1994: 26 per cent were replacements and 17 per cent additional machines. A third were bought from general retailers, a third from specialist computer retailers and 32 per cent were second-hand. Games continue to be the largest use, with 54 per cent of users regularly playing games. Whatever they are used for, the PC market is a large one that overlaps with ours and is worth consideration from the sales and servicing points of view.

There is increasing equipment overlap. ICL is planning to introduce a PCTV machine which will combine a multimedia PC with a 14in. Nicam stereo TV receiver. Pioneer is to launch PCs that use the Apple Mac operating system: the aim is to integrate AV products with PCs. Model MPC-GX1, a desktop AV system, will include a 3D speaker, a quad-speed CD-ROM drive and a PC with a PowerPC 601 RISC chip; Model MPC-LX1000 is an AV computer with a Motorola 040-series processor. These models are to be launched initially this summer in Japan. No price details have been released.

JVC's Surround Sound System

JVC has developed a Dolby Pro-Logic Surround sound format called Dolby Pro-Logic 3D-Phonic. It enables users to hear the full Dolby Pro-Logic effects using two speakers instead of five. The system is expected to be demonstrated later this year. No launch details have been released.

Sanyo's New VCRs

Sanyo's latest range of VCRs, which are due for release in May and April, incorporate a new chassis. The drum has been redesigned to extend head life, and the power consumption has been reduced by up to 40 per cent. Improved access to the power supply, tuning circuits and all major components should make servicing easier: the self-diagnostic system has also been tweaked to simplify fault-finding. Models range from the VHR245E at about £230 to the top-of-the-range VHR795E at around £430.

In Brief

A helpful BBC Computer User Group is being run by Ron Marshall, Solinet, 41 Westbrook Drive, Rainworth, Mansfield, Nottinghamshire NG21 0FB (0623 795 053). Members send a blank 5.25in., 80-track DFS format disc every second month, together with a stamp, return address label and 50p piece: the disc is returned containing members' hints, tips, problems, programs – and letters about everything under the sun!

An article in a recent issue (December 1994) described the Os-Con, a form of electrolytic capacitor that uses organic semiconductor material as the electrolyte, giving greatly improved performance. We understand that these devices are stocked by Semicom UK Ltd., The Forge, Mulberry Green, Old Harlow, Essex CM17 0ET (01279 422 224, fax 01279 433 339).

Panasonic NVR10 and Others

We've had a few Panasonic camcorders in recently with faults similar to the one with this machine. It would shut down during record or playback: sometimes an error code would appear in the EVF display. Once we gained access to the innards the cause of the trouble was soon evident. The plug to the head cylinder motor was badly fitted to the main board.

You can sometimes get away with resoldering the connections to the print, but in this particular case the connector had to be replaced. It can be a difficult job, and an expensive one if the fine and delicate print is damaged during the replacement. **B.S.**

Panasonic NVS1

The problem with this compact camcorder was vertical coloured bands on the left-hand side of the playback picture. On dismantling the machine we noticed some evidence of impact damage – some casing fixtures were bent. In view of this we decided to examine the delay lines along the edges of the board. Sure enough DL8001 was cracked, its replacement restoring a clean picture. **B.S.**

Panasonic NVMS4

A jerking capstan motor was the fault with this machine. Something caused a ragged spike to appear on the capstan drive voltage. With faults of this type it can be difficult to prove whether the cause is in the drive, output or error correction circuitry.

Our first checks were in the power supply, as the fault was reflected on all the supply lines. But this proved to be a red herring. After much testing, measuring and tail chasing we found that the cause of the fault was within the main system and servo microcontroller chip IC6001, which was generating the defective control voltage. A new MN6755243V6E chip, fitted with care, restored normal operation. **B.S.**

Panasonic NVM7B

This camcorder's zoom control buttons were inoperative: all other functions worked correctly. The lens was undamaged and was free to rotate, and when the zoom motor was removed and checked with a bench power supply it seemed to work. The motor drive circuit was found to be o.k., but it wouldn't power the motor. Fitting a replacement motor assembly cured the problem. So why did the original one work with the bench supply? It would revolve, but in doing so it drew approximately three times the normal current. **D.C.W.**

Sharp VLC680H

A knock to the optical assembly caused the autofocus to stick. The cure was easy: to remove, clean and refit the optical assembly elements. What was not so easy to cure was the fact that the viewfinder display showed XCAS-SETTEX at the upper left-hand side. The camcorder's functions all worked correctly, but the viewfinder failed to show the correct function details. When we removed the camera

section for inspection we noticed that one of the connections to P701 appeared to be slightly farther out than the rest of them. The offending connection was to pin 1, the 'ready' line between the camera microcontroller and the syscon controller. Refitting cleared the problem. **D.C.W.**

Canon E200E

Two of these camcorders came in on the same day with the same fault. They would cut out after a few seconds in either fast forward or rewind, entering the caution mode (eject flashing). If play or record was selected there was normal operation for maybe ten minutes, then failure. We found that the capstan motor FG signal disappeared when the failures occurred. Both camcorders had to have new capstan motors fitted. **D.C.W.**

JVC GRSX9E

Because of a faulty record tab switch this S-VHSC machine would suddenly stop recording. Unfortunately the switch is available only as part of the complete sensor board assembly, greatly increasing its cost. **D.C.W.**

Canon E60E

More and more camcorders are suffering from what at first seemed to afflict mainly the Sanyo VMD3P, leakage of electrolyte from capacitors of the round-can, PCB-mounting type. The symptom that led to this machine being brought in was loss of the video output signal from the AV phono socket – the EVF picture was o.k., as were all other functions. C104 and C108 on the main PCB were leaky.

Since we encountered this problem for the first time, two other machines with the same fault have come in for attention. Doubtless there are other potential failures to look forward to. **D.C.W.**

Sony CCDTR105E

Everything seemed to be o.k. except for rewind. When this was selected the tape would spill out, because the supply spool failed to rewind correctly. The cause of the trouble was the fact that the relay belt which couples the midway gear assembly to the capstan motor drive had 'flipped' over at one end. As a result the non-toothed side ran against the driving gear. There was still enough torque for most functions – except rewind. A new belt cured the fault (a Sony kit that includes the parts mentioned above is available). **D.C.W.**

Canon E850E

The reported fault was failure to eject. In fact this meant failure to do anything mechanical at all! The cause of the fault was loss of the FG output from the capstan motor. With this design the syscon microcontroller chip immediately senses the absence of the FG pulses and brings about a remarkably fast shut-down sequence – so fast that the capstan motor hardly has time to rotate! **D.C.W.**

MPEG

Digital Television

For All

STAY IN TOUCH WITH THE FUTURE OF TELEVISION!

NEW!

MPEG - DIGITAL TELEVISION FOR ALL



ONLY **£19**

Postage: -
UK: £1.50 Europe: £3
Rest of World: £8 ISBN 1 872567 07 X

Send stamped, addressed envelope for complete list of satellite books, videos and software

SWIFT TELEVISION PUBLICATIONS

17 Pittsfield, Cricklade, Wilts, SN6 6AN, England
Tel 44 (0)1793 750620 Fax 44(0)1793 752399

NTL's authoritative guide to digital compression

- ✓ An authoritative guide from NTL on leading edge techniques for future television.
- ✓ Detailed information on how to squeeze 30 channels into an existing single channel!
- ✓ Describes compression and bit rate reduction techniques!
- ✓ Explains the advantages and disadvantages of digital television!
- ✓ Sets out an international standard for digital TV source coding!
- ✓ Defines Discrete Cosine Transform (DCT) and how to convert blocks of pixels into a frequency domain representation!
- ✓ Explains the MPEG System layer, MPEG Data streams and MPEG video compression!
- ✓ Includes full descriptions of I Frames, P Frames and B Frames. What they are and what their functions are!
- ✓ Sets out how to exploit temporal and statistical redundancy!
- ✓ Covers detailed descriptions of Transform coding!
- ✓ Analyses Quantisation techniques!
- ✓ Covers compressed audio in MPEG!
- ✓ Rationalises picture quality at various bit rates, and the variable compression rates!
- ✓ Defines conditional access and scrambling, scrambling control field and adaption field!
- ✓ Lists various modulations systems such as QPSK and QAM!
- ✓ Covers the advantages of MPEG on existing cable systems!
- ✓ Includes NTL's System 2000, 3000 and VCS 4000!
- ✓ Explains other forms of bit rate reduction coding!
- ✓ Summarises future digital TV techniques!

104 ABBEY STREET, ACCRINGTON
LANCS BB5 1EE
Tel: 01254 236521/23261
Fax: 01254 395361
SEND LARGE S.A.E. FOR TRADE CATALOGUE

WE ARE CLOSED ALL DAY WEDNESDAY

CALLERS WELCOME AT TRADE COUNTER MON-FRI 9-5pm SAT 9-1pm

ASK US FIRST FOR ALL YOUR COMPONENT NEEDS AS WELL AS FOR:

Satellite Dish Packs with LNB (60cm) ...	£45.00
Enhanced LNB (for Astra ID).....	£22.95
ADX Converters	£19.99
Pace 9000 repair kits.....	£6.99
Pace 9000 repair kits.....	£5.50
60cm dish, only	£20.00
Listener plug-in monitor, no wiring.....	£18.50
Doorman two station intercom	£11.95
Portable PIR alarm	£19.95
Two band AM/FM clock radio	£9.95
CCTV monitor/camera	£165.00
Covert CCTV camera (disguised as smoke alarm, PIR, etc)	£135.00
10" AC/DC CTV with scart. Ideal for caravan or computer use.....	£165.00

OUR FAMOUS DEGAUSSING COIL: £27.50

WE CAN'T LIST EVERYTHING THAT WE STOCK. OUR RANGE IS EXTENSIVE. WE HAVE A TRADE CATALOGUE ON REQUEST. WE ARE ALSO ON LINE WITH 'MOVIES' TO ORDER ANY PHILIPS PART QUICKLY. JUST SOME OF THE THINGS WE SELL: REPAIRS, BRACKETS, BATTERIES, CABLE CONNECTORS, CMOS CAPACITORS, COMPUTER ACCESSORIES, DISCS, DIODES, ELECTRICAL ACCESS, FUSES (CS, LOPTX, LEADS), MANUALS, PUSH BUTTON LIGHTS, PHONES, PHONE ACCESS, POTENTIOMETERS, RELAYS, SEMICONDUCTORS, STRIPBOARD, STYLUS, SMOKE DETECTORS, SWITCHES, TUNERS, TV BATTERY LEADS, TV WALL BRACKETS, TOOLS, TEST EQUIPMENT, VALVES AND EVERYTHING YOU NEED FOR VIDEO REPAIRS - HEADS, IDLERS, TYRES, PINCH ROLLERS, CLEANERS, TEST CASSETTES, VIDEO TAPE (inc BETA and V2000) etc.

P.V. TUBES
HOW TO ORDER: Up to 1K ADD £2.00 per order P+P (U.K.). Heavier parcels, e.g. cables, service aids, degaussing coils please allow £2.00 P+P (U.K.). Export orders charged at cost. First Class Mail is used whenever possible. Add 17.5% VAT to total except where it carries zero rate. Over 3K will be sent by carrier £12.00 + VAT up to 15k (except tubes). We do not despatch on Saturdays.

Goods are despatched on the day we receive your order. If for any reason we are out of stock we will try to inform you as quickly as possible. We try our best to give a speedy, fair and efficient service. VAT invoice on request. Give us a ring - we'll give you service. Please ask if what you need is not listed - we will try to help. Prices are subject to change without notice. In some cases we may have to supply an equivalent. We need expiry dates for credit card orders. MIN. ORDER £5.

MARAPET ELECTRONIC COMPONENTS

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

SEMI CONDUCTOR SELECTION

AM26L S30PC	3.97	LM1203N	9.92	TDA4600-2	3.70	IC Protectors	
AM26L S31PC	2.49	LM137K	1.73	TDA8170	3.45	For N series	
Ams40054	11.69	LM3909N	2.15	TDA8380	3.25	50p each	
Ams40092	9.01	LM833	1.95	TEA5570	2.99		
Atari SI Ktbrd		MB81416-12	3.75	TIP1791A	2.25	27C256-200	
CPU	20.85	MC74HC65	0.85	TL031CLP	1.99	EPR0M	3.50
AY38912P	6.58	MK464-15	1.79	TL487ACN	3.99	1M4001	0.07
BB110	0.29	MSM6246B	9.99	TMS4164-15	2.25	1N5061	0.85
BUV46A	4.17	NE531V	1.39	TMS4532N14	0.99	25A1015GR	0.99
CA741CE	0.25	NE555CDP	0.27	UC3842	2.34	25A608	0.55
CN765	3.99	P8255A	2.85	UC3844	4.25	25A673	0.66
CDP6818AE	7.24	PC713V	2.89	UF88284A	6.43	25A844	0.76
CO24947	10.03	R2G	1.29	UPC575C2	3.49	25A933	0.63
CO25913	27.99	S2000AF1	1.99	UPD039HLC	10.55	25C1675	0.88
DS1488N	0.79	SED9420CAC	14.93	Z8B302	6.49	25C1740	0.76
DS1489N	0.79	SN74LS00N	0.15	Z8B401	5.44	25C2001	0.60
DS75150N	1.49	SN74LS245N	0.39	14DN476G	14.30	25C210Y	1.43
KA6210AH	1.50	TA7280P	4.95	4052	0.68	25C2482	0.52
DTA114ES	1.28	TA7281P	4.95	4116-2N	1.75	25D471	1.85
HI1L3	2.99	TA8410K	4.59	4520	0.68	25D571	0.89
HA12006	7.08	TBA530	1.25	4538	0.62	BC337	0.24
KA6210AH	7.49	TBA810P	1.29	626RS VIC	13.49	BC359B	0.25
KM4164B-12	2.12	TBA810S	1.35	8565R2 VIC	15.03	BC848B	0.25
KM4168-10	2.55	TDA1001B	2.39	74LS157	0.25	BF241	0.79
LA6324	2.46	TDA2595	4.24	74LS74	0.45	BF299	0.66
LA7910	2.70	TDA3654	2.89	74HC04N	1.50	BF435	1.95

CRAZY SALE '30% off' ALL THESE SEMICONDUCTORS

The above Semiconductors are offered at 30% below the marked price. Yes, almost one third off - simply add it up your order for any Semiconductors shown; deduct 30%, add any other items along with postage, then add VAT. This is a genuine offer, available to 24/05/95, or while stocks last.

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 PC14GDDO Service	£5.00
Amstrad PCW9512 User	£19.99
CBM C64/C64C Service	£14.99
CBM C64 User	£5.49
CBM C64C User	£4.99
CBM C + 4 User	£5.49
Panasonic KXP-1123 Service	£14.95
Philips CM8833 (Mk1) Service	£8.55
Philips CM88xx Service Supp	£3.00
Philips CM8873 Service	£8.76
Philips CM11342/62 Service	£9.99

TV/MONITOR LINE OUTPUT TRANSFORMERS

AMSTRAD, IBM, DIGITAL, etc	P.O.A
COMMODORE 1084/PSP etc.	P.O.A
PHILIPS CM8533/CM8833 etc.	£21.27
PHILIPS CM11342/62 (CM8833 MK II)	£24.49
Ferguson TX90 14" Eqp.	£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
CEC C2089H/90HC/2288 to 2291H/C2294H	£21.60
Hatch CPT2036/46/78/79/CPT2234/36/CPT2246/78	£21.60
Hatch 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.

When ordering: Please add £1.20 P & P (+ 50p for LOPTX) 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.
Overseas orders welcome - minimum p&p charge is £2.50

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

Letters

DEVICE 'NOT AVAILABLE'

In the March TV Fault Finding column John Hepworth mentioned his repair of a dead Matsui 2180TT by replacing the STR58041 chopper chip and the fact that a previous 'repairer' had given up, claiming that the STR device is no longer available. We find that this sort of thing is quite a common problem in our area. Presumably the customer rings round the shops and finds that an accurate estimate is chargeable. He then rings the local cowboy's number, found in the small ads of the local newspaper – "any make of equipment repaired, with free estimates and free collection and delivery". This may be possible with some easy repairs, but when it comes to buying a service manual or expensive parts the cowboy will either tell the customer that the parts are not available or quote such a high price that the customer declines to have the repair done.

In a recent example a not very happy customer brought along a Sanyo CBP2152. She had apparently cleaned the screen with an over-damp cloth, with the result that water had run down the front on to the control PCB. She had been elsewhere with the set, where she was told that the microprocessor had failed and was no longer available. The set was stuck on ch. 1 and none of the customer controls did anything. She'd also written to Sanyo and received a reply, from the customer relations department, saying that the microprocessor was in fact available to account holders from stock or to non-Sanyo account holders from Chas Hyde, at about £29. After she'd agreed to our estimate charge of £15 (including VAT) we investigated and found that the cause of the fault was simply that diode D743 was leaky.

In the same issue of *Television*, on the Help Wanted page, a reader was seeking a chip for a Samsung microwave oven. We got in touch and suggested that we took a look at the control PCB, as the chip rarely fails. Apparently he'd been quoted £80 to carry out the repair, i.e. replace the chip. The cause of the fault turned out to be a dry-joint on the ceramic resonator associated with the microcontroller chip. After putting the PCB through its paces we packed it up and posted it back, all for less than £20.

When will the public learn that an accurate estimate has to be paid for? How much good equipment ends up in the tip because Mr Cowboy quotes over the top when he finds that he can't do the job?

Incidentally we don't charge for the estimate if the customer decides to buy a replacement set, or whatever, from us.

*Michael Dranfield,
Buxton, Derbyshire.*

COMMENTS FROM GRUNDIG

First, there's an error in our entry in the Spares Guide. Our fax number is 01443 220 221, not 237 206.

Secondly, the letters about technical advice. It's refreshing to see that people are at last waking up to the fact that responsible manufacturers have a pivotal role in the service industry and that they are not charities for giving free advice to anyone who feels it's their god-given right. Every manufacturer has a legal (not to mention moral) responsibility to take all reasonable steps to prevent consumer safety being compromised. It has nothing to do

with restricting repairs to oneself.

Well done Mike Molloy on the Willow Vale 0891 approach.

Good idea from R.J. Longhurst. How about small repair businesses providing details of qualifications (for consumer safety reasons) to manufacturers with an annual fee, then having access to advice by fax. Would it work? How much should the fee be? Should it include automatic mailing of service data? Your thoughts and comments on such points to *Television Letters* or to me.

*Paul F. Goldring, Eng. Tech., TMIEIE, MISM,
General Service Manager,
Grundig Satellite Communications Ltd.,
Unit 10, Llantrisant Business Park,
Llantrisant, Mid Glamorgan CF7 8LF.*

CAN YOU HELP?

Following the tragic death of our joint chairman Freddy Rottman in a traffic accident it has been decided that we will compile a history of the company, NEI, that he and his co-chairman Izak Uziyel founded in 1978.

If any readers have any NEI/Network TV sets, mono or colour, that are scrap or surplus to requirements and are complete and reasonably tidy, working or not, please contact Denis G. Mott on 0181 207 6868, extension 127.

*Denis G. Mott, Engineer,
Network Electronic Industries Limited,
Premiere House, Elstree Way,
Borehamwood, Herts WD6 1JH.*

PROBLEM WITH A GRUNDIG 2 x 4 SUPER

I had two problems in tackling this fault. First it was intermittent, and secondly when it comes to even thinking about repairing equipment of my own I tend to remember all the other outstanding household jobs that require attention, reflect that I don't have the particular manual to hand, recall how cold the workroom is and, let's face it, suffer from a bout of technofear!

The latter affects my ability to think straight. I *do* know the logical approach to fault-finding, and I *do* know that it works 99.9 per cent of the time. But I always assume that I am dealing with the odd 0.1 per cent case.

The problem was with a Grundig 2 x 4 Super VCR. While this old machine provides picture quality far below that of my Sony SLV777, it's useful when I have to copy a tape at fast forward/reverse or in slow motion. I know that there are other and better ways of doing this, but at what cost?

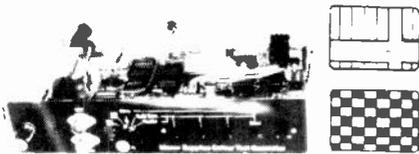
Anyway, to the fault. After a few weeks of procrastination it had become permanent. All seemed to be well at turn on, but when playback was selected the tape laced up, thought for three seconds then promptly unlaced, with the tape LED flashing the helpful message that there was no drum rotation. After removing the top cover and the massive head protecting cover I checked a few voltages in the head areas then waggled and tried to reseal the motor-drive connectors. The cause of the problem was that connector L9 ('headwheel motor to motor connection board') had a hair-line crack. After repairing it with instant glue I turned on, pressed playback and was rewarded with the correct noises (I'd forgotten the noise of its head rotating) followed by pictures from my test tape. I'm sure that any competent apprentice/trainee would have done the job in a fraction of the time, but just in case there are others who forget that stressed plastic eventually breaks or deforms – check it!

*G. Beard,
London SW18.*

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" x 6" x 2 1/4") 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)

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

ADD
VAT
17.5%

LINE OUTPUT TRANSFORMER TESTER

- ★ 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

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

MANOR SUPPLIES

QUALITY TV & VIDEO SPARES SUPPLIED FOR ENGINEERS BY ENGINEERS

TV & VIDEO SPARES

REMOTE CONTROLS

Replacement for: Ferguson, Hitachi, Philips, Panasonic, Grundig, ITT, Sony, Saitoh, Granada, Saitoh + many others Phone for make and model no.

IC SELECTION

14DN487	£15.80	SAI 1039	£2.20	1BA121	£5.80	1DA2600	£6.80	1DA5510	£12.50
AN5521	£3.80	SDA2546	£9.00	1BA1208	£6.00	1DA2611A	£1.90	1DA5850	£2.80
AN5900	£2.20	SL470471	£5.00	1BA2789	£2.20	1DA2640	£3.20	1DA5872	£2.50
BA6209	£6.80	SL486	£3.20	1BA920	£2.80	1DA2653A	£2.90	1DA5874	£2.20
BA6219	£3.80	SL490	£3.80	1BA950	£2.20	1DA2654	£5.70	1DA5153	£7.80
BA6229	£3.80	SL1430	£2.40	1BA2500	£1.80	1DA2655B	£16.60	1DA58170	£3.80
BA638A	£6.80	SL1432	£2.40	1BA2760	£3.80	1DA2656	£1.80	1DA58172	£2.95
BA6239	£3.80	SN76226DN	£1.80	1CA800	£1.80	1DA2660	£3.80	1DA58173	£3.50
CCUR607	£4.40	SN76705	£9.80	1DA316AP	£1.80	1DA2660	£3.80	1DA58180	£7.80
CN562	£14.00	SLK5322	£21.80	1DA10351	£2.40	1DA2780	£6.80	1DA58190	£3.80
DA11251	£2.80	SLK5333	£4.80	1DA10351	£2.40	1DA3160	£2.20	1DA58205	£2.95
HA11423	£3.80	SLK5326	£6.80	1DA1044	£2.90	1DA3301	£6.80	1DA58341	£2.80
HA513388P	£21.50	SLK5332	£4.80	1DA1060	£3.80	1DA3303	£19.80	1DA58372A	£9.40
LA4415	£3.80	SLK5333	£3.80	1DA1082	£1.80	1DA3340	£12.50	1DA58380	£3.20
LA4270	£4.80	SLK5333	£4.80	1DA1208	£4.80	1DA3501	£6.80	1DA58442	£2.50
LA4520	£2.80	SLK5338	£6.80	1DA1180	£2.80	1DA3505	£15.80	1DA59105	£5.80
LA7800	£1.80	SLK5339	£6.80	1DA1185A	£3.20	1DA3510	£9.80	1DA59103	£3.80
LA7520	£2.80	SLK5342	£4.80	1DA1190Z	£2.20	1DA3540	£2.50	1DA5913	£4.80
LA7801	£3.80	SLK5373H	£7.80	1DA1212P	£5.70	1DA3541	£3.50	1DA5917	£2.20
LA7820	£3.80	SLK5392	£6.80	1DA1512	£2.20	1DA3562A	£5.80	1DA5918	£1.90
LA7830	£2.80	SLK5421	£5.80	1DA1515	£5.80	1DA3562X	£4.00	1LA1019	£1.90
MA1041H	£16.80	SLK5422	£5.30	1DA1524	£6.80	1DA3565	£7.80	1LA2018A	£2.20
MA291H	£18.80	SLK5471	£4.50	1DA1670A	£3.20	1DA3565	£5.80	1LA2026	£5.80
MA90BH1	£16.80	SLK5481	£7.80	1DA1701	£3.80	1DA3565B	£15.80	1LA2029	£5.80
MA91BH1	£9.80	SLK5482	£4.90	1DA170A	£9.20	1DA3570B	£10.25	1LA2164	£3.95
MA94	£9.80	SLK5490	£7.80	1DA1870	£6.80	1DA3640	£5.20	1LA2165A	£6.80
MA11002P	£9.80	SLK50923	£3.80	1DA1872	£9.80	1DA3650	£7.95	1LA21815	£6.80
MDA2062	£3.80	SLK5253	£6.80	1DA1908	£2.80	1DA3651	£2.50	1LA21821	£16.80
MI926	£4.80	SLK7308	£4.80	1DA1940	£3.20	1DA3653A	£3.20	1MA1476 432AP	£1.90
MN15425	£15.80	SLK7348	£5.40	1DA1950	£3.50	1DA3653B	£3.20	S188	£21.95
PCF8729	£9.80	SLK8063	£4.80	1DA2004	£3.80	1DA3654	£1.80	1MP476 432AP	£1.90
SA1024	£9.80	SLR4090	£3.80	1DA2030	£2.80	1DA3654	£19.50	1MP476 434A	£1.90
SA1061	£5.80	SLR5412	£4.95	1DA2090A	£2.80	1DA4420	£2.20	1MP476 434A	£1.90
SA1124	£3.50	SLR4090	£6.80	1DA2010	£2.80	1DA4426	£3.20	3415	£14.90
SA11250	£3.80	SLR44115	£9.80	1DA2030A	£3.80	1DA4427	£3.20	1MP476 434A	£1.90
SA11251	£6.80	SLR4090	£6.80	1DA2050	£4.80	1DA4442	£2.80	1MP476 434A	£1.90
SA1129402	£6.80	SLR50103	£4.80	1DA2050	£4.80	1DA4443	£7.80	1MP476 434A	£1.90
SA1293103	£6.80	SLR50115	£14.50	1DA2150	£3.20	1DA4500	£4.00	3550	£14.90
SAAS000	£6.80	SLR50141	£16.80	1DA2270	£3.90	1DA4501	£5.00	1LA2000	£6.50
SAAS001	£5.80	SLR50141	£5.80	1DA2570A	£5.80	1DA4502A	£19.50	1LA2015	£5.80
SAAS010	£5.80	SLR50141	£5.80	1DA2576A	£5.80	1DA4503	£7.80	1LA2016	£14.80
SAAS012	£5.80	SLR50141	£5.80	1DA2577A	£3.20	1DA4510	£3.80	UPC1363C	£5.80
SAAS030	£6.80	SLR60100	£7.80	1DA2577A	£3.20	1DA4510	£3.80	UPC1363CA	£5.80
SAAS050	£11.80	SLR60100	£6.80	1DA2579A	£3.60	1DA4565	£2.80	UPC1378	£5.80
SAAS051	£7.80	SLR60100	£5.80	1DA2581	£3.80	1DA4600	£3.85	UPC1394	£3.80
SAAS053	£23.50	TA7680AP	£5.80	1DA2582	£2.50	1DA4601	£2.80	UPC1420A	£12.20
SAAB035	£3.80	TA7680AP	£5.80	1DA2583	£1.80	1DA4605	£2.20	UPC1488	£3.20
SAB3037	£8.80	TA7680P	£6.80	1DA2594	£3.80	1DA4610	£6.80	1UP1397A	£4.80
SA1052	£4.50	TA8730P	£4.50	1DA2595	£4.80	1DA4950	£1.60	1UP1397A	£4.80

LINE OUTPUT TRANSFORMERS p.p. £1.80

ALBA CTV1800	£23.80	PHILIPS K13	£12.90
ALBA CTV1800	£23.80	PHILIPS K30	£22.80
BUSH 20412	£15.50	PHILIPS CTX15	£12.90
BUSH A120910	£34.80	PHILIPS K14	£22.50
DECCA/TATUNG NG 145 146 147 P/S 53750	£21.80	PHILIPS 2A	£16.90
FIDELITY ZN3000	£12.50	PHILIPS K40	£27.50
FIDELITY ZN3000	£14.50	PHILIPS 5A	£16.90
FIDELITY ZN3000 22"	£21.80	PHILIPS 2B	£16.90
FIDELITY CV1340	£15.00	PHILIPS C11	£23.80
GOODMANS LX20	£19.50	PHILIPS 190	£15.50
GRUNDIG C12476	£14.50	PHILIPS C110	£15.00
GRUNDIG C12200 2400	£19.80	PHILIPS GR1AX	£15.50
HNARI C14 C15	£14.00	PHILIPS N3	£29.50
HITACHI P11455 1456 1476 243414	£14.50	SAINBO C114R C114 3714002	£15.80
HITACHI P12158	£19.50	SAINBO C114H C114 3714000	£22.80
HITACHI P11446 1626 2432981	£18.60	SANYO CBP144 2148	£39.80
HITACHI P12174 2176 2176 2434274	£14.00	SANYO CT127132 7135	£16.80
HITACHI P12176 2476 2434001	£17.80	SOLAXON 14R19	£16.90
HITACHI P12074 2274 2433752	£15.50	SOLAXON 16R19	£21.80
HITACHI/SALORA FM503A	£49.80	SOLAXON 20119	£21.80
HITACHI/SALORA FM503A	£55.00	SOLAXON 22R19	£15.00
ITT/NOKIA Compact 110	£17.80	SOLAXON 22N19	£15.00
ITT/NOKIA Compact 80 110	£14.80	SOLAXON 22109	£15.00
ITT/NOKIA Compact 80 90	£14.70	SOLAXON 22119	£15.00
ITT/NOKIA Compact 80 110 151	£19.80	SONY KA1412	£21.80
ITT/NOKIA CV 25 30 32	£16.80	SONY KA1440 1460	£20.00
ITT/NOKIA CV 800 801 803	£16.95	SONY KA1822	£24.80
ITT/NOKIA CV 1100 Picos	£16.50	SONY KA2056 2062	£24.80
ITT/NOKIA CV 1150 1175	£14.95	SONY KA2092 96	£24.80
ITT/NOKIA CV 1200 1201 Min2	£17.80	SONY 2212 2216 2217	£24.80
ITT/NOKIA CV 1204	£13.50	SONY KA2178 41	£16.80
ITT/NOKIA CV 1210 12 15 17	£12.80	SONY KA2252 56 2752 56 2762 66 P13	£29.00
ITT/NOKIA Diag 3 110	£18.45	SONY KA2704	£29.00
ITT/NOKIA CV 90 45103346	£19.80	SONY KA27XR11U	£25.00
ITT/NOKIA Cor 110 4510345	£19.80	THORN/ERG 1N89	£23.50
ITT/NOKIA Cor 110 151	£19.95	THORN/ERG 1N85 86	£23.80
LOEWE (8001) Art1 Art 121 Art 128 Contar	£23.90	THORN/ERG 1N89	£23.50
LOEWE (8001) Classic M24 S127 S25 Cont r	£21.80	THORN/ERG 1N9014 19031 Red Spot	£16.90
LOEWE Classic M24 M27 Contar M27	£34.40	THORN/ERG 1N9020 19044 White Spot	£14.80
LOEWE Profi M21	£34.40	THORN/ERG 1N100 110 16031 Green Spot	£13.50
LUXOR 55 B01101	£27.60	THORN/ERG 1N100 90 243892 Yellow Spot	£16.90
MAISU 1440A 1450A 3714002	£15.00	THORN/ERG 1N100 110 151 16031	£16.80
MAISU 1420B 1440B 3214009	£16.80	THORN/ERG 1N100 90 16031 Blue Spot	£15.00
MAISU 1455	£21.80	THORN/ERG 51P7	£32.00
MAISU 1465	£19.50	THORN/ERG 1C 5 44076100	£28.00
PANASONIC 111145201 111145681	£14.50	THORN/ERG 1C 5 47235901	£21.80
PANASONIC 111145211 111145761	£14.50	THORN/ERG 1C 5 47236700	£21.80
PANASONIC 111145841	£23.80	THORN/ERG 1C 5 59M5	£28.00
PANASONIC 111145861	£21.80		

MANY OTHER LOTS IN STOCK. PLEASE PHONE WITH MAKE AND MODEL NUMBER

TRIPLERS EHT MULTIPLIERS p.p. £1.80

CONTINENTAL UNIVERSAL TVK & BG	£13.80	DECCA/TATUNG BG 20044 TYPE 87.80	£16.80
RANGE (Quoted exact no) £13.80		GRUNDIG BG 2077-642-10031004 £14.80	£16.80
TVK 96-1 £13.80		GRUNDIG BG 2087-642-10011002 1006 £14.80	£16.80
TVK 96-1 £18.00		GRUNDIG BG 2000-641 £13.80	£16.80
U.K. UNIVERSAL (best quality) £7.80		THORN 9000 £9.80	£16.80

MISCELLANEOUS p.p. £1.80

VHF/UHF upconverter £40.00 p.p. £3.50		TRANSPARENT VIDEO SERVICE CASSETTE	£6.80 p.p. £1.80
INFRA RED REMOTE CONTROL TESTER		TV FAULT FINDING GUIDE £14.80	
CRT TESTER & REACTIVATOR (under kit A)		VCR FAULT FINDING GUIDE £14.80	
pro belts) Swap places		HITACHI FRAME MODULE HS1 £251 £9.80	
MAINS IRRADIATION RM RS 6 3Volts CR1		HM6322 £12.80 p.p. £1.80	
boost £8.80 p.p. £1.80		HITACHI THERMISTOR TH902 £2.85	
Mains Isolating 500VA £51.25 p.p. £5.25		FERGUSON TX10 FOCUS UNIT £8.50 p.p. £1.80	
455 CRYSTALS for handsets 4 for £2.00 p.p. 80p		PHILIPS BACK UP BATTERY: 2 4V £3.00	
DEGAUSSING ROD £33.75 p.p. £3.50		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 0171-794 8751/794 7346 Fax 0171-431 5778
172 WEST END LANE, LONDON NW6 1SD
CALLERS WELCOME AT SHOP
Mon-Fri 9.30-6pm - Thurs 9.30-1pm - Sat 9.30-5pm

Servicing the Hitachi CPT1471/1473

John Coombes

These 14in. Hitachi colour portables were sold in large numbers during the years 1982-85. The CPT1473 differs from the CPT1471 in having remote control. The chassis, type NP82C2, employs straightforward circuitry.

The Power Supply

Fig. 1 shows the power supply, which is of the self-oscillating series chopper type. All the transistors involved are within the STR6020 chip IC901. T901 is the chopper transformer, whose primary winding acts as an inductive reservoir: the output is smoothed by C909 to provide the 111V h.t. supply for the line driver and output stages and the audio output stage. D906 is the efficiency diode, which conducts when the chopper transistor within IC901 switches off. There are two secondary windings on the chopper transformer. One feeds rectifier diode D907 which produces, across C907, a feedback voltage that's fed to the error amplifier in IC901. The other provides, via R908, C908 and R905, feedback drive to the chopper transistor (at pin 2 of IC901). The operation of the power supply is synchronised with that of the line output stage by means of a winding on the line output transformer. R902/3 and C912 provide a start-up action at switch on.

A crowbar thyristor in the line timebase section of the chassis is connected across the h.t. line. Its gate circuit senses the current and voltage conditions in the line output stage, via ZD751 and CP751 respectively. Should these exceed specified limits the thyristor will fire, shorting the h.t. line via R751.

No Results

The first step to take with a dead set is to check the voltage across the mains bridge rectifier's reservoir capacitor

C906 (180 μ F, 400V). You should obtain a reading of about 320V here. If this voltage is missing, check whether the 2AT mains fuse F901 is blown or open-circuit. If it has blown, check the bridge rectifier diode D901 (RB156), the protection capacitors C902-5 and the reservoir capacitor C906 for shorts. If these items are o.k., the chopper chip IC901 could be shorted internally. If F901 is intact, check whether the bridge rectifier or the mains on/off switch S901 is open-circuit. The correct type of mains switch must be used as this (and most of the other components mentioned so far) are safety rated devices.

If there's a voltage across C906 and F901 is all right, check the voltage across the h.t. smoothing capacitor C909 (220 μ F, 160V). This capacitor could be short-circuit or open-circuit. In the latter event the h.t. voltage will be low. A low h.t. voltage reading could also be caused by a fault in the line timebase. In this event first check zener diodes ZD721 and ZD722 (both type HZ-27) for shorts, then the 2SC2271 line driver transistor Q721 for the same condition. Should these items all be o.k., check the voltages around the LA7801 timebase generator chip IC701 carefully. Replace it if you obtain incorrect readings. A short-circuited 2SD898B line output transistor (Q781) will remove the voltage across C909.

The cause of no voltage across C909 could be on the primary side of the power supply circuit. Check D906, D908, D905 and C908 for shorts. On rare occasions D905 goes open-circuit to cause the fault. If these items are all o.k., check IC901 by replacement.

If the voltage across C909 is correct at 111V but there's no sound or picture, suspect that the line frequency is low because the LA7801 chip IC701 is faulty: check it by replacement.

If the h.t. voltage is high, D907 and/or C907 could be open-circuit or IC901 faulty.

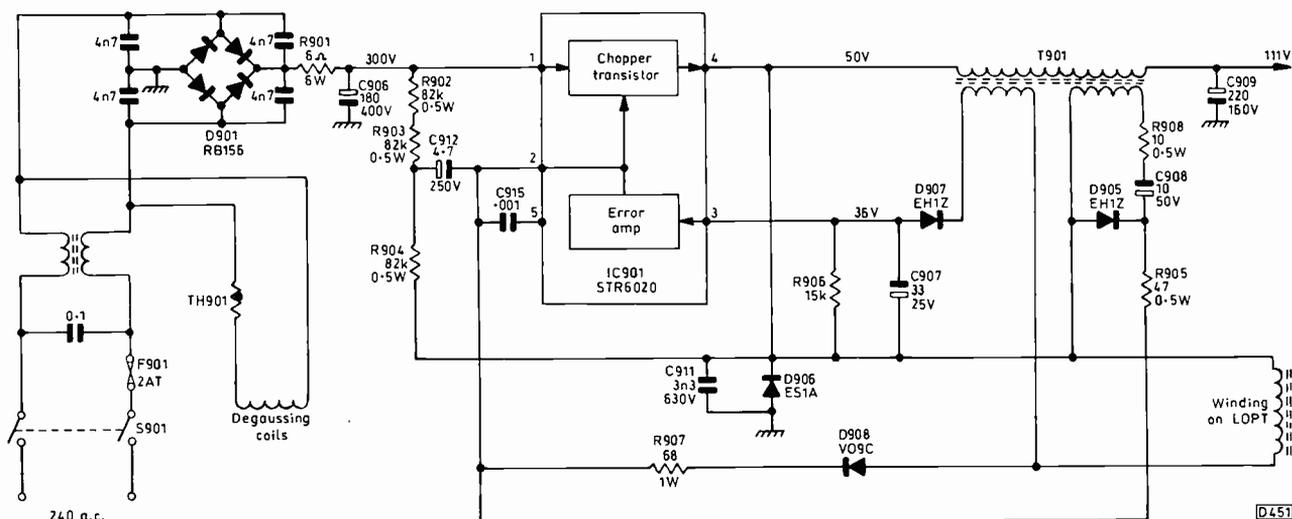


Fig. 1: The chopper power supply circuit used in the Hitachi Model CPT1471 (NP82C2 chassis).

Dealing with UHF Interference from Satellite Receivers

J. Lejeune

Interference to terrestrial u.h.f. TV reception caused by satellite receivers is a very common occurrence that can be troublesome to eradicate. Although in theory satellite receivers should not cause interference, the fact is that many of them do – even though they conform to the current standards for spurious emissions.

Patterning

The main cause of patterning is leakage from the receiver of the clock signal required for digital processing of the video signal in the VideoCrypt decoder. The clock signal is a 14MHz square wave which is rich in harmonics that extend well into the u.h.f. bands. In extreme cases u.h.f. channels as high as 60 can be affected, but the most commonly affected channels are 22, 25, 28 and 32, a group that's widely used throughout the UK. Patterning can also be caused by stray radiation from the microcontroller circuit, the tuner/demodulator's phase-locked loop and the switch-mode power supply.

In many installations patterning will not be noticed. Two factors determine the visibility of the interference. The quality of the u.h.f. aerial and the interconnecting r.f. leads must be high, and the signal strength of the incoming u.h.f. signals must be adequate.

UHF Installation Quality

We'll start by considering the quality of u.h.f. reception installations. It's true to say that many are not particularly good. But because there is little interference present, the overall performance may appear to be satisfactory – until a satellite receiver appears on the scene.

The first kind of poor installation that springs to mind is the type where the house builder has provided a cable feed

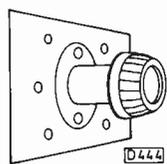


Fig. 1: Fitting a bulkhead female coaxial connector to a wall outlet plate. Remove and discard the rear plate.

into the living room, using cheap cable with a skimpy braid run beneath plastic capping or the wall plaster. The cable is usually terminated by an outlet plate where at least an inch of unscreened inner conductor is present. Such installations are mainly carried out by electricians who are unskilled when it comes to r.f. cabling and don't appreciate that a 'good' electrical connection is not necessarily o.k. for r.f. signals. This type of set-up's immunity to quite small interference signals is surprisingly low. There may also be damp conditions within the house wall, as a result of which corrosion may have affected the connections. Salt-laden air in coastal areas makes matters worse. Be especially vigilant where there's a masthead amplifier that's powered via the cable.

Use of the ready-made r.f. leads supplied with most satel-

lite TV and VCR products will make matters worse. They usually have very little screening braid and quite a high u.h.f. loss. Many installations just get away with it – until, that is, a satellite receiver is added to the cluster of black boxes beneath the TV set! So where do we begin?

Steps to Take

The minimum one should do is to replace any ready-made, moulded leads with ones made up from copper tape-and-braid screened coaxial cable – the sort used, hopefully, for the run from the LNB to the satellite receiver. Use metal coaxial plugs with the inner conductor soldered: aluminium plugs are suitable inland, but nickel-plated brass plugs are better for coastal installations. Where a female connector is required, the normal male type can be used along with a good quality back-to-back connector. Where the signal arrives at a wall socket, the cable from this to the satellite receiver's aerial input socket should also be of the heavily screened type.

Take a look at the outlet plate. If the interference persists after replacement of all the fly-leads, disconnect the incoming cable from the outlet plate and fit a coaxial plug to it. Use another back-to-back connector to couple this to the lead to the satellite receiver. You may well learn a valuable lesson about outlet plates in so doing. If you can obtain one, it's often possible to fit a bulkhead-fitting female coaxial socket to the outlet plate. This is a coaxial socket with a fixing flange half way down. See Fig. 1. Remove the rear connection plate and the existing socket, leaving just the face plate with the hole. Fit the bulkhead socket into this hole from the rear, fixing it in place with Superglue or fast-curing Araldite. The aerial cable can then be fitted into the shell of the socket to provide a fully-screened outlet plate. If such a drastic modification is not to your taste, a fully-screened outlet plate can be obtained: they are rare and expensive, but well worth the trouble.

The steps just outlined will have two benefits: the interference will be much less or will disappear, and the input signal will be marginally stronger. The result will be a noticeable improvement. This way of modifying an outlet plate can also help where Astra 1D interference is present on group C u.h.f. channels: the use of a u.h.f./satellite twin-

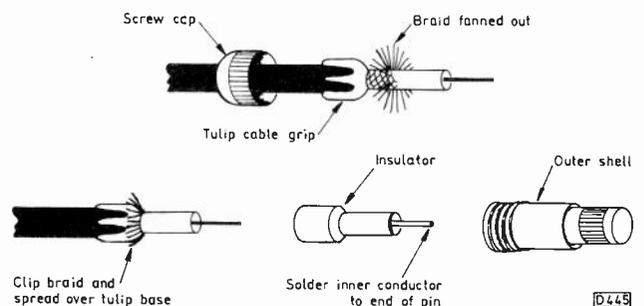


Fig. 2: The correct way of fitting a standard coaxial plug to the cable.

outlet wall plate is not recommended in this situation.

These measures have been proved to work repeatedly, with a wide variety of domestic installations.

The Aerial Signal

The next step in the elimination of patterning is to improve the u.h.f. signal. This will improve the wanted to the unwanted signal level ratio – troublesome installations are usually those where the u.h.f. signals available are poor. If the owner is prepared to buy a small mast-head amplifier he will obtain the double benefit of noise-free terrestrial pictures with no patterning.

Multi-TV Installations

Many homes have more than one TV set in use nowadays, and it's not unusual to find the r.f. output from the satellite receiver and the VCR split to provide two or more feeds to several sets. Patterning can again occur unless all the r.f. cables near the satellite receiver are well screened and have properly fitted plugs.

Coaxial Plugs, Sockets and Cables

Even a slack coaxial socket outer shell can impair interference immunity. You can provide tension by placing a tyre from a discarded toy vehicle over the shell. Alternatively a short length of heat-shrink sleeve or rubber tube will support a weakened shell. This 'bodge' works, doesn't look too bad and is inexpensive.

Note that crosstalk can arise between cables that run close together. If it's necessary to keep the cables together for the sake of appearances, make sure that they are of good-quality tape-and-braid construction. A good installation will pay off in terms of viewing satisfaction, reliability and freedom from all kinds of interference, not just that from satellite receivers.

It's rare to find that a coaxial plug has been made-off properly. Most installers pull the braid back over the outer sheath and then clamp the 'tulip' grip over it. The correct method however is to take the braid through the tulip grip then fray it out, cut it short and bring it over the base of the grip – see Fig. 2. This ensures that the braid is clamped between the tulip grip and the body of the plug when the cap is tightened.

Some newly designed Triax coaxial plugs are of one-piece construction. Make-off the end of the cable as shown in Fig. 3 and insert it into the plug, which is then screwed on

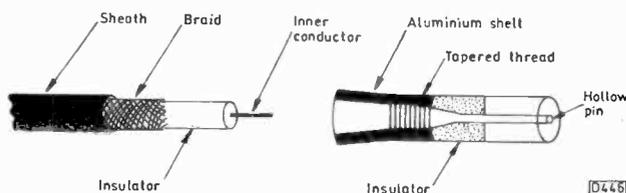


Fig. 3: Fitting a Triax one-piece coaxial plug.

to the cable to give a firm grip and a perfectly satisfactory connection.

In Conclusion

In view of the high priority given to customer satisfaction today, the days of the 'fixit quick' installer are surely numbered. Call-backs mean loss of profit and diminished respect from your customer. Isn't respect for our skills and knowledge overdue for a comeback?

Win a Teletest!



This month we have a Teletest TV test pattern and audio signal generator to give away in a free-to-enter prize draw. The Teletest is Ozan's popular battery-powered, hand-held test signal source for checking TV sets and VCRs.

In reviewing the the Teletest in last November's issue Eugene Trundle wrote: "Design and construction look reliable and rugged, sufficient to give many years' service. . . The four patterns provided are certainly the most useful ones for testing, diagnosis and setting up. . . When a scope was used, the line frequency was within 2Hz of 15.625kHz, which is very good. . . The video signal was found to be very close to the specified 1Vp-p. . . The audio tone was very rounded and pure. . . I found the Teletest to be handy, useful and trustworthy, with many uses. . ."

To enter the competition, simply turn to Ozan's advert in the TV fault finding section of this issue and answer the following three questions: How many patterns does the Teletest generate; what frequency is the audio test tone; what type of battery does the Teletest use? Send your answers, along with your name and address, to: Teletest Competition, Television, Room 302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS – to arrive no later than May 31st.

The Editor's decision will be final and no correspondence will be entered into. Employees of Reed Business Publishing and Ozan are ineligible to enter. The competition is open to UK and overseas readers.

What a Life!

Donald Bullock

The other night, as I swallowed my blood-pressure pill and slyly topped up the tiny whiskey that Greeneyes had poured me, I got to thinking about some of the scrapes that this trade has got me into over the years.

Sandals

For example there was the time, many moons ago now, that I broke my resolution not to do house calls any more. I don't know why I agreed to call upon Mr Smooth. Perhaps it was because he caught me at a weak moment, or maybe it was because of his soft, harmless-sounding voice. Or perhaps I saw a quick dollar in it. He said that his TV set's volume control operated roughly and wanted me to cure it. So I grabbed my can of Murphy line output transformer oil and showed up at his terrace house down by the park. He asked me inside and closed the front door. We were in a long, narrow passage. Then he looked at my shoes.

"Please will you be wearing these instead" he said sweetly, handing me a tiny pair of sandals. I looked at the sincere eyes glinting from his black-whiskered face and found myself slipping off my shoes and wishing I was some place else.

"Come" he said as he started down the passage. I tried to follow but the sandals were too small and kept falling off. He stopped and waited patiently. When I'd managed to wedge them on we started off again. We went into a dusky room at the end of the passage. The air was sweet and the odour of curry lay thickly. An old TV set and a woman in a barber's apron rested on a mountain of sandals. I glanced at them anxiously, looking for a pair of size tens, but no luck. So I yanked the TV set upside down, squirted the volume control then got the set upright once more. I noticed that they were both staring at my right foot. Oh dear, my big toe showed through a hole.

I slipped back into the sandals, hobbled back to the front door and got out quick. I'd never felt such a prize sap before and resolved never to tell anyone about it, ever!

Problem with a Door Bell

Then there was the time, one winter's day, when I delivered a repaired set to a very grand house. It was snowing heavily on to an already thick carpet of snow. The front door was set at the top of a high flight of steps. To one side there was a bell-pull. I balanced the set on one knee so that I had a free hand to pull at the bell then, as I gripped the pull, I slipped and, to a crazy cascade of bells, wound up at the bottom of the steps – with the set on top of me and the bell-pull in my hand, attached to yards of wire. The butler, who'd opened the door, looked down with undisguised contempt.

The Debt Collector

One more, the time the firm's debt collector roped me in to help him repossess a TV set. I was to ram a pin through the coaxial cable just before he knocked on the door to ask for the back payments. His plan was that the customer would claim that the set had never been right.

He'd take it away under the pretence of getting it put right. I didn't know that the set had been tampered with, nor that it would turn out to be a filthy night. What I did discover was what it felt like to take the mains to earth.

Mrs Tench's CD Player

Mrs Tench called in the other day with an Hitachi DA6000 CD player. She's a nursery school teacher and doesn't seem to be able to forget it.

"Listen carefully!" she commanded. "The door opens. You insert a disc. Then there's a pause. After that the door opens again and the disc comes out! Isn't that remarkable?"

When she'd gone we pulled the player on to the bench. It didn't take us long to find the cause of the trouble: the loading belt was slipping. It lives to the top right of the carriage assembly. After fitting a new one I asked Steven to phone to let her know that it was ready for collection. "What's her name?" he asked. I told him.

"It's ready Mrs Stench" he said.

"Tench, Tench, TENCH!" screamed the phone.

"Struth" said Steven, "funny woman."

Squat Picture

I don't know who our next caller was. He brought in an old 16in. Philips set, one fitted with the KT3 chassis. I pulled the pad over and asked for his name and address. Although his mouth moved, I couldn't hear anything. After trying a couple more times I gave up and asked him to return later. Then I gave Steven a pained look.

"Another" I said.

He put the set on the bench and tried it. The picture was only about an inch high. So he took out the field output transistors and tested them.

"They're o.k." he announced.

"Nevertheless, try new ones" I replied. He did, and up came a full picture.

"Often happens with those sets" I continued, "and be careful when you lift the chassis up and down. The leads to the tube base get caught up and if you're not careful the stress will cause print cracks. You could lose one or more of the colours – or possibly the brightness should the tracks to the heaters go open-circuit."

No Channel Storage

We'd a Fidelity CTV1404R awaiting attention (these sets sometimes come in as the Murphy M14R01). It worked all right but wouldn't store the channels. Knowing the set, I checked for 24V at pin 3 of the M491BB1 remote control decoder/tuning chip IC301. As it was low at 8V I went straight to the 33V stabiliser ZD1. It was warm and leaky. A replacement (type MVS460-2) put that right.

I then noticed that the picture would occasionally quiver and the sound fizz. There was a dry-joint at the 1Ω surge limiter resistor R112 in the 25V supply. It hides near the line output transistor's heatsink. To be on the safe side I fitted a replacement.

The Sharp VCA105HM

I'm fast becoming fed up with repairs to the latest generation of VCRs. In fact I can hardly operate some of them. Steven's got a different type of mind and seems to be able to take them in his stride. So I'm happy to leave them to him and concentrate on TV sets and machines with control knobs on them.

TELEVISION INDEX/DIRECTORY AND FAULTS DISCS PLUS REPRINTS SERVICE

INDEX DISC

Version 3 of the computerised index to *TELEVISION* magazine covers Volumes 38 to 44 (1988 – 1994). It has over 6,000 references to TV/VCR fault reports and articles, with synopses. Includes a TV/VCR spares guide, an advertisers list and a directory of trade and professional organisations. The software is easy to use and very quick. It runs on any IBM or compatible PC with 512K RAM and a hard disc.

Price £30 (specify 5.25" or 3.5")

Those with version 1 or 2 discs can have them upgraded for £12 each: return the disc quoting its serial number.

FAULT REPORT DISCS

Each disc contains the full text for TV, VCR, camcorder, satellite TV and CD fault reports published in individual volumes of *TELEVISION*, giving you easy access to this vital information. Note that the discs cannot be used on their own, only in conjunction with the Index disc: you load the contents of the Fault Report disc on to your computer's hard disc then access it via the Index disc. Fault Report discs are now available for:

Volume 42 (November 1991 – October 1992)

Volume 43 (November 1992 – October 1993)

Volume 44 (November 1993 – October 1994)

Price £15 each (specify 5.25" or 3.5")

REPRINTS

Reprints of articles from *TELEVISION* back to 1986 are also available: ordering information is provided with the index, or can be obtained from the address below. Hard copy indexes of *TELEVISION* are available for Volumes 38 to 44 at £3.50 each.

All the above prices include UK postage and VAT where applicable. Add an extra £1 postage for overseas EC orders, or £5 for non-EC overseas orders. Cheques should be made payable to Video Interface Products. Please allow 28 days for delivery.

Video Interface Products Ltd., 1 Vineries Close, Cheltenham GL53 0NU, UK.

The other day he had a Sharp VCA105HM on the bench. It would accept a tape and made to operate, then ejected the tape. Steven took off the top and tried again. This time the loading mechanism jerked about in sympathy with intermittent capstan movements.

He homed in on the mode switch, which was full of goo. Cleaning and resetting it cured the fault. Then he pulled up another machine, again a Sharp VCA105HM. With this one a loud vibration noise came from the capstan on all functions, including load and eject.

"Ah" he said, looking intelligent (he takes after me in some ways), "the capstan shaft bearing will be dry." He took it out, cleaned it, greased and reassembled it. The machine then worked perfectly.

A Matsui 2180TT

Just then Greeneyes clopped in, closely followed by a chap who looked like the Pied Piper on hard times. He was wearing a cravat and smoking a Woodbine in a long holder. I remembered him from about three years ago.

"It's Mr Flighty" Greeneyes announced. "He's got this

faulty Matsui colour set. It's dead and goes bzzzzz, bzzzzz, bzzzzz – doesn't it Mr Flighty?"

Flighty nodded vigorously and started making a kyocking noise and falling about.

"How do you know?" I asked Greeneyes.

"Because he's been telling me all about it" she replied.

I turned to Mr Flighty, who was studying my face.

"My, doesn't time play tricks?" he said.

"Never mind about that" I replied, "what about the set?"

It was a Matsui 2180TT (Saisho FST212T). We got it on to the bench and tried it out. It produced a channel display but nothing else – except for the buzzing.

"Ah, I've had this before" cut in Steven. "It might be the STR58041 chopper chip IC501, but check the R2M crowbar diode D512 first. It'll probably be short-circuit. And check for dry-joints at R427 and R428 in the line driver stage. Another fault I've had with these sets is that the negative from the on/off switch arcs itself open-circuit, where the metal gripping pin bites it." I moved over to let Steven deal with the set. He had it going in no time. I looked about the workshop and noticed that the floor needed a sweep. So I reached for the broom.

Fault Notes for the Sony CCDF450

Keith T. Keeton

We've encountered the following faults with this camcorder.

Camera

Black screen in E-E mode, playback o.k.: Iris shut. No output at pin 1 of IC651 on board VC67P. Replacement chip cured fault.

Dark E-E picture: In one case FP268 on board CD20P was cracked. In another case the shutter was constantly on because IC902 on board CT21P was faulty.

No E-E colour: IC708 (NJM2233BM) on board CT21P was faulty, failing to switch the camera colour through.

No E-E colour, playback o.k.: In one case IC203 (CXA1208R) on board VA46P was faulty. In another case there was no 4fsc signal to the encoder board. X122 on board CD20P was faulty.

Intermittent loss of E-E colour: Cause was a dry-joint at pin 4 of CN202 on board VS72

No E-E colour, recorded colour slightly low: Track was broken between pin 4 of CN202 and C219 on board VS72. Cured by hardwiring between pin 4 of CN202 and C219.

No E-E picture, playback o.k.: Iris was closed, because Q126 on board CD20P was faulty.

No E-E picture, screen scrambled: Crystal X121 on board CD20P was faulty.

No E-E picture, playback picture garbled in pause: FL204 (LC delay) on board VA46P was faulty.

No record colour, playback o.k.: Signal o.k. at pin 1 of CN202 but not present at C325 because of a faulty PCB pin-through link (board VS72). Hardwire or replace board.

No red on titler, E-E and playback pictures o.k.: Caused by a dry-joint at pin 40 of IC704 on board CT21P (incorrect signal output from IC704).

No titler red or green, E-E o.k.: C745 (0.01 μ F) on board CT21P open-circuit (signal o.k. at pin 13 of IC703, no signal at pin 31 of IC704).

Noisy coloured lines on E-E picture, playback o.k.: Dry-joint at pin 22 of IC401 on board VC67P.

No E-E or record sound: Faulty microphone. Note that there are two types of microphone with this model.

No right channel E-E sound, playback o.k.: Dry-joint at pin 40 of IC400 on board VA46P.

Failure to focus: FP268 on board CD20P cracked. Replace FP268.

No zoom; focus, E-E and playback o.k.: Lens motor faulty. Replace lens assembly as motor is not available separately.

Zoom causes iris to close, E-E picture o.k.: Pin 17 of IC501 on board VC67P shorted to pin 18 via solder link (same varying voltage at pins 17 and 18). Resolder pins.

E-E power down to no raster, very intermittent: Repair/replace camera/off/VTR switch S514 on board VK10P because of poor contact (no raster when top board touched hard).

Patterning on E-E picture: Open-circuit at Q126 (XN4601) on board CD20P. Resolder/replace Q126 as necessary.

E-E picture goes black intermittently: C418 on board VA46P open-circuit.

E-E picture too bright: Iris sticking when nearly closed. Replace lens.

Powers down to no raster, sometimes intermittent: IC501 (CXP801166790) on board SS100P faulty.

Records black screen, E-E and playback o.k.: Dry-joint at pin 43 of IC201 on board VA46P (no input at Q115/7).

Camera/VTR

Flashes low battery then powers down: This was a really odd fault. We had to replace IC501 on boards SS100, FU72 and VC67 because they failed one after the other for reasons unknown. Probably a one-off fault.

Intermittent power down: We've experienced various causes of this fault, as follows:

(1) Switch S514 (VTR/camera power) on board VK10P faulty.

(2) IC901 (MB3783PFV) on panel SS136 faulty. There was a VTR DD on signal at pin 21 but no output at pin 41.

(3) Powers down to a black raster because IC501 (UPD75316GF0643B9) on board FU72P is faulty. A replacement PCB is cheaper than the chip.

Function buttons didn't work: There was also no remote commander operation because the data lines were earthed. Corrosion adjoining CN508 (it's next to the video output socket) on board VA46P was the cause. Board was replaced.

No EVF picture: L903 on board VF26P faulty (vertical pulse notched).

No power to camera/VTR: L901 on board SS100P dry-jointed.

No power to camcorder: C518 (4.7 μ F, 18V) on board FU72P short-circuit (high current drawn from the power supply).

No power to camcorder, EVF o.k.: PS501 (N10) on board SS100P high-resistance, so no power to the loading motor.

No power to camcorder, EVF display present but scrambled: PS990 (1250) on board FU72P high-resistance

Unit dead: Replace X301 on panel VA67P.

No playback/record sound, E-E o.k.: C401 on board SS100P broken – was knocked by C703 on board CT21P.

Interference lines on record picture, E-E and playback o.k.: IC203 (CX1208) on board VA46P faulty.

Mechanism

Capstan rotates very fast on eject: No feedback from capstan motor (check FG and Hall). New capstan motor cured fault.

Eject symbol shows when play/record selected, then mechanism stops after four seconds: No eject, half unloads then stops. Power down to complete eject. Take-up reel sensor (photocoupler) D303 faulty.

Mechanism loads without tape: Replace C529 (15pF) and C711 (470pF) on board SS100 (on eject the FF reel spins then the arms load whilst still ejected).

At power up the drum rotates and the mechanism operates in the fast forwards mode, but no eject: The mechanism was in the load position because IC501 on board SS100 was faulty.

Tape rides up pinch roller: Various causes, as follows:

- (1) Incorrect back tension – adjust.
- (2) Pinch roller not straight because support pole bent. Chassis had to be replaced.
- (3) Worn capstan motor (moves up and down in bracket).

VTR

No playback picture (black screen): Pin 3 of CN507 on board VA46P open-circuit. Resolder or link.

No playback picture (black screen), sound and E-E o.k.: IC201 (CXA1207R) on board VA46P faulty (no output at pin 38).

Snowy playback picture, E-E o.k.: HIC board RP77 (SBX150951) faulty. Replace.

No playback sound, E-E o.k.: FL402 on board VA46P open-circuit. The signal was o.k. at Q400 but missing at Q401.

Next Month in TELEVISION

INSIDE THE PANASONIC ALPHA 4 CHASSIS

The Alpha 4 chassis was introduced in 1992 and is still in production. It replaced the A2 and A3, offering high-quality performance at a lower manufacturing cost than its predecessors, in part because of simplified construction. The specification, which varies with different models, includes teletext, Nicam and Dolby Pro Logic Surround sound.

SERVICING THE LOEWE C8001 CHASSIS

This chassis was used in quite a number of Loewe models, with both 90° and 110° tubes. Chris Watton provides a guide to fault finding.

CABLE AND SATELLITE '95

Ian Martin reports on equipment shown for the first time at the Olympia Cable and Satellite Exhibition, including new receivers from Pace and Grundig amongst others.

FERGUSON SERVICE BRIEFS

Latest servicing guidance from Ferguson, mainly on the new ICC9 chassis.

REPAIRING THE PACE PRD800/900

Jack Armstrong on repairs to the Pace PRD800 and PRD900 series satellite receivers, which have also appeared in the Ferguson, Grundig, Maspro, Nokia and Philips model ranges.

SERVICING THE JVC HRD530

John Coombes on various mechanical and electronic faults experienced with these VCRs. There's a Ferguson equivalent, the FV14T.

ORDER FORM

To.....
(Name of Newsagent)

Please reserve/deliver the June issue of TELEVISION (£2.20), on sale May 17th, and continue every month until further notice.

Name.....

Address.....

.....

Notes on the Grundig GRD150/250

Jack Armstrong

These receivers are manufactured by Grundig in South Wales. Unfortunately they won't release any service information or spare parts until April. Meanwhile we poor independent dealers are getting complaints from customers because of the time it takes us to repair their receivers.

The problem has arisen because Grundig decided to give Mr Joe Public a super guarantee: the retailer would exchange any faulty unit immediately for a refurbished one from Grundig. This meant that we had to buy a refurbished receiver and keep it in stock, on the off-chance that a receiver we'd sold developed a fault. As you can't sell a refurbished receiver as a new one, it just sits on the shelf. Naturally most independent dealers are not made of money and don't want to stock receivers like this. In addition customers usually prefer to have their own receivers repaired, so that they don't have to reprogram all their favourite channels etc.

Whereas Pace run a superb 48-hour turnaround free repair service for in-guarantee receivers (and an equally fast out-of-guarantee service at a cost), Grundig can't offer such a service. In fact the Grundig service department at Rugby isn't allowed to carry out any repairs before April and doesn't even have a service manual. By the time that you read this, spares and information should be coming on line. But why not a year earlier, and why no service like that provided by Pace?

Fortunately the GRD150/250 has proved to be reasonably reliable. But the following problems have been noted.

Dead Set

The mains fuse tends to melt when a mains voltage surge occurs. The GRD150 shares this problem with other satellite receivers such as the Nokia SAT1700 Mk 1, the Amstrad SRD510 etc. and the Cambridge ARD200, BTSV200 etc. In fact of course the fuse is actually doing its job of protecting the receiver against dangerous mains spikes.

So if the receiver is dead, probably all that will be necessary is to replace the fuse with one of the same type and advise the customer to invest in a surge-suppression plug. If the fuse hasn't melted, check the mains input socket's solder joints. These can be put under tension by the securing screw.

LNB Installation Menu

The other main problem with the GRD150 is its LNB installation menu, which allows you to type in a silly local oscillator frequency. Make sure that you type in either 10.000 or 09.750, otherwise you are likely to end up with either no channels or just a single channel – the bottom one in the Astra 1D band.

Grundig has installed an algorithm that will reset all channel frequencies to standard. To activate this 'factory reset' you have to enter a four-digit code in the menu. Unfortunately the system wipes out all the channel names at the same time. Since there's no receiver-to-receiver downloading facility (like Pace provide), and no programming box (such as that sold by Nokia), you then have to punch in each channel name by hand. For those of you desperate to reset the channel frequencies Grundig's technical department will divulge the special code, but you have been warned of the consequences!

No Polarisation Change

A receiver I had for repair refused to provide the LNB with a

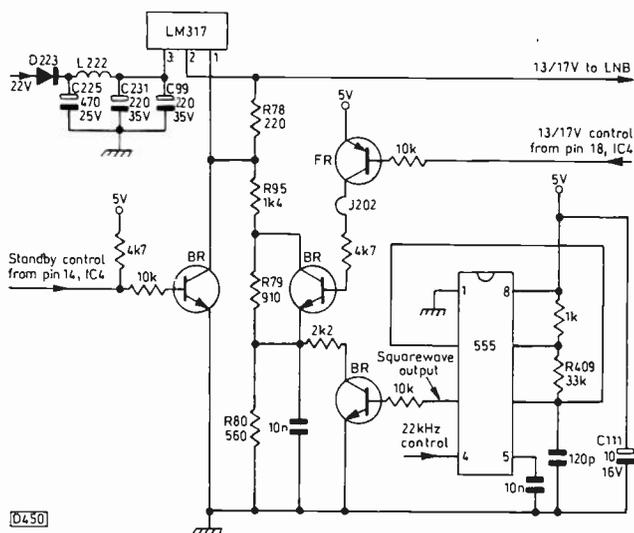


Fig. 1: The LNB voltage generator circuit in the Grundig GRD150. Components without reference numbers are surface-mounted devices.

17V supply: it remained stubbornly at 13V regardless of the polarisation setting or channel. Since Grundig refused to supply a service manual I had quite a job to find the cause of the fault. Eventually I traced the cause to a surface-mounted pnp transistor marked 'FR' – but you'll need good eyesight to find it.

If you have any LNB voltage problems the circuit shown in Fig. 1 should be useful. The switching circuitry is simply doubled up in the twin-LNB input GRD250.

Miscellaneous Points

The remote control handset battery clips can move and touch each other. In the case I had this resulted in a handset melt as the battery cells became hot. Later handsets have a different design. Other faults have occurred but, in the absence of parts and information, I've no solutions at present. I'll report back when the situation improves.

Models GRD150/250 have a very low component count. Most of the work is carried out by a large microcontroller board that plugs into a socket on top of the main board. Nearly everything else is done by a multi-legged, surface-mounted chip beneath the main board. If you ever attempt to remove this chip without special equipment you'll probably rip the tracks off the board!

When working on the power supply remember that various capacitors will remain charged though the receiver is disconnected from the mains: also that most of the components on the primary side of the circuit are 'safety critical' and must therefore be replaced with only the correct spares obtained from Grundig or an authorised supplier.

Satellite Book

Faults we've encountered with other satellite receivers are described in a 250-page book entitled *Satellite Secrets Revealed!* It's available from Davenham Satellite Systems, 1 Firths Fields, Davenham, Northwich, Cheshire CW9 8JB at £19.95 inclusive. Send two stamps for a list of repair kits, components and accessories available.

NEW – NEW ARRIVALS

For video spares. Following parts for **Amstrad, Fidelity, Funai, Granada, Hinari & Osaki** videos.

Geari assemblies loading left & right.....	VS 4600G
Bearings assembly trigger	VS 4601G
Loading pulley	VS 4602G
Loading gear	VS 4603G
Cam gear loading & beam.....	VS 4604G
Impedance roller assembly.....	VC 4605G
Reel assembly	VS 4606G
FE slide plate & lever.....	VS 4607G
Back tension arm	VS 4608G
Plate assembly	VS 4609G
Pulley assembly middle.....	VS 4610G
Gear assembly play	VS 4611G
Gear assembly RF	VS 4612G
Brake pad & arm	VS 4613G
Reverse guide parts	VS 4615G
Idler arm assembly	VS 4616G
Roller post assemblies left & right.....	VS 4617G
Gear assembly lift (R).....	VS 4618G
Gear assembly lift (L).....	VS 4619G
Shaft sync & geared assembly.....	VS 4620G
Full erase head	ALL 0551G
Pinch roller assembly	PW 3028G
Loading motor & pulley.....	VM 5023G
Lamp holder & assembly.....	VL 57026G
Sensor dew	VL 7027G
Sensor PCB cassette	VL 70
Cassette holders assembly.....	CH 1105G

Please ring for prices

Amstrad
Mod Kit
only
£2.75 each

CD Player
motor. **JVC**
& **Pioneer**
only
£4.99 each

105°
Degrees
Electrolync
capacitors
in stock

3Y35
Castan motor
only
£19.99 each

Konig line output
transformers at
reduced prices.
Ring for models.

Satellite power
supply repair kits
now in stock

VCR stervice
tool kit only
£29.00 each

SPECIAL OFFERS

Valid up to 15/5/95

Hitachi VTII Pinch Roller **PW3100** = 150

JVC/FER Pinch Roller **PW3051** = 150

Amstrad Pinch Roller **PW3025** = 150

Please refer JJ's catalogue for model number for order codes.

Correct at time of going to press – SUBJECT TO ALTERATION



Please phone us for the types not listed. Please add 60p post & packing and then add 17.5% VAT to the total. Callers by appointment only.

J.J. COMPONENTS

63 THE CHASE, EDGWARE,
MIDDX. HA8 5DN, ENGLAND

Hotline No: 0181-381 1700/0181-952 4641
Free fax orderline ONLY: 0800 318498
General Fax: 0181-381 1700

Test Case 389

The shop door banged and Mr Phelps bore down on the boss's son who, on this sunny spring morning, was behind the counter totting up the rental accounts. The irate Mr Phelps was waving a bubble pack in his hand. He banged it down on the counter and demanded an exchange or his money back. The item in question was in fact an Astra 1D converter, which we do for £24.95. We replaced it and peace descended on the shop once more.

Half an hour later the phone rang. It was Mr Phelps again. The new converter was no better than the first. Why didn't they work properly he demanded? Like many of the questions we get from customers, this one was unanswerable without checking things out on the spot. So it was that Colin Doc, our long-suffering man on wheels, was asked to call on the gent when he was in that area later in the day. Colin duly called.

On arrival he found a Pace receiver with the converter box, in effect a superhet frequency changer, correctly hooked up at its LNB input socket. This particular converter is switched into operation for reception of the 1D channels, which it block converts to a higher band that can be tuned in by the satellite receiver. The converter can be switched by hand at the unit itself, or connected to the satellite receiver's scart socket so that 1D operation can be selected by using the TV/Sat button on the remote control unit.

Colin could find nothing wrong with the unit, its wiring or the connections. When the converter was switched to bypass, for reception of the Astra 1A, B and C channels, the signals passed straight through the converter which did not affect reception in any way. When 1D operation was

selected however the screen went snowy and tuning in the channels was fraught with problems. One channel came in reasonably well, the next one suffered heavily from sparklies, and such others as there should have been were either non-existent or barely discernible in the noise.

Since this was exactly the same result that the first converter produced it seemed unlikely, unless there was a batch problem, that the units themselves were faulty. Colin decided to return with one of a different type and make. So he took the Supereconomic Electronics model away and returned next day with one made by Silicon Satellite Ltd.

Silicon Satellite's wonderbox did no better than Supereconomic's, so it seemed that the cause of the problem lay elsewhere. But where? Colin decided to phone Sage back at service HQ, since Sage had made a study of these things and had a Supereconomic converter working perfectly satisfactorily in the workshop – they'd not yet got around to installing an enhanced LNB on the tin roof.

Colin had barely started to dial the number when Mr Phelps bound into the nall, this time waving a VHS cassette in his hand. Colin hung up and listened to what Mr Phelps had to say. He was told that the converter had upset the operation of the satellite receiver: since the new unit had arrived, all the on-screen captions had disappeared from the TV set's screen and were now being recorded on tape. Mr Phelps was waving the VHS cassette under Colin's nose. He'd have to refer the matter to Sage, who would know the answers. Once more Colin started to dial the workshop number.

Sage did indeed know the answers! One of the problems was very easily solved – in fact Mr Phelps had brought it on himself. The solution to the second problem was not so simple. It took several days to sort out, with a great deal more hassle from Mr Phelps. What then were the causes and cures? Over to you, and to page 498 if you can't work it out.

Summer of '75

Brian Storm

Two senior engineers off sick and a mountain of work were the circumstances that led to yours truly being unleashed upon the TV world at large. As an apprentice at an old family-run firm in the East Midlands, most of my work during the previous four years had been carried out under the watchful eyes of technicians who had served their time. But now I was off the leash and steering my way solo in a battered old Escort van – with a stack of job cards and my first port of call in sight.

The Farmer's 3000

A local farmer was soon beckoning me through an assortment of dogs and hens into a truly dirty kitchen and then to a musty lounge. There I found a large Ferguson colour set, surrounded by a motley collection of old shoes and boots, waiting patiently in the corner. The farmer departed after telling me that it kept losing stations.

Having seen grown men sobbing gently over the circuit diagram, I had some respect for the 3000 chassis that confronted me when I'd removed the set's back. This was to be an easy fault however: the tuning bar that's moved around by the tuning buttons was swinging freely at one end. It's held in place by solder and is thus susceptible to being dislodged when prodded by large agricultural thumbs. After carefully resoldering it, and being even more careful not to disturb any other part of the set, I replaced the back and departed for my next call.

Contrasts

One of the problems with field servicing is a perverse relationship between successive calls: if your last one is to a dirty old farmhouse with muddy yard your next one is likely to be to a posh detached executive house with carpet pile a foot deep. And so it was on this occasion. My mission was to a Dynatron console set that resided in the study.

I was not too familiar with this hybrid chassis, but as the job card said "dead set" I thought that the cause would be something simple. I began by removing the several hundred screws that secure the back cover. There was life when the set was switched on, but one valve glowed rather more than it should. The PY500A boost diode had turned a nice cherry red. This was another fault that I could handle, a short-circuit 0.47 μ F, 1kV boost reservoir capacitor hidden somewhere in the dense wiring loom. After fitting a replacement I found that the boost diode seemed none the worse for the extra stress from which it had suffered, and was rewarded with an excellent picture. All that remained was to deal with those screws.

A Pensioner

Then on to call on a pensioner who seemed to be more in need of a chat than anything else. She claimed that the picture produced by her ageing dual-standard Ultra set (950 chassis) would sometimes become quite faint. Unable to find anything amiss with the set I gratefully accepted a cup of milky coffee which I drank while cleaning the valve bases and lubricating the system switches.

A Couple of Bush A823s

Three down and only another nine to go. But the next call was across the town to a large council estate. The house had no number on the door nor the gate. In fact it barely had a gate or fence, only some splintered remains. A helpful neighbour confirmed that I'd arrived at the correct destination, and shortly after I was face to face with a large Bush console which had a slot meter tacked to the side. It was fitted with the Bush A823 chassis.

The set was dead but spluttered to life briefly as I removed the back cover. This chassis was popular with most of my colleagues as the picture quality was good and the modular construction and well documented fault history made servicing easy. One of these well-documented faults was present on the convergence panel: a 7 Ω wire-wound potentiometer in the line convergence circuitry had expired, leaving a charred mess in its place. I tidied up the print, fitted a replacement, gave it a quick tweak to reset the convergence and was soon on my way again.

Half an hour later I turned into the drive of a quaint Victorian house on the outskirts of town. Another A823 resided here, this time with a Murphy badge. Once again it tried to splutter into life as I removed the back cover, but this time for a different reason. A thermistor in the mains input circuit gave trouble in these sets. It was in some distress and fell apart as I removed it from the PCB. Once I'd repaired the power supply I found that the static convergence was in need of adjustment, also the grey scale. The lady of the house seemed unsure about having a picture that wasn't predominantly blue, but let me leave without too much trouble.

Racing

My next call was to an out-of-focus KB set fitted with the CVC5 chassis. It's master was immersed in the horse racing and was reluctant to let me find a test card on another channel. He was even more reluctant to let me switch the set off to check the resistors in the focus circuit. I was eventually able to replace the 2.2M Ω resistor on the tube base panel and the 4.7M Ω resistors at either side of the focus VDR. The master of the house seemed unimpressed at being able to identify the horses more easily: as he was surrounded by a dense cloud of cigarette smoke he was probably unaware of the improved resolution. He grunted something I didn't catch, but I was reluctant to delay reaching the fresh air.

A Smell of Burning

A couple of miles away I was to attend to a Marconi-phone set fitted with the 1400 chassis. The lady of the house had complained of a burning smell when it had been on for a while. So I settled down with the three children their mother and gran to wait for the smoke. After about ten minutes a smell of burning became apparent, though with no detriment to the picture. The cause was evident once the back cover had been removed: someone had repaired the mains-dropper assembly by wiring a replacement 15W resistor across the faulty section. Unfortunately it almost touched the back cover, which was now badly scorched.

The van had done well with the required spares so far: once again I found in the wooden box, amongst a selection of mains droppers, what I needed. When this had been fitted there continued to be quite a bad smell, but I assured the attendant group that it would soon burn in and become odourless. I collected my tools and wrote out an invoice for

the repair. After payment I returned to the road and the rental calls.

Reactivation

A few doors away another monochrome set was in serious need of attention. After closing the curtains I could make out a faint, silvery picture on the ancient Bush dual-standard set's screen. This was a job for the reactivator.

My colleagues had all made their own tube rejuvenators. They were housed in smart metallic boxes, with important-looking and neatly labelled switches, dials and knobs. In fact there seemed to be some sort of unspoken competition as to who had built the most effective jacker. The service manager had only recently completed construction of the one in this van. I gingerly connected it to the dying c.r.t. The meter barely flickered to indicate what life there was in the tube. I pressed the reactivate button. The meter flickered then returned to its previous state.

It was kill or cure now as I pressed the boost and reactivate buttons simultaneously. The needle leapt across the dial. Unfortunately when the voltages were restored to anything like normal the meter returned to its previous state of inertia. Muttering curses under my breath I replaced the back then unscrewed the four legs and plates. I assured the lady that it would soon be back, apologised for the inconvenience of its loss, and bundled it into the back of the van.

The New Friends Club

A twenty minute ride later, after a brief stop for my sandwich lunch, I arrived at a glorified pub with the legend "New Friends Club" barely readable on the decaying sign above the door. On entering the gloomy hall I was approached by an obese individual who wore a lumberjack shirt. He motioned me to a room where someone had cleverly mounted a huge white colour television set on a custom-built shelf about six feet above floor level. It was a 26in. Ultra model.

The club's custodian told me tales of the set's heart-rending ability to go dead, frequently, at irregular intervals – usually when the club's members were absorbed in the gripping tales of day-to-day life in *Coronation Street* and *Crossroads*. At the time the set was performing faultlessly, but as I knew that it contained the 3500 chassis I believed everything he said. If he'd told me that the set had a tendency to climb down from the shelf and growl at passing dogs I would have believed him – these sets were beginning to become a legend with me and my fellow students at the local technical college, with new and more obscure problems being reported daily.

Unable to remove the set from its perch, all I could do was to arrange for a loan set to be brought out and the delinquent to be interrogated for a few days in the confines of the workshop.

Lack of Height

By now the traffic was starting to increase as parents and children began to congregate at the local schools. Rush hour would soon begin, with traffic building across the town. The next call would be more easily reached by going around the outskirts of the town. This brought me to the home of a young couple on a new housing estate. As they were both out at work they'd left the key with a neighbour.

When I'd managed to get in I found a monochrome HMV set in the brightly decorated living room. It was almost entirely surrounded by a gaudy collection of LPs.

Moving some by the Grateful Dead aside, I pulled the set out so that I could work on it. The chassis was the Thorn 1500, the complaint lack of height. Even with the height control set to maximum there was barely enough. A new PCL85 soon put that right. After readjusting the height and replacing the back I wedged the set in its original position amongst the records and returned to the road.

A Professional Complainer

Half an hour later I arrived at Mr Brown's home. This was my least favourite type of call. Mr Brown was a professional complainer: he would call us out frequently to draw our attention to imperfections he had observed during his day-to-day viewing. The lounge was dominated by a pair of huge electrostatic speakers, both the size of central heating radiators. The TV set was a large Telefunken one with a hybrid chassis. He viewed it with the curtains drawn and the contrast reduced to give a milky but in his eyes perfect picture.

His complaint this time was of convergence errors, despite the fact that it was better in this respect than most sets. With a bit of persuasion the convergence panel dropped down from the bottom of the set. Mr Brown settled down to watch me rearrange the convergence errors until he was sufficiently satisfied to release me for my next call.

All Ultra Modern

My final call that day was to an ultra-modern apartment in a new block of flats overlooking the local park. As was almost obligatory for any fashion-conscious couple, the set was an Acoustic Murphy. Available in many gaudy colours, the discerning hirers of this particular one had opted for a shade of darkish red to match the black leather three-piece suite: it was on a chrome swivel stand to match the dining table and chairs. Baulking somewhat at the garish decor, I failed to notice the split-level lounge and arrived at the set in a quicker and less dignified manner than I had intended.

A trendy middle-aged man, fashionably attired in a dressing gown of violently clashing colours, told me that the set tended to lose colour on BBC-2. After removing the back to confront yet another A823 chassis I pulled out the tuner unit and examined the nylon runners that are part of the tuning mechanism for each button. As expected, the button corresponding with BBC-2 had a rather worn nylon runner. A quick visit to the van revealed a packet of bright blue replacements. After a brief struggle I managed to fit them. It was then bye-bye to the resident peacock and back to the rush-hour traffic for my return to the workshop. Not a bad effort for my first solo foray.

MATHEMATICS MODULES

The Institution of Electronics and Electrical Incorporated Engineers (IEEIE) has added a new title, the eighteenth, to its open-learning programme Mathematics for Engineers and Technicians. The new title is Introduction to Differential Calculus. Under the open-learning programme the student works individually but receives support, by post of telephone, from the Institution's network of tutors. Enrolment fee for the new 'module' is £20 (IEEIE members £16), inclusive of support, postage and VAT. For further details phone the IEEIE on 0171 836 3357.

TV Fault Finding

Reports from Tony Ashworth, Terry Lamoan, Andrew J. Finn, Alfred Damp, Mike Leach, John Pitt-Francis, Robert J. Longhurst, Richard J. Avis, Stephen Cook, David Chaplin and Gerald White

Hitachi C2114T

The cause of loss of teletext operation with one of these sets was traced to failure of crystal X2231 in the teletext circuit. The part no. is E516045. T.A.

Toshiba 3327DB

This set was happy to display previously stored channels but wouldn't memorise any new ones. The culprit turned out to be the UPD6254CX memory chip ICA07. It has to be replaced with the correct device (part no. 23319016) from Toshiba as it needs to be preprogrammed. T.A.

Hitachi C2564TN (G10Q Chassis)

This set was dead except for a flashing standby light and a faint tripping sound that came from the power supply. There was 330V across the reservoir capacitor C907 but the voltage didn't reach the chopper transistor Q901, a f.e.t type, because link FB910 was dry-jointed. The offending joint was not immediately apparent as it's hidden beneath a blob of glue.

Link FB911 is also worth resoldering as it can cause similar problems. T.A.

Matsui 1466

When I switched this set on there was no picture or sound, though the LED was alight and the channel change worked. This is a regular problem. I replaced R502 and R503 and got the set working. T.L.

Philips 24CE2670 (2A Chassis)

The screen was blank. A raster was visible, and the mute light was continuously on: it looked in fact as if the set was switched to external input. As a check, the output from a satellite receiver was connected and sure enough a good picture appeared – but the mute light remained lit. When the scart plug was removed the set returned to normal operation.

A week later the fault returned. I connected a meter to pin 8 (the switching pin) of the scart socket and, to my surprise, obtained a reading of about 5V. So the set was being switched to external input, but how? I traced the line back to socket F3, pin 1. Pulling this board out revealed all. Someone had replaced the back-up battery on the top of this board and a solder splash had fallen on to plug connections 1 and 2, forming an intermittent bridge. Pin 2 is at about 5V. The moral is to take care when replacing back-up batteries, as solder splashing could give rise to more obscure problems later on. A.J.F.

Toshiba C2036B

This set was stuck in standby. It came from another dealer who had already replaced ICA11, crystal ZR01 and the

BC557A standby switching transistor QR10. Tracing back from the microcontroller chip's initialising pin I found that the 0.7V that should be present at the base of QG27 was missing. CG31 here was 22 μ F instead of 47 μ F. Changing that didn't improve the base voltage, so back to the 5V supply. This measured o.k. with a meter, but a scope check showed that ripple was present. This was cured by replacing CG632 (1,000 μ F, 25V), but there was still no operation. QR10 had to be replaced again as it had gone open-circuit. A.J.F.

Panasonic TX1786 (Z3 Chassis)

There was intermittent loss of the picture. An inspection of the PCB with a strong magnifier revealed hairline cracks at the legs of the line driver transformer T531. A.D.

Ferguson 14M2 (TX89 Chassis)

This set's power supply whistled, though it was quiet in the standby mode. In addition the intensity of the whistle varied with picture content. The culprit was D9 (BYV96D) which was short-circuit. A.D.

Ferguson TX100 Chassis

A dead TX100 with a difference this time. C118 (6.8nF) was short-circuit, taking pin 4 of the TDA4600-2 chopper control chip to chassis. C118 is part of the chopper transistor collector current simulation circuit. A.D.

Nikkai Baby 10

This set was dead but for a change it wasn't the 12V regulator. R402 (1 Ω , 0.5W) was open-circuit. A.D.

Ferguson TX90 Chassis (20in version)

The power supply would trip on channel change and also with some scene contents. We found that the set-h.t. control wouldn't reduce the h.t. below 125V (it should be 115V). The culprit was R229, which had risen in value from 39k Ω to 50k Ω . A.D.

Sony KVM14TU

For intermittent a.g.c. overload check for dry-joints inside the i.f. module. A.D.

Ferguson TX85 Chassis

There's a tendency for power supply blow-ups with this chassis. The usual cause is a faulty degaussing posistor (Z2): it's good practice to replace this item whenever one of these sets comes in for repair. With this particular set however the cause of the problem was the fact that R97

(10 Ω) had risen in value to 11k Ω . As well as the obviously faulty components (the mains fuse, the surge limiter R88, the chopper transistor etc.) I also replaced the mains rectifier diodes, the TEA2018 chopper control chip and the three series biasing diodes D8/D10/D23 (type 1N4002).
A.D.

Tatung 160 Chassis

The power supply in this set was tripping. But instead of the h.t. feed to the line output stage pulsing because of an excessive current demand the h.t. voltage was constant and correct. Scope checks revealed that there was no drive at the base of the line output transistor. The cause of this was traced back to the TDA4503 jungle chip 1101 whose 12V supply was missing. R508 (12k Ω) in the feed to the base of the 12V regulator transistor Q503 had gone open-circuit.
A.D.

Salora 25M87 (M Chassis)

Loss of line sync was the problem with this set. We found that the flyback pulse feedback to the DPU2543 deflection processor chip ICB501 was missing because RB545 (390k Ω) had gone open-circuit.
A.D.

Sharp C1421H (7PS Chassis)

If one of these sets or one fitted with a similar chassis comes in suffering from severe line jitter, save yourself a lot of time by replacing R308 (820k Ω). I spent a long time on one of these sets recently, replacing many components in the line timebase and power supply sections, before eventually tracing the cause of the fault – in this case the line jitter was at the top of the picture only.
M.L.

Bush 2151T

The chopper transformer was ringing and whistling very loudly – over and above normal volume control settings. It was obvious that there was something amiss in the power supply. We found that two electrolytics, C115 (22 μ F, 35V) and C116 (10 μ F, 35V), were leaky. Replacing them cleared the whistle.
M.L.

Philips KT4/K40 Chassis

For line jitter at the top of the picture try C2195 (1 μ F, 63V). It's on the main left-hand panel, near the TDA3576 sync chip IC7200. It worked for me!
M.L.

Samsung CI5052AT

The field scanning would slowly reduce in amplitude to leave a black line at the top and bottom of the picture. It would then start to bounce, slowly getting worse as the set warmed up. Voltage checks around the field output chip (type KA2131) revealed very little, while replacement of the chip and various associated components made no difference. The cause of the fault turned out to be the MC7812 regulator IC402. It provides the 12V supply for IC101 (TDA8362), which produces the field drive. Strange that only the field scanning was affected, as this chip is responsible for many other things.
M.L.

Tatung 190 Chassis

No results was the complaint with one of these sets. When the back had been removed a tripping noise could be heard

coming from the power supply area, but the standby light was not illuminated. We tried disconnecting the supply lines from the chopper transformer, but the tripping persisted. While checking in this area I noticed that the h.t. reservoir capacitor C814 (47 μ F, 250V) had leaked on to the main panel. A replacement failed to cure the fault however. Eventually, while resoldering in the area of the mains bridge rectifier's reservoir capacitor C808 (100 μ F, 385V), I heard it bubble under the heat of the iron. On removing it much gunge could be seen. I cleaned up the mess and fitted a replacement, after which the set worked fine.
M.L.

Samsung CI5012Z

This set suffered from a field linearity problem: the field was up at the bottom and stretched at the top. When it was adjusted the field linearity control VR303 had little or no effect. The culprit turned out to be C306 (2.2 μ F, 50V), which is between the linearity and height potentiometers.
M.L.

Hitachi C21-P819 (G8Q Chassis)

The complaint with this set was no sound, but before this it had been intermittently switching to standby of its own accord. A check showed that the voltage at pin 12 of the AN5836 audio chip IC451 was low: it should vary with the volume setting. The cause of the fault was the T900553-058 microcontroller chip IC1501. Its replacement restored the sound and stopped the intermittent switching to standby.
M.L.

Matsui 1436X

When this set was switched on a normal, clear picture would appear. But after ten to forty minutes the picture would go dark and lose its colour, then the width would decrease with a folded line scan. The cause of all this was the line output transistor, which was leaky. Most modern chopper power supplies tend to trip in this situation. This one seems to ration the h.t. power continuously however, by reducing the voltage.
J.P-F

Ingersoll XK505

There was no life in the line output department of this little TV/radio/cassette model. Because of leakage from a dud battery the line driver transistor Q400 had physically rotted away! A clean up with PCB cleaning fluid, a new transistor and a dab of varnish in the affected area cured the fault.
J.P-F

Sony KVM19TU (BE1 Chassis)

There was no picture because the tube's first anode supply was missing. D852 was short-circuit and R852 open-circuit. This is a regular, stock fault.
J.P-F

Fidelity CTM2000T (ZX3000 Chassis)

There was severe fine ringing in the verticals with this set. The customer referred to the symptom as a "blurred picture". The cause was traced to the h.t. reservoir capacitor C100 (33 μ F, 250V).
J.P-F

Amstrad PC14HRCD/EU-A (Orion Chassis)

It was impossible to set up this monitor's grey scale. The tube was good but the display had a pink cast, with a greater

degree of adjustment on the left-hand side of the screen. We traced the cause to C105 in the green signal coupling circuit. All three coupling capacitors on the input side of the M52025SP RGB amplifier chip were replaced, using high-temperature (105°) type electrolytics. J.P.-F.

Sony KV1412

The tuner in this set was out of action, but why? The 33V regulator was o.k., and Q10 was supplying a control voltage. But by the time this reached the tuner's VC pin it was only a fraction of a volt. The almost complete short-circuit was traced to C134 within the tuner. It had an 80Ω leak. J.P.-F.

Ferguson 37351 (TX9 Chassis)

This set suffered from a buzz that came from the loud-speaker. But intriguingly it was present only in the standby mode. The cause was traced to C907 which was almost completely open-circuit. J.P.-F.

Osume CTV1482

An otherwise excellent picture was spoiled by wavy verticals. We traced the cause to C117 (22μF) in the line hold control circuit associated with IC101. It had fallen to a very low value. J.P.-F.

Matsui 1420A

There was no sound or picture though the e.h.t. was o.k. When the setting of the first anode preset was advanced we found that there was field collapse. The 12V regulator that provides the supply for IC401 was red hot. Cause of the trouble was C436 (470μF, 16V) which was leaky. R.J.L.

Matsui 1455

The sound and picture were intermittent, and I found that tapping the line output transformer cleared the fault. A screw near C316 bonds the line output transformer's screening plate to chassis. It was loose. R.J.L.

Luxor 18056449 (SX9 Chassis)

The screen was bright with flyback lines and the line output transformer sounded as if it was arcing internally. Rectifier DH04 (BA159) was short-circuit and the 330Ω fusible resistor RT41 open-circuit. R.J.L.

Sony KV2052

This set was intermittently dead. When the fault was present the e.h.t. would come up then die away. When the set did come on there was picture tearing. In the fault condition the set was in a semi-standby state. The cause of this trouble was Q001 in the standby circuit – it was leaky collector-to-emitter. A BC237 made a suitable replacement. The set would work if the standby switching transistor Q501 was removed. R.J.L.

Solavox 16R19 (ITT Pico S Chassis)

When this set was switched on there was a blank raster with line tearing. The sound might or might not come on. Switching the set off and on a few times would clear the fault. Checks showed that the h.t. and all the other supply

line voltages were low. The cause of the trouble was C524 (10μF). R.J.L.

Matsui 1422

This set was dead. Because the h.t. was high, the line output transistor Q305 had gone short-circuit. The basic cause of the trouble was C609 (47μF). R.J.L.

Mitsubishi 2555STX

There was patterning on the picture. It looked like i.f. instability. We found that C920 (470μF, 16V) was open-circuit. R.J.L.

Matsui 1450/Saisho CT147R/Hinari CT4

There was an unusual though quite distinct fault with one of these sets – no luminance. The culprit turned out to be the coil across CF101. It was open-circuit, but the quality of the circuit diagram is such that we can't provide the component reference number. R.J.A.

Akura CX33

This set was stuck in standby – some 10ft off the ground in a local burger bar! After getting it down we found that D833 in the 22V supply was short-circuit. R.J.A.

Fidelity ZX3000 Chassis

For poor/intermittent start-up check whether C89 (100μF, 25V) in the TDA4600 power supply circuit has fallen in value. R.J.A.

Sharp CV2123H

It looked as if this set had a duff tube. On further investigation however we found that the c.r.t.'s heaters were not being fully supplied because R621 (1.2Ω) had increased in value to about 5.6Ω. R.J.A.

Hitachi CPT1446R

This set was stuck in standby though it changed channels. We found that R908 had increased in value from 22kΩ to 30kΩ. R.J.A.

Sony KV2090/92/96 (XE4 Chassis)

No results was the complaint with one of these sets, but the owner reported that prior to this the set had for several days been reluctant to start when first switched on and would suddenly go off apart from a fast, loud ticking noise from the back.

We found that the 1.25A h.t. fuse F602 had failed because the 2SD1398 line output transistor was short-circuit. There was a good picture when these two items had been replaced. But after a short time the set would, just as the owner had described, shut down intermittently. We checked the usual dry-joints for which these sets are noted but there were no problems here. The cause of the fault was eventually traced to intermittent breakdown of C513 (2,700pF) in the line oscillator circuit. S.C.

Hitachi C14-P216 (G7P Mk 2 Chassis)

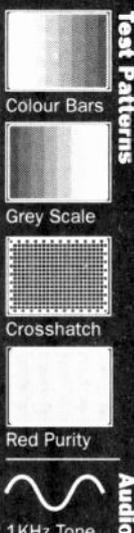
The complaint was no results, but when we switched the set

TELETEST £99.95

offer ends 30th April ...

From 1st May the TELETEST will be £149.95

(above prices are ex VAT)



HANDHELD TV TEST PATTERN & AUDIO SIGNAL GENERATOR

Signal Outputs

Composite Video: Phono skt 75Ω
Line out Audio: Phono skt 1KΩ
UHF ch32-39 PAL I: Co-Axial skt 75Ω
(PAL G version also available)

Power

9V FP3 battery (not included)
or External PSU
Included with the TELETEST

Synchronisation

Fully interlaced, 50Hz, CCIR spec
Size: 155x75x40mm
Weight: 265g



HOW TO ORDER



ORDER PACK.....Call us now for your free information & ordering pack

CREDIT CARD.....Phone, Fax or Post us your credit card details

CHEQUE.....Send us a cheque made payable to "OZAN"

Until 30th April, the total UK price is £124.43 (includes mains PSU, £5.95 P&P & £18.53 VAT)

From 1st May, the total UK price is £176.19 (includes mains PSU, free P&P & £26.24 VAT)

Tel: 01202 877270 Fax: 01202 877271

OZAN, FREEPOST, Wimborne, Dorset, BH21 7BR

OVERSEAS

Until 30th April, the overseas price is £114.95
From 1st May, the overseas price is £164.95

Prices in Pounds Sterling & includes 4-7 day recorded P&P.
If you belong to the EC and are not VAT registered add 17.5% VAT.
Specify: PAL I or PAL G & UK 3-pin or Euro 2-pin PSU.

Tel: +44 1202 877270

Fax: +44 1202 877271

OZAN, 37 Havland Road, Ferndown Ind Est, Wimborne, Dorset, BH21 7SA. UK

The TELETEST is Designed & Manufactured in the UK by OZAN and comes with a One Year Parts & Labour Guarantee

on we noticed that there was momentary arcing at the spark gap connected to the tube's first anode. This was followed by power supply shut down. So we wound up the mains input gently, using a variac, whilst monitoring the h.t. voltage. It rose to well in excess of the correct 103V. Further checks showed that R909 (39kΩ) in the chopper circuit had risen in value to over 90kΩ. It's in series with the h.t. preset VR901. A replacement restored normal power supply operation and after resoldering a dry-joint at C711 in the 200V supply we were rewarded with first-class results.

S.C.

Alba/Bush CTV1400, Harwood HTV3604R etc

We've had the same fault symptoms with two of these sets, though the causes were slightly different. Both sets had no sound or raster, and in each case the BZX85C12 zener diode ZD401 was short-circuit and resistor R414 (12Ω, 2W) was open-circuit.

After replacing these two items the Bush set switched on all right, with sound and a picture, but the components immediately blew with the slightest movement of the PCB. We also discovered that the AN5521 field output chip got blisteringly hot. This time we monitored the h.t. voltage after replacing ZD401 and R414. The set switched on normally again, with the correct 114V h.t., but when the board was flexed it shot up to 140V. As no dry-joints could be found all likely culprits in the power supply were resoldered. After this there was an unwavering 114V h.t. supply with everything running cool.

When the Harwood set came in with the same faulty parts we replaced them and carried out the same resoldering

job. This time the h.t. remained high at about 128V, but dropped steadily until it stabilised at 114V. When we gave C909 (47μF, 25V) a shot of freezer the h.t. and e.h.t. went into orbit. After fitting a replacement rated at 50V the h.t. stayed put no matter what we froze!

D.C.

Rediffusion/Granada/Doric Mk 4 with Text

A normal though dark picture was overlaid with vertical black stripes, each about 5mm wide. When text was selected the lines disappeared and what at first appeared to be a blank raster was produced. On careful examination however a very dim text display could just be discerned on this raster. It reminded me of a similar fault I've had with the Philips 2A chassis. So I switched the set off and checked the teletext chips, which are mounted in DIL sockets. I could feel a couple of them push home. When I switched on again there was a normal picture.

D.C.

Mitsubishi CT2531 (Euro 4 Chassis)

The power supply is starting to give problems in these sets, which are now over five years old. The latest common problem is repeated blowing of the 2SD1877 line output transistor. If the transistor is removed and a 60W bulb is connected as a dummy load across the h.t. supply you will find that it shines excessively brightly. The reason of course is that the h.t. is high, typically over 200V with no adjustment. The usual cause is C908 (10μF, 100V) which goes open-circuit. Replacing it should cure the problem. It's good practice to soak test these sets for at least three days before returning them to the customer.

G.W.

Help Wanted

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

Wanted: Service manuals for the Sharp VC8300, Philips portable V2000 system comprising the VR2120/05 and VR2220, and the Panasonic NV777. A timer control flap for the NV777 is also required. Philip Morrison, 43 Park Road, Alrewas, Nr Burton-on-Trent, Staffordshire DE13 7AG. 0283 790 747.

Wanted: A source of transformers for old guitar amplifiers. Roger White, Bosvean Electronics, 47 Bosvean Road, Shortlanesend, Truro, Cornwall TR4 9DX. 01872 76 186.

Wanted: Instruction manual (photocopy would do) and TV codes for the CPC RC6 universal remote control unit. Also STR4090 voltage regulator, possibly from a scrap Sharp TV panel. D. Lee, 16 Devonshire Place, Cloughton, Birkenhead, Merseyside L43 1TU16.

Wanted: Circuit diagram/service manual for the Gould 3300 oscilloscope (photocopy would do). T.S. Edwards, 3 Lacy Close, Wimborne, Dorset BH21 1DL. 0202 884 646.

Wanted: Instruction book or circuit diagram (photocopies would do) for the Airmec Televet type 877. G. Cannon, 16 St. Cuthbert's Road, Holy Cross, Wallsend, Tyne and Wear NE28 7JF. 01912 620 712.

Wanted: The July and August 1984 and the January, March and June 1989 issues of *Television*. John Galvin, 94 Church Road, Croydon, Surrey CR0 1SD. 0181 681 7090.

Wanted: Variac in good condition, also a colour bar generator. Have £1 coin meters for disposal. Service TV, 18 Benfleet Road, Hadleigh, Essex. 0702 558 444.

Wanted: Pinch roller assembly for the Technics RS-M5 audio tape deck. Also the Y/chroma module IC301 (part no. HES-8454C) and IC201 module (part no. HT4907C) for the Hitachi VT520E – or a scrap machine with the parts in situ. J.W.B. Perry, Safeguard Security Electronics, 21 Paynes Lane, Broughton, Stockbridge, Hants SO20 8AH. 01794 301 466.

Wanted: Remote control panel (part no. 8213 101 13523) for the Philips G11. Also back number of *Television* containing a description of this chassis. A. Ashurst, 62 Westfield Road, Harpenden, Herts AL5 4QU. 0582 767 990.

Wanted: Service manual (photocopy would do) for a Bekoteknik 14in. colour portable with fastext – there's no model no. on the set. Also information on the importer/distributor of these sets. A. Bayne, 26 Orchard Street, Motherwell ML1 3JD. 01698 264 698.

Exchange: Have *Television* from 1950 to 1995 to exchange for the *Radio and Television Servicing* books dated 1960-61 to 1964-65 or an old valve radio. M.D. Stevenson, 124 Green Lane, Eastwood, Essex SS9 5QJ. 0702 522 929.

Wanted: Manual (photocopy would do) for the Telequipment D43 scope. J. Cole, 66 St Johns Avenue, Old Harlow, Essex CM17 0BD. 01279 437 650.

Wanted: Amstrad 1512 computer monitor with integral power supply, either colour or monochrome and preferably working. A.J. Parker, Derwent Electronics, Derwent House, Roslyn Road, Hathersage, Sheffield S30 1BY. 0433 651 993.

For disposal: AZ1, EF9 (used), EBL21, 6K7, EM4, UM4, EF22, ECH21, HBC90, 6X50, 6BZ6, PC90 and 6AV6 valves, also a 2M2 tone control for the old Holland Philips

radio. Offers please, plus shipping charges. Benjamin D. Samson, 8605, 60th Road, APT#5H, Elmhurst, NY11273, USA. Tel. 718 651 6397.

Wanted: Main chassis board for the Hinari CT4. Also microwave control panel for the Thorn EMI Model MH1080 or main chip type EF6805U3P. Keith Twamley, 25 Davena Drive, Weoley Castle, Birmingham B29 5UL. 0121 426 4471.

For disposal: Retired engineer has a number of working Rediffusion Mk 3 chassis panels for disposal free. I require the circuit for the Panasonic NV7000 VCR. A. Tomkinson, 10 Lodge Court, Station Grove, Wembley, Middx HA0 4AP. 0181 903 5574.

Wanted: Power supply and timebase panel for the National Panasonic Model TC333G, or an AN239 chip (IC102) and KIV15A diode (D811). Also the line output and any other panels for the Rank T20/T22 chassis. Donald Bills, 69 Greenfields Road, Kingswinford, DY6 8EG.

Wanted: Scrap U202 video subpanel for the Toshiba V300 VCR. It's an upright subpanel that houses a THB89YP chip. D.J. Long, 697 Halifax Road, Hartshead Moorside, Cleckheaton, West Yorks BD19 5QT. 01274 877 211.

Wanted: Circuit diagram for the CMC302 ITT control panel, also servicing information and/or software driver program for the Microtek International GP256 EPROM programmer. Garry Griffiths, 167 Middlemarch Road, Radford, Coventry CV6 3GJ. 01203 595 144.

Wanted: Line module for the Bush 6125A 16in. portable (Saba chassis). Tony R'Ewen, Tiree TV and Video Services, 4 Reef Terrace, Isle of Tiree PA77 6UT. 0879 220 679.

Wanted: Roland PG300 programmer, EPROM for SIEL MK80 synthesizer, Roland US-2 link box, Roland TR909 drum machine, Roland TB303 baseline – even broken ones. Any broken synthesizers or modules welcome. Mr Khan, 26 Hermitage Road, Parkstone, Poole BH14 0QQ. 01202 734 739.

Wanted: LOPT (T801) part no. 1-439-201-00 and deflection yoke (L903) part no. 1-451-125-00 for the Sony KV1820UB. Mike Tapscott, 2 Oaktree Cottage, Royal Oak Road, The Pludds, Ruardean, Glos GL17 9UG. 01594 861 169.

Wanted: LOPT (part no. TLF15606) and remote control unit (part no. TNQ8E0420) for the Panasonic TX1786. Also a mains transformer with a 240V primary winding and a 24-30V (approximately) secondary at around 30A. Michael J. Levy, 19 Totterhoe Close, Kenton, Middx HA3 0HS. 0181 907 3620.

Wanted: Circuit diagrams for the Samsung CL338GA CTV set and Tashiko LVG981 VCR. Telephone/fax 0117 971 2403.

Wanted: LOPT type SCS307 or equivalent for a Matsushita (Panasonic) TR-13DG10 mono monitor. D.R. Hanson, Wilton Grove, Heywood, Lancs OL10 1AS. 01706 624 737.

Wanted: Circuit diagram for the Kenwood X7-WX cassette deck. Lloyd Charvis, 91 Ardav Road, Hill Top, West Bromwich, West Midlands B70 0RA. 0121 502 1417.

Wanted: Keypad PCB for the Ferguson 59J7 (sited beneath the c.r.t. with three edge sockets, panel no. M1645/021C). Also tuner/clock PCB for the Ferguson 3V43 VCR. Roy Mann, Manns Television Services, 368 Loughborough Road, West Bridgford, Notts NG2 7FD. 0115 923 4052.

Wanted: Circuit diagram for the Hammond T500 electronic organ and Rotel RMR90 audio remote control centre. B.J. Theodrom, 83 Caulfield Road, Shoeburyness, Essex SS3 9LP.

Wanted: Philips 10CX1120 complete in working order or repairable condition. Keith D. Friday, 2 Chadwick Close, Coventry CV5 7HQ. 01203 461 572.

Installing a CD-ROM Drive

Part 1

David Botto

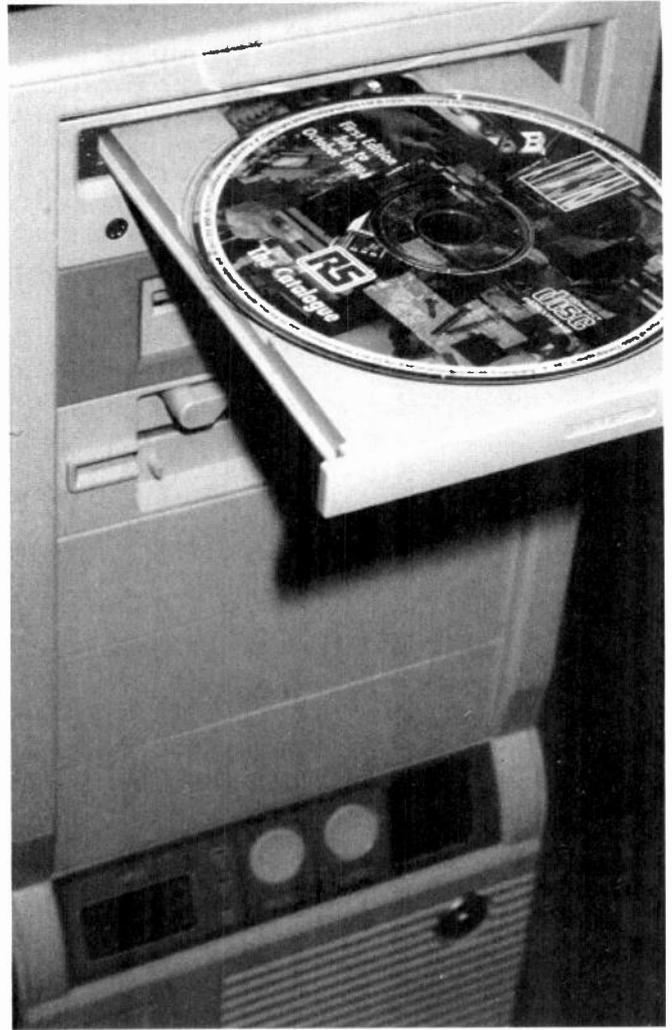
Suddenly a PC without a CD-ROM and its associated stereo sound card seems to be only half complete. Multimedia is here, and a CD-ROM drive can be regarded as an essential item for the workshop PC. If your PC doesn't have a CD-ROM drive, it's easy enough to install a high-tech unit at reasonable cost.

The world of CD-ROMs abounds in strange acronyms and terms. It's as well to understand them, if only to be able to provide your customers with explanations. Here's a brief list:

ATAPI	Advanced Technology Added Package Interface.
BUS	Two or more parallel conductors that carry data.
CD-ROM	Compact Disc Read Only Memory.
ESDI	Enhanced Small Device Interface.
FM	Frequency Modulation – method of data storage on disc.
IDE	Integrated Drive Electronics.
ISA	Industry Standard Architecture.
MFM	Modified Frequency Modulation – allows twice the bit storage on a disc as FM.
MPC	Multimedia PC.
RLL	Run Length Limited – an encoding system for recording data on a hard disc.
SCSI	Small Computer Systems Interface (“scuzzi”).
VGA	Video Graphics Adaptor.

A CD-ROM disc can store over 600Mbytes of digital computer data – not bad for a small, circular piece of plastic!

It's the addition of a sound card that converts your PC



A CD-ROM drive installed in the Television PC project (July-August 1994 issues.)

into a multimedia system. The PC can then, using suitable software, merge text, sound, video and graphics. To be able to operate as a multimedia machine, your PC's hardware must be to the appropriate standard: this is MPC level one, set by the MPC council. It calls for a minimum of a 386 microprocessor, 2Mbytes of RAM, a sound blaster (or equivalent), a VGA graphics card and a CD-ROM drive.

Once you have installed all this you can use programs such as the RS catalogue on CD-ROM, which will save you hours of time when seeking and ordering electronic parts. Software programs can be down-loaded from a CD-ROM straight on to your PC's hard disc. Use of Kodak's Photo CD service enables you to have between 80 and 125 photographs or colour transparencies stored on a CD-ROM disc. This service costs me just £12.11p for 36 pictures or £8.79p for 24 shots.

What to do

Until recently CD-ROM drives were expensive, and those that were available ran irritatingly slowly. A price list dated early 1993 shows that single-speed CD-ROM drives were then available at prices ranging from £287 to £734. A year ago a quad-speed drive would cost around £800. Today an efficient Mitsumi IDE quad-speed drive can be obtained for less than £150.

What if your PC contains a SCSI instead of an IDE? In this case you'll need an additional Mitsumi IDE CD-ROM adaptor board. See Fig. 1 and the price details on the next

page. This board can be used with one or two IDE CD-ROM drives, is ATAPI compatible and will plug into a spare ISA bus slot. It will coexist happily with SCSI, ESDI, RLL, MFM and other IDE controllers. You won't need it if your PC uses an IDE hard drive.

By fitting your own CD-ROM drive and sound card you'll save money and better understand your PC system. It could be a first step to installing CD-ROM drives and sound cards in your customers' PCs. This can be a source of substantial extra profit for a little easy work.

System Requirements

The basic requirements for a PC CD-ROM installation are a 386 microprocessor and 4Mbytes of RAM. A PC with a 486 microprocessor and 8Mbytes of RAM will run CD-ROM programs a lot faster however. Another requirement is that Windows 3.1 or Windows for Workgroups is installed on your hard disc. Without Windows your CD-ROM use will be severely limited, because nearly all CD-ROM programs load via Windows.

Before ordering a CD-ROM drive and sound card it makes sense to check whether there's enough room in your

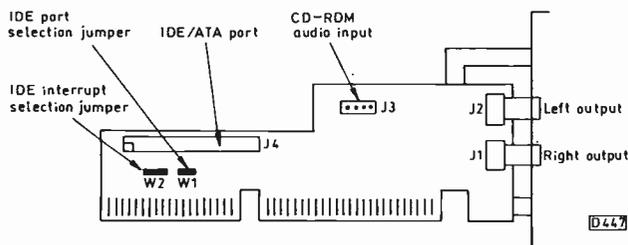


Fig. 1: The IDE CD-ROM adaptor.

PC to fit them. Switch the PC off, disconnect it from the mains supply and carefully unplug all the leads at the back. Remove the screws and lift off the cover. Be sure to wear an antistatic wrist strap to avoid the possibility of circuit damage: if you don't have this, now is a good time to buy one. If your PC is a roomy desktop type or a tower unit there should be no problem. When everything is crammed in tight on small PCBs things can be more difficult.

Check that the mother board has at least one empty 16-bit expansion slot and that there's an empty horizontal 5.25in. drive bay slot. The PC must have a standard IDE interface card. Make sure that you've at least one unused four-conductor cable from the power supply, with a socket at its end. This cable will provide the 5V and 12V d.c. supplies required by the Mitsumi drive. The PC project published in the July/August 1994 issues of *Television* is ideal for CD-ROM upgrading.

What You Require

The items you need can be obtained from Simply Computers, 28 Walthamstow Business Centre, Clifford Road, Walthamstow, London E17 4SX (telephone 0181 523 4020) or other good PC suppliers. The list is as follows. The prices quoted (from Simply Computers) exclude VAT and delivery and are correct at the time of going to press. Prices vary frequently, so check before ordering. Save all the packing: if it is necessary to return anything that's under guarantee it is essential to do so in the original box(es).

(1) Mitsumi FX400 quad-speed CD-ROM drive complete

with interconnecting leads. £125.

(2) Creative Labs Sound Blaster Pro SB1600 sound card complete with all leads. Includes two nice-sounding Kingsway WS180 stereo mini loudspeakers. £59.

If you prefer larger speakers, a Yamaha 10W per speaker system with active servo technology for bass response,

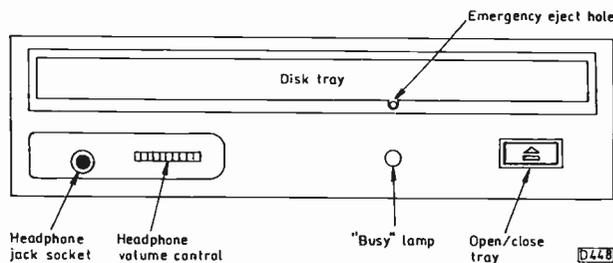


Fig. 2: Front view of the Mitsumi FX400 quad-speed CD-ROM drive unit.

including an a.c. adaptor and all cables, is available for £55 per pair.

(3) One Kingsway TM201 microphone YST-M10. £9. This is a tape recorder type microphone with 300-500Ω impedance and a 3.5mm jack plug.

If required, an MTM2183M IDE CD-ROM ISA-to-IDE interface adaptor, part no. 400 499 89A. £13.

The CD-ROM drive is also available from Mitsumi Electronics, Coliseum Business Centre, Riverside Way, Watchmore Park, Camberley, Surrey GU15 3YL (0276 29 029).

3M 1.44Mbyte floppy discs are available from Action Computer Supplies (0800 333 333) at £4.95 for ten.

If there's sufficient space, fit an internal CD-ROM drive in an empty drive bay – you save money and there are no messy trailing leads.

For this project I chose the Mitsumi FX400 which features quad-speed operation with access times of 250 and 420ms. It satisfies the MPC II specification and exceeds the High Sierra and ISO 9660 specifications. Data transfer rates are better than 600kbytes/sec. An added bonus with the FX400 is that it's Photo CD compatible. With a sound card you can also play audio CDs in stereo. The motor-driven front loading tray ensures ease of use and reduces tray mechanism wear to a minimum.

The Mitsumi drive comes with a four-pin audio cable for use with a sound blaster card and all the fitting screws you require. A comprehensive installation manual and installation software on a 3.5in. disc complete the package. Figs. 2 and 3 show the appearance of the FX400 drive unit (units may vary in appearance because of continuous improvement).

The sound card I selected is the stereo Sound Blaster

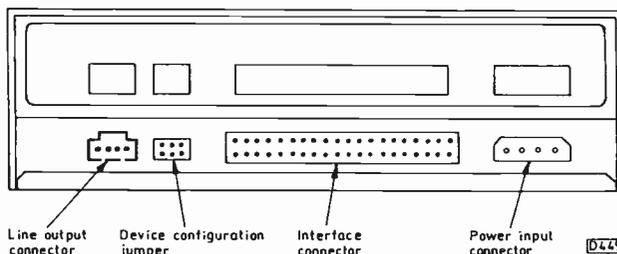


Fig. 3: Rear view of the CD-ROM drive unit.

SB1600 (see photograph). It's reasonably priced, extremely powerful and comes complete with all the necessary leads and screws. You can use it to play digital stereo recordings or to record sound from a microphone on to a floppy disc or the hard disc. Each audio channel delivers 4W. Two small 4Ω impedance loudspeakers plug into the sound card directly. You'll also need a microphone. The SB1600 also brings speech power to your PC. The installation software required is on four 3.5in. 1-44Mbyte floppy discs.

Software discs that contain *Lemmings* and *Indianapolis 500* complete with sound are included in the software package.

Installing the CD-Drive

Make a back-up copy of the CD-ROM software disc. To do this you need a new, formatted 1-44Mbyte 3.5in. floppy disc. Use the DOS disc copy command (DISKCOPY A: A:). Store the original disc in a safe place, using the back-up disc for the software installation.

At the DOS prompt, type MEM. Details of the PC's memory will then appear on the screen. Use the 'Print Screen' key to print it. Retain the copy – you'll need it when the CD-ROM drive and sound card installations have been completed.

The only tools required are a sturdy crosshead screwdriver and possibly a set of metric box spanners. No soldering is involved. Read the entire FX400 manual that comes with the drive before you start.

At this stage forget the sound card. You first need to check that the CD-ROM drive works properly. Push out the plastic front blanking panel in the PC's spare drive bay and insert the Mitsumi FX400. Make sure that it's the right way up. Line up the screw holes in the drive with the ones in the PC's metal frame. Ensure that the drive is nicely centred then insert the screws.

Push the power supply connector into the socket at the rear of the CD-ROM drive. A spare disc drive plug from the IDE board plugs into the interface connector at the rear of the CD-ROM drive. The Mitsumi installation procedure is simple and trouble free.

Reconnect all your PC's leads, but leave the cover off. Switch on. If the PC works correctly you can start to install the CD-ROM drive software. The PC cannot read from the CD-ROM drive until the software files have been installed correctly.

Software Installation

Select the hard disc by typing C: (assuming that the hard disc is designated C) at the DOS prompt, then press enter. Type cd, then press the return key to ensure that the root directory is selected.

Put the installation disc into drive A and type A: then SETUPD. Press the enter key. The disc's SETUP.EXE program will then run. Follow the on-screen instructions. Reboot the system when the installation program has been successfully completed.

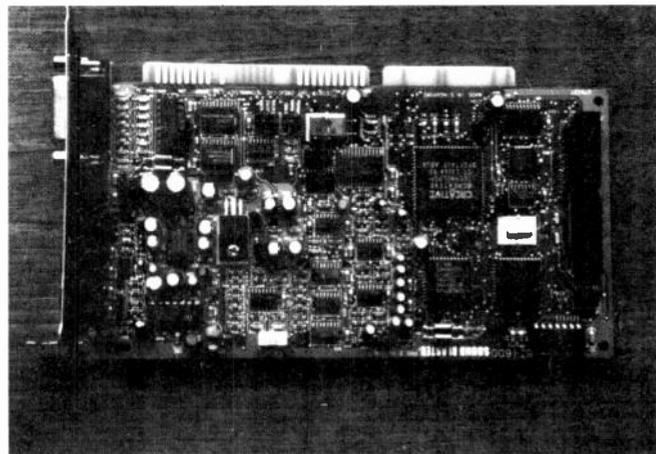
Testing the Drive

Press the open/close button on the CD-ROM drive's front panel. The tray should open. Press it again and the tray should close. Warning: keep the tray closed unless you are loading or unloading a disc. The CD-ROM tray is delicate and easily broken.

You may receive a free CD-ROM disc with your drive. If not, some excellent CD discs are given away free with

computer magazines each month. If you have an account with RS Components you can request a free copy of the RS CD-ROM components catalogue.

Place a CD-ROM disc in the drive. At the C: DOS prompt type the CD-ROM drive letter, probably D or E. Type DIR,



The Creative Labs SB1600 sound card.

hit return and if all's well you will see an on-screen directory of all the files on the disc. Follow the instructions that came with the disc and you'll soon be in business.

If you experience any difficulties check that the interface and power cables are securely attached and pushed on to the correct pins, and that the CD disc is inserted the correct way up (this sounds silly, but mistakes can be made).

Sound Card Installation

Once the CD-ROM drive has been installed and tested the next job is to fit the Sound Blaster Pro SB1600 sound card. Make back-up copies of the sound card software discs. You'll need four 3.5in. 1-44Mbyte discs. You can also copy the games discs if you wish. Read the *Sound Blaster Pro SB1600 User's Guide* thoroughly before attempting to install and use the card. More on this is Part 2 next month.

SB1600 Features

The Sound Blaster Pro SB1600 card is capable of doing quite a lot. It has a built-in 4W per channel stereo power amplifier that will drive headphones or speakers. It will play back all types of digital sound (speech, music and comprehensive special effects) via its two 8bit DACs. It will also digitise and record sound from a microphone, line input or an audio CD disc. A built-in digital/analogue mixer is software programmable.

The SB1600 will mix digital stereo, f.m. music, CD audio, line and microphone input signals during playback. It has a.g.c. and a master volume control. The microphone, line and CD audio inputs can be selected via the software supplied. A 64-byte FIFO (fast in fast out) buffer for high-speed data transfer is also incorporated.

Next Month

In Part 2 we'll describe how to set up and install the sound card and load its software. We'll also describe how to get your PC to read back documents in good, clear English. Finally we'll look at some CD-ROM drive and sound Windows applications and consider how to get the best from a CD-ROM drive.

USE YOUR ACCESS OR VISA TEL 0902 773122 FAX 0902 29052

15/80H	3.83	2SC1942	7.48	2SD401A	0.77	BC149	0.04	BD911	0.41	BUZ280A	2.57	KSR1004	0.14	MPSA55	0.12	STR59041	9.68	TD11770A	15.01	TEA1039	2.19
15/85R	3.84	2SC1959	0.18	2SD438	0.35	BC157	0.13	BD912	0.63	BUZ90	3.90	L200CV	2.19	MPSA92	0.18	STR6020	5.04	TD11904	2.04	TEA2018A	1.70
1N4001	0.04	2SC1969	2.48	2SD468	0.24	BC158B	0.12	BD939F	1.61	BUZ90A	2.55	4918	1.27	MPSA93	0.11	STR620KIT	15.05	TD11905	2.12	TEA2029C	5.89
1N4002	0.07	2SC1983	1.87	2SD526	0.85	BC161	0.27	BD164C	1.18	BY127	0.14	LA1230	1.95	MR854	0.85	STRD1816	6.78	TD11908A	1.12	TEA2031A	3.40
1N4003	0.05	2SC2001	0.23	2SD555	8.54	BC178B	0.18	BD165C	1.66	BY133	0.08	LA1503	1.29	MR856	0.21	STRD4420	10.15	TD11909A	1.86	TEA2164	2.96
1N4004	0.07	2SC2060	0.29	2SD592	0.21	BC182L	0.06	BDW93C	0.64	BY164	0.67	LA1160	0.94	NE545B	3.20	T6064V	2.63	TD12002	1.12	TEA2165	4.27
1N4006	0.06	2SC2068	0.72	2SD600	0.64	BC183L	0.09	BF197	0.52	BY179	0.80	LA4160	0.44	NE555N	0.37	T6076V	5.04	TD12003	0.90	TEA2165A	9.58
1N4007	0.06	2SC2073	0.77	2SD613	0.94	BC183LB	0.10	BF199	0.04	BY184	0.12	LA4270	2.73	NE556	0.43	T9053V	0.93	TD12004	2.57	TEA2261	3.25
1N4148	0.06	2SC2078	0.86	2SD636	0.19	BC184A	0.05	BF240	0.11	BY206	0.40	LA4280	3.12	NE592N	1.91	T9064V	1.44	TD12005	2.57	TEA5101A	3.95
1N4448	0.06	2SC2120	0.23	2SD637	0.16	BC184L	0.06	BF244	0.43	BY210400	0.19	LA4282	4.56	NE646N	4.45	TA7205AP	1.68	TD12006	1.06	TEA5115	2.91
1N5062	0.51	2SC2166	1.29	2SD638	0.41	BC184LC	0.10	BF244A	0.60	BY226	0.16	LA4422	1.33	OA200	0.22	TA7217AP	1.46	TD12009	2.29	TIC106D	0.82
1N5400	0.07	2SC2168	3.01	2SD639	0.60	BC204	0.14	BF245A	0.14	BY227	0.08	LA4440	2.40	OA47	0.25	TA7222	1.28	TD12030H	1.12	TIC106M	0.75
1N5401	0.14	2SC2229	0.31	2SD666	0.43	BC212B	0.06	BF245B	0.06	BY228	0.38	LA4445	2.90	OA90	0.64	TA7222AP	1.87	TD12030V	1.05	TIC225M	1.02
1N5402	0.12	2SC2230	0.68	2SD667	0.38	BC212C	0.08	BF258	0.04	BY2291000	1.31	LA4460	2.02	OC71	1.03	TA7227P	2.29	TD12040H	2.11	TICP106D	1.95
1N5404	0.13	2SC2236	0.36	2SD669A	0.64	BC212J	0.11	BF258	0.04	BY229800	1.31	LA4466	2.05	PC814	1.39	TA7240	2.74	TD12040V	2.45	TIP110	0.36
1N5406	0.12	2SC2240	0.17	2SD716	1.46	BC213L	0.04	BF324	0.12	BY229800	0.92	LA4461	2.05	PCD8582P	3.54	TA7250	4.07	TD12050	4.24	TIP112H	0.95
1N5408	0.12	2SC2271	0.36	2SD718	2.21	BC214C	0.08	BF338	0.43	BY238	0.43	LA4476	3.09	PC16C57KTSO	6.61	TA7250BP	4.49	TD12050A	1.12	TIP120	0.57
1N914	0.04	2SC2274	0.35	2SD734	0.26	BC214E	0.09	BF420	0.21	BY252	0.14	LA4508	2.13	R2M	0.67	TA7251BP	4.40	TD12050B	1.80	TIP121	0.42
2N2222	0.22	2SC2278	1.29	2SD762	1.80	BC237C	0.08	BF421	0.24	BY255	0.14	LA4700	4.27	R4050	3.04	TA7270P	1.59	TD12050C	5.95	TIP122	0.42
2N2222A	0.23	2SC2314	0.38	2SD820	5.06	BC237C	0.11	BF422	0.19	BY259	0.14	LA5512	0.72	R4051	3.18	TA7271P	2.79	TD12050D	4.25	TIP125	0.41
2N2369A	0.34	2SC2320	0.19	2SD837B	1.02	BC238A	0.06	BF423	0.18	BY259	0.14	LA6324	0.84	RB156	2.40	TA7273P	4.10	TD12050E	4.27	TIP127	0.47
2N2907	0.20	2SC2335	1.56	2SD856	1.03	BC238B	0.06	BF458	0.39	BY339	0.86	LA6358S	0.62	RC4558	0.48	TA7274P	2.74	TD12050F	4.97	TIP132	0.65
2N3053	0.38	2SC2458	1.4	2SD863	0.35	BC238C	0.06	BF469	0.34	BY399	0.23	LA7520	2.77	REGBABY10	14.80	TA7280P	2.98	TD12050G	4.27	TIP137	0.48
2N3055	0.86	2SC2482	0.35	2SD869	5.18	BC239	0.07	BF470	0.33	BY414J	0.26	LA7800	1.46	RGP10G	0.26	TA7281P	2.98	TD12050H	2.99	TIP142	1.14
2N3442	1.00	2SC2500	0.33	2SD870	3.43	BC239C	0.06	BF480	1.10	BYD330	0.14	LA7801	1.41	RGP15G	0.33	TA7283	2.23	TD12050I	2.05	TIP295S	0.83
2N3772	1.24	2SC2570A	0.20	2SD871	5.08	BC239C	0.07	BF493	0.35	BYD33J	0.27	LA7820	2.71	RGP15G	0.24	TA7288P	2.04	TD12050J	0.76	TIP29C	0.61
2N3819	0.55	2SC2655	0.31	2SD880	0.36	BC258	0.09	BF494	0.12	BYD33M	0.21	LA7830	1.46	RGP15M	0.44	TA7299P	2.65	TD12050K	2.21	TIP29E	0.47
2N3904	0.32	2SC2660	2.93	2SD882	0.46	BC261B	0.27	BF758	0.32	BYV10-40	2.55	LA7835	1.63	RGP30M	0.30	TA7317P	0.93	TD12050L	3.19	TIP305S	0.94
2N4123	0.30	2SC2724	0.19	2SD898B	6.41	BC300	0.48	BF759	0.38	BYV55B	0.29	LA7837	1.63	RM11C	1.71	TA7609P	2.75	TD12060	3.74	TIP30C	0.17
2N4401	0.06	2SC2979	2.74	2SD902	6.67	BC301	0.28	BF760	0.26	BYV96F	0.52	LC7132	3.76	S2000A	1.98	TA7680AP	4.55	TD12060A	0.64	TIP31A	0.33
2N5296	0.69	2SC3117	0.60	2SD973	0.38	BC303	0.24	BF762	0.24	BYV96G	0.27	LC7132	3.76	S2000AF	1.68	TA7705P	1.70	TD12060B	1.32	TIP31B	0.30
2SA1013	0.35	2SC3153	2.40	2SJ115	6.41	BC307B	0.06	BF788	0.52	BYV96G	0.52	LED330	0.10	S2005AF	2.02	TA7769P	3.01	TD12060C	19.93	TIP32A	0.41
2SA1015	0.11	2SC3156	6.61	2SK1117	3.06	BC307B	0.06	BF789	0.25	BYW34	0.42	LF35R	0.10	SA129302	8.69	TA7778P	5.11	TD12060D	1.27	TIP32C	0.40
2SA1015GR	0.11	2SC3199	0.43	2SK1168	6.41	BC307C	0.15	BF869S	0.38	BYW56	0.32	LF35R	0.10	SA129303	10.25	TA7784P	2.25	TD12060E	9.40	TIP35C	1.39
2SA1020	0.44	2SC3225	0.50	2SK794	8.12	BC308	0.05	BF871	0.11	BYW76	0.31	LM1203	10.47	SA129304	10.25	TA7784P	2.25	TD12060F	12.29	TIP36C	1.37
2SA1029	0.26	2SC3242	0.19	2SK742	0.52	BC308A	0.09	BF959	0.18	BYW95C	0.65	LM1303N	0.88	SA5012	3.34	TAB200AH	4.95	TD12060G	1.29	TIP36S	1.37
2SA1048	0.19	2SC3311	0.29	2SK794	6.41	BC308C	0.04	BF960	0.06	BYW96E	0.94	LM1317T	1.29	SA5243PE	1.07	TAB201	3.93	TD12060H	2.40	TIP41A	0.41
2SA1115	0.18	2SC3355	0.96	3054	6.42	BC309	0.06	BF966	0.26	BYX55600	0.23	LM324N	1.48	SAB3035	1.71	TAB205	3.93	TD12060I	0.98	TIP41C	0.43
2SA1123	0.59	2SC3358	0.69	3SK88	1.54	BC309C	0.14	BF970	0.14	BYX71600	1.48	LM339N	0.31	SG264A	11.57	TAB205AH	4.10	TD12060J	2.96	TIP42A	0.52
2SA1286	0.60	2SC3423	0.80	74LS00	0.23	BF374A	0.78	BVZ10	0.30	BVZ10	1.08	LM340T	0.40	SGSF344	7.28	TAB207P	2.74	TD12060K	4.79	TIP42C	0.43
2SA1301	3.37	2SC3460	2.60	74LS247	0.62	BC327	0.10	BF939	0.43	CD4001	0.21	LM358N	0.42	SL1430	1.53	TAB210H	4.79	TD12060L	3.90	TIP47	0.51
2SA1306	1.13	2SC3468	0.80	74LS305	0.78	BC327B	0.17	BF939	0.69	CD4008	0.31	LM380N	1.03	SL1431	1.70	TAB215H	4.79	TD12060M	5.18	TIP1761A	1.58
2SA1370	0.43	2SC3502	0.62	7806	0.60	BC328	0.07	BF990A	0.68	CD4011	0.21	LM386N	0.57	SL1432	8.54	TAB216H	8.01	TD12060N	4.93	TIP1791A	1.25
2SA1489	2.40	2SC3656	0.18	7808	0.72	BC337	0.09	BF991	0.60	CD4013	0.45	LM393	1.63	SL471	1.70	TAB220H	7.69	TD12060O	2.95	TLO62	0.60
2SA1706	0.52	2SC3679	3.59	7809	0.69	BC337L	0.22	BF991A	0.92	CD4016	0.14	LM393N	1.19	SN7605AN	1.70	TAB221H	6.56	TD12060P	5.98	TLO71	0.69
2SA562	0.17	2SC3788	0.77	7810	0.52	BC338	0.06	BF996	0.55	CD4017	0.47	M10481	8.54	STA341M	3.35	TAB221L	7.19	TD12060Q	9.78	TLO72	1.03
2SA608	0.24	2SC3795	1.97	7812	0.30	BC368	0.25	BFW16	2.14	CD4024B	0.23	M192B1	1.88	STA441C	4.51	TAB410C	4.27	TD12060R	11.31	TLO72CP	0.53
2SA673	0.12	2SC3958	1.64	7815	0.82	BC369	0.17	BFW92A	5.12	CD4047	0.45	M29381	23.49	STK12221	6.70	TAB691N	7.01	TD12060S	5.92	TLO74	1.15
2SA684	0.60	2SC3807	0.84	7824	0.31	BC372	0.62	BFY51	0.39	CD4049	0.26	M491	7.94	STK13221	8.89	TA6550B	0.24	TD12060T	9.91	TLO82CP	0.69
2SA733	0.17	2SC3853	3.34	78105	0.26	BC461	0.31	BR100	0.21	CD4053	0.39	M494B1	5.65	STK14111	8.12	TA6550C	0.30	TD12060U	3.63	TMP47C432AP8188	1.88
2SA769	1.29	2SC3883	5.92	78M05	0.35	BC517	0.14	BR101	1.15	CD4060B	0.76	M51387P	10.68	STK14141	11.03	TBA120	0.53	TD12060V	2.57	TMP47C432AP8189	15.19
2SA794	0.91	2SC3892A	4.74	7905	0.35	BC546A	0.07	BR103	0.53	CD4066	0.30	M51395AP	4.64	STK14210	9.40	TBA120C	0.65	TD12060W	6.53	TMP47C432AP8189	15.19
2SA844	0.26	2SC3973B	2.57	7915	0.62	BC546B	0.12	BR303	1.22	CD4070	0.21	M5218L	1.59	STK14521	10.68	TBA120S	0.89	TD12060X	2.57	TMP47C432AP8189	15.19
2SA872A	0.35	2SC4106	2.05	AA119	0.36	BC547	0.11	BRX44	1.02	CD4093	0.32	M5231L	2.36	STK14621	10.48	TBA120T	0.51	TD12060Y	1.34	TMP47C432AP8189	16.63
2SA900	0.67	2SC4204	0.38	AC126	0.37	BC547A	0.04	BRX46	0.31	CD4094	0.36	M54519P	1.37	STK14711	13.20	TBA120U	0.40	TD12060Z	2.23	TPU2732	10.05
2SA916	1.14	2SC4517	4.70	AC127	0.11	BC547B	0.11	BRX49	0.43	CNX624	3.83	M54543L	1.97	STK14921	15.79	TBA800	0.51	TD12060AA	3.76	TPU2732	10.05
2SA93																					

1000's Thousands of semiconductors I.C's etc.
of video parts, heads, belt kits etc.
of remote controls. etc. etc.

80,000 over 80,000 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	X 5	£4.95	BUT11AF	X 5	£3.45
BU508A	X 5	£3.60	BU426A	X 5	£3.75
BU508AF	X 5	£5.00	TDA4601	X 2	£2.55
BUT11A	X 5	£2.25	TDA3654	X 2	£2.50
Philips type 1.2 volt Back up battery	X 5	£4.50			
Philips type 2.4 volt Back up battery	X 5	£8.75			
Scart - Scart lead 1.5m Fully wired	X 2	£2.90			
3V29 etc. Belt kit	X 5	£4.50			
3V35/36 etc. Belt kit	X 5	£4.25			
VT11E etc. Bel kit	X 5	£5.50			
Standard video sensor lamp	X10	£2.50			
Std video sensor lamp + plug	X10	£4.00			
Thorn TX9/10 Remote control	each	£7.49			
Thorn TX.0 Green spot LOPTX	each	£14.95			

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

(please add £1.00 handling all + VAT)

YOU!!!



NEED ECONOMIC

*Economic supply TV & Video parts. *VERY FAST*

*Our experienced staff *WANT* to help you !!

*We can give you an instant answer from our database that contains over 80,000 items and we can give that answer *IN SECONDS*

*If we cannot find it immediately

*We will *'SEARCH THE HEAVENS'*

*We will hassle our suppliers

*We will hassle the manufacturer

*We will make phone call after phone call

*We will send Fax after Fax on your behalf

***WE WILL DO ALL THIS FOR YOU**

***We do it willingly and for free - YOU NEED ECONOMIC!!**

Satellite PSU Repair / Refurb kits

Over 20000 kits sold

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 least 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

	MANUFACTURER	MODEL 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

Please add £1.00 handling all + VAT

Economic Devices
PHONE (01902) 773122 FAX (01902) 29052

32 Temple Street, Wolverhampton WV2 4 AN, United Kingdom.

International Phone ++ 44 1902 773122 Fax ++ 44 1902 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.

Tube Testers and Testing

Les Austin

About ten years ago I thought of sending details of my newly designed and absolutely wonderful tube tester to the magazine. At the time however a different design seemed to be appearing every few months, so I just got on with using it as and when needed instead of writing about it.

A few weeks ago another engineer asked me if I could help him with information on his newly acquired Leader tube tester. This set me thinking about testers again, and since there has not been much on the subject recently in these pages here goes.

In addition to the tester I built to my own design I have recently purchased a Leader LCT910A and a Muter BMR95. I also have a very old Beamac, plus access to a B & K 467 and various models produced by Video Circuits.

Do You Know This One?

Before getting into this subject however I'll describe another of my toys – in the hope that someone out there can help me with some information on it. The story starts about eight years ago when I was at an electronics auction. In the middle of a pallet of gear I saw this pathetic looking 'scope thing. It fixed me with a baleful stare from its single large (3in. diameter) eye and I knew it wanted me to give it a new home. It certainly looked as if it had been neglected, and as you will know by now I'm a sucker for old junk. So I had to buy it. I checked on my finances and wrote down a limit in my catalogue.

The bidding was not particularly furious, but it reached my prescribed limit. So the only other bidder won the prize. I reasoned that no one else could seriously want it. Maybe the other chap wanted the rest of the lot. So I approached him and made an offer (£10 I think) and it was able to come home with me after all. The thing in question is, according to the information on the front, a CRT Characteristic Curve Display Unit.

Let me try to describe it. Do you know the very early single-beam Telequipment scope? The model was S31, but it was usually simply

labelled Servicescope and given a serial number. My new toy was obviously a professionally built derivative of the S31. It carried the serial number 003, but when I later removed the serial number plate and turned it over I found the number 5065 on what was obviously the correct face. As a friend at Telequipment couldn't help and other enquiries were fruitless, I put it aside as a Christmas Day project. This is a day when I can normally play with such toys without fear of being interrupted. Unfortunately I've not had enough free Christmas Days recently. . .

All I know about it is that it should have thirteen valves – they are all missing. Three of them must have been 85A2 neon stabilisers, and I suspect that many of the others should be ECF80s – but not all of them. Instead of the S31's normal valve rectifier there's a bank of selenium rectifiers. The unit appears to have been built in about 1964. Two boxes, one attached to each side, were apparently added in about 1973. One of them appears to provide a 6/12V heater selection choice, the other a source of 400V – there are two 200V zener diodes as limiters and a 16 μ F electrolytic capacitor here. I wonder if this latter box is intended as a clear-leak facility? An attached note reads "don't work Ron gets a shock". If Ron is reading this, or if anyone else can cast any light on the subject, please write in to me via the magazine. A circuit would be better than the sketchy thing I've begun to create. Maybe it'll provide the basis of an interesting article at a later date. Back to testers however.

Operation of a CRT

Before we discuss tube testers it's as well to know what we are trying to measure. So we'd better start with a look at cathode-ray tubes from first principles. A c.r.t. is merely a rather large valve: it operates with a particularly high anode voltage, and incorporates an electron lens system to focus the electron beam. This beam strikes the screen, which is coated with electroluminescent phosphors.

Apart from a few gas-filled types, all valves operate under extremely

high vacuum conditions. When the surface of a metal or certain other materials, i.e. the cathode, is heated in such a vacuum it releases electrons which remain near the surface in an equilibrium condition unless something is done to alter the situation. The electrons can be attracted to another electrode (the anode) some distance away by applying an appropriate positive voltage to it. This establishes an electron flow – the beam. In order to restore equilibrium conditions the heated cathode surface will release more electrons, maintaining the beam. Provided we don't ask for more electrons than the surface is able to emit, the current flow will continue.

This process is known as thermionic emission. It's governed by well-known physical laws. The main determining factors are the area of the cathode surface, its temperature and a surface property known as the work function. At one time the cathode was directly heated. This was superseded by indirect heating: a heating element is enclosed within a thin tube that forms the cathode. The tube is usually made of nickel, on which a thin coating that consists of oxides of two of the alkaline earth metals strontium and barium is deposited. With this arrangement the temperature for the same electron emission needs to be only 800°C compared to 2,000°C with a directly-heated cathode. The indirectly heated cathode has a much higher work function, providing greater electron release densities with a suggested operating life of up to 20,000 hours. A pal of mine has a twenty year old Grundig TV set fitted with a Philips A66-410X tube. Used for about three hours a day, the tube has so far exceeded this expected life by a couple of years. Obviously the fifteen hours per day viewer can expect his tube to last for only about four years.

Space-charge and Temperature Limiting

When the beam current is relatively low, the current flow is said to be 'space-charge limited'. It can be calculated by reference to the Child-

Langmuir Law. At very high beam current levels a saturation effect comes into operation: increasing the electric field to attract more electrons from the cathode no longer produces the expected increase in the electron flow. This is known as the temperature limited area of operation, and is governed by Richardson's Law.

For normal viewing c.r.t.s operate in the space-charge limited region and our customers are happy. If the heater's resistance should rise, which can occur with age, or the effective cathode surface is reduced because of contamination (again reducing the work function), the tube will start to operate in the temperature limited region and our customer will not be happy. We recognise the fault as a low-emission tube. There are other causes of reduced emission, but the effect is the same. It may be possible to improve the situation (by tube 'boosting'), but it's as well to have some idea of what causes the problem before this is tried.

Efficiency

It's interesting, as an aside, to consider the efficiency of modern tubes. With a heating power of about 0.5W for each of the three guns of a current 28in. FS tube the total beam power released is about 25W. I think that recent improvements have been achieved primarily by careful design of the geometry of the heating element.

Operating Voltages

A colour tube operates with around 25kV at the final anode. This is the voltage that establishes the beam. It's aided by something between 500V and 700V at the second grid (screen grid, first anode or whatever you prefer to call it), whilst a negative voltage with respect to the cathode does its best to restrict the current flow. A balance is achieved, and we get our picture on the screen. The negative voltage (with respect to the cathode – it's usually about 0V as the cathode will be at an average d.c. potential of some 100V) is applied to the grid, or Wehnelt cylinder as it is more correctly known. It effectively encloses the cathode, concentrating the electron flow to form a narrow central beam. This is of importance in relation to testing.

Vacuum and Gettering

As mentioned earlier, a very high

vacuum is required within the tube. This is not an easy condition to achieve. Quite apart from the need for the tube to be able to withstand the considerable load (atmospheric pressure) acting on the glass, reaching the required vacuum level presents problems. Because of a condition known as adsorption, any gaseous molecules present inside the tube, especially water vapour, will try to stick to the surface of the glass. For this reason the tube must be pumped to as low a pressure as possible while being heated to around 400°C (since heat is the enemy of adsorption). These conditions must be maintained for a period in excess of an hour.

Furthermore the cathode has to be activated, which involves heating it to convert the coating to the oxide form. During this process there's a considerable release of gas. To keep these gaseous molecules out of harm's way, use is made of a device known as a getter. It consists of a small pan which is usually made of barium, though magnesium has also been used. An induction heating process is used to activate the getter, after which it has a highly reactive metallic surface. This, throughout the life of the tube, absorbs any stray molecules that might otherwise contaminate the surface of the cathode.

Ionisation

Any unattached gas molecules present during the life of the tube are likely to become ionised. Negatively-charged ions will find their way to the central part of the screen. This has not been a problem since the advent of aluminised screens in the Fifties. The problem today is the effects of positively-charged ions. You would expect them to hide in the Wehnelt cylinder (grid), since this is the most negative section of the tube's internal assembly. But some of them reach the surface of the cathode. This contamination means loss of emission.

Tube Rejuvenation

Can anything be done to alleviate this cathode contamination? There have been many approaches to tube 'boosting' or 'regeneration'. Some are gentle and occasionally effective. Others are fierce and unlikely to be helpful with current tube types. The fierce methods were in use twenty years ago and were often very effec-

tive. But today's tubes don't seem to be made of such stern stuff.

These cures work by driving cathode contamination off in a gaseous state. It's important to appreciate however that no method will have a lasting effect unless there's an active getter section to absorb the gas molecules. If the getter is exhausted, boosting will have only a short-lived effect. On a negative note, I understand that some getters won't absorb all the types of gas likely to be present in some types of tube. If all else fails, there remains the option of fitting a regunned tube – or to consign the set to the scrapheap.

Testing

What about testing then? The best method of testing a tube must be to have it in a working set. With all the electrode voltages at the correct levels, display a chessboard pattern then increase the brightness, at maximum contrast, until the maximum specified beam current is flowing. Examine the white squares visually. There should be no loss of line structure. Any smearing, flaring or lack of clearly visible lines suggests that the cathode(s) are operating in the temperature limited region, not in the space-charge limited region.

Such a test procedure is not readily available for most of us, so we must settle for something less. The first compromise is to dispense with both a picture and the e.h.t. supply to the final anode. The Grunther Beamac attempted to retain a final anode supply (at about 1.5kV), but that was about forty years ago for monochrome tubes only. Normally the beam current is extracted by applying a voltage to the first anode (second grid). In some testers about 300V is available for the purpose: in my own design the voltage is a little in excess of 400V, though my next design (which is still in my head, not on paper or in the metal) it will be likely to have a range of say 500V to 750V.

A decision has to be made about the beam current to be measured. In the past most testers have aimed for 250µA, as my own does. I intend to test for about 750µA in my next design. Having fixed these parameters we next come to the most important factor, the grid voltage for test purposes. This seems to have been the weak point with many testers in the past. But as the reason for this is none too clear I will leave the explanation for my next article.

Long-distance Television

Roger Bunney

February was again a very poor month for DX-TV reception in the UK. Apart from the usual very brief Meteor Shower (MS) pings and tropospheric signals from the nearer outlets conditions were virtually dead. Reports from several readers confirm this situation. My thanks nevertheless to David Glenday (Scotland), Ryn Muntjewerff (the Netherlands), Peter Schubert (Rainham) and Roger Fussell (Torpoint) for keeping in touch. A postcard from Robert Copeman (Melbourne) reports that the Sporadic E season continues to be good down under: during mid/late January he received signals from 1W tourist information transmitters in North Queensland, the Gold Coast and Northern New South Wales.

Satellite Sightings

The 1995 Jason Project is under way, the remote location this year being at the site of an active volcano in Hawaii. There are receiving terminals at several UK locations, the main UK base being at Liverpool where John Locker is again involved with evenings at the Maritime Museum, talking satellite with visitors. The Liverpool base is a two-way operation, enabling questions etc. to be sent to the Hawaiian base camp. The PanAmSat PAS-1 satellite at 45°W is used for the Atlantic hop, at 11.639GHz, but the use of digital compression makes domestic reception impossible.

John mentions that Orion 1 at 37.5°W is becoming busier. He usually checks the morning feeds for the BBC and GMTV breakfast shows. Ray Carman (Reigate) comments that 12.585GHz vertical is the most active Orion transponder, with east-bound traffic from the USA (usually 525 lines NTSC). Starbird Frankfurt is another frequent user of this transponder, with various German programme feeds. Various services to mark the allied bombing of Dresden were seen on February 12/13th, including a midnight candle-lit service from the cathedral carried by WTN. Starbird has also been sending clear PAL BBC feeds to the UK. It's also worth checking at 11.578GHz vertical. Orion has been fairly quiet in the FSS band: high-level unmodulated carriers are usually seen – check out 11.500 and 11.615GHz horizontal as these seem to

be the most active frequencies.

David Thorpe (*Transponder Bulletin*) reports that the German TV SAT 2 satellite has been leased to the Norwegian PTT and has been moved from 19°W to 1°W. Five TV channels are available between 11.747-12.054GHz, with left-hand circular polarisation.

I received a strong 12.504GHz carrier recently from Eutelsat I F4 at 25.5°E. According to John Locker this Telecom band carrier is often seen, though as yet without any pictures.

The Reuters Moscow Bureau feed has moved from Gorizont 20 at 14°W to Gorizont 12 at 11°W. Gorizont 20 has an inclined orbit, Gorizont 12 being more stable.

The French Telecom 1C satellite at 3°E is another quiet bird. It often carries UK signals, for example BBC regional reports and occasional corporate items at 12.606GHz vertical. The BBC's Arabic TV service is also transmitted via this satellite at times, en route to Orbit International in Rome.

The local football matches shown on the Wire TV channel are usually linked via Intelsat 601 at 27.5°W: check for clear pictures at 11.472GHz horizontal.

There have been promotional videos for Eurotica, with occasional bursts of VideoCrypt scrambling, from Eutelsat II F1 (13°E) after TRT closedown for the night.

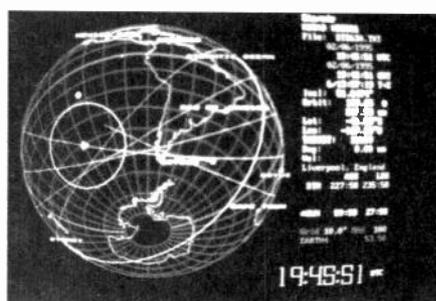
The heavy rain during February caused alarm in the Netherlands in case the dykes should burst. There was live SNG coverage on several days via Eutelsat II F3 at 16°E. German SNG reporting via Kopernikus 2 at 28.5°E showed the Rhine with the worst flooding for many years. There was also the occasional NTV feed via Intelsat K at 21.5°W.

Finally bad news from Reuters VisEurope which has resumed scrambling with its 12.521GHz horizontal transmissions via Eutelsat II F1 at 13°E. This represents the loss of a rather interesting news feed. I've noticed that the Associated Press TV (APT) feed on an adjacent carrier has used line-shuffle scrambling recently.

News Items

Russia: The Ostankino TV and Radio Broadcasting Company is now called Public Russian Television (ORT). The company has been floated with the state owning 51 per cent of the capital and the remaining 49 per cent shared between twelve major national companies. With ORT now becoming an independent, self-running and -financing operation, the state is now financing a single TV channel, VGTRK – the All-Russian State TV and Radio Company.

The European Broadcasting Union: The EBU is to be restructured and streamlined to improve its business efficiency. Although it's a non-profit organisation, the aim is to reduce the budget by nearly £6m a year. Both Eurovision and



Left: A weak SNG signal from Chechnya during the recent conflict. Received via Eutelsat II F3 at 16°E. Centre: NASA-TV provided much TV coverage during the recent NASA/MIR space rendezvous. Photo from John Locker (Wirral) of reception from Intelsat K. Right: Another John Locker photo, showing the MIR and Challenger Shuttle rocket orbits. This is used via his own STS Plus satellite program.

Euroradio have been told to work towards self-financing.

UK: The BBC is now using fibre-optic cables hung from National Grid pylons to distribute radio/TV network programming. There are to date 67 paths to distribution centres, the main control centre for the system being at Warwick. Over the next eight and a half years the network will be expanded to cover the whole country.

The BBC has also released information on its DAB (digital audio broadcasting) service, which is to start this autumn. About 27 DAB transmitters will be used to provide the service across the country. Five will be in the London area, at Crystal Palace, Alexandra Palace, Bluebell Hill, Guildford and Reigate. Other transmitters will be opened at Bristol, Cardiff, Leeds and Belfast, also in Scotland and the NE and NW. Distribution to the transmitters will be via the existing terrestrial network, but a move to satellite distribution is expected to reduce costs.

Poland: A further 150 radio and 25 independent TV services are to be opened.

Norway: More on the Band I close down. The reasons for the close down are the incidence of summer-time interference and the fact that the Norwegian Telecoms Authority wants the frequencies for other uses. During the next two-three years twelve main transmitters will close – parallel u.h.f. services will operate while the close down is being carried out. Gamlesveten ch. E3 already has a parallel u.h.f. outlet: u.h.f. transmitters are being installed at Bagn, Melhus and Hemnes during the current year.

Hungary: PAL is now being used by all TV-2 transmitters. The TV-1 network will use SECAM until the end of the year, then change to PAL.

Iran: IRIB-TV now has a teletext service.

South Korea: Korean TV is to take over ch. A2 from the American Forces Korean Network which is moving to ch. A34 (at 30kW e.r.p.).

Estonia: A new high-power transmitter, Tipp-TV, is in operation at Tallinn (ch. R45). It's being received at up to 100km.

Amateur TV: Dates for up-coming activities are as follows: Summer Fun '95, June 10th at 1800 hours GMT to June 11th at 1200 hours. The International 1995, September 9th at 1800 hours to September 10th at 1200 hours. The last Sunday of each month at 0800-1300. These are the dates/times you are most likely to receive amateur TV signals. The easiest frequency is 435MHz.

Wideband Band I Array

Brian Williams (Penarth) has built the wideband array shown in Fig. 1, covering the ch. E2-4 spectrum, in his loft – the large structure occupies nearly the whole length. It makes use of the Antiference system of wideband cable-dipole matching and various other ideas.

The array in effect consists of two aerials, a three-element rear section covering chs. E2/R1 and a five-element front section covering chs. E4/R2, with the reflector for the E4 section (element D) doubling as a director for the E2 section. Each section has a folded dipole, with separate coaxial feeds taken down to a selector switch at the receiving end. Because of its size, the aerial is built on the loft floor, fixed in an east/south east direction. According to Brian the results, with

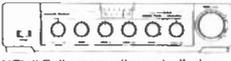
NEW PRODUCTS

PROFESSIONAL MULTISYSTEM DIGITAL VIDEO CONVERTER



- Digital Conversion from input signals of NTSC 3.58, PAL, SECAM
- Output signal NTSC 3.58/4.43 & PAL
- Digital line (525 to 625 lines) and field (50 to 60 fields) conversion. 4M bit field memory. Static resolution: 500 lines. Dynamic resolution: 300 lines.
- Built in Time Base Correction (TBC).
- Accommodates two inputs and two outputs at the same time.
- Video inputs and outputs via RCA phono sockets
- AC mains powered.

£499.00



NEW! Fully manually controlled satellite receiver. Built-in Bandwidth Filter, C/Ku band switching, 14/18V LNE options, low threshold, eight front panel user controls, ideal for weak signal work. (SAE for details).

£199.00

(All prices are inclusive of VAT, Carnage & Insurance delivery £9.00 on large items). Full range of satellite equipment supplied.

Our CATALOGUE at £1 samples some but not all that we can supply, send for your copy today. UK & overseas despatch normally ex stock within 24 hours, we'll accept the usual credit cards, cash, cheques, POs – as convenient. Ring daytime with your query or late on our 24 hr phone or send in your fax and we'll get back to you shortly.

Sandair RC4021 21" Multi-system Colour TV



Flat square screen with full remote, on screen display and teletext.

- "Personal Preference" memory function – (Volume, Colour, Brightness, Contrast and Hue)
- 5-System: PAL-B/G, PAL-D/K, PAL-1, SECAM B/G, SECAM D/K and NTSC 3.58/4.43 (AV in)
- Infrared Remote Control
- 90 Preset Channels
- Automatic Tuning
- On Screen Display – Volume, Colour, Brightness, Contrast, Hue and Channel
- EURO-AV (SCART) Socket
- Sound Muting Function
- Presettable Off Timer (15-120 Minutes)
- Automatic Power Off Function – when no broadcasting signal is received within 10 minutes
- Full VHF/UHF Coverage
- Cable Tuner
- Single or Dual Digital Control

£299.00

Aerial Techniques

VISA

11 Kent Road, Parkstone, Poole, Dorset BH12 2EH
Tel: 01202-738232 Fax: 01202-716951

both SpE and tropospheric reception, have been excellent.

I built a similar aerial many years ago, with an additional director in the E4 section. It also worked well with switch selection, the E4 section tending to give better results in ch. E3 than the E2 section – predictably, the latter became non-directional at the higher frequency. I found it advisable to short out one dipole when using the other, say with 50Ω across the termination, to minimise re-radiation from the open-circuit feeder (this tended to degrade the overall performance). If the aerial is indoors, cable connection can be via solder tags screwed tightly on to the tubing with long, self-tapping screws.

Brian used 0.5in. outside diameter elements. Aluminium

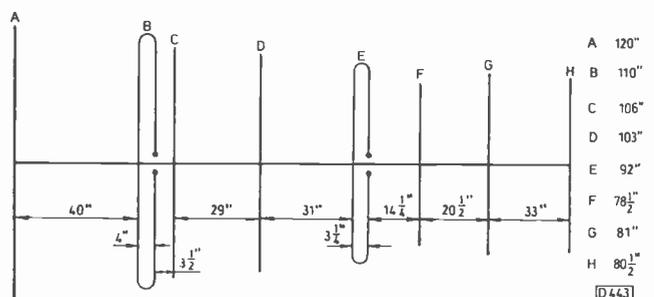


Fig. 1: Details of the wideband Band I aerial array devised by Brian Williams to cover the ch. E2-E4 spectrum. Separate coaxial cables are connected to the two folded dipoles B and E, taken along the boom to a point roughly midway between elements C and D, then fed down together to a selector switch at the receivers.

tubing of this diameter is available from metal suppliers. Soft-drawn seamed tubing can be used for an indoor aerial – it's much cheaper than hard-drawn seamless. Another possible source of tubing is burglar alarm companies, which often use 0.5in. alloy tubing for external wiring runs. Brian used broomsticks for the boom of his loft array: using salvaged materials, the overall cost was nominal.

We'd be interested in hearing from anyone else who has built an aerial for Band 1 DXing.

Satellite TV News

The Apstar-2 satellite was lost when a Chinese Long March rocket exploded recently. It had been fully booked by thirteen major programme suppliers including MTV Asia, Disney, ESPN, HBO, Discovery and Turner. Many are likely to switch to PAS-4, which is due for launch in July. A replacement for Apstar-2 will take eighteen months to two years to build.

Good news for UK satellite enthusiasts: Israel is to launch a satellite, AMOS, at 4°W with at least two TV channels. Intelsat 702 at 1°W is to move to 56°W at the end of the year: 708 will replace it at 1°W, with fourteen Ku band transponders (two more than 702).

A rival to the EBU news service will soon be in operation via Eutelsat II F4 at 7°E: the European News Exchange (ENEX) will provide a digital network link for RTL, M6 (France) and Antenna TV (Greece). A 9MHz bandwidth allocation will be used initially. Other satellites may be used as the network expands.

Watch for a new ident/log via PAS-1 at 45°W. PanAmSat is now feeding the French TV5 service to Montreal via PAS-1 from the Paris Teleport. PAS-3 and PAS-4 will also be used by PanAmSat when in orbit. China Central Television is to be downlinked via PAS-3 to the Americas, Africa and Europe: digital transmission will be used, the intension being to reach nearly forty million Chinese workers overseas.

The German Chaos Computer Club offers its members access to the VideoCrypt-1 scrambling parameters used for Sky TV transmissions via Astra. Recent ECMs (electronic counter measures) knocked out many cards, but hackers have now cracked the 'new numbers': hack updates are available across Europe on Internet/BBSs. Gadgets that will reformat older Sky TV cards are currently being advertised in the German satellite press. One problem is the shortage of older Sky cards, though German pirate firms hope to buy cards from the UK. The German price for an old Sky card is about

THE SATELLITE NEWSLINE

The Satellite Newsline is available, **7 days a week, 24 hours a day** and covers all the latest news, including:

- ◆ **New Channel Launches**
- ◆ **The Latest Scams and Cons**
- ◆ **New Products and Services**
- ◆ **Adult Viewing - What's Really Going On**
- ◆ **Smartcards & Decoders - who has What and Where**
- ◆ **The latest Rumours and Issues Investigated**
- ◆ **All the News that affects the Satellite World**

Either Call and listen to today's news in the Satellite World, updated twice a day, 7 days a week.

0336-413 413 (VOICE BASED)

Or Using your Fax machine call this number and follow the instructions for a written copy of the Satellite Newsline. This written copy is downloaded onto your Fax machine immediately.

0336-422 888 (FAX BASED)

TRANSPONDER WATCH

0336-422 889 (FAX BASED)

Using your Fax machine call this number and follow the instructions for a written copy of the current Transponder Watch. This written copy is downloaded onto your Fax Machine immediately. This Line is Updated at least 4 times a week and contains:

- ◆ **The latest Transponder and Satellite Information**
- ◆ **News on New channels**
- ◆ **Test Cards**
- ◆ **Intermittent use of Transponders**

TV LIVE Limited, 3 Ebury, Northwood, Middlesex HA6 2PF
Providing Satellite News & Information since 1990.

All calls to all services detailed above cost 39p per minute cheap rate and 49p per minute at all other times. The Copyright in these services is owned by TV LIVE Limited. No part of these recordings may be reproduced or transmitted in any form without the written permission of the copyright holder.

100DM when handed in: reformatted cards sell for up to 500DM.

According to John McCormac's *Hack Watch News* the Disney channel is to join the Sky stable of programmes in September, as a bonus for the Premium subscription package. But there may be a price hike to about £30 for the full Sky package in August. For details of *Hack Watch News* call 0336 422 885 via your fax machine: you'll receive masses of interesting satellite updates, with particular reference to the latest state of play in the hacking world! The charge is 49p per minute at peak time, 39p per minute at other times.

Answer to Test Case 389

– see page 481 –

All that trouble and hassle, and two house calls, for a net profit of about £6 on the sale of an Astra 1D converter! None of the three converters were in any way faulty of course. Nor was the satellite receiver.

The cause of the problem lay with the LNB up at the dish. It was an early type that was not suitable for reception of the lower s.h.f. band used by Astra 1D. The solution was to replace it with one of more modern design, one that had a bandwidth wide enough to cover all the Astra 1A/B/C/D frequencies. This cost Mr Phelps money, and he was not at all happy about that. He tried to get us to buy him the new LNB and install it free of charge, on the strength of having bought the converter box from us. . .

We find that the performance of LNBs bought more than a year or so ago is quite unpredictable with Astra

1D reception. It depends on make, model and, it seems, the manufacturing batch. Many of the older LNBs that manage to pull in the 1D channels struggle to do so. This means that dish alignment is more critical, and that weather conditions have a greater effect on reception. Mr Phelps was unfortunate in this respect, but continues to blame us and Supereconomic Electronics.

Why was Mr Phelps recording the satellite receiver's on-screen captions on tape and not seeing them on the screen of his TV set? While fiddling with the converter box and its connections he'd swapped over the TV and VCR scart plugs!

Terrestrial Digital TV

Eugene Trundle

At a recent event in London NTL staged the first ever live demonstration of four digital TV channels being transmitted simultaneously in a single u.h.f. broadcast channel slot. The broadcast was on channel 34 (578MHz centre frequency) from the Croydon transmitter, at 1kW e.r.p. It was picked up at a hotel in Westminster, using an ordinary indoor domestic TV aerial, and fed to individual set-top converter boxes for display on the screens of four TV sets.

Various ITV broadcasters and Channel 4 provided the programme material – pictures plus stereo sound – which was converted from analogue to digital form then bit compressed in accordance with the MPEG-2 format and transmitted as 2Mbit, 4Mbit and 6Mbit data streams. The modulation technique used was 16-QAM OFDM, which was described by Geoff Lewis in the July 1993 issue of *Television*. Although up to ten digital TV channels can be transmitted in a single 8MHz-wide u.h.f. channel, for the purposes of the demonstration – to show the effect of bit compression on picture quality – the four TV sets displayed pictures transmitted at 2Mbits/sec, 4Mbits/sec (two sets) and a widescreen (16:9 aspect ratio) variant at 6Mbits/sec.

Picture Quality

The only picture to show noticeable degradation was the one transmitted at 2Mbits/sec: fast motion was rather broken up, and a degree of pixelation and quick-frozen noise was evident on some scenes. The two displays transmitted at 4Mbits/sec needed very close and critical examination over a long period to be able to notice any effect of the compression. They were virtually indistinguishable from a conventional PAL broadcast, except that there was a complete absence of noise, patterning, ghosting and cross-colour, all of which were obtrusively present on a conventional TV set provided alongside for purposes of comparison. This set was fed from the same aerial and was tuned to a regular London broadcast from the same transmitter, on a nearby channel. The widescreen picture looked very good indeed. It was certainly equal, subjectively at any rate, to that produced by a full PALplus receiver, and was much

better than any existing 625-line analogue system.

It was difficult to gauge the definition achieved with the moving pictures being transmitted. But with a digital system the definition achieved depends on several other picture characteristics as well.

Service Area

The modulation and encoding techniques used for digital TV provide great noise and interference tolerance with the received signal. As a result, much lower transmission powers can be used to achieve the same geographical coverage as with the present analogue system. This in turn means that many of the channels that are not at present usable because of possible interference could be used to provide terrestrial digital TV services. It's envisaged that in the area at present served by any one transmitter an additional twelve channels could be provided initially by using digital transmission, increasing to thirty or more (including interactive ones for video-on-demand etc.) in the fullness of time.

Hardware

The set-top converter required for digital TV reception would contain a u.h.f. tuner and demodulator, an MPEG decoder, a DRAM field-store memory and digital-to-analogue converters to produce RGB outputs for connection to a suitably-equipped TV set via its scart socket. The converter would also incorporate a PAL encoder to provide a composite video signal for use with a VCR or a TV set not equipped with RGB input facilities, and perhaps a fully-programmable u.h.f. modulator – though use of anything other than base-band RGB inputs would degrade the performance of the system.

The converter and remote control will resemble, in size and function, those of a satellite receiving outfit. It's envisaged that manufacture will be licensed out to setmakers in general. Cost is expected to be in the region of £300 initially, falling as production of the chips and boxes reaches high levels. Once the system is up and running QAM/OFDM demodulators and MPEG decoders will be built into production TV sets and VCRs, and

domestic VCRs will incorporate digital record and playback interfaces using the yet to be finalised DVR format. Digital TV decoders will have a smart-card slot.

Prospects

NTL, which provides transmission services for ITV, Channel 4 and many independent radio broadcasters, plans to invest many millions of pounds on a digital TV network that will use the existing 1,000 UK transmitters: it could be operational by the end of 1997. BBC TV has been offered transmission services – indeed NTL is interested in taking over BBC transmission if and when this is privatised. NTL considers that combining the transmission operations of itself and the BBC could save £10-20m a year.

Terrestrial DTV transmissions cannot begin until the necessary legislation has been enacted. It's hoped that this can be achieved by mid-1996, to give time for programme providers and hardware manufacturers to gear up for a start to services in 1997. The final DTV system specifications are expected to be agreed by the end of this year.

NTL points out that digital transmission offers many advantages, primarily more services per channel; more formats, e.g. widescreen and high-definition pictures; provision for Pay-TV and interactive services; addition of encryption and conditional access; improved picture quality in poor reception areas; release of broadcast spectrum space for other services (after a long compatibility period); lower interference levels; and energy saving at the transmitters.

What will the extra channels be used for? Certainly for simulcasting of the existing channels to facilitate the change over to all-digital TV. Other uses have yet to be decided upon. What's for sure is that people's viewing time is limited – it's already declining slightly in terms of hours per day. It will thus be increasingly fragmented amongst a larger number of programme providers who will find it harder to operate profitably. The public, true to form, will spend money on hardware and subscriptions only where it can see value for money – never mind the technicalities of this system or that, or the quality of the picture viewers get.

Satellite Notes

Pace PRD800/PRD900 etc

Failure of the LNB supply in early versions of these receivers (not the Plus, Astra 1D models) is not unusual – mostly because of dry-joints or print cracks at or near L3 (18 μ H) at the front right-hand corner of the PCB. In this particular case however all was well here. When we traced the fine print above and below the panel we came to R543 (1 Ω , 0.25W) which was burnt and open-circuit. It's in series with pin 5 of MOD1, being one of the LNB supply pins. A replacement restored the LNB supply, and as a bench test revealed no other faults the LNB was checked and replaced on return of the receiver to the customer.

The all too common power supply failure with these models, requiring a major rebuild kit, has been well documented previously. There's another regular failure however. In this case the set is completely dead but F1 and R1 are intact, the BUT11A chopper transistor and the 1N4007 bridge rectifier diodes are not short-circuit and there are no other obviously faulty components. In some cases you may be able to hear the PSU pulsing quietly, or the display LEDs may pulse visibly. When you encounter this fault the action required is to replace electrolytics C5 (22 μ F, 35V) and C7/C8 (both 10 μ F, 35V). High-temperature (105°C) components must be used. This should restore normal operation, but to complete the repair F1 (1AT) should be replaced with a fast-acting 1A fuse and R1 (4.7 Ω) should be changed to a 10 Ω , 2W non-inductive type. **John C. Priest**

Pace MSS500/MSS1000

These models, with Dolby Surround Sound, rely on scart connections from the TV set and VCR to the appropriate sockets on the receiver for implementation of the full automatic Sat/TV/VCR switching that provides Surround Sound performance with appropriate terrestrial TV programmes and videotape playback as well as with satellite transmissions. Note however that some late model, up-market CTV receivers do not, although fitted with one or more scart sockets, operate automatic pin 8 scart/AV switching. A recent experience with a Panasonic Model 28G1, about six months old, which had no connection to pin 8 of either the scart 1 or scart 2 socket proved embarrassing when a new satellite system was being set up. Panasonic Technical Advice at both Leeds and Slough was unaware of this at first, but a kind gentleman at Slough eventually produced the component and connection details required to enable the function to be implemented retrospectively.

Have a chat with the gentlemen on your sales side regarding such models. If a customer already has a Dolby Surround Sound system, either as a feature with a recent new TV set or an AV processing system, there's not a lot of point in selling him a Dolby satellite system as well – apart from the sales figures of course. Complications arise when interfacing the new with the existing system, and with the MSS1000 an extra four loudspeakers have to be accommodated. For example, the Dolby encoding has been stripped off the stereo audio output from the MSS500/MSS1000's scart sockets, therefore the TV set's Dolby circuits are unable to respond. It's possible however to take Dolby signals from the L-front and R-front phono sockets to feed another Dolby decoder. Special arrangements, leads etc. are

required to provide automatic scart switching so that the system will work to the customer's satisfaction. It is much simpler and cheaper to install a non-Dolby receiver such as the MSS200 or MSS300. **John C. Priest**

Pace SS9200

This unit was dead with R13 (0.22 Ω) open-circuit. As no shorts could be found I replaced R13 and switched on. The receiver worked all right for a few minutes then blew the fuse. It was still dead with a new fuse fitted, as the chopper transformer T2 had died. I replaced T2 and the TDA8380 chopper control chip U23. The receiver then worked but the transformer was making a hissy sound.

After checking a lot of components I started to check the print around U23 and found that the track to pin 8 had broken. This was causing the fault, by upsetting the snubber circuit. I've had this sort of thing before with Pace equipment, because the boards seem to be too delicate to withstand the application of a soldering iron. **John Hepworth**

Amstrad SRD400

This was a naughty fault as it made the viewing card become invalid. A loud buzz and a lot of picture disturbance indicated that the cause of the fault was in the power supply. After only a few tries I found that one leg of CP01 (4,700 μ F, 25V) was dry-jointed.

It's worth noting that you can run these receivers without the decoder in place, provided you join the input and output together – this is the small four-pin plug near the back of the decoder. I usually push a low-value resistor, say around 10 Ω , into the plug – the pins with the white wires to them. This can make working on one of these receivers much easier. **Chris Watton**

VideoCrypt Decoders

If a VideoCrypt decoder refuses to decode a satellite broadcast, even with a valid card inserted, or silly messages such as "please insert is invalid" appear on the screen, try disconnecting the receiver from the mains supply for a minute or so then reconnect it. Short power interruptions, such as those caused by thunderstorms, can confuse the logic circuitry. I've experienced this with a stand-alone VideoCrypt decoder and also with the VideoCrypt section of the Amstrad SRD400. Unnecessary service calls can be avoided by advising the customer to try this course of action first. **S. Pearson**

Pace PRD/PSR/MRD 950/960 Series

Interference on the output from the u.h.f. modulator, seen as a fine herringbone pattern, is occasionally experienced with these receivers. The cause is r.f. instability (at 1.5MHz) with the audio operational amplifier chip U15A. It occurs only when a mono Panda audio mode is selected (mono 2-9). Because of this it will be seen on certain programmes only, such as Eurosport, CNN, Cartoon Network etc.

The solution is to raise the impedance seen at the inverting input (pin 2) of U15A by adding a 2.2k Ω , 0.25W 5% carbon film resistor (part no. 940-2220501) in series with the input coupling capacitor, which is C555 with PRD models and C373 with PSR/MRD models. You can fit the resistor on the top of the PCB.

This modification is incorporated, on the underside of the PCB, in later production sets. Accurate recognition of the fault symptoms is important to prevent this modification being duplicated.

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

LENSON HEATH SATELLITE ANTENNA

PACE SATELLITE RECEIVERS, DECODERS
PALCOM SATELLITE RECEIVERS

PROMAX TEST EQUIPMENT

STIFF fixings BOLTS PLUGS
mungo BOLTS PLUGS

Teleste SMATV UHF/VHF
TRIAx U.K. AERIALS TOWER CLIPS

UNI-FIX CLIPS
VOLEX RAYDEX COAX CABLES

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

Trace 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: 0121 784 8478

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 485 Dual Trace 100MHz Delay Sweep	£500
TEKTRONIX SC504 Dual Trace 80MHz 8 MSO3B	£500
DAWTSU 55571C 4 Channel 100MHz Delay Sweep with DMH	£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 CO356070T 3 Channel 60MHz Delay Sweep	£350
HITACHI V650F Dual Trace 60MHz Delay Sweep	£350
PHILIPS PM3317 Dual Trace 50MHz Delay Sweep	£400
GOULD OS1100 Dual Trace 30MHz Delay Sweep	£240
GOULD OS3000 Dual Trace 200MHz	£200
TRIO CS1566A Dual Trace 20MHz	£200
GOULD OS2508 Dual Trace 15MHz	£125
HITACHI VC6045 2 Channel 40 MS's Digital Storage	£1100
LE CROY 9400 Dual Trace 125MHz Digital Storage	£1000
GOULD OS4000 Dual Trace 120MHz Digital Storage	£200

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 B6245A 5.9 12.4GHz	£400
SYSTRON DOPNER 1702 Syn Sig Gen 100Hz-1GHz	£600
RACAL 9081 Synthesised 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 Synth TF2171 (Lock box)	£350
PHILIPS PMS326 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 Score 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 CP5250 Trigger Output PSU 2x20V0.5A Var. SVZA Fixed	£225
TEKTRONIX CF2350 Func. Gen 0.2Hz-20Hz to 500Hz/Tri/Tri	£180
TEKTRONIX CDM250 Digital Multimeter 3 1/2 digit Led	£180

SPECTRUM ANALYSERS

H.P. 853 with 8559A 0.0121GHz	£4500
H.P. 3580A Led SRA03A	£1000
ANRITSU MS628 with Trac Gen 10KHz-1700MHz	£1500
POLARAD 6411 10MHz-18GHz	£1500
ANDO AC2881 with AC3211 1700MHz	£1500
H.P. 852 with 8558B 100Hz-1500MHz	£1500
H.P. 141T with 8558B & 8552B 500KHz-1250MHz	£1200
H.P. 141T with 8558B & 8552A 1KHz-110MHz	£800
MARCONI TF2370 30Hz-110MHz	£1000
H.P. 840B Tracking Generators Available from	£300
H.P. 141T Main Frames only, Good Tubes	£225

H.P. 3456A DVM 6 1/2 digit DC/True RMS AC/Res. HPB	£600
BIP/DANA 351D P Wave Freq Counter 20Hz-18GHz	£500
H.P. 5341A Frequency Counter 50MHz-1.5GHz LED	£300
MARCONI 2433 Digital Frequency Meter 2GHz	£400
RACAL 1998 Freq Counter 1.3GHz (Ops GPB & High Sub)	£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 6 1/2 digit Autocal Multimeter True RMS AC/Current	£850
H.P. 3490A 5 digit Multimeter AC/DC/Ohms	£200
H.P. 3435A 3 1/2 digit PMH AC/DC/Ohm/Current, Led	£100
PHILIPS PM2534 Multi Func DMM 3 1/2 digit GPB/EE	£450
SOLARTRON 7150 6 1/2 3 1/2 digit DMM with IEEE	£400
SOLARTRON 7045 4 1/2 digit Multimeter Volts/Amps/Ohms	£80
WAYNE KERR BR05 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 8B RLC Bridge	£60
BRADLEY 192 Oscilloscope Calibrator	£600
WILTRON 560 Scaler Network Analyser with Detectors	£1000
H.P. 5005A Signature Multimeter	£250
FARNELL H30100 D-30V, D-100A, Metered	£800
FARNELL V5709.2 70V SA/75V 10A, Metered	£300
FARNELL B3010 30V 10A, Variable	£200
FARNELL L30E D-30V, D-5A, Metered	£125
MARCONI (WER) TF154 0.30V 1A, 0.15V 2A, 0.75V 4A Metered	£60
H.P. 3516A D-30V, D-60MA, Metered	£150
BRANDENBURG Model 4724 4 1/2 Digit Metered	£200
FEEDBACK FG600 Sine/Sq/Tri 0.01Hz-100KHz	£40
LYONS PG71N Pulse Gen PRF 1Hz-5MHz 10 nanosecs	£75
FARNELL PG101 Pulse Gen 100nsecs 100MHz (1Sec 1Hz)	£125
UNIDOS LAI PR28 Audio Analyser	£500
UNAOHM EP501 Audio Analyser	£200
PHILIPS PM5518 Colour TV Pattern Generator	£1250
RAFORD LD04 Low F Distortion Oscillator	£300
RAFORD LDMS2 Low Distortion Measuring Set	£300

NEW EQUIPMENT

HAMEG OSCOPE HM1005 Triple Trace 100MHz Delay Trace	£847
HAMEG OSCOPE HM604 Dual Trace 60MHz Delay Sweep	£653
HAMEG OSCOPE HM201 7 Dual Trace 20MHz Comp Tester	£262
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
METCOR 100 FREQUENCY COUNTER 100MHz	£119
METCOR 600 FREQUENCY COUNTER 600MHz	£145
METCOR 1000 FREQUENCY COUNTER 1GHz	£189
JUPITOR 500 FUNCTION GEN 0.1Hz-500kHz Sine/Sq/Tri	£119
OWON COLOUR BAR GENERATOR Pal/TV/Video	£229

All other Black Star Equipment available

OSCILLOSCOPE PROBES

Swchable x 1 x 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: 01734 268041 Fax: (01734) 351696
Callers Welcome 9am-5.30pm Mon-Fri (until 8pm Thurs)

CAR RADIO SECURITY DECODING SOFTWARE

The most comprehensive software package ever from only £649 + 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 (3 1/2")

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., including Ford RDS V1 & V2, Grundig SC303. New software Memphis SQR88 and also the CDP09 is now available and upgraded for only £375 to existing customers only.

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 menus
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, Kohn, 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

VCR Clinic

Reports from Eugene Trundle, Brian Storm, Andrew Tebbutt, Robert Philpot, David Belmont, Gerald Smith, Mike Leach, Ed Rowland and John Edwards

Tatung VRH8350

This model uses an Akai deck, so the same fault could occur with its Akai contemporaries. The symptom was loss of field lock, with a very poor playback f.m. envelope shape at the start of each head scan. This was because the tape rode very high (round the top of the adjusting nut in fact!) at the first stationary guide upstream from the full-erase head. We found that the back-tension arm was bent to the extent that its tape-feeler pin listed heavily to starboard. As bending the arm back with sufficient precision is difficult we fitted a new one. **E.T.**

JVC HRD520

It's not uncommon for this and similar models to leave a loop of tape dangling from the cassette occasionally on eject. The well-known cure for this and various other mechanical problems is to replace the mode switch – we change the main cam as well.

One machine we repaired in this way bounced straight back with the same fault – and a very irate customer waving a damaged *Snow White* tape! We found that there was some toffee-like substance on the felt strip of the back-tension band and the corresponding periphery of the supply spool turntable. As a result the turntable 'picked up' the band now and again during eject and jammed, preventing tape take-up during the unthreading process. **E.T.**

Panasonic NVH65

This machine had two faults, both of which were intermittent. The cause of occasional loss of colour in the record mode only was tracked down to dry-joints on the YC pack at the point where the mother board connection pins are soldered. You have to remove the pack to deal with this one. Then at odd intervals, depending on temperature, the machine would lose servo lock, the result being wobbly sound and cyclic mistracking. The cause was C1023 (1,000µF, 10V) in the power supply. It had gone low in value – and was very responsive to heat and freeze treatment. **E.T.**

Sony SLV415

This was a nasty one! When the machine was connected to the mains supply one of two things would happen: there would be either no sign of life or a very bright MON – and nothing else at all – would appear in the fluorescent display panel. In neither case would the front-panel keys or the remote control system do anything at all. We found that the power supply worked but didn't get an on command from the system control department. It transpired that the 4.19MHz crystal X1, which is mounted alongside the micro-controller chip on the front panel, was responsible: its oscillation was intermittent, in fact 'ragged' when viewed with an oscilloscope. **E.T.**

Panasonic NVHD100

This machine had an intermittent problem: after operating for a few hours it would shut down and sulk. Any attempt to

get the tape out would be frustrated until the machine had been left disconnected from the mains supply for a few hours. After many hours had been spent head scratching we eventually found that the mechanism loading motor, part no. VEM0427, was the culprit. A replacement restored the machine's good nature. **B.S.**

Panasonic NVSD44

We've had this fault, not stopping on station when search tuning, on two occasions now. The basic cause is that the a.f.c. defeat signal fails to reach the demodulator panel. In these machines the sub-panels plug into the main board. The trouble has been that the first pin on the demodulator board plug is bent. As a result it doesn't engage properly with the socket, hence the tuning problem. Straightening the pin and refitting the socket cures the problem. **B.S.**

Panasonic NVJ30

This machine had a dead power supply. The usual culprit is C1109, but not this time. Checks showed that the power supply worked initially but swiftly cut out. We eventually found that D1110 on the secondary side of the power supply was leaky. A new MA185 diode was all that was required to restore full operation. **B.S.**

Panasonic NVJ35

My report (February, page 254) on a capstan servo fault caused by a defective component in the power supply led to a couple of queries. The symptoms were bad sound wow with spasmodic tracking bars on the screen. The report was correct for the machine in question – C1118 was the cause of the fault. C1122 is the more usual cause however, as several readers pointed out. Both capacitors had deteriorated in the machine on which the report was based. **B.S.**

Panasonic NVG21

This machine's playback picture had an attractive swirling pattern superimposed on it. The cause, not unusually for a machine that's as long in the tooth as this one, was a capacitor in the power supply. C1022 (47µF, 50V) was the culprit. For good measure C1118 and C1023 were also replaced. **B.S.**

Mitsubishi M20V

The cause of the fault with this machine appeared to be simply dirty heads. I should be so lucky! The symptom consisted of very severe noise on the playback picture – in fact you might have thought that the machine was in the picture search mode. The tracking control didn't seem to have much effect and, knowing that the machine had recently been transported by not the smoothest of means, I suspected that there might be print damage in the vicinity of the control. When I turned the machine on its side to dismantle it further a small metal shaft fell out: it was the slant pole from the entry guide. When this had been refitted

the picture was restored to its former glory.

This had been a field call, and unfortunately the customer's problems were not at an end. While I was still there a rather nasty hail storm passed, bringing with it a huge puddle of water down the aerial lead. Oh well, such is life!

A.T.

Grundig VS200

The owner of this machine bought a second-hand satellite unit to add to his existing two VCR and three TV set-up. As all the signals had to travel around the house the connections were made at u.h.f. This, together with our local group A transmissions, didn't leave much room for another modulator! My solution was a small modification to the only varicap modulator in the set-up, the one in this VCR. The 9V zener diode that regulates the supply to the tuning preset was replaced with two zener diodes, providing 5.1V and 5.6V, connected in series. This increased the tuning voltage sufficiently to provide an extra three channels, releasing enough room for the satellite receiver.

I've since modified several Grundig modulators in this way, in each case obtaining enough room for pattern-free reception.

R.P.

Philips VR6760 and Clones

A very simple modification to these machines will extend the modulator tuning range to channel 43 or 44. This will often give pattern-free reception where band space is limited. Simply short out one of the resistors in series with the feed to the tuning supply. The values of these resistors seem to vary at the whim of the designers. You'll find them outside the can, right by the potentiometer. Short out the resistor with the lowest value. In some models released abroad there's only one resistor.

R.P.

Grundig VS200

The owner of this machine had only recently arrived in our area and called me in to retune it to the local transmissions. Would I set the clock while I was about it? The tuning memorised all right, until the power was disconnected when all memory was lost. It then emerged that the clock hadn't worked for a long time. So a quick tune-in turned into a workshop repair.

The fact that the clock could be set but wouldn't run led me to the power supply, where I found that the 50Hz pulses were weak and distorted. This was a complete red herring however. The memory and clock functions were both restored by replacement of the 1.2V power pack. It had shorted internally, one result being an excessive load on the circuit which buffers the 50Hz pulses that trigger the battery-powered crystal oscillator when the mains supply is available. This battery is quite hard to find: it's on the board immediately to the left of the deck. A Philips type memory cell worked all right when the mounting had been 'fine tuned'.

R.P.

Matsui VX2700

This machine wouldn't load or unload: the load motor drive chip IC1003 had failed.

D.B.

Saisho VRS4200

No LP-mode sound was the complaint with this machine. It didn't matter whether you were in E-E, LP playback or LP

record, the sound was muted. Checks around the syscon microcontroller chip IC1001 showed that pin 61 (audio mute) went high in the LP mode. LP/SP switching is controlled by the logic level at pins 16 and 17, which receive inputs from the servo chip. These levels were correct.

A new OEC0015 microcontroller chip (IC1001) seemed to be the answer but made no difference. Pin 61 goes high in the search mode, its output going to IC4202 (audio switching) and to IC5001 and IC5002 on the audio subpanel. Further checks showed that in the LP mode pin 61 of IC1001 went to approximately 3.8V while in the search mode it went to 5.4V. So as a temporary measure I connected a 4.7k Ω resistor between pin 61 and earth. Bingo: sound o.k. I was tempted to add this resistor on the audio subpanel permanently, but removal of this panel revealed the true culprit – a bit of liquid corrosion between pins 17 and 18 of IC5001. Cleaning this off cured the fault.

D.B.

JVC HRJ200/205/400/600

In a previous report I mentioned that excess grease causes white spots on the picture. JVC has issued a modification for implementation where removal of the grease doesn't cure the trouble. This is as follows: replace the brush assembly with a new brush, part number PDM4343A, and fit a capacitor (part number PD4328-2) to the upper drum's lower bearing. If the machine is an HRS5900 the part number for the brush is PDM4343B.

D.B.

Panasonic NVG25

Intermittent shut down was the complaint with this VCR. We found that capacitors C18-21 were all low in value. Replacement cured all the faults.

D.B.

Saisho VR805S/Hinari VXL2

Intermittent colour was the complaint with this machine, which had been back to us several times with the same fault. Replacing crystals X3001 and X3002 and realigning the colour circuit usually provides a cure, but not this time. A new colour board, type PCB 301, put matters right.

D.B.

Sanyo VHR291

Sound slurring and tape creasing were the reported faults with this machine. At some previous stage it had been stripped to fit a new reel sensor and had not been reassembled correctly. Dismantling it and reassembling it correctly put matters right.

D.B.

Matsui VP9401

I've had two of these machines with the same symptoms but different faults. The symptoms were that the machine would accept a tape, play it if the tab is missing, but there's no display and the front panel buttons don't work. In one case the control chip IC601 was the cause of the fault. In the other case we found that a digital waveform was superimposed on the oscillator signal: because of a dry-joint at CN601's earth connector, the oscillator's earthing was open-circuit.

D.B.

Amstrad TVR2

This TV/VCR combination originally came in because it wouldn't play tapes. Realigning the carriage and cleaning

the heads sorted that out. But when an aerial was connected to the TV section the signal was poor, as though the tuner's gain was low. A new tuner didn't solve the problem and, to cut a long story short, we eventually got a clear picture by replacing the SAW filter. **D.B.**

Ferguson FV71LV

The picture was fuzzy, giving the appearance that there was no output from one head. Cleaning the drum made no difference, nor did a replacement preamplifier chip (IR01). We finally found that CR05 was leaky. **D.B.**

Amstrad UF40

This machine was dead. Fortunately the power supply hadn't blown up – R1018 was dry-jointed. When this had been attended to we had no E-E or record sound. The r.f. block, which consists of an r.f. converter, a tuner and i.f. strip all in one can, had to be replaced. **D.B.**

Sanyo VHR315

This machine had a cassette jammed inside it. The usual cause is a faulty mode switch, which jams the mechanism. After fitting a replacement we put the machine on test and found that it would sometimes leave tape out on eject. A sticky capstan brake was the cause. Replacing the brake pad and cleaning the capstan cured the problem. **G.S.**

Hinari VXL8

There was no rewind or fast forward operation, though play and record were fine. We soon spotted that the brakes didn't come off in the rewind and fast forward modes, but it took a lot longer to find the cause.

The brake trigger mechanism, items 259-262 in the exploded view in the manual, was suspected. Trigger lever 260 didn't latch properly. The cause of this was traced to a square rubber pad that sits over a pin on the mechanism. In the stop mode it rests against brake plate 261. This rubber bumper holds brake plate 261 to the right, enabling trigger lever 260 to latch. As the rubber bumper wears down, the trigger stops latching and the brakes stay on in fast forward/rewind.

As this rubber bumper isn't shown on the diagram you can't get it. You can either get one from a scrap machine or turn it round by 180°, which will cure the problem. **G.S.**

Panasonic NVJ42

There was no record or E-E video, though the sound was o.k. (use the test signal switch to get sound with self-muting TV sets). This machine is very hard to work on, with limited access to the luminance/chroma PCB. Replacing IC302 cured the problem. **G.S.**

JVC HRD880

This machine was dead, with no clock and no functions. Checks in the power supply showed that the 12V supply was missing. CP2 was open-circuit. **G.S.**

Nokia 3782

This machine lost around thirty seconds a day, the clock time gradually drifting off. The problem was cured by replacing the 32kHz 'crystal oscillator' X7101. **G.S.**

Akura VX140

This machine kept going to standby and ejected any tape that was inserted. To be more precise, the motor that drives the lift ran continuously then the machine went to standby. I stripped down the lift assembly and refitted a spring on the switch-arm assembly (item 244). This triggers the lift eject stop switch 'C-OUT'. The machine was then up and running. **G.S.**

Akai VS427

This machine came in because it required the usual pinch roller replacement and general clean up. We also noticed a secondary fault. A hum bar would appear briefly when a cassette was ejected and sometimes during rewind. The symptom was worse when pressure was applied to the capstan motor, with the hum bar permanent. Various smoothing capacitors in the power supply were tried, but the cause of the fault was eventually traced to D2 (1N4002) which was leaky – it's also in the power supply. **M.L.**

Ferguson 3V29/JVC HRD110

Regardless of which button was pressed all you got was fast forward. Normal operation was restored by replacement of the right-hand carriage end sensor (viewed from the front). Fine. But can anyone explain why the loading belts in these machines invariably fail the minute they arrive in the workshop? While we're on this subject, when refitting the motor after belt replacement anchor the motor assembly with one screw then stand the machine on end and push both loading arms forward into the V blocks. The motor can then be located with the gears meshed correctly and the remaining screw fitted. **E.R.**

Samsung VI710

This machine was totally dead, with a tape stuck in it. We're not familiar with this particular model but, fortunately, noticed that R109 in the power supply had disintegrated. After fitting a replacement the machine powered up. We then discovered, not surprisingly, that the idler was worn. Changing it didn't look too easy, as the carriage has to be removed. We overcame the problem by turning the machine upside down, removing the idler pulley from its assembly then, after replacing the tyre, refitting it. **E.R.**

Toshiba V57

The capstan rotated for a few seconds when this machine was switched on, then it shut down. We found that the circuit protector CPI for the switched 12V supply was open-circuit, a replacement restoring normal operation. The current through CPI peaked at only 110mA during lace-up, so there didn't seem to be any overload. After soak testing it for a day we pronounced the machine fit. **J.E.**

Panasonic NV730

This machine wouldn't accept a tape. We measured 10V at both terminals of the carriage motor, indicating that there was an open-circuit somewhere. Checks on the BA6209 loading motor drive chip IC6004 showed that all pins were at 10-12V. The cause of the trouble was a hairline crack in the print connected to pin 1 of IC6004. Soldering a link across this restored normal operation. **J.E.**



ELECTRONIC TEST EQUIPMENT

Audio - Video - Television - Satellite TV - Telecommunications

The manufacturer who cares about quality & features rather than being lowest in price !



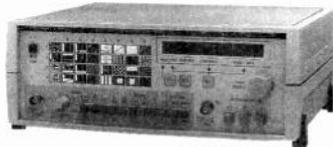
Audio Analyser
Model AA-930

Multi-function meter. Measures distortion, 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

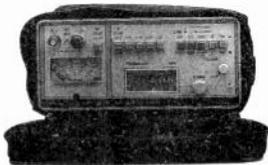
Compact high performance generator, RF and video outputs. Frequency range same as GV-698/11, 37 to 865 MHz. Circle pattern included. £ 433



TV & Satellite Level Meter

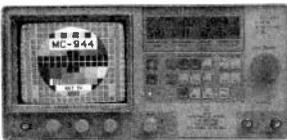
Model MC-360

Ideal instrument for the professional installer of FM/TV aerials and satellite TV dishes. Covers 48 to 856 MHz and 950 to 2050 MHz. Lightweight, 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



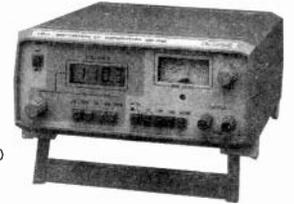
TV & Satellite Level Meter
Model MC-944

This meter has everything for the top flight installer 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 as high 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

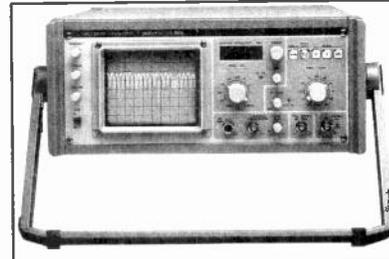
Model TA-901

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 for easy 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



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.



Prices shown exclude VAT, but includes UK delivery. Most items available for immediate despatch.



ALBAN ELECTRONIC LIMITED
4 - St Albans Enterprises Centre - Long Spring
Porters Wood - St Albans - Hertfordshire - AL3 6EN
Tel: 0727 832266 - Fax: 0727 810546

Inside the Ferguson ICC9 Chassis

Part 3

Mark Paul

In this concluding instalment we'll look at the video processing arrangements and the timebases, and finally provide some guidance on how to go about fault finding.

Video Processing

Fig. 1 shows in block diagram form the video section of the ICC9 chassis. The newly-designed Thomson STV2160 chip IV01 simplifies the video circuitry. Everything that contributes to the final form of the RGB signals fed to the c.r.t. base panel is carried out within IV01: adjustments for

each of the three RGB channels are accomplished via the I2C bus, under the control of IR01.

Three types of video signal can be accepted by IV01. These are the off-air video in luminance plus colour-difference (YUV) form, from the colour decoder section; teletext/OSD video from IR01, in RGB plus FB (fast blanking) form; and external video, again in RGB plus FB form, from the AV1 scart socket. Selection of the required input is controlled by the I2C bus or, in the case of the external RGB or teletext/OSD RGB signals, detection of the accompanying fast-blanking signal, FB1 or FB2. The RGB inputs are converted to YUV form within IV01 prior to selection and processing. Contrast, saturation and brightness adjustment is under IR01 control via the I2C bus.

Following these adjustments the YUV signals are matrixed to produce RGB signals for application to the chip's output stages. The I2C bus is active here as well, to ensure correct grey-scale and peak-white tracking. This requires feedback, in the form of beam current cut-off signals, from the RGB output stages on the tube base panel. Beam current limiting, to protect the tube and the line output stage, is also applied within IV01: the beam sensing point is at the earthy end of the e.h.t. section of the line output transformer.

Non-inverting buffer amplifiers are incorporated between the RGB outputs from IV01 and the tube base panel. Feedback capacitors in these stages reduce the 20MHz bandwidth capability of IV01 to 5MHz. The RGB output stages that drive the tube are incorporated within the TEA5101A chip IB01. This is a high-voltage chip whose output transistors are MOSFET types. The first anode and focus voltage presets are mounted on the tube base panel. This board also houses a switch-off spot suppression circuit and tube beam sensing circuitry for the grey-scale and peak-white tracking system. This uses the now conven-

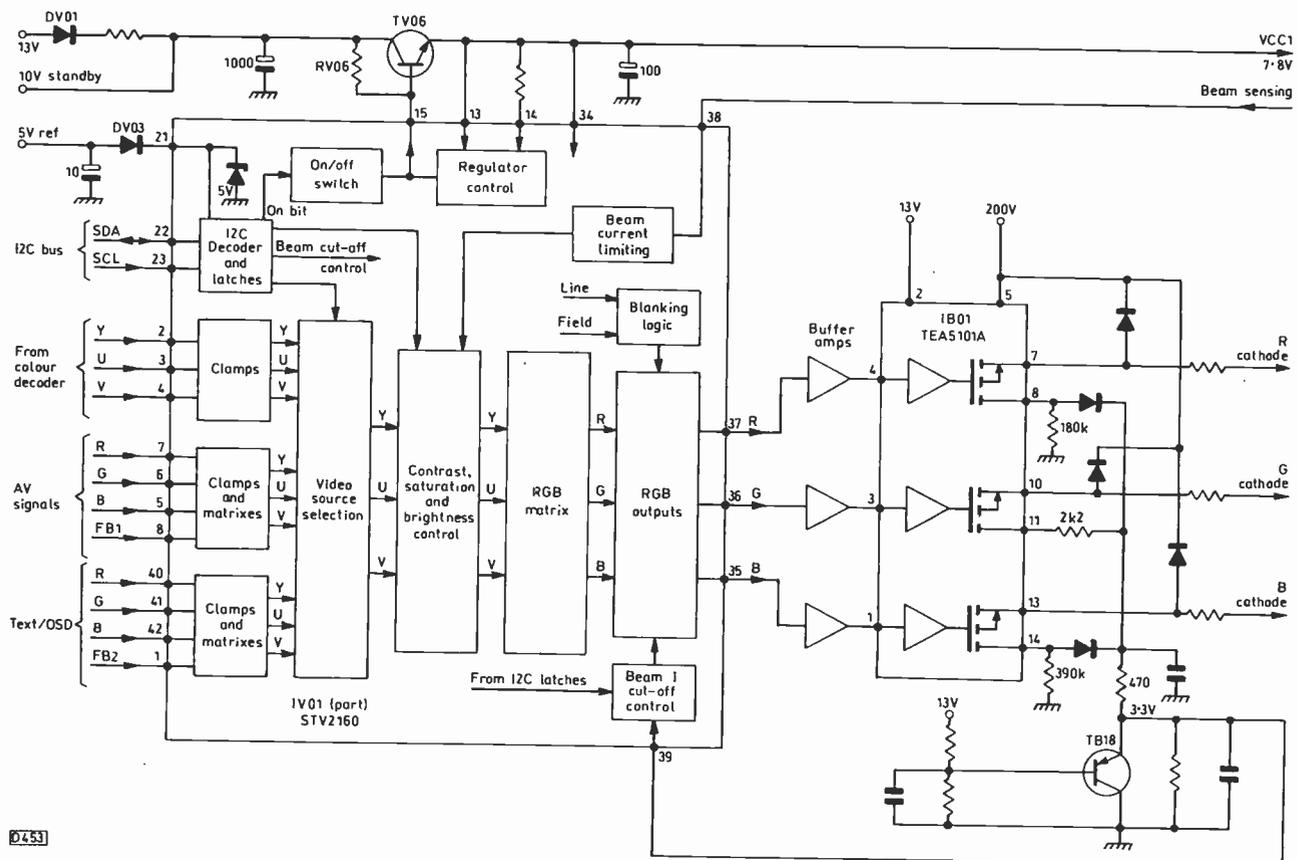


Fig. 1: Block diagram of the video processing circuitry.

tional technique of inserting test lines during the field blanking period and measuring the resultant current flow.

Power Supply Control

Various power supply arrangements associated with IV01 are of great importance for the overall operation of the chassis. An internal 5V zener diode produces, at pin 21, the 5V ref supply. This controls the series regulator transistor TR80 (see Fig. 5 last month) that produces the 5V μ C supply – the supply for the microcontroller chip IR01 and for the IR remote control receiver, both of which are active in the standby mode.

The 5V ref supply is used within IV01 for the I2C bus decoder and latches. This is of importance because to bring the set out of the standby mode IV01 must be addressed by IR01 so that the data on video and scanning requirements can be fed to the bus decoder and latches (remember that IV01 also contains the timebase generator and chopper PWM drive circuitry). Part of the data is the 'on' bit, which on receipt switches the receiver from standby to on. This is accomplished by switching on TV06, which produces the 7.8V supply (VCC1) at its emitter. The VCC1 supply is used by the rest of IV01 and in the line driver stage. TV06's collector is fed from the 10V standby supply initially, but once the receiver is in full operation the line output stage derived 13V supply is the source, via DV01. TV06 is then regulated from within IV01, via pins 13 and 14 (voltage and current sensing respectively) and 15 (base drive). Once IV01 is in full operation it takes over chopper and video control and provides the timebase drives. To go into the standby mode the reverse operation takes place: IR01 tells IV01, via the I2C bus, to switch off TV06, removing the VCC1 supply.

The Colour Decoder Section

The input to the colour decoder section can be in composite baseband video form or separate luminance and chroma (S video) form, via the scart or front panel sockets. In either case the input comes via the switching chip IX01. There are two chips in the colour decoder section, the newly-designed Thomson STV2151 colour decoder chip IC01 and the Philips TDA4671 picture signal improvement (PSI) chip IC02. YUV outputs from IC02 form one of the inputs to IV01.

IC01 is a multi-standard decoder chip able to handle PAL B/G/I/M, Secam and NTSC 3.58/4.43MHz signals. Selection is under I2C bus control from IR01, being set up in the service alignment mode. Decoding follows conventional practice of course but one major item you'll not find is a separate chroma delay line. The chroma delay line is integrated within IC01: it operates digitally, using CCD technology.

The PSI chip IC02, which is also under IR01/I2C control, has two sections, one for the colour-difference signals and the other for the luminance signal. The purpose of the colour-difference signal processing is to sharpen the edges of colour signal transitions. It operates when a signal transition with a duration of less than 800nsec is detected. A signal delay is then introduced, during which a faster rise-time transition is generated. It is this sharpened signal that appears as the output. CTI (colour transition improvement) has the effect of increasing the chroma signal bandwidth to nearly match that of the luminance signal. Although the human eye is not sensitive to fine colour detail, there is a perceived improvement as colour smear is reduced and there is a desensitising to chroma/luminance crosstalk.

This chroma signal delay means that a corresponding delay has to be introduced in the luminance signal path within IC02. This is accomplished by the use of a variable delay line, which again uses CCD technology. The delay is variable between 20 and 1,155nsec, the actual time being set by both the I2C bus (in accordance with the transmission standard) and the chroma signal processing circuit so that the chroma and luminance signals are time synchronised. Black-level clamping is provided prior to the luminance delay line, which is followed by coring and peaking. This improves the luminance signal edge response, both processes again being under I2C control.

The peaking function has four levels, -2dB, 0dB, +3dB and +6dB. 0dB is selected for the normalised position. The effect is to introduce a small amount of pre- and over-shoot on luminance transitions. This gives a subjective improvement to all edges in the picture, so that they appear sharper – thus the 'peaking' adjustment is another name for sharpness improvement.

There's a downside to this process however, as any background noise in the picture will also be peaked, with the result that the picture appears to be noisier. The coring function is used to overcome this effect. It reduces noise on a peaked signal by reducing the peaking gain during periods when the signal level is flat, i.e. there are no transitions. Once a transition appears the coring function ceases to operate – in this condition the noise is invisible subjectively.

The luminance output at pin 12 of IC02 is applied to a two-transistor amplifier (TC02 and TC03) with a gain of two to raise the signal level from 350mV p-p to the level required at the input of IV01. A further circuit prior to IV01, centred on transistor TC04, provides group-delay compensation. This compensates for frequency-selective delays in the signal path: the lower luminance frequencies are delayed while the higher frequencies pass unhindered.

IC01 and IC02 are powered by the 13V supply derived from the line output stage. Because of noise on this line heavy filtering is required. There is also a voltage regulator transistor, TC01, in this feed. Its control circuitry is within IC01. There is further regulation within IC02.

The Line Timebase

Generation of the line drive is conventional and takes place within IV01, the line drive output appearing at pin 32. It's controlled by two phase-locked loops (PLLs). The first one compares the output from the line oscillator/logic circuit with that from the sync separator. The second PLL compares the output from the first one with line output stage derived pulses. Both are under I2C bus control.

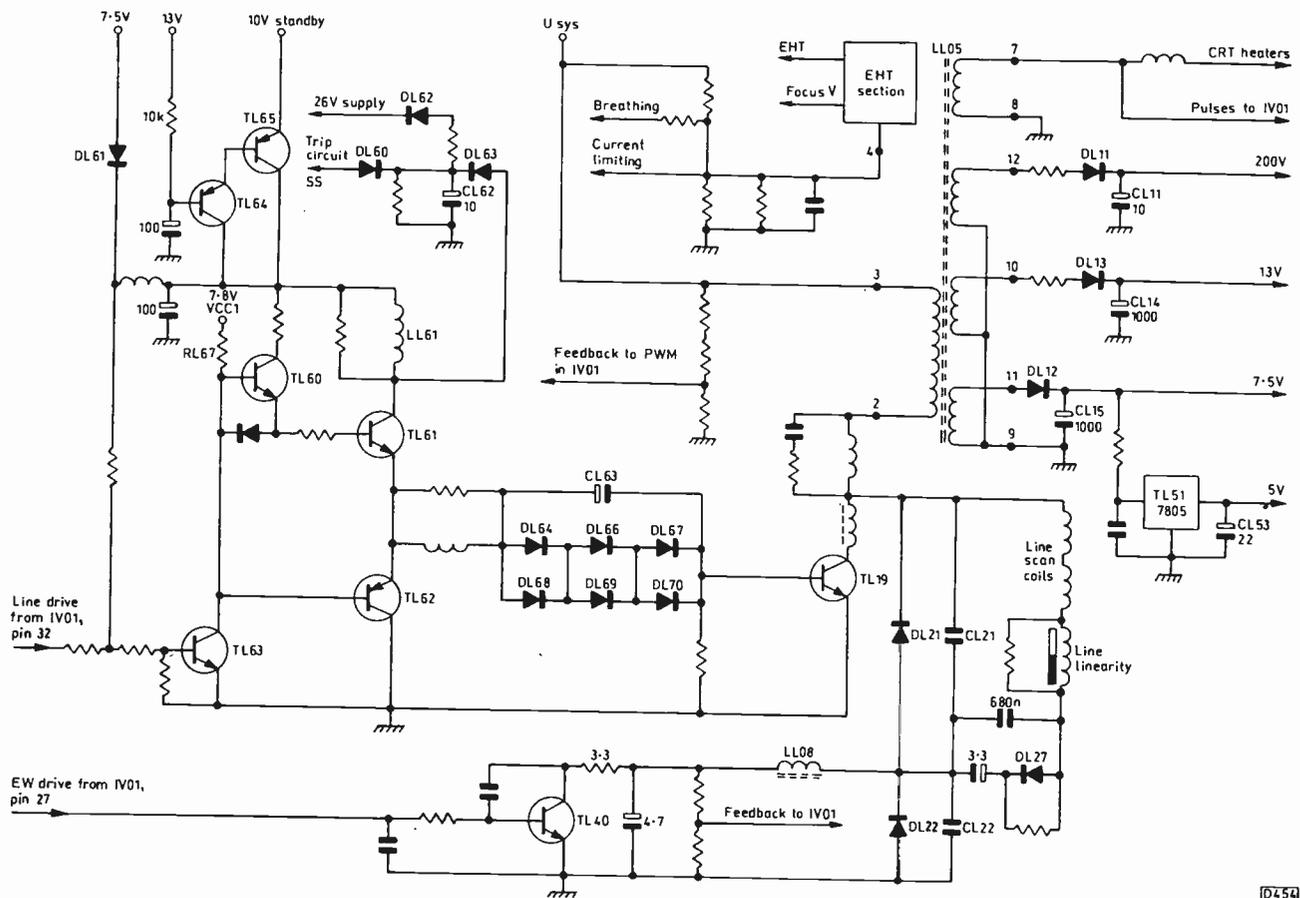
At receiver switch on information relating to both the line and field deflection is sent via the I2C bus to IV01. Once this has been latched in the 'on' bit will, as described above, switch on TV06, powering the rest of IV01 so that, amongst other things, the line drive is produced. The following line timebase adjustments are carried out via the I2C bus:

H-VCO: Line oscillator free-running frequency.

H-POS: Horizontal picture position.

H-AMP: Picture width.

A d.c.-coupled push-pull line driver stage is used, see Fig. 2. In the start-up mode this stage is powered from the 10V standby supply produced by the chopper circuit. It's fed via transistor TL65. Once the line output stage is working, the



0454

Fig. 2: Basic line driver and output stage circuitry, with EW modulator (110° sets only).

13V and 7.5V supplies appear. The 13V supply is taken to the base of TL64 which, being a pnp device, switches off. TL65 is in turn switched off and the 7.5V supply, via DL61, takes over to power the line driver stage.

In the standby mode the line drive output at pin 32 of IV01 remains high. Thus TL63 and TL62 will be switched on and the line output transistor TL19 will remain off. When the receiver-on condition is requested, IV01 will start to produce line drive pulses. When the output at pin 32 falls, TL63 will switch off. Note that its collector load resistor RL67 is fed from the 7.8V VCC1 supply from TV06. As TL63's collector voltage rises, TL62 will switch off and TL60 and TL61 will rapidly switch on, providing TL19's base circuit with current to initiate the line scan process. When the output from IV01 rises again, the conditions are reversed, i.e. TL63 and TL62 switch on and TL60 and TL61 switch off.

The result of this off-on-off switching is that TL19 is provided with a triangular base current drive. The waveform is shaped and defined by the various components in TL10's base circuit. CL63 is charged by TL19's base current: diodes DL64/66/67/68/69/70 clamp the voltage across CL63 at +2.1V. When TL63 and TL62 switch on again to produce the flyback, CL63's positive plate is effectively connected to chassis and its negative charge ensures that TL19 switches off rapidly.

LL61 is the component that gives the base drive its triangular shape. When TL61 switches off to produce the line flyback, the back-e.m.f. developed across LL61 has to be absorbed. Rectifier diode DL63 and its reservoir capacitor CL62 provide the necessary action: the recovered energy is returned to the 26V output from the chopper

power supply.

The line output stage itself is conventional and therefore requires no description here. With 110° models there's an EW modulator circuit which obtains its drive from pin 27 of IV01. The actual modulator circuit is as old as the TX100 come-back-all-is-forgiven chassis. Operation is again under I2C control for the following adjustments:

EW AMP 1: Pincushion correction.

EW AMP 2: Parabola shape adjustment.

TILT: Trapezium distortion adjustment.

The Field Timebase

Once IV01 is brought out of the standby mode it will start to produce a field drive output at pin 16. This is again under I2C bus control, giving the following adjustments:

VERTICAL OSCILLATOR FREQUENCY: 50/60Hz, with switching derived from detection of the line sync pulses.

VOLTAGE RAMP GEN: Gives height adjustment in 128 steps, from 75 to 140 per cent of 'normal'.

VERTICAL SHIFT: Adjustable in 32 steps (10 per cent of vertical amplitude).

S-CORRECTION: Linearity adjustable in 16 steps.

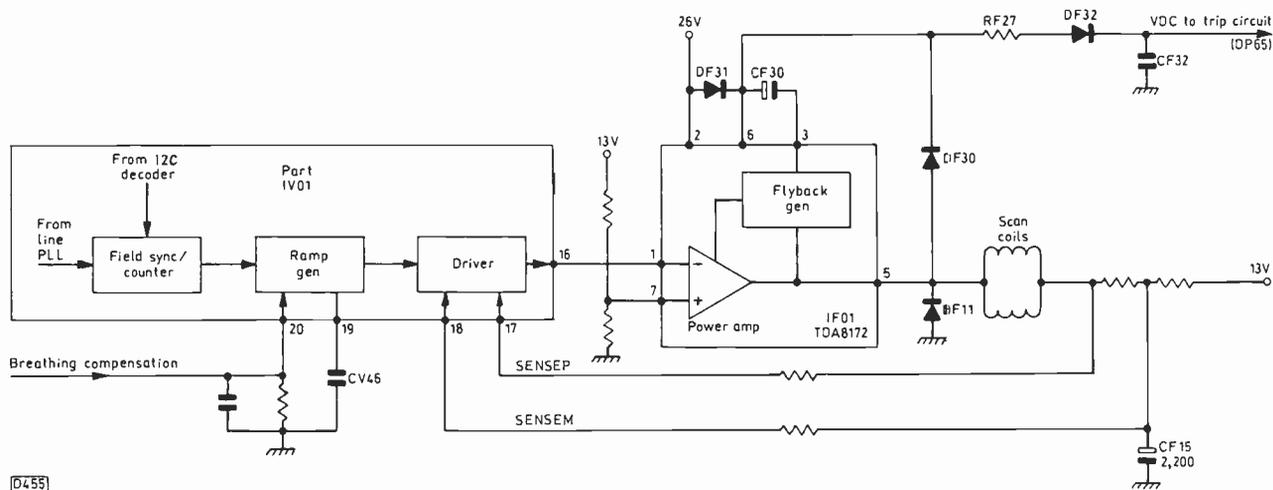


Fig. 3: Basic field scan circuitry.

Fig. 3 shows the arrangement of the field timebase. Various pins of IV01 affect the field drive output, as follows:

Pin 17, sensep: This a.c. feedback signal affects the height.

Pin 18, sensem: This d.c. feedback affects the vertical position.

Pin 19, CVERT: The ramp voltage produced by CV46 during line 270 of each field scan is monitored to maintain the height.

Pin 20, breathing: This pin is linked to the earthy end of the e.h.t. section of the line output transformer (pin 4). It enables e.h.t. current variations that would otherwise result in picture breathing to be sensed, compensation being provided within IV01.

Note that pin 20 is a very high-impedance input: measurement here is possible only with a f.e.t. probe.

The field output stage is based on a TDA8172 chip, IF01. This is a fairly conventional arrangement. A 26V supply is used, so the output at pin 5, which feeds the scan coils, varies between 0-26V. As the other side of the scan coils is taken to the 13V supply produced in the line output stage, bidirectional current flow through the coils is achieved. Note that the current flow is to and from CF15: the 13V supply is used simply as a reference and is not loaded by the operation of the field output stage – provided CF15 retains its value. With some types of picture tube an additional small d.c. might be required for correct centring.

To protect the output stage during the field flyback a standard voltage doubling circuit is used, consisting of DF31 and CF30: this gives rapid absorption of the back e.m.f. from the yoke.

Pin 6 is monitored by the power supply trip circuitry, via RF27 and DF32: if the voltage during the flyback is less

than 75 per cent of its nominal value the power supply will trip out.

Fault Finding

(1) Ensure that pin 21 of IV01 is at 5V. If it isn't, the I2C bus information cannot be sent to IV01. If IR01 and IV01 don't communicate, the receiver won't come out of the standby mode.

(2) If the standby LED lights at switch on and remains alight it's safe to assume that the power supply is running. If on the other hand the red LED blinks on and off the all-important communication between IR01 and IV01 hasn't happened.

(3) If IR01 and IV01 haven't communicated, isolate the chopper power supply for checking by disabling IR01's 5V supply. This can be done by lifting DP84, which is in series with the 10V standby supply. Now check whether the supplies on the secondary side of the chopper transformer are at approximately 90 per cent of their normal voltage levels. If so the fault is not in the power supply: check the deflection circuitry.

Care should be the watchword when working with protection circuits. This point noted, DP54 can be disconnected at pin 16 of the chopper transformer to see which supply is faulty. If the set still trips, either the loading is across the h.t. supply (Usys), which means that the fault is likely to be in the line output stage, or the loading is across the 26V supply which feeds the field output stage. In this case don't be tempted to do something and look for smoke: do cold checks.

(4) As IR01 plays such an important role in the set's operation, it is important to check that IR01 is working correctly. Check the 5V ref and 5V μ C supplies and the clock. It's difficult to check that data has passed from IR01 to IV01, but 5V is the necessary level on the I2C bus.

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 of by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.

TRY THE FOLLOWING EQUATION. THE ANSWER WILL BE
A COMPELLING REASON TO USE OUR SERVICES

MODERN TECHNOLOGY

TEL 0161 746 8037

+
COMPETITIVE PRICES

0161 746 8038

+
EXPERT WORKFORCE

FAX 0161 746 8136

+
SAME DAY TURNROUND

= A FIRST CLASS FACILITY

TO ASSIST YOUR BUSINESS
WE ARE ONLY A PHONE
CALL AWAY

MCES LTD,
15 LOSTOCK ROAD,
DAVYHULME,
MANCHESTER
M41 OSU

AMSTRAD HANDSETS

VCR4500 18.08
VCR4600, 4600MkII 11.75
VCR4700 17.63
VCR5200 11.75
VCR6100 (Indexer) 25.85
VCR6100 (Barcode Indexer) 32.44
VCR6200 Barcode 32.44
VCR9000 (Old type) 11.75
TVR 2 8.46
SRD400 18.15
SRD400 (Equivalent) 11.05
SRD500 11.75
SRD510/520 13.81
TS90/99 Tower System 11.75
GOODMANS VCR102 11.75
PROLINE 5100TX 17.63

AMSTRAD LOPTS

CTV1000 FB182K 12.93
CTV1400 FB165KA 23.50
CTV1401/93714002 22.33
CTV2000 FB171 10.58
CTV2200 FB171K 10.58
CTV2200 3722002 15.28
CTV2210 3722002 15.28
TVR3 181297 14.69
PCW9512,8256,8512 7.05

AMSTRAD TUNERS

UE33-B01 VCR4600/4700 9.40
UE2-B31F CTV2200/2210 5.88
1810829 VCR5200 7.05
ENV87509F2 CTV1400 5.88
UVE33-F01 VHF-UHF 14.10
UVE33-F02 VHF-UHF 14.10
1813766 VHF-UHF 14.10
FX9600 FAX PSU 29.38

AMSTRAD IF UNITS

TPS7-B0006 VCR4600/4700 9.40
TPS7-L0002 14.10
1813766 14.10

AMSTRAD MODULATORS

18108221 VCR5200 7.05
ENP-E730-2 VCR7000 5.88
VCR4600MkII, 4700 7.05
SRD100/200/400 7.05

AMSTRAD SERVICE

MANUALS

VCR4600MkII, 4700 9.00
VCR6000/6100 11.50
VCR7000 9.00
VCR8700 8.00
VCR8800 9.75
VCR9000/9004 9.00
VMC100 16.50
SRX100/200 4.70
SRX100/200 SRD400 11.50
SRD510/520 6.50
PC1512 11.50
PC2086 12.00
PC2286 12.00
PC2386 15.00
PC3086 11.00
FX9600 FAX 15.00

AMSTRAD COMPUTER OPERATORS MANUAL

PC1640 11.75
PC2286/2386 11.75
PPC512/640 11.75
PC1512 (Tech. Ref.) 6.00
PC1640 (Tech. Ref.) 8.00

AMSTRAD VCR CABINET PARTS

VCR4500 Cabinet Front 15.28
VCR4700 Cabinet Front 12.93
VCR6000 Cabinet Front 15.28

VMC100 - Various parts available, please phone for prices.

AMSTRAD COMPUTER MONITOR PARTS

12" HRCO Monitor PCB 32.32
(DAEW00)
PC/ECD Monitor Tube 58.40

AMSTRAD VCR DECK 4500, 4700, TVR1,2,3

Head Base Assy. (Audio) 5.88

AMSTRAD MOTORS

Loading Motor MCB9B02 3.53
Drum Motor E20EL05 10.87
Capstan Motor LLA4B02 10.28
Capstan Motor JLN4B02 10.28
Tape Loading MCF9B02 9.99
Cassette Housing RF280R 9.99
Capstan Motor LLN4802 10.28

AMSTRAD PCB's

(Complete, fully populated)
4500 Timer 12.93
4500 Systems Control 10.58
4600 Systems Control/Servo, Display & Control PCB's 31.73
4600 Display 12.93
4600 Control 6.46
4600 Video & Audio 19.98
4600 Power Supply 16.98
4600MkII Main PCB Assy. 43.17
4600MkII Timer 15.28
4600MkII Control 6.46
4600MkII Head Amp 5.88
4600MkII Power Supply 6.46
4600MkII Hybrid, Luminance 9.40
4700 Main PCB Assy. 43.17
4700 Timer 15.28
4700 Control 6.46
4700 Head Amp Assy. 5.88
4700 Power Supply 6.46
5200 Timer & Channel Disp. 18.81

5200 Video 15.28
5200 Switch Panel 5.88
6000 Power Supply 8.81
6100 Main PCB 31.73
6100 Audio PCB 7.05
6100 Power Supply 8.81
6100 Hybrid, Chrominance 9.40
6100 Hybrid, Luminance 9.40
7000 Switch PCB no:7 2.35
CTV1400 MkII Main TV PCB 31.73
CTV1400 Switches, Presets & Tuner (ENV87509F2) 9.70
CTV2200 PCB no:3 3.53
CTV2200 PCB no:4 4.70
TVR 2 Main TV PCB 41.13
TVR2 Video Front Display PCB 15.86
TVR 3 Main TV PCB 47.00
TVR 3 Head Amp Assy. 5.88
TVR 3 Video Power Supply 6.46
VMC100 Main PCB 29.38

AMSTRAD PC12MD

VGA MONO MONITOR
Suitable for use with 2000/3000 series and any other VGA compatible PC (Carr. at Cost) 64.63

AMSTRAD SOFTWARE

ACCOUNTSMASER 19.98
(Full accounts program for running small business on any PC)

Many AMSTRAD COMPUTER & PRINTER SPARES available, please phone for price.

PRICES INCLUDE VAT.

ALL ITEMS ARE BRAND NEW AND GUARANTEED

*** SAME DAY DESPATCH ***

Write or Phone for FULL LIST.

***POST & PACKING**

***£1.18**



Harrison Electronics

CENTURY WAY, MARCH, CAMBS PE15 8QW.
FAX: (01354) 51416. TEL: (01354) 51289

WE ALSO STOCK MANY SEMICONDUCTORS, RESISTORS, FUSES ETC.

TV RENTAL ARREARS?



By fitting Alberice Teletime coin meters, you'll keep your customer - and your money!

- | | |
|---|--|
| <p>Packed full of features, Teletime will even recover past arrears for you! At the same time, its attractive design ensures your customer will find the unit acceptable in the home.</p> | <ul style="list-style-type: none"> • Uses £1 coins • Compatible with all modern sets • Counts coins used for added security • 50,000 already installed in UK by major rental companies |
|---|--|



Alberice Meters Ltd, 87 Sterte Ave East, Poole, Dorset BH15 2BD
Telephone: (0202) 674272

PHONE FOR FULL DETAILS TODAY!



Yes, I would like increased income from TV, Cable and Satellite rental - please rush me details of Alberice's

TELETIME COIN METERS

Name: _____

Business Name: _____

Address: _____

Telephone: _____

Post this coupon **FREE** of charge to:

Alberice Meters Ltd
FREEPOST

87 Sterte Ave East, Poole, Dorset BH15 2BD

TUBES TUBES TUBES

CRAZY PRICES ON 14" and 16" TUBES

14" NEW tube
to replace 37-570,
37-554, 37-573,
370EFB22,
37SX101Y **£25**

16" NEW tube
to replace 38EAC,
38EAE, 38EAP,
AXM42-001, 420FSB22
420GJB22 **£25**

14" NEW tube
to replace 37-590,
3708B22,
370HUB22,
370HFB22 **£39**

14" SONY
tube
34JBU10X
from **£79**

16" NEW tube
to replace AXT42-001,
42-590,
420EFB22,
4202B22" **£25**

14" NEW tube
to replace
almost any
narrow-neck
tube **£39**

Ring us and we will do our best to fulfil your tube needs. We have 1000's of tubes in stock, new regun, B grade, and part-used. **ALL** at competitive prices. Ask for Irene or Jane



Carriage and VAT
extra



EXPRESS TV
The Mill, Mill Lane,
RUGELEY, Staffs WS15 2JW
Tel: 01889-577600
Fax: 01889-575600

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/TL 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 £73!!!
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 (BA 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, mainslead, 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.

5mw LASER POINTER. Supplied in kit form, complete with power adjuster, 1-5mw, and beam divergence adjuster. Runs on 2AAA 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 SEP42

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 lens. Rack and pinion focusing, 6 interchangeable rotating object lenses, interchangeable eye pieces, +scaled eyepiece for accurate measuring etc. Powerful low voltage illumination system with green filter and variable intensity, 100mm black/white + ground glass stage plate, 70mm swivel mirror, adjustable eyepieces (both focus and width). Magnification range 4.6-100.8, field of view 39-2.4mm. Price is £299 for complete setup. Ref 95/300.

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 lens, a sample 3D slide, a 3D slide viewer and 2 different lens 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 t/hp 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.

Miniature 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 an straight from 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 forced 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 dips. 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 TAP RECORDER Small voice activated recorder, uses micro cassette complete with headphones. £28.99 ref MAR29P1.

ULTRAMINI BUGHMIC 6mmx3.5mm made by AKG. 5-12v electret condenser. Cost £12 ea. Ours? just four for £39.99 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 NIGAD PACK encapsulated pack of 8 AA nicad batteries (ticked) 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 AUG6S

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

MAINS CABLE P/rect 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 PCs over a long distance. Complete kit £8.99.

MINICYCLOPS 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

*SOME OF OUR PRODUCTS MAY BE UNLICENSEABLE 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

***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.

***MINIATURE RADIO TRANSCEIVERS** A pair of walkie talkies with a range of up to 2km in open country. Units measure 22x5x155mm. Including cases and earpieces. 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.

LQ3600 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 Apocot 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 CARPHONE £6.99 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, 3xAAA'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.

B.K. TEST

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

B.K. Electronics. Suppliers of Test Equipment Excellence

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

3 1/2 Digit LCD Display
Auto/Manual Ranging
Measurement:
DCV: 1000V Max
ACV: 750V Max
DC A: 10A Max
AC A: 10A Max
Resistance: 2MΩ Max

POWER SUPPLY

3 1/2 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 supplied 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 - 4000µF
Frequency	5Hz - 40MHz
Temperature	-40 - +1200 C

Price:
£99.00
+ £17.33
V.A.T.

OTHER HAND HELDS

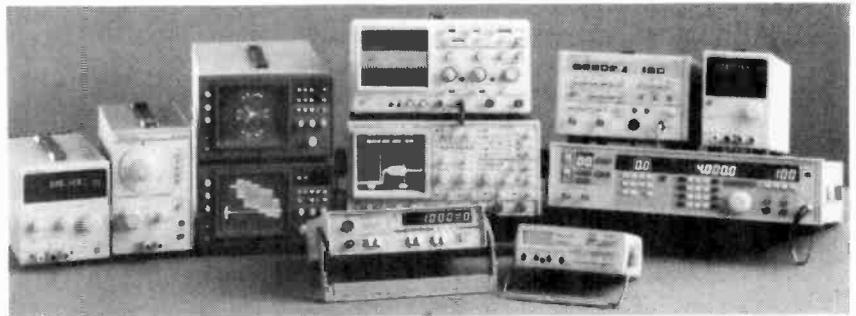
CAPACITANCE METER CM9023
9 Ranges Opf (with set zero) to 20,000µF * Large, 3.5 Digit, 18mm LCD Display.
Price: £57.90 + £10.13 V.A.T.

LCR METER LCR195
3.5 Digit LCD Display * 7 Capacitance Ranges 0 - 200µF
* 6 Inductance Ranges 0 - 200H * 7 Resistance Ranges 0 - 200MΩ
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 & VECTORS

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 Outputs, 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

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

PO 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

CS 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	£2,385.00 +	£419.13 V.A.T.
DCS 8200	£2,499.00 +	£437.33 V.A.T.
CV 1255	£2,249.00 +	£393.58 V.A.T.
CV 1245	£1,599.00 +	£279.38 V.A.T.
SG 5110	£1,825.00 +	£319.38 V.A.T.
CG 932	£736.00 +	£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.
FG 758	£555.00 +	£97.13 V.A.T.
PO 35-10	£845.00 +	£112.88 V.A.T.
PR 19-3A	£235.00 +	£41.13 V.A.T.
PS 20-54	£1,610.00 +	£281.75 V.A.T.

DON'T FORGET - THERE ARE OVER 100 KENWOOD MODELS

U.K. POST PAID. Export enquiries welcome. Visa / Mastercard on cheque with order, payable B.K. Electronics. Official Orders welcome from 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).



EURAS GIVES YOU NOTHING BUT SOLUTIONS



FOR JUST £12 A MONTH

When repairing TVs, videos or CDs seems to bring nothing but problems, you want the fast and helpful solution that you'll find in the Euras System - now available on subscription for just £12 a month.

The Euras System is Europe's largest repair tips database for video, TV and CD with over 140,000 time-saving tips for 15,000 models from 270 manufacturers. So you're almost certain to find the help you need, even for unusual faults and unfamiliar models.

This essential help is available on disk or in a range of manuals. The PC subscription gives you access to our entire database, with regular free updates and upgrades, for only £12 a month, making Euras even more affordable. For full details, including your free demonstration disk, clip the coupon or call us direct on 0117 986 0900.

EURAS INTERNATIONAL LTD,
EURAS HOUSE, 51 BRISTOL ROAD,
KEYNSHAM, BRISTOL, BS18 2BA

**FREE
DEMO
DISKETTE**



NOW! EVEN EASIER TO BUY  

EURAS

TV 4/95 C

Solutions at your fingertips

PLEASE SEND ME A FREE DEMONSTRATION DISK AND DETAILS OF EURAS PC SUBSCRIPTION

PLEASE SEND ME A FREE SAMPLE EURAS MANUAL

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

POSTCODE _____ TEL _____

TV **FREE** VCR

COMPONENTS
CATALOGUE
HUGE RANGE OF SPARES
COMPETITIVE PRICES

+

TV TUBES

RE-PROCESSED
NEW
B GRADE

+

Over 150 Types in Stock
VISTA are BSI approved

**VIDEO
HEADS**

Manufactured by Vista to Hi-Tech
Specifications

150+ types available covering
2000+ VCR models

+

**TECHNICAL
HELP-LINE**

**vista
electronics**

FOR CUSTOMER CARE AND SERVICE CALL

TUBES: 0429 837100

COMPONENTS: 0429 838057

FAX: 0429 837101



Vista Electronics Ltd

Unit 1B, Wingate Grange Industrial Estate, Wingate, Co.Durham, TS28 5AH.

A Z ELECTRICS

18 BROOKWOOD ROAD, SOUTHFIELDS, LONDON, SW18 5BP
Telephone: (0181) 877 3492 Fax: (0181) 877 3518

NEAREST TUBE STATION - SOUTHFIELDS

Stock items despatched by return

VIDEO HEADS

Amstrad	
TVR1 2 3 4 VCR4500, 5200, 4600, 4700, 6000, 6100, 81600, 9000, DDB900, 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, Hitachi, 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
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	£6.85
Philips - Idler Mod. - VR6462, 6463	£4.50
Samsung - Idler V1510, 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
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 from £2.80. Please ask for list.	
JVC 520 etc Pinch Roller Assy	£6.00
TRIPLERS	
Universal Tripler	£6.20
Universal Tripler with Focus Unit	£9.50
Decca 120/130 Series	£8.50
Thorn TX10 Focus Unit	£6.50
Grundig Triplers	POA
REPAIR KITS - TV/SATELLITE/VIDEO	
Akai - Power Board VS22, 23 etc	£29.00
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	£8.50
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	£18.50
TX100 Yellow Spot	£19.50
TX90 State Screen Size	£15.50
Ask for models not listed	
Hinari - CT4/5, TVA1	£17.50
Hitachi - CPT1475, 2174, 76, 78	£15.00
CPT2275, 2476, 78	£15.00
Ask for models not listed	
Matsui - 1440, 420	£19.00
ITT - CV2530/32	£9.50
Compact 80, 110	£16.75
Computer Monitor Lopts	POA
Mode transformer TX100	£15.50
Compact 8C, 90	£19.75
CV1204	£11.50
CV800/1/3	£21.50
CV1100	£16.50
CV1150/1/75	£20.40

Hitachi - Lopt1471/72/73	POA
Sony - 27XRT4 Lopt	POA
Ask for models not listed	
Panasonic - 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
Degaussing Positor White	£1.30
Degaussing Positor Blue	£4.00
Degaussing Positor Philips	£3.00
Degaussing 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
TRAINING TAPES	
Akai	£22
G Mec	£15
Ferguson	£22
SATELLITE SPARES	
LNB 1 20B Standard or Enhanced	£24.00
Frequency 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 £25.00.	
Idler Tyres for popular makes in stock for as little as 35p each.	

Access	
VISA	

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

Visions

VIDEO PRODUCTIONS

TRAINING TAPES £19.95 + VAT

AKAI VCR's 1989-1994

FERGUSON ICC5 T.V. CHASSIS

PACE PRD 800/900

SATELLITE RECEIVERS

AKAI AX/GX VCR's (NEW CHASSIS)

AVAILABLE FROM

Willow Vale Electronics,

Charles Hyde & Son,

Seme and C.P.C.

or direct from

Visions Video Productions,

23 Spring Lane, South Norwood,

London SE25 4SP.

Tel: 0181 654 1379 Fax: 0181 654 8492

£2 p&p for UK and £4 Overseas

the new

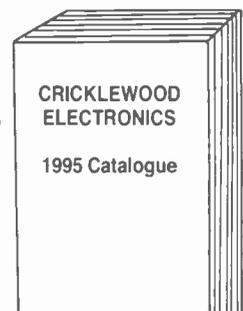
CRICKLEWOOD Electronics

Very Interesting CATALOGUE

FREE with Company Letter-heading, Normally £2.50!

Astronomical Range At Down To Earth Prices

- Transistors + ICs + Semiconductors
 - Resistors + Capacitors + Inductors
 - Surveillance + Secrecy + Security
 - Plugs + Sockets + Leads + Connects
 - TV & Video Spares (inc Video Heads)
 - HiFi + Disco + HiFi Gadgets + Speakers
 - Audiophile Components (inc Capacitors)
 - In Car Audio + Speakers (inc Bass Tubes)
 - Computer Accessories + Boards
 - Tools + Test Equipment + Benchware
- & much much much more.*



SEND TODAY FOR THE VERY INTERESTING CATALOGUE

Catalogue orders accepted only with this coupon

Please send FREE copy of the 1995 Cricklewood Catalogue. I enclose company letter heading (UK on'y). Otherwise I enclose £2.50. (£5.00 overseas)

Name

Company Name

Address

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Cricklewood Electronics Ltd, 40-42 Cricklewood Broadway,
 London NW2 3ET. Tel: 0181 450 0995 Fax: 0181 208 1441



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

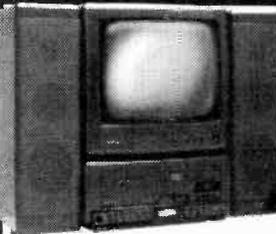
WORKING VHS VIDEO RECORDERS

- ◆ 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

akura TV, VIDEO & HI-FI



**AKURA
QUARTET**
REMOTE
CONTROLLED
TV/AUDIO
HI-FI SYSTEM
COMPLETE WITH
14" TV • CD • TAPE DECK
• DIGITAL RADIO.

£130.00
(PLUS VAT).



SPARES F.O.C. FOR
ONE YEAR FROM DATE
OF PURCHASE.

MINIMUM ORDER
OF 5 UNITS (MIXED).

DELIVERY: £2.50+VAT
PER UNIT.

ALL PRODUCTS ARE
WORKING & BOXED AS
NEW WITH ALL ACCES-
ORIES.

PAYMENT BY
"PRO-FORMA".

WHEN WE'RE OPEN
MON-FRI: 9.00-5.30
SATURDAY: 9.30-5.00

- AKURA CX30**
14" REMOTE CONTROL..... **£85.00+VAT.**
- AKURA NR1**
14" NON-REMOTE..... **£65.00+VAT.**
- AKURA CDM4**
CD MICRO HI-FI..... **£40.00+VAT.**
- AKURA M4**
RECORD DECK MIDI HI-FI..... **£22.00+VAT.**
- AKURA CDC103**
MULTI-PLAY CD MIDI HI-FI
WITH RECORD DECK..... **£85.00+VAT.**
- AKURA CX240**
20" REMOTE CONTRCL..... **£110.00+VAT.**
- AKURA CX250T**
20" FASTTEXT REMOTE..... **£123.00+VAT.**
- AKURA CX1400T**
14" FASTTEXT REMOTE..... **£105.00+VAT.**

14 PAYNE STREET, PORT DUNDAS, GLASGOW G4 0LF.
TEL: 0141 3531665 • FAX: 0141 353 1124



MANUFACTURERS 'B' GRADED STOCK

**Televisions, Videos
Audio, Music Centres
Microwave Ovens**

Complete, reboxed, working
Current model stock

Turner Lyons Enterprises Ltd
9 Howard Place,
Shelton
Stoke on Trent ST1 4NN

Phone David
01782 285416

ADVERTISERS' INDEX

Aerial Techniques.....497	J.J. Components.....481
Alban Electronic Ltd.....505	Manor Supplies.....471
Alberice Meters.....511	Marapet Electronic Components...469
Anglian TV Wholesale.....522	MCES.....510
AZ Electrics.....515	OZAN.....487
Besco.....517	Nikko.....464
BK Electronics.....513	P.V. Tubes.....469
Bull Electrical.....512	Red Bank.....518
Campion Wholesale TV Ltd.....519	Repo TV.....521
CDH Electronics.....501	Sendz Components.....528, IBC & BC
Central TV Wholesale.....522	Stewart of Reading.....501
Centrevision.....522	Superscreen.....523
Coastal Aerial Supplies.....519	Swift Television Publications.....469
Colour Trade.....521	Teleprice Ltd.....518
Cricklewood Electronics.....515	Tree, W.....523
CTV (Midlands).....519	Turner and Lyons.....516
CTV (N.E.).....523	TV Live.....498
East London Components.....464	TVs Direct.....516
East London Wholesale.....516	Vision Care.....517
Economic Devices.....492-3	Visions Video Productions.....515
Euras.....514	Vista Electronics.....514
Express TVs.....511	West Midlands TV.....521
Grandata Ltd.....454-463	Western Trade Services.....523
Hardy, J.W.....501	Willow Vale Electronics Ltd.....IFC
Harrison Electronics.....510	Wiltsgove Ltd.....517
HCTV.....520	
HST Distribution.....519	

VISIONCARE

THE NEW NAME IN BERKSHIRE FOR

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
WITH REASONABLE ORDER**

NOW AVAILABLE GRADED STOCK — MAJOR BRAND

Complete with original boxed, handset and
instruction book — Good as new
Latest Nicam, Fasttext, Prologic

ALMOST HALF PRICE OF RETAIL

★★★ STAR BUY ★★★

SANYO — SX915 SPEAKERS (NEW) £14.95 per pair

DEFINITION VIDEO TAPES E-180

TRADE PRICE £0.79 (Minimum Quantity 50)

WE HAVE NOW MOVED TO OUR NEW ADDRESS

UNIT 21, DEACON WAY, SCOURS LANE,

TILEHURST, READING BERKSHIRE RG3 6AZ

TEL: 01734 420251 and 01734 420555

OPEN MONDAY TO FRIDAY 9am-5.30pm

EXPORT ENQUIRIES ARE WELCOME

All stock subject to availability and VAT

WILTSGROVE LTD

28-29 RIVER STREET, DIGBETH

BIRMINGHAM B5 5SA

TEL: 0121 772-2733 FAX: 0121 766-6100

Complete range of

THORN — GRANADA

**EX-RENTAL, GRADED STOCK, TVS,
VIDEO, AUDIO, HI-FI, MICROWAVE ETC**

Also complete range of spares and components

**ICS, Handsets, Video Heads, Flaps, Trims,
Tools, Aerials, Batteries, etc**

**LORRY LOADS OF FRESH STOCK EVERY DAY
COME AND PICK YOUR STOCK FROM THE LORRY**

Free delivery service to most areas of the UK
(with reasonable order)

**GRADED STOCK (good as new) MAJOR BRANDS
TVs, Hi-Fi, Videos**

Complete with original box, handset and instruction book
(name cannot be mentioned for security)

ALMOST HALF PRICE OF RETAIL

EXPORT ENQUIRIES ARE WELCOME

All stock subject to availability and VAT

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

Slim fron loading video, off the pile £20 Working front loading video from £45

Standard CTV's, off the pile, from £5 Text TV, off the pile, from £25

FREE!! Coffee, Tea, Pop, Bacon/Sausage/Egg Sandwich, Loud Music

Bring plenty of money!

All Prices Subject to VAT

BESCO LTD

Walker House, Bottomley Street, 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.

GREATER MANCHESTER'S NO 1 WHOLESALER

RED BANK ^{UNIT} 20

HERE

STRUGGLING FOR STOCK?

WE HAVE GOT WHAT YOU NEED

**THORN and GRANADA
PORTABLES and F.S.T's
AVAILABLE NOW!!**

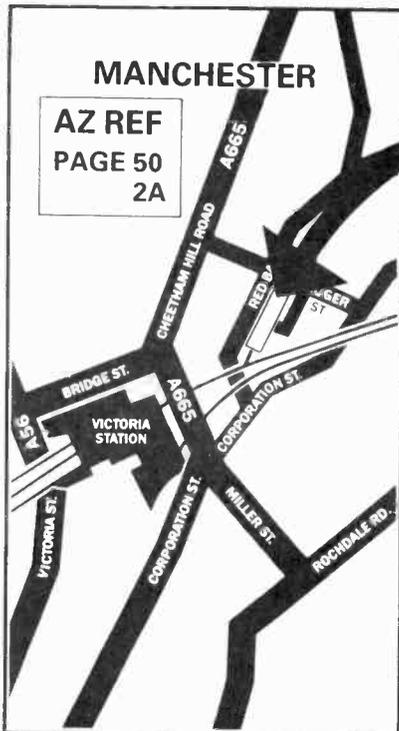
Televisions from £5, F/loading Videos from £20
Working Teletext from £35, 1,000s of TVs and Videos in stock
FRESH STOCK ARRIVING DAILY
RING NOW FOR STOCK UPDATE

*Export Enquiries Welcome
Open 10am - 5pm Mon-Fri

**UNIT 20, RED BANK ARCHES,
MANCHESTER M4 4HF**

— CHEQUE — ACCESS — VISA —

**PHONE 0161 832 4220
FAX 0161 834 6368
PRICES SUBJECT
TO
VAT**



TELEPRICE

LIMITED

Leaders in the supply of:

Ex-rental, End-of-line, Customer returns and Surplus stocks of Televisions,
Video and Audio Equipment, and Domestic Washing Machines,
Dryers, Refrigerators, etc.

to the Trade

Contact your nearest Area Manager for latest prices:

Area	Contact:	Mobile:	Fax/Tel:
South East	Colin Gordon	0374 738701	01227 741312
South West	Tony Lewis	0374 732784	01291 425018
North/N.I.	Ian McClelland	0831 597331	01244 400602

Head Office: Baird House, Arlington Business Park, Theale, Reading, Berks RG7 4SA.

Tel: 01734 309933 Fax: 01734 309934

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: 01299-251522
0836-585829/0860-809673 (24HR)

Fax: 01299-251543 EXPORT ENQUIRIES WELCOME

**APPROVED
TELEPRICE
DISTRIBUTOR**

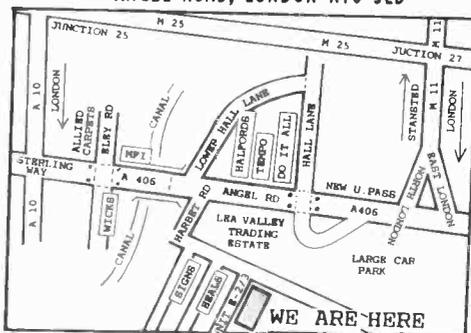
**HST
DISTRIBUTORS
LONDON**

Suppliers of high quality
THORN EX-RENTAL STOCK
Direct from source

PHONE FOR DELIVERY DAYS ON

01 81 803 0505

UNIT E2/3, Stonehill Business Park, Lea Valley Trading Estate,
ANGEL ROAD, LONDON N18 3LD



AERIALS

FOR TV & FM RADIO, PLUS 1000's
OF MASTS, BRACKETS, LASHING
KITS, CLAMPS, PLUGS, CABLES,
OUTLETS, DIPLEXERS ETC

AMPLIFIERS

FOR DISTRIBUTION SYSTEMS
AND DOMESTIC, MAST HEAD
OR SET BACK. WE HAVE ONE
OF THE LARGEST RANGES,
AVAILABLE FROM STOCK

MAIN DISTRIBUTORS

FOR ANTIFERRENCE, LABGEAR,
WOLSEY FRINGE, TRIAX,
TELEVES, VOLEX-RAYDEX,
KUBLER + MANY MORE

COASTAL

AERIAL SUPPLIES

UNIT X2, Rudford Industrial Estate, Ford, Arundel

01903 723726

NO MINIMUM ORDER VALUE
NEXT DAY DELIVERY ACROSS UK
CARRIAGE FREE ON ORDERS £250+



**COMPION
WHOLESALE LTD.**

**QUALITY USED
TV & VIDEO**

**COMPLETE RANGE OF TV'S AND
VIDEOS MOST MAKES AND
MODELS AVAILABLE**

STOCK ARRIVING DAILY

**TV's from £3.00 · Videos from £30.00
Prices Ex-VAT**

Free Delivery Service to most areas of the UK

**UNIT 75, BARRACKS ROAD,
SANDY LANE INDUSTRIAL ESTATE,
STOURPORT-ON-SEVERN,
WORCESTERSHIRE DY13 9QB
Just 10 Mins from M5 Junct. 6 Worcs North**

**UK'S LARGEST EXPORT
WHOLESALE. CONVERSIONS
TO MOST COUNTRIES**

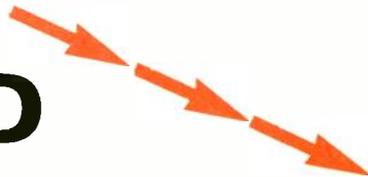
01299-879642 (3 lines)

FAX: 01299 827984



TV & VIDEO WHOLESALERS

PRICES SLASHED



* MEGA DEALS ON GRADED STOCK

NOBODY BEATS OUR PRICES *

GRADED STOCK – Boxed with remote and instructions,
 14" Portable – £50 14" R/C Portable – £65
 20" Fasttext – £115 21" Fasttext – £135 21" Nicam – £165
 25" Fasttext – £155 25" Nicam – £175

RUMBELOWS CLOSING DOWN STOCK

MOST STOCK NEARLY NEW

TOP BRANDS AVAILABLE!

TELEVISIONS
 MIDI SYSTEMS
 SEPARATES
 SATELLITES
 VIDEOS

AIWA
 AKAI
 JVC
 KENWOOD
 PHILIPS
 PIONEER
 SHARP
 SONY

LARGE QUANTITIES AVAILABLE

CALL NOW AND PAY US A VISIT

PRESTON

UNIT 439, OAKSHOTT PLACE
 WALTON SUMMIT IND. EST.
 PRESTON PR5 8AU
 TEL: 01772 312101

BIRMINGHAM

208 BROMFORD LANE
 ERDINGTON
 BIRMINGHAM B24 8DL
 TEL: 0121-327 3273 FAX: 0121-322 2011

LONDON

UNIT 2, THE ROYAL LONDON EST
 29/35 NORTH ACTON ROAD
 LONDON NW10 6PE
 TEL: 0181-961 5005

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

W.M.T.V.

THE LARGEST INDEPENDENT
 WHOLESALERS IN WALSALL
 – SUPPLIERS OF HIGH QUALITY EX-RENTAL
 TVs AND VIDEOS TO THE TRADE
 AT COMPETITIVE PRICES
 ALSO AVAILABLE: NEW B-GRADE PRODUCTS
 – TVs, VIDEOS, AUDIO & MICROWAVES –
 ALL TESTED & BOXED

1/2 Mile of Junction 10 M6. Easy Parking Facilities

UNIT 3, BENTLEY LANE BUSINESS PARK
 BENTLEY LANE, WALSALL WS2 8TL
 Tel: 0922-724542. Fax: 0922-722208
 Mobile: 0831-246622 (24 Hours)

OPEN:
 MON-FRI,
 9-6pm
 SAT 9-2pm
 SUNDAY BY
 APPOINTMENT
 DELIVERY
 SERVICE
 THROUGHOUT
 THE COUNTRY



REPO WHOLESALE

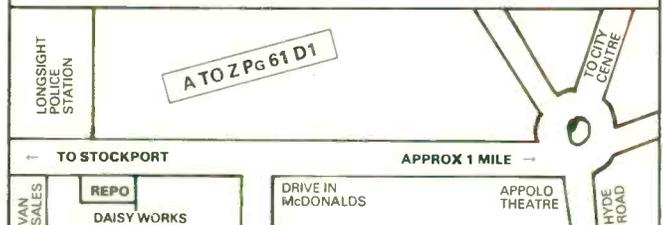
DAISY WORKS, 345 STOCKPORT ROAD
 LONGSIGHT, MANCHESTER M13 0LF
0161-273-2854/274-3409/Fax 273-4486

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.



CENTRAL TV

WHOLESALE DISTRIBUTOR

Attention All Traders

If you are looking for Serious Deals on Videos, TVs, Camcorders, Satellite Equipment, Microwaves, B Grade TVs & Videos

CALL US NOW!

Best deals on Ex-Rental TVs & Videos off the pile or buy direct from source at Agent Prices.

Agents required for export

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: 0121-756 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 WHOLESALE

A.T.V.

FULL RANGE
OF EX-RENTAL
TV AND VCR

PORTABLES * FASTEXT
F.S.T. * SLIMLINE VCR

ALL TOP QUALITY WORKING STOCK
CURRENTLY STOCKING UNITS OF: FERGUSON
THORN, TOSHIBA, PHILIPS, SANYO, HITACHI, AND MANY MORE

CALL TODAY

For personal and professional service that is second to none. Providing superb stock at astounding prices !!

STOCK ARRIVING REGULARLY

Tel/ Fax: **01362 691611** Monday to Friday, 10am to 5pm
24hr Ansaphone

Direct loads and delivery service available
Export specialist



Unit 4,
Brecklands Business Centre,
Tavern Lane, East Dereham,
Norfolk NR19 1PX

EVERYTHING MUST GO

Large stock of B Grade TVs
Top Brand Names Boxed & Working

14" Portables now £75

BUY THIS BLOCK SAVE POUNDS

21" Fastext	£165
25" Fastext	£225
21" Nicam	£195
28" Fastext	£325
	<u>£910</u>

Block Price £849 Save £61

MICROWAVES from £10

EX RENTAL TVs

Direct from source. Untouched
Basic TVs £5, £10 and £15, R/C £20
Teletext £30. Videos from £25

Mini Micro Systems with CD
from £25 various makes.
Hi-fi Midi System from
£12 Boxed.

Stereo Radio Cassettes. Boxed £10.

W TREE WAREHOUSE
UNIT 1, SUNSHINE MILLS, WORTLEY RD, LEEDS 12
TEL: 0113 2638804 FAX: 0113 2310275

C.T.V. (NORTH EAST)

**9A/B, 94 Carrmere Road
Leechmere Ind. Est.
Sunderland
SR2 9TE**

No. 1 in the North East
for all makes and models
of high quality ex-rental
televisions and video recorders
at very competitive prices

**Now Open
Saturday morning
by APPOINTMENT ONLY**

**091-523 5554
Fax: 091-523 8035**

Export Enquiries Welcome.

**SERVICING THE NORTH EAST,
YORKSHIRE AND SCOTLAND**

SUPERSCREEN

**STOCK WHEN YOU WANT
HOW YOU WANT**

OFF THE PILE ? ✓ YES !
WORKING ? ✓ YES !
SHOWROOM READY ? ✓ YES !
GUARANTEED ? ✓ YES !

AND NOW —

**DAILY DELIVERIES THROUGHOUT
THE NORTH EAST AND YORKSHIRE
— RING FOR INFORMATION —**

SUPERSCREEN

5 Redesdale Court, Forest Grove, Riverside Park
Industrial Estate, Middlesbrough, Cleveland
Tel: 01642-250850 or 0831-715423

WESTERN TRADE SERVICES

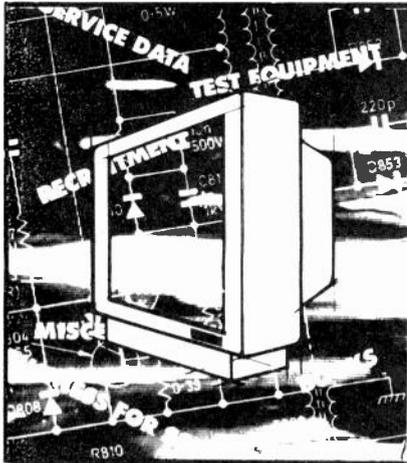
EST 14 YEARS
SUPPLIERS OF EX-RENTAL
TV & VIDEO
THORN AND NON THORN

SOUTH WEST

2A Barton Hill Road,
Torquay,
Devon TQ2 8JH

Tel: 01803 312222
Fax: 01803 326767

Delivering throughout
Devon and Cornwall
weekly



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 be sent to The Television Classified, 11th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.



PHONE 0181-652 8339 FAX 0181-652 8931



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. £9.00
- 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-209. £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 VJ1. £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-94. £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: 01844-351694. Fax: 01844-352554

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 for 1 item. 2 items or more post & packing free.

PLEASE ADD £1.00 HANDLING CHARGE

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 MANUALS

£10 EACH + £5 CREDIT IF RETURNED
Initial Membership £75 (renewal £20)

FREE advice by phone

FREE Data Ref Manual (worth £9.95)

Phone/Write for more Info'

STREE

76 Church St, Larkhall, ML9 1HE
Phone: 01698 883334/884585 Fax: 01698 884825

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: 01291-623086 Fax: 01291-628786
VISA, ACCESS accepted

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: 01202 870656

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.

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 _____



A NEW BREAKTHROUGH IN

SERVICE MANUAL & CIRCUIT SALES



RETURN ANY MANUAL OR CIRCUIT BOUGHT FROM US AND WE'LL GIVE YOU 25% OF THE PURCHASE PRICE BACK AS CREDIT AGAINST YOUR NEXT PURCHASE (must be in good condition)

REMEMBER: We Have The World's Largest Selection Of Service Manuals/Circuits

SPECIAL OFFERS

Any 20 Service Manuals for a one off payment of only £200. Order as you need them, postage inc'd.

oOo

PC SOFTWARE: *Any* title at 25% off RRP, send for our current list.

oOo

Please call or write for your FREE quote & catalogue

JUST SOME OF OUR TITLES

Satellites:

- Euro' Scramb' Sys's 4th Edn. £32.00
- The Satellite Book £32.00
- Satellite Secrets Revealed £19.95

Audio, Radio & CD's:

- Buy, Sell & Serv'ing Used CD's £9.95
- Serv'g Audio & HiFi by N.Beer £25.00
- Audio & HiFi Engineers P.B. £12.95
- U'standing & Serv'ing CD's £25.00

CTV's & VCR's

- Practical TV Rep's 2nd Edn. £16.95
- Buy/Sell & Serv'ing used VCR's £9.95
- Buy/Sell & Serv'ing used CTV's £9.95
- CTV Serv'ing by King £16.95
- VCR Serv'ing by Beeching £25.00
- PAL System £9.95

Electronics & Miscellaneous:

- Circuit Calculations £14.95
- Electronic Circuits P.B. £14.95

DATA REFERENCE GUIDE

NEW 6th EDN. Only £9.95

Around 150 A4 pages full of every imaginable CTV, VCR, CD, Midi, Radio, Satellite, etc...Listing every model's Chassis, Equivalent, cost Plus FREE updating for life.

- Refrigeration P.B. £14.95
- Electronic Circuits Handbook £15.95
- Telecommunications P.B. £14.95
- Oscilloscopes How to use/work £15.95

CIRCUIT COLLECTIONS

- | | |
|-----------------|-------------------|
| Alba/Bush.. £29 | Amstrad/Fid'y £25 |
| Ferguson £60 | Grundig £45 |
| Hitachi £55 | ITT £45 |
| J.V.C. £29 | Mitsubishi £45 |
| Panasonic £60 | Pioneer £14 |
| Rediffusion £25 | Sanyo £35 |
| Sony £74 | Toshiba £43 |

Technical Information Services & INFOTECH

76 Church St, Larkhall, Lanarks, ML9 1HE

Tel: (0698) 883334/884585

Fax: (0698) 884825

Postage is £2.50 on any order

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

4 South Parade Bawtry Doncaster Yorkshire England DN10 6JH

Technical Publishers Tel: 01302 719997 Fax: 01302 719995

Satellite TV Mail Order

Receivers/Dishes

Repairs, Accessories, Components, Books

Repair it yourself or send in to us!

Davenham Satellite Systems

1 Firthfields, Davenham, Northwich, Cheshire, CW9 8JB

Send two stamps for catalogue

01606 49085

Mobile 0831 216810

SATELLITE SECRETS REVEALED!

Learn the trade secrets about satellite television

HOW TO BUY
WHERE TO BUY
HOW TO INSTALL
WHERE TO INSTALL
HOW TO MAINTAIN
HOW TO REPAIR

£19.95 post free



SPARES & COMPS

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

ALDER COMPONENTS

127A Westgate, Heckmondwike, West Yorkshire WF16 0EW
Tel/Fax: (01924) 411089



Prices Inc VAT. Free Post & Packing. Cheques with Order

CLASSIFIED CLASSIFIED CLASSIFIED CLASSIFIED CLASSIFIED

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY
 1 to 24 volts up to 1.2 amp 1 to 20 volts up to 1 amp 1 to 16 volts up to 1.2 amps D.C. Fully stabilised twin panel meters for instant voltage and current reading. Overload protection. Fully variable. Operates from 240V A.C. Compact Unit size 9" x 5 1/2" x 3ins. £45 inc VAT Post & Ins. £4
NEW MODEL. Up to 38 volts DC at 6 amp 10 amps peak. Fully variable. Twin panel meters. Size 14 1/2" x 11" x 4 1/2". £96 inc VAT Carr £6

RADIO COMPONENT SPECIALISTS
 137 WHITEHORSE ROAD, CROYDON, SURREY, U.K. Tel: 0181 884 1665
 Lot of transformers, high volt caps, valves, speakers, in stock. Phone or send your wants list for quote.

SURPLUS/REDUNDANT ELECTRONIC COMPONENTS WANTED

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

ADM General Trading
 Tel. 01827 873311 Fax. 0827 874835

LNB's 10.00GHz 1Db	18.95	21 pin fully wired scart/scart	9.90/10
LNB's 9.75GHz 1Db	18.95	Male/Fem Fly leads	3.20/10
LNB's 9.75GHz 8Db	24.95	Male/Male Fly leads	3.20/10
LNB's 9.75GHz Twin	34.95	Phono/Phono leads 1.5mtr	4.00/10
F connectors	10.00/100	Phono/Phono leads 5mtr	6.00/10
Y Splitters	3.50/10	Powermids	35.95
Amalgamating tape	3.75	Astra ID converters	14.99
Cable clips 7mm br/bl	8.50/1000	Sat/TV remote controls	from 5.95
Mong o/split bolt	8.00/50	Indoor aerials	from 1.60

Complete range of cable, dish packs & receivers/electrical plugs & sockets

ALL PRICES + CARRIAGE + VAT
H.S. Wholesale, 125-127 Queen St., Withernsea, E. Yorks. Tel/Fax: 01964 614439

START YOUR OWN MOBILE COMMUNICATIONS BUSINESS

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 £9.95 postage paid, cheques/P.O.:

Global Media Communications (TV)
 1a Park Place, Leeds LS1 2RU

RELAY
 OMAGH LTD COMPUTER SOFTWARE

**DO YOU RENT TELEVISIONS?
 DO YOU STILL USE A CARD SYSTEM?
 DO YOU FIND IT DIFFICULT TO KNOW YOUR ARREARS TOTAL AT ANY GIVEN TIME?**

If you do then we recommend our computer TV and Video Rental package. This package includes

- * automatic updating of each customer's record
- * alphabetical print-out of each customer's arrears and payments missed
- * total arrears immediately available
- * easy to use and operate.

NEW HIRE PURCHASE PROGRAMME NOW AVAILABLE AS WELL.
 These programmes operate on all IBM compatibles running under MS-DOS. Free demonstration discs available.

CONTACT WILLIAM J THOMPSON
 Donaghane Post Office
 Beragh Co. Tyrone
 Telephone Beragh 58214 (0662 7)

BUSINESS FOR SALE

Well established, lock up shop + 4 bedrooms living accommodation.

T.V. Video and Satellite repairs/sales + T.V. and video rental + video library (1800 members). Low rent, profit £30K P.A. owner emigrating

Ring Redditch 01527 63529

COMPAC ELECTRONICS

TV Video & Satellite Components
 Large range of Lopts, IC's, Remote Controls available + Other components
 Universal Remote Controls Special Offer
 Phone for best prices
 We buy surplus components
 Phone For Your Requirements
0181 984 0831
 3L Weyland Road, Dagenham, Essex RM8 3AB

John Carrington electronics training
*Specialists in Hi Tech Product Knowledge
 Sales and Technical Training*

Telephone: 01773 743245

TV LINE OUTPUT TRANSFORMERS
 PHONE: 0181-948 3702 FAX: 0181-332 0583

ALBA · AMSTRAD · BUSH · DECCA · DORIC · BLAUPUNKT · FERGUSON · FIDELITY · GEC · GRUNDIG · GRANADA · HITACHI · HINARI · INDESIT · ITT · KIMARA · NIKKAI · MATSUI · MURPHY · OSAKI · NORDMENDE · LOEWE-OPTA · PANASONIC · PYE · PHILIPS · SANYO · SAISHO · SHARP · SONY · SOLOVOX · SUSUMU · TANDBERG · TELEFUNKEN · THORN · TRIUMPH · THOMSON · GOLDSTAR · BINATONE ·

**FULL RANGE OF KONIG: VIDEO HEADS, BELT KITS, IDLERS, PINCH ROLLERS, TENSION BANDS.
 LARGE RANGE OF REMOTE CONTROLS IN STOCK**

TIDMAN MAIL ORDER LTD · 236 SANDYCOMBE ROAD · RICHMOND · SURREY · TW9 2EQ
 Mon-Fri 9 am to 12.30 pm & 1.30-4.30 pm
 Approx. 1 mile from Kew Bridge.

REBUILT CRTs
VDU - MONITOR - TV

Image Burn-In Removed From Screen Phosphors

N.G.T. ELECTRONICS LTD
 Unit 116, 62 Tritton Road, London SE21 8DE
PHONE: 0181-766 0114
Britain's Oldest Established Tube Rebuilder

MÜTER · AT2 · BMR 95 · BMR 700

AT 2, Audi-Multi-Tester, 16 test-circuits for loudspeakers, tuners, amplifiers, head-phones, tape recorders, mikes, boosters.

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**, Ranelast, 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.

car radios, CD-players: measurement of millivolt, drift, watt, performance: with generator, radio, signal tracer/injector, 13 volt supply etc.

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

INDEXES ! INDEXES !

In **BOOK** form or now on **DISK** !

DISK - This easy to use custom written program provides an index to **over 12,000** Tv, video, satellite, camcorder & cd faults listed in 15 years of television magazine. Specifically developed for this application & using compression technology to bring you a program thats fast, Yet requires just 95k of ram & 740k of disk space. Runs on any IBM PC or compatible - even straight from the floppy (amazing). Features include - pop up menus, on screen help & keyword searches to name but a few. All this for our special introductory price - **only £17.50**
Please specify disk size (3.5 or 5.25 inch) when placing your order.

BOOKS - Now in their 14th Edition with thousands of copies sold worldwide the E.C.S. Television, Video, satellite, camcorder & CD indexes contain over **10,000** fault references listed in 12 years of television magazine.
Price per full set (indexes listed above) - **only £14.75**

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 covers a broad range of makes, models & chassis and contains 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 fault solutions 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**

E.C.S. TECHNICAL PUBLISHING

31, Prenton road west, Prenton, Wirral, Merseyside. L42 9PY.
Please add £1.75 P & P to total (europe £2.75, r.o.w please enquire).

MOBILE PHONE RE-PROGRAMMING

Equipment Supplier

Mobile 0850 842651

01234 347154

VALVES & VALVE HI-FI WANTED FOR CASH

(KT88, PX4, OX25 £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 I 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**

LINEAGE

OCHRE MILL Technical Services, Grundig TV spares for most models to 1985, fast, friendly, helpful, sensible prices. Gt Lype Farm, Charlton, Nr. Malmesbury, Wilts SN16 9DR. Tel: 01666 823228.

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel: 01494 814317.

VIDEOCRYPT DECODER Service sheet with smartcard contact details Eurocrypt card interlace £12.00. E.M.O. Ramsbottom, Lancs BL0 9AG. Tel: 01706 823036.

TUBE REGUNNING PLANT complete includes for ovens. Ring Dave on 01772 703570 for more details.

AVO MULTIMETER Model 8, £45. 500 volt meters £30. 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: 01532 496048.

TV SLOT METERS 50p or £1. Also we buy old TV meters. Call Phoenix Electrical. Tel: 01761 472152 Fax: 01761 471018.

WANTED YOUR surplus TVs/Videos, new, part exchanges, reconditioned, working or broken. Cash waiting, any quantities considered. Phone 01642 672181, 0831 181214.

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 Phillips, 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.

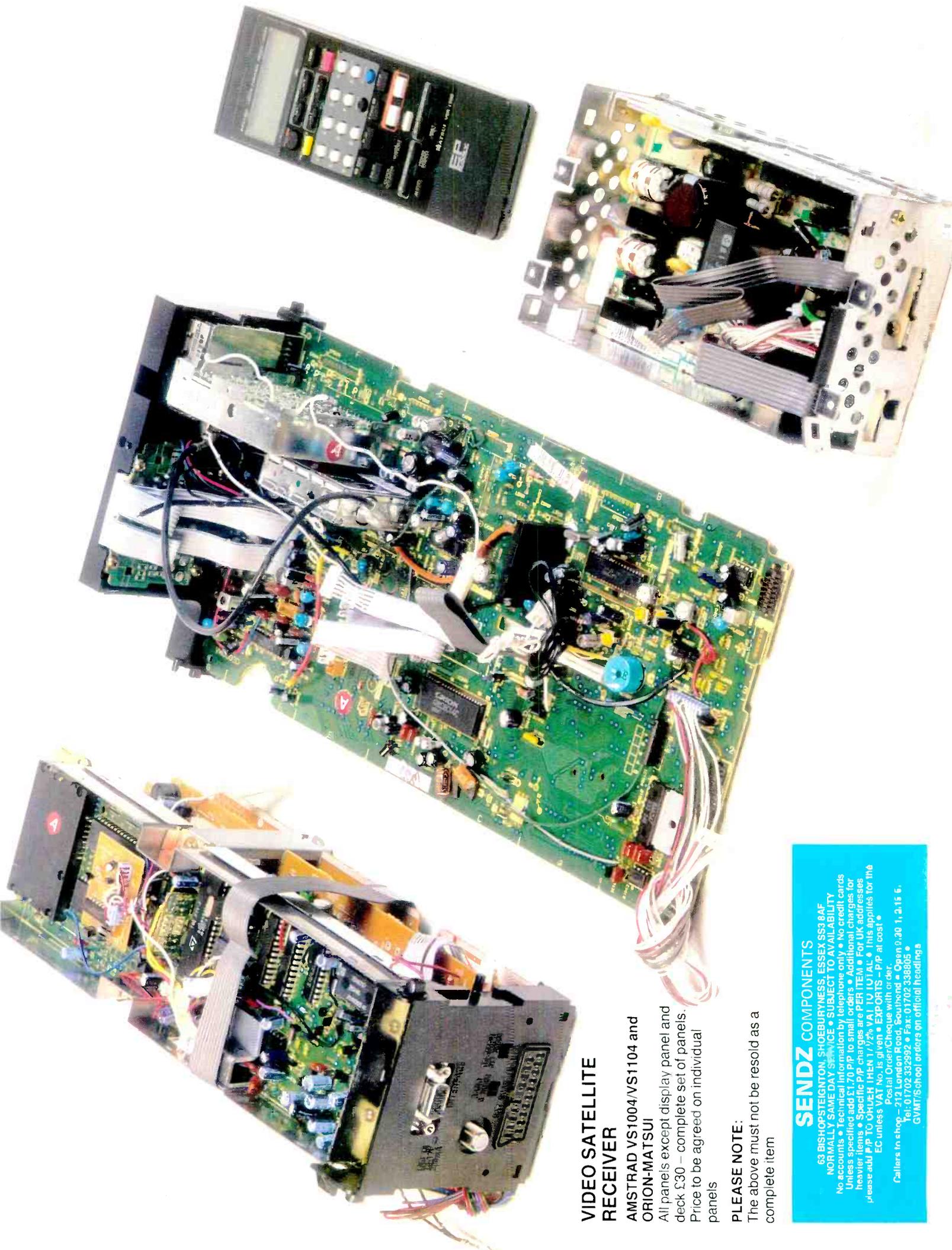
Tel. Sales: 01325 301007 Fax: 01325 300189 Mobile: 0860 221 099

Ferguson White Spot Line O/P Trans	£8	Samsung & Orion Video decks with heads	£16.00	ORION	Hand set	TDA3561A	£3.00
FERGUSON CHASSIS		TV & Video hand set	£2.00	LCD Video Easy Programmer	£10.00	TDA3566	£3.50
New		Orion TV and video hand set	£2.00	RC18	£3.00	TDA3564	£4.00
TX 100	£15.00	B.Sky.B VHF to IF Block Converter	£1.00	PHILIPS		TDA3565	£3.00
TX80	£15.00	10 Panels Ferguson		U/V Handset TV/VCR/TXT		TDA3581	£3.00
TX 98	UK £20.00	Mixed from TX9 to ICC5	£20.00	Remote RC 5903	£12.00	TDA3590	£3.00
TX 90 Push Button Chassis 14"	£15.00	TV Aerial Ring Type	40p	ORION	Hand set	TDA3591	£1.00
PP on each chassis	£5.00	TX100 Remote Hand Sets	£6.00	Video RC44		TDA3592A	£3.00
Quartz Halogen		ITT-Nokia Tuner IF		LCD	£3.00	TDA3650	£7.00
500w. 240v. For outdoor lamps	£1.00	RF-IF-Module 5829 02 58	£6.00	Video RC07	£3.00	TDA3651	£3.00
Plastic Front with Flap 8.900	£3.00	UK 5828-04-10	£6.00	LCD		TDA3651AO	£3.50
Clock Display Panel 8.900	£5.00	Amstrad-Double Decker Switch Mode POWER SUPPLY	£5.00			TDA3652	£3.50
TX 100 FST Chassis		Amstrad-Long Chassis and short Chassis		PANASONIC-TV	Original	TDA3653AQ	£2.00
LOPT No 260482	£20.00	Power supply	£4.00	Handsets for models:		TDA3654	£1.00
£5 Post		Models 1991/1992		TC1632, TC1642, TC2232		TDA3654Q	£2.00
Sharp Tuner & IF		BU 208A, BU 508A, BU 508D,		TX2034, TX2044, TX2200		TDA3710	£3.50
1810587 PAL1 UK	£3.00	BU 508AF, BU 508DF,	£1.00 each	TX2234, TX2244, TX2300		TDA3800	£4.00
Tuner IF UE30-BO 3		BU 801	60p	TX2336, TX3300, RC201		TDA3803A	£4.00
Amstrad	£3.00	2SD 1398	£1.00	replaces TNO1411/2		TDA3180	£2.00
10 Mixed Tube Bases		2SD 1428	£1.00			TDA4260	50p
All New Types	£1.00	2SD 1556	£1.00	TOSHIBA	Hand sets	TDA4501	£3.00
SFE 6 Meg. Filter	25p	2SD 1844	£1.00	CT 9511	£5.00	TDA4508NE	£3.00
CDA 6 MHz Filter	25p	TDA 2600	£1.50	CT 9234		TDA4420	£2.00
SFE 5.5 MHz Filter	25p	TX90 Mains Transformer	£10.00	CT 9233		TDA4439	£2.00
455 Filters	25p	TDA 3560	£2.00	CT 938		TDA4600	£3.00
480 Filters	25p	TDA 3654	£2.00	CT 9268A		TDA4601	£2.00
Ferguson Red Spot LOPTS	£8	TDA 3654	90p	CT 9194		TDA4901	£2.00
Ferguson Green Spot LOPTS	£10	TDA 3653AQ	£1.00	CT 9296		TDA3180	£3.00
Ferguson Y260482 FST LOPTS	£10	TDA 3562A	£1.00	CT 9186		TDA3800	£3.00
Ferguson Tuners		STR 4211	£6.00	CT 9187A	£3.00 each	TDA3803A	£4.00
TX 90 to TX100	£4	STR 6020	£6.00			TDA3180	£2.00
U/V 615	£10.00 each	STR 6602D	£4.00			TDA4260	50p
U/V 616		01 M4-412-001-RU1				TDA4501	£3.00
Tuners		8 Way Pre sets for TX10-TX100	£3.00			TDA4420	£2.00
Nat. Pan. Small		Philips Handsets				TDA4439	£2.00
UHF/VHF	£3.00	RC 5353				TDA4600	£3.00
U321 - U341 - U342 - U343 - U344		RC 5300	£8.00			TDA4601	£2.00
Tuners	each £5.00	RC 5176	each			TDA4901	£2.00
U 411 Tuner	£5.00 each	RC 5177				TDA3180	£3.00
U 412		Philips 36832 2A LOPT.	£15.00			TDA3800	£3.00
LNB'S MARCONI		2433274 LOPT	£12.00			TDA4260	50p
Ex Rental Black Cap	£2.00	Line Transformers				TDA4501	£3.00
No Guarantee		Green Spot				TDA4420	£2.00
Bridge Rectifiers	10 for £1.00	White Spot	£10.00			TDA4439	£2.00
Matsumi Miniature Infra Red Receiver	£1.00	Blue Spot				TDA4600	£3.00
Turntable Satellite Modulator TV	£1.00	Yellow Spot				TDA4601	£2.00
Sound 5.5 MHz MPM 1000T	£1.00	FERGUSON				TDA3180	£3.00
Sound 6.0 MHz MPM 1040	£1.00	KT3-K30 Tripler	£5.00			TDA3800	£3.00
FEROX		U/V Tripler	£4.00			TDA4260	50p
RF Filter Clamp for Coax Cable	50p	Grundig Tripler with Focus Pot	£7.00			TDA4501	£3.00
Circuit for detecting R.F. Send for Circuit using clamp	£1	BG 2087-642-1005 Triplers	£7.00			TDA4420	£2.00
Ferguson Switch Mode Transformer		BG 2032-642-3002	£7.00			TDA4600	£3.00
TX85, TX86, TX100	each £3.50	PERDIO PV 1188 Hand sets	£3.00			TDA3180	£3.00
ICCS Ferguson Switch Mod Trans 3112-338-32642	£4.00	HANDSETS				TDA4260	50p
12v DC and 24v DC power supply regulated	£2.00	Amstrad Export	£3.00			TDA4501	£3.00
Philips		Amstrad U/V	£3.00			TDA4420	£2.00
Text Decoder K40	£8.00	Amstrad 6800	£4.00			TDA4600	£3.00
ICCS Tube Base on panel		Amstrad 6000	£15.00			TDA3180	£3.00
ICCS Decoder panel	each £5.00	Amstrad 4700	£5.00			TDA3800	£3.00
KT3/k30 T/Text Hand Set	£8.00	Amstrad 4600	£3.00			TDA4260	50p
KT3K30 Full Remote	£15.00	IO081 GEC	£3.00			TDA4501	£3.00
Pye & Philips handset		FERGUSON	Hand sets			TDA4420	£2.00
KT3-K30 chassis		BSB	£1.50			TDA4439	£2.00
No. RC5150-RC5176-RC5071-RC5177.		ICC5	£5.00			TDA4600	£3.00
Special Price	£13.00	IK2000	£5.00			TDA3180	£3.00
RC4001 KT3 and Teletex	£12.00	IK7000	£5.00			TDA3800	£3.00
TX10 Hand Set Text	£12.50	SRD 2	£1.00			TDA4260	50p
TX9 with Text	£12.50	SRD 3	£1.00			TDA4501	£3.00
TX9 & TX10 button print	£1.00	T780	£2.00			TDA4420	£2.00
TX10 Focus Pots	£4.00	SRD 4	£1.00			TDA4600	£3.00
Mains Stand By Switch with Coil	£1.00	TX85 - TX8 Ferguson	£10			TDA3180	£3.00
Nicam Boards		PANASONIC TV Video Handset				TDA3800	£3.00
Texas Instruments MKII	£15.00	1993 models with door-				TDA4260	50p
Toshiba Nicam Board	£6.00	3 types	£7.00 each			TDA4501	£3.00
Ferguson Nicam Board	£15.00					TDA4420	£2.00
Text-Type						TDA4600	£3.00
Replace Hand Set for Philips KT3-K30, K4 etc	£6.00					TDA3180	£3.00
Thorn Handsets						TDA3800	£3.00
9000-9600-TX9-TX10-TX100						TDA4260	50p
Text and Non Text	£10.00					TDA4501	£3.00
Philips RCS171 (Handset)	£8.00					TDA4420	£2.00
Sanyo Magnatron						TDA4600	£3.00
Type 2M218H	£10.00					TDA3180	£3.00
1992 to 1993 Mod.						TDA3800	£3.00
Orion Video Hand Set with LCD	£5					TDA4260	50p

SENDZ COMPONENTS

63 BISHOPSTEIGNTON, SHOEBURYNESSE, ESSEX SS3 8AF
NORMALLY SAME DAY SERVICE • SUBJECT TO AVAILABILITY
 No accounts • Technical information by telephone only • No credit cards
 Unless specified add £1.70 P/P to small orders • Additional charges for
 heavier items • Specific P/P charges are PER ITEM • For UK addresses
 please add P/P TO ORDER THEN 17.5% VAT TO TOTAL • This applies for the
 EC unless VAT No. is given • EXPORTS - P/P at cost •
 Postal Order/Cheque with order.
 Callers to shop - 212 London Road, Southend • Open 9.30-1, 2.15-5.
 Tel: 01702 332992 • Fax: 01702 338805 •
 GVMT/School orders on official headings

MARCONI COMPACT L.N.B. 1.DB £25 10.7 TO 11.7GHZ		Switched Mode Trans 3112. 338. 32642 Ferguson £1 Philips switched mode transformers for K40 £5		VIDEO AMSTRAD (L.C,D Types) HANDSETS (HOME MARKET) £4.00 (EXPORT) £2.50 WILL WORK IN HOME MARKET 6.000 and 4.600 4.700 £3 PBS00 Panic and Button Transmitter 180MHz £1.00 G11 CAP 250V. 470M £1.35 LEADS Scart to Scart all pin connected £2.00 1 1/2 meters		SEND FOR DATA D2 MAC SATELLITE RECEIVER £35 (£5 Post) TELEPHONE BATTERY SANYO 3.6V 250/MA - £2 VARTA 3.5V 280 MA £3.00 FEEDHORN FOR OFFSET ANTENNA £8.00 FOR NOKIA LNB'S £3.00 each Washer Kit included HITACHI U/V HAND SET VIDEO - £10			
SATELLITE RECEIVERS - New Ferguson BSB Chassis with Tuner, Modulator etc £10 Hand Set £1.50 £4 Post		33V33, 3V37 BATTERY £10 TX100 HAND SRT (785) £10 Power Supply 0-15 Volts 0-30 Volts 3 Amps with Meters £34 Post £5		SMALL SATELLITE TUNERS (950 to 1750 MHz), L.F. frequency 4000MHz VHF/UHF S BAND TUNER £9.00 each DAM MAINS CHASSIS AMSTRAD MONITOR C £3.00 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 KM0 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 NBC 1833 Solar & Battery Powered Calculator £8.00 THORN PANEL TV9 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 TX91F £2.00 THORN PANEL No.515-353, 548-02, 565-01, 509-102, 515-173, 508/161 £5.00 THORN TV STEREO SOUND O.P. PANEL (1 C 1A7227P) £1.00 THORN VIDEO AERIAL AMP (1) M4-597-001 £6.00 ULTRASONIC TRANSDUCER 15p		AMSTRAD MODULATOR SAT 510 £3 A.A.A. BATTERIES - 24 for £1		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 GREY OR BLACK £1.50 ET596A £5.00 5AMP MAINS LEAD WITH ET595A £5.00 PLUG SOCKET FOR TEST EQUIPMENT ETC. 06D4-025-001 Mains input choke for TX9 E4 THORN M494B1 on Remote Panel £5	
TX100 REMOTE PANEL No.564131C M293B/and SAAS012 £10 etc		6251 FRAME O/P THICK FILM HITACHI GEC £9.00 THICK FILM HITACHI HM9205A £4.00		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		TX100 SWITCH MODE TRANS 5157/48 £5 AND (0)D4252(0)1 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			
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		Hitachi Copr 2435062 £10 Hitachi 2433271 LOPT £10 Ferguson 2435121 TX85/TX86 £8 TX9 Remote Panels £5 TX10 Remote Panels £5 TX100 Remote Panels IC M293B/SAAS012 £10 TX100 Remote Panels with Stand by Battery £10 and IC's TX85-86-89-90-98-99-100 Tuners £4 Orion Modulator Video MDL K 8B513A £3.50 Hitachi Mains Switch with Stand by 50p Scart to 4 Phone Leads 1/2m £2.50 SX7202234 Sat. Tuner with Base Band Min £4		REGULATED PWR. SUP. 500M/A 1.5V-12V DC switched + & - £5.00 ELECTRONIC SWITCH Sat - TV - Video. All plugged into One Box SUMMARY OF THE SCART SYSTEM BENEFITS <ul style="list-style-type: none"> * Avoids picture quality loss which occurs when using the aerial socket connections. * Stereo audio inputs and outputs. * RGB signal inputs and outputs. * Simple to install - standardised connectors and no tuning. * Eliminates interference. * Provides 'Command' signals for the TV. £6		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 INFRARED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY POWER SUPPLY KIT 0.28 volts 1/2 amps with 2 meters £12 Printed circuit board and components			
LARGE Focus pots. Fits Pyc. GEC. ITT. Decca 75p		PHILIPS NEW TYPE U/V HANDSET £10		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		TX100 SWITCH MODE TRANS 5157/48 £5 AND (0)D4252(0)1 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			
BSB SAT/REC NEW. CHASSIS, TUNER AND MOD £5 + Post £3		Mitsubishi/RM M45/43308 Hand set £6 ICC 5 Hand sets £5 CASSETT MAINS LEAD 50p		REGULATED PWR. SUP. 500M/A 1.5V-12V DC switched + & - £5.00 ELECTRONIC SWITCH Sat - TV - Video. All plugged into One Box SUMMARY OF THE SCART SYSTEM BENEFITS <ul style="list-style-type: none"> * Avoids picture quality loss which occurs when using the aerial socket connections. * Stereo audio inputs and outputs. * RGB signal inputs and outputs. * Simple to install - standardised connectors and no tuning. * Eliminates interference. * Provides 'Command' signals for the TV. £6		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 INFRARED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY POWER SUPPLY KIT 0.28 volts 1/2 amps with 2 meters £12 Printed circuit board and components			
Have you got Acid Rain in your garden? PH METER £5.00 Post £5 Actuator Antennmotor £15.00		PHILIPS NEW TYPE U/V HANDSET £10		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		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 INFRARED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY POWER SUPPLY KIT 0.28 volts 1/2 amps with 2 meters £12 Printed circuit board and components			
LATEST VIDEO For Latest Philips, GEC, Pyc and Hitachi. Front panel with memory chip and push button and pots and LEDs - £6.00 NEW		TX100 FRONT PANEL £5 8 Button		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		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 INFRARED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY POWER SUPPLY KIT 0.28 volts 1/2 amps with 2 meters £12 Printed circuit board and components			
FERGUSON YELLOW SPOT TX100 NEW CHASSIS £12 £5 Post		TX100 FRONT PANEL £5 8 Button		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		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 INFRARED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY POWER SUPPLY KIT 0.28 volts 1/2 amps with 2 meters £12 Printed circuit board and components			
UNC HIGHZ NOKIA LNB FOR OFFSELDISH £13.00 ELECTROMAGNETIC POLARIZER 10.95-12.75GHZ £9.00 11GHZ LOW NOISE BLOK DOWN CONVERTER SCL 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		PHILIPS NEW TYPE U/V HANDSET £10		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		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 INFRARED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY POWER SUPPLY KIT 0.28 volts 1/2 amps with 2 meters £12 Printed circuit board and components			
2433752 £30 2432984 2432871 2432801 2435016 2433952 2433953 2432211 796JSA DNF850243 1F B3069D K41 O.P.T K40 2433452 2432904 2434451 £11		PHILIPS NEW TYPE U/V HANDSET £10		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		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 INFRARED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY POWER SUPPLY KIT 0.28 volts 1/2 amps with 2 meters £12 Printed circuit board and components			
SPLIT-DIODE 2433752 £15 EACH TX100 Green Spot £15.00 TX100 Yellow Spot 1 O.P.T. £10.00 TX90 White Spot 1 O.P.T. £15.00 796JSA DNF850243 1F B3069D K41 O.P.T K40 2433452 2432904 2434451 £11		PHILIPS NEW TYPE U/V HANDSET £10		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		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 INFRARED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY POWER SUPPLY KIT 0.28 volts 1/2 amps with 2 meters £12 Printed circuit board and components			
SATELLITE TUNER 950MHz (1750MHz) £5.00 TTT PANEL CMC 301 CMC 113 CMC 302 CMC 115 CMC 450 303 CMC 964 BRIDGE RECTIFIERS 10 FOR £1.00 4 Amp for Video Power Supply SELITT 1FB25412 Front Panel £15.00 DECCA - GEC - ITT 6 push button £5.00		PHILIPS NEW TYPE U/V HANDSET £10		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		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 INFRARED DETECTOR WIDE AND SHORT ANGLE WALL MOUNT £8 WITH RELAY POWER SUPPLY KIT 0.28 volts 1/2 amps with 2 meters £12 Printed circuit board and components			
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		TRANSFORMERS 2435701 £10 2434393 £10 2435016 £10 2435014 £10 2436797 2434494 £15 INFRA RED DETECTOR (for outside use) with Time Control & Distance Control £12 Sensitivity Adjustment Control Night Adjustment Time Delay Adjustment		SHARP MS101C709 £10 EACH 0004-235 002-01 Hand Set Type uv (£10) VIDEO MOTOR for VT1568 type VC610DS £8.00 AMP TUNER HF for VT1568 Hitachi & GEC £9.00 U/V 6. DIODE TRIPLERS £2.00 400 TO 8600 AMSTRAD VIDEO HAND SET WITH LED £10 NICAM MKII KIT MODULE £20.00 with data Burglar Alarm Has time delay to set £2 Mains Transformer £4.00 240v to 110V to 20v cut Lamp post £3			
2433752 £30 2432984 2432871 2432801 2435016 2433952 2433953 2432211 796JSA DNF850243 1F B3069D K41 O.P.T K40 2433452 2432904 2434451 £11		PHILIPS NEW TYPE U/V HANDSET £10		TRANSFORMERS 2435701 £10 2434393 £10 2435016 £10 2435014 £10 2436797 2434494 £15 INFRA RED DETECTOR (for outside use) with Time Control & Distance Control £12 Sensitivity Adjustment Control Night Adjustment Time Delay Adjustment		SHARP MS101C709 £10 EACH 0004-235 002-01 Hand Set Type uv (£10) VIDEO MOTOR for VT1568 type VC610DS £8.00 AMP TUNER HF for VT1568 Hitachi & GEC £9.00 U/V 6. DIODE TRIPLERS £2.00 400 TO 8600 AMSTRAD VIDEO HAND SET WITH LED £10 NICAM MKII KIT MODULE £20.00 with data Burglar Alarm Has time delay to set £2 Mains Transformer £4.00 240v to 110V to 20v cut Lamp post £3			
2433752 £30 2432984 2432871 2432801 2435016 2433952 2433953 2432211 796JSA DNF850243 1F B3069D K41 O.P.T K40 2433452 2432904 2434451 £11		PHILIPS NEW TYPE U/V HANDSET £10		TRANSFORMERS 2435701 £10 2434393 £10 2435016 £10 2435014 £10 2436797 2434494 £15 INFRA RED DETECTOR (for outside use) with Time Control & Distance Control £12 Sensitivity Adjustment Control Night Adjustment Time Delay Adjustment		SHARP MS101C709 £10 EACH 0004-235 002-01 Hand Set Type uv (£10) VIDEO MOTOR for VT1568 type VC610DS £8.00 AMP TUNER HF for VT1568 Hitachi & GEC £9.00 U/V 6. DIODE TRIPLERS £2.00 400 TO 8600 AMSTRAD VIDEO HAND SET WITH LED £10 NICAM MKII KIT MODULE £20.00 with data Burglar Alarm Has time delay to set £2 Mains Transformer £4.00 240v to 110V to 20v cut Lamp post £3			
2433752 £30 2432984 2432871 2432801 2435016 2433952 2433953 2432211 796JSA DNF850243 1F B3069D K41 O.P.T K40 2433452 2432904 2434451 £11		PHILIPS NEW TYPE U/V HANDSET £10		TRANSFORMERS 2435701 £10 2434393 £10 2435016 £10 2435014 £10 2436797 2434494 £15 INFRA RED DETECTOR (for outside use) with Time Control & Distance Control £12 Sensitivity Adjustment Control Night Adjustment Time Delay Adjustment		SHARP MS101C709 £10 EACH 0004-235 002-01 Hand Set Type uv (£10) VIDEO MOTOR for VT1568 type VC610DS £8.00 AMP TUNER HF for VT1568 Hitachi & GEC £9.00 U/V 6. DIODE TRIPLERS £2.00 4			



VIDEO SATELLITE RECEIVER

AMSTRAD VS1004/VS1104 and ORION-MATSUI

All panels except display panel and deck £30 – complete set of panels. Price to be agreed on individual panels

PLEASE NOTE:

The above must not be resold as a complete item

SENDZ COMPONENTS
 63 BISHOP-STEIGTON, SHOEBURNESS, ESSEX SS3 8AF
 NORMALLY SAME DAY SERVICE • SUBJECT TO AVAILABILITY
 No accounts • Technical information by telephone only • No credit cards
 Unless specified add £1.70 P/P to small orders • Additional charges for
 heavier items • Specific P/P charges are PER ITEM • For UK addresses
 please add P/P TO ORDER THEN 1 1/2% VAT TO TOTAL • This applies for the
 EC unless VAT No. is given • EXPORTS - P/P at cost
 Postal Order/Cheque with order.
 Callers in shop - 212 London Road, Southend • Open 9.30 - 5.15
 Tel: 01702 332932 • Fax: 01702 338605
 GVMIT/School orders on official headings