THE LEADING UK CONSUMER ELECTRONICS TECHNOLOGY MAGAZINE

SERVICING. VIDEO. SATELLITE. DEVELOPMENTS

FEBRUARY 1998 £2.50

A REED BUSINESS PUEL CATION

# LOPT Tester

Thomson TX805 chassis technology

The Onwa power supply

Language of digital TV

Toshiba service briefs





Fault Reports TVs, VCRs, Camcorders and Satellite

# The new Uni remote from Philex

Welcome to the Uni range of universal pre-programmed remote controls covering the leading brands of television.



- 1 BRAND-FOR-BRAND REPLACEMENTS Each Uni remote covers all the TV's from one major manufacturer as well as many clones
- 2 CODELESS SET-UP Ready to use in seconds - just follow the simple instructions and the Uni remotes are fully operational
- (3) TELETEXT AND FASTEXT All the Uni remotes support Fastext and a wide range of the other Teletext functions (as long as the original TV supports these functions)
- 4 PRE-PROGRAMMED FOR THE LATEST MODELS As well as operating current and earlier models the Uni remotes also contain preliminary information for operating new TV models
- **(5)** EASILY DISTINGUISHABLE FROM OTHER REMOTES Available in distinctive colours which makes it easy to pick out the uni from normal remotes
- **6** REPLACE BROKEN OR LOST REMOTES
- **7** CUSTOMER CARELINE AVAILABLE FOR ALL UK CUSTOMERS
- 8 BRANDS CURRENTLY AVAILABLE Panasonic - Sony - Phillips - Hitachi Mitsubishi - Nokia - Samsung





## CONTENT

February 1998

Vol. 48, No. 4

#### Day that changed the world 231

**Teletopics** 

DVD prospects in Europe, DVB latest and other news items including the FireWire high-speed data bus.

The Onwa TV Power Supply 236 Philip Blundell, AMIEEIE, and Stephen Brushforth on a widely used power supply that has been causing a number of problems. Includes a full description of the operation of the circuit.

Satellite Workshop

240

Jack Armstrong's column on satellite receiver servicing.

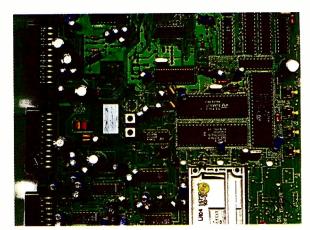
Test Case 422

241

242

Test Report: Service Training Tapes

Eugene Trundle reports on the current range of training tapes available from Visions Video Productions.



Pace PRD800/900 Modification

Martin Pickering, B.Eng., describes a modification that enables an otherwise unused microcontroller option to be employed for external control.

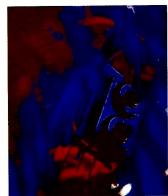


#### **Toshiba Service Briefs** 246

Know-how from Toshiba Technical on TV and projection sets, satellite receivers and VCRs.

#### **LOPT Tester** 248

Charles Ritchie describes a simple LOPT tester that uses a TBA920 chip and a switching transistor.



**Photography Mark Swallow** 

#### Monitors

250

More fault reports and servicing hints on computer monitors.

The Language of Digital TV 252 Now that digital TV is about to arrive we are going to

have to get used to a load of new terms and abbreviations. Mark Paul has compiled this helpful list for handy reference, starting with abbreviations.

#### What a Life!

256

Some reminiscences on earlier times then back to today's dud TVs and other equipment. Donald Bullock's column.

#### TV Fault Finding

258

#### Service Notebook

262

Hints and tips from John Edwards on tackling various TV and VCR problems.

#### Help Wanted

275

#### VCR Clinic

276

#### Satellite Notebook

278

Solutions to problems with satellite equipment and installations.

#### Thomson TX805 Technology

J. LeJeune starts on a two-part account of the technology used in this novel small-screen chassis.

#### Letters

284

#### **Long-distance Television**

286

Roger Bunney reports on terrestrial DX and satellite news and reception, the Hot Bird 3 line up, 1998 meteor shower dates and a Band I notch filter design.

John A. Reddihough

#### **Production Editor**

Tessa Winford

#### **Consultant Editor**

Martin Eccles

#### **Publisher**

Mick Elliott.

#### **Advertisement** Manager

Kate Hale 0181-652 3076

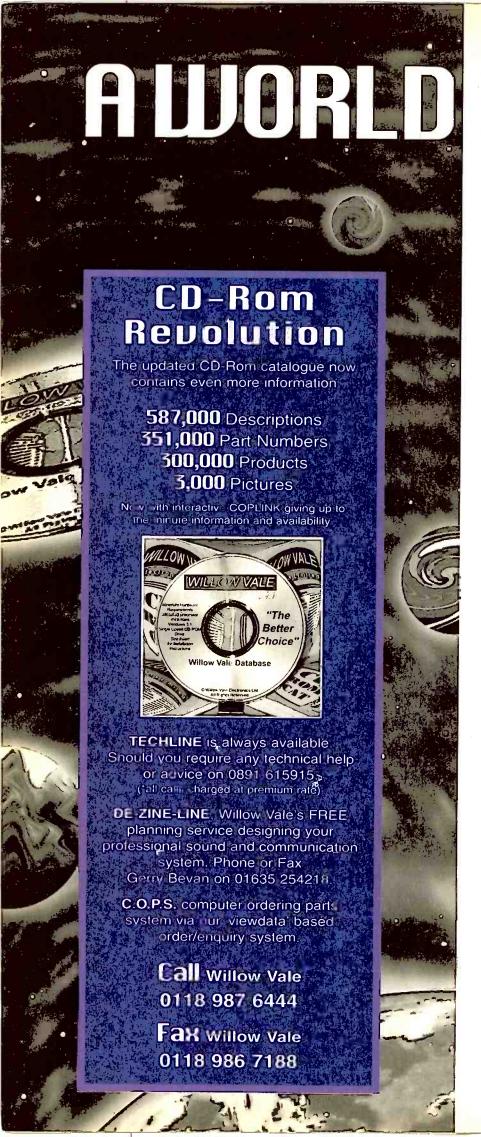
#### Advertisement Sales **Executive**

Pat Bunce 0181-652 8339 Fax 0181-652 8931

#### **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.



# OF SPARES

#### Authorised Spares and Accessories Distributors for:

- Sharp
- Philips
- JVC
- Grundig
- Tatung
- Pace
- Nokia
- Matsui
- Ferguson
- Saisho

Genuine manufacturers' parts available for many other premium brands.

#### Sound and Security Division Distributors for:

- Adastra
- Altai
- Aiphone
- Audio Technica
- Audix
- Baldwin-Boxall
- Bose
- Computar
- Domineye
- Eagle
- ERL

- Goodmans
- Inkel
- Jamo
- Millbank
- Next Two
- Philips
- Secure Care
- Shure
- TOA
- Trantec
- Univox

# WILLOW VALE

#### 'The Better Choice'

#### **READING HEAD OFFICE**

Tel: 0118 986 0158 Fax: 0118 986 7188

#### MANCHESTER BRANCH

Tel: 0161 682 1415 Fax: 0161 682 9031

### The day that changed the world

Just over fifty years ago, on December 16th 1947, Drs Walter Brattain and John Bardeen, working at the Bell Telephone Laboratories, made a discovery that was to change the world as we know it. They were investigating the properties of the semiconductor material germanium, in particular surface potentials under various conditions, using two very closely spaced (one or two thousandths of an inch) metal probes, when it was noticed that a change of current flowing via one contact influenced the current flowing via the other one. In particular they discovered that when one metal-to-semiconductor contact was forward biased and the other one was reverse biased there was a power gain. For the first time, amplification had been achieved with a solid-state device. How did they come to be carrying out these experiments? Although they had discovered the basis of the bipolar transistor, that had not been their aim. They had discovered the transistor effect by accident!

The use of semiconductor material for various electrical/electronic purposes preceded the thermionic valve era. Electrical non-linearity in metal sulphides such as galena (lead sulphide) and pyrites (iron/copper sulphides) was demonstrated by Ferdinand Braun in 1874. This led to the development of metal rectifiers and crystal detector diodes. The most common device for radio work was the catswhisker, which consisted of a springy metal wire that pressed against the surface of a piece of galena. It was not an ideal arrangement: you often had to adjust the contact for optimum performance by varying its pressure and position. But it worked, and was successful to the extent that crystal sets outnumbered valve sets until 1927.

So the semiconductor rectifier/detector had long been known. In the early Twenties a Russian experimenter, Lossev, described a device using zincite (zinc oxide) and two catswhiskers. How far he got with his experiments is uncertain. In 1925 Dr Julius Lilienfield, in New York, came up with the idea of using an electric field to alter the conductivity within a block of semiconductor material – what we now know as the field-effect transistor. Although he filed a patent, neither he nor anyone else at the time was able to produce such a device. What Bardeen and Brattain, with Dr William Shockley, were trying to do in 1947 was to create a field-effect device. They couldn't understand their failure, which John Bardeen suggested was because surface states prevented the field penetrating the block. Hence the experiments with surface conductivity, which led to the discovery not of the FET but the point-contact germanium transistor.

Most books quote 1948 as the date of the discovery of the transistor effect, for which Brattain, Bardeen and Shockley received the Nobel Prize in Physics in 1956. This is because Bell didn't make a public announcement – and demonstration – until June 30th 1948. They had been working

out the theory and getting the patent situation sorted out. Shockley had established the theory by the end of January 1948, and on the basis of this proposed the junction transistor, with pn junctions within a block of semiconductor material. The first junction transistor, again a laboratory device, followed in February 1948. It proved that bulk rather than surface effects were the basis of the bipolar transistor effect.

The announcement of the transistor in mid 1948 produced little public response. It was, after all, still a laboratory device. But the technology rapidly evolved, and it wasn't long before transistors started to be used in hearing aids. Transistor radios first appeared in 1954/5. The Regency in the USA in 1954, produced by collaboration between the IDEA Corporation and Texas Instruments, and a Sony set in 1955. The transistor radio came to the UK in 1957, with models from Cossor and Perdio.

The devices then in use were all germanium ones. They suffered from various limitations – temperature stability, voltage restrictions etc. It was hoped that more robust devices would be possible if silicon could be used as the semiconductor material. But purifying silicon was more difficult. Texas Instruments solved this and announced the production of the first practical silicon transistor in 1954. A further major step came with the advent of the silicon planar transistor, which protected the collector-base junction from contamination during manufacture.

From the late Fifties on the transistor gradually took over from the thermionic valve as yields increased and prices fell – with early production methods you'd be lucky to get ten per cent of usable devices (yield) from a semiconductor wafer. The valve market peaked in 1955 (by volume) and in 1957 (by value). In the consumer electronics market the transistor, in its original and subsequently its IC form, has made it possible to produce smaller and smaller products and to pack more and more features into such items as TV sets and VCRs. But perhaps the most significant impact of the transistor was in the computer field. Computers started to do far more and to cost far less as more and more transistors were packed in. The ubiquitous PC, on which we all now rely, would have been an impossibility in the thermionic valve era.

It is doubtful whether Drs Bardeen, Brattain and Shockley could have foreseen what lay ahead when they made their discoveries. But what they came across was to do more than anything else to change the world in which we live, making modern electronics and all the things that rely on it possible. What about the field-effect transistor they were after? The first commercial FET, a junction device, appeared in 1958, at roughly the same time that Texas Instruments produced the first IC. The metal-oxide silicon transistor (MOSFET), which was to give a further major impetus to semi-conductor technology, appeared in the early Sixties.

#### COPYRIGHT

© Reed Business Information Ltd., 1998. All rights reserved. No part of this publication may be reproduced, stored or transmitted in any form or by any means without the written permission of the publishers.

All reasonable precautions are taken by *Television* to ensure that the advice and data published 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", Reed Business Information, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Editorial correspondence should be addressed to "Television", Editorial Department, Reed Business Information, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

#### INDEXES AND BINDERS

Indexes for Vols. 38 to 47 are available at £3.50 each from SoftCopy Ltd., who can also supply an eight-year consolidated index on computer disc. For further details see page 291.

Binders that hold twelve issues of *Television* are available for £6.50 each from Television Binders, 78 Whalley Road, Wilpshire, Blackburn BB1 9LF. Make cheques payable to "Television Binders".

#### **BACK NUMBERS**

Some back issues are available at £3.00 each. For further details see box on page 243.

#### SUBSCRIPTION ENQUIRIES

 Telephone:
 01444 445 566

 Fax:
 01444 445 447

 Credit card orders:
 01622 778 000

Address: Television, Subscriptions Dept, PO Box 302,

Haywards Heath, West Sussex RH16 3YY, UK. Make cheques payable to: Television

Subscription rates:

UK £32.00 per year Airmail Eire £36.00 per year Airmail Europe £46.00 per year Airmail Rest of World £59.00 per year

#### **NEWSTRADE ENQUIRIES**

Distributed by MarketForce

**Telephone:** 0171 261 7704

#### **WEB SITE**

For a full list of RBI magazines: http://www.reedbusiness.com

ISSN 0032-647X



## http://www.telepart.co.uk

Possibly a FIRST AGAIN, you can search our www site for video spares, semiconductors, remote controls, satellite gear, line output transformers and CCTV components. Its simple and will only cost the price of a local call. You can order parts, enquire about parts, or simply send a message. All at the cost of a local call. If you don't have the gear to access the internet get straight in touch with your local computer supplier or ask us for a fact sheet.

# Have you AGGESS OF VISA

- Economic supply TV & Video parts very Fast
- Our experienced staff WANT WANT WANT to help you which contains we can give you an instant answer from our database which contains over 100,000 references and we can give that answer IN SECONDS
- If we can't find it immediately, we will **HASSLE & HASSLE** our supplier, **HASSLE** the manufacturer. We will make phone call after phone call, and Fax after Fax on your behalf. **WE WILL DO ALL THIS FOR YOU**.

We do it willingly and for FREE YOU NEED ECONOMIC!

								all and a second								
1N4001	. 0.03	2SC2274	0.35	AA119	0.36	BC557 .	0.09	BT151500R	1.12	BZX6122	0.10	MAX232CPE	4.70	T4 70010	2.00	
1N4002	0.04	2SC2335	1.12	AC127	0.36	BC557B	0.09	BT151300R	1.12	BZX6122	0.19			TA7281P	3.20	TDA3654Q 2.82
1N4003	0.03	2SC2458	0.84	AD162	0.71	BC558B	0.18	BU208A	1.46		0.07	MC13002P	7.69	TA7698AP	5.97	TDA4500 4.66
1N4003	0.03	2SC2482	0.35	AF127	2.48	BC558B	0.18			BZX6133	0.19	MC7812CT	0.77	TA7778P	5.11	TDA4501H 9.57
1N4004	0.06	2SC2570A	0.38					BU208D	1.61	BZX6136	0.19	MJ15003	2.23	TA8205AH	4.50	TDA4503 4.00
1N4005	0.06	2SC2570A 2SC2655		AN5265	1.76	BC559B	0.14	BU2508AF	1.58	- BZX613V9	0.14	MJ2955	0.77	TA8210AH	0.00	TDA4505E 7.35
			0.31	AN5512	1.76	BC560C	0.11	BU2508DF	1.58	BZX615V6	0.11	MJ802	2.91	TA8210H	4.79	TDA4505M 11.97
1N4007	0.04	2SC2705	0.35	AN5515	2.79	BC635	0.23	BU326A	1.36	BZX6168	0.11	MJE13005	0.86	TA8215H	4.96	TDA4510 2.74
1N4148	0.06	2SC2785	0.36	AN5521	1.66	BC636	0.14	BU406	0.69	BZX616V2	0.11	MJE18004	2.05	TA8216H	8.01	TDA4580 10.05
1N5062	0.14	2SC3225	0.60	AN5601K	9.74	BC637	0.11	BU426A	0.86	BZX616V8	0.19	MJE3055T	0.45	TA8221H	0.00	TDA4600 2.14
1N5401	0.14	2SC3330	0.52	AN7171K	5.56	BC639	0.21	BU500	1.41	BZX617V5	0.09	MJE340	0.45	TA8403K	2.31	TDA4600/2/3 2.82
1N5402	0.14	2SC3400	0.17	AN7190K	11.11	BC640	0.11	BU500S	2.05	BZX618V2	0.19	MJF18004	2.05	TA8427K	3.76	TDA4601 1.46
1N5404	0.13	2SC3423	0.60	BA157	0.09	BC846B	0.52	BU508A	1.29	BZX619V1	0.09	MJF18204	6.07	TA8718N	7.69	TDA4601D 1.46
1N5408	0.09	2SC369	0.06	BA158	0.07	BC848B	0.35	BU508AF	1.32	BZX61C22V	0.11	MN650	1.71	TA8739P	6.01	TDA4605 4.10
1N6263	0.20	2SC3807	0.91	BA159	0.11	BC848C	0.41	BU508APH	1.99	BZX7910	0.30	MPSA06	0.35	TAA550B	0.31	TDA46052 1.97
1N914	0.02	2SC3953	0.72	BA3910B	6.99	BC856B	0.21	BU508D	1.56	BZX7912	0.11	MPSA13	0.18	TBA120S	0.89	TDA4950 1.76
1844	0.11	2SC4517A	3.14	BA5406	2.14	BC858C	0.19	BU508DF	1.88	BZX7936	0.10	MPSA63	0.18	TBA120U	0.47	TDA7240A 2.57
2N2222A	0.23	2SC458	0.18	BA5412	2.48	BC875	0.33	8U508V	2.40	BZX793V9	0.09	MPSA93	0.11	TBA820M	0.35	TDA8138 3.59
2N3055	0.50	2SC4742	5.11	BA6209	1.18	BD131	0.33	BU536	1.65	BZX795V6		MR856		TDA1013A	1.56	TDA8140 4.62
2N3055H	1.29	2SC4769	4.02	BA6209N	1.27	BD132	0.26	BU806	1.03		0.09		0.11	TDA1015	1.37	TDA8145 . 1.97
2N3773	1.52	2SC536	0.30	BA6219B	1.76	BD132				BZX796V2	80.0	NE555	1.03	TDA1015	4.27	
2N3904	0.32	2SC945					0.46	BU908	1.68	BZX79C33	0.11	NE555N	0.43	TDA10351		
2N4401			0.11	BA6222	1.70	BD139	0.31	BUH515D	2.14	BZX79C5V1	0.11	P600A	0.33		1.43	TDA8172 2.65
	0.11	2SD1207	0.57	BA6247	1.95	BD140	0.24	BUK444500B		BZX853V9	0.11	P6KE130A	2.55	TDA1060 TDA1085C	1.08	TDA8175 6.41
2N555	0.12	2SD1246	0.30	BAT43	0.52	BD233	0.23	BUL54AR	1.27	BZY8812	0.09	P6KE180A	4.65	TOATUSO	. 2.74	TDA8178FS 5.95
2SA1013	0.35	2SD1275	1.41	BAT85	0.96	BD234	0.36	BUT11	0.65	BZY882V7	0.23	PIC16C8404:		TDA1170	1.82	TDA8180 4.87
2SA1015	0.11	2SD1276	1.39	BAV21	0.21	BD237	0.31	BUT11A	0.95	BZY883V0	0.11	R2KL -	0.77	TDA1170N	2.57	TDA8190 3.59
2SA1020	0.44	2SD1292	0.64	BAX14	0.17	BD238	0.24	BUT 11AF	1.18	BZY884V7	0.09	R2M	0.84	TDA1170S	2.05	TDA8350Q 5.56
2SA1029	0.26	2SD1 330	0.31	BC107B	0.20	BD243	0.45	BUT12A	1.17	BZY885V1	0.13	R4050	3.04	TDA1180P	2.48	TDA8380 2.53
2SA1048	0.19	2SD1397	2.31	BC108	0.24	BD243A	0.60	BUT12AF	1.87	BZY88C12V	0.09	REGBABY10	13.00	TDA1516Q	3.59	TDA9503 2.13
2SA1145	0.36	2SD1398	2.14	BC109A	0.00	BD243C	0.44	BUT18AF	1.37	CD4001	0.24	RG2	0.64	TDA1518Q	4.27	TEA1039 2.11
2SA1 286	0.60	2SD1426	3.51	BC141	0.36	BD244A	0.34	BUT56A	1.19	CD4017	0.47	RGP10G	0.26	TDA1519A	2.74	TEA2018A 2.29
2SA1370	0.43	2SD1427	2.91	BC147A	0.24	BD244C	0.43	BUV48A	1.97	CD4049	0.35	RGP15G	0.33	TDA1520B	4.50	TEA2029C 7.04
2SA1706	0.50	2SD1432	5.04	BC148A	0.35	BD245C	0.94	BUW11A	1.32	CD4052	0.29	RGP15J	0.17	TDA1524A	7.52	TEA2031A 4.26
2SA733	0.18	2SD1439	5.86	BC148B	0.11	BD433	0.29	BUW41B	1.39	CD4053	0.61	RGP15M	0.44	TDA1553Q	4.79	TEA2164 3.40
2SA872A	6.10	2SD1441	5.98	BC158B	0.12	BD434	0.31	BUW84	1.03	CNX62A	1.29	RGP30M	0.30	TDA1554Q	8.12	TEA2260 2.48
2SA933	0.36	2SD1453	3.85	BC168	0.04	BD436	0.52	BUX84	1.03	CNX82A	2.10			TDA15570	4.23	TEA2261 3.68
2SA940	0.82	2SD1497	4.74	BC182	0.14	BD437	0.52	BUZ71A	1.03	CNX83A	2.55	S2000A	2.57	TDA1558Q	7.69	TEA5101A 6.48
2SA950	0.18	2SD1541	4.96	BC182L	0.14	BD437 BD438						S2000A3	3.59	TDA1670A	2.98	TIC106D 0.82
2SA966	0.41	2SD1541	5.95	BC184A			0.38	BUZ80	3.52	CNY75B	0.52	S2000AF	1.46	TDA1675A	3.85	TIC246D 1.54
2SA992	0.41	2SD1548	3.25	BC184A BC184L	0.12	BD681 .	0.47	BUZ80A	4.15	DTA114ES	0.31	S2055AF	3.74	TDA1904	1.63	TICP106D 0.60
2SA992 2SB1010	0.31	2SD1554 2SD1555			0.06	BD826	0.43	BUZ90A	3.40	DTC124ES	0.77	SAA129302		TDA1908A	5.61	TIP110 0.35
2SB1010 2SB1066	0.35		2.65	BC187	0.47	BD839	0.57	BUZ90AF	3.30	DTC144ES	0.19	SAB3035	1.71	TDA2002	1.12	TIP112H 0.77
		2SD1556	5.11	BC212	0.09	BD901	0.52	BY127	0.18	FR605	1.90	SG264A	12.88	TDA2002	1.83	TIP120 0.40
2SB1143	0.77	2SD1651	2.38	BC212B	0.19	BD902	0.60	BY133	0.08	FXT749	0.43	SGSIF344	10.70	TDA2006	1.06	TIP122 0.40
2SB1243	0.60	2SD1858	0.43	BC212L	0.18	BD911	0.52	BY206	0.20	HA13001	3.85	SL1430	1.92	TDA2030H	0.91	TIP2955 0.89
2SB560	0.43	2SD1877	2.14	BC237	0.12	BDT64C	1.18	BY227	0.13	HA13119	2.05	SL1431	2.82	TDA2030V	1.46	TIP295 0.89
2SB643	0.29	2SD1878	2.63	BC237B	0.19	BDT65C	1.68	BY228	0.26		13.20	SN74141N	0.17	TDA2050		
2SB647	0.57	2SD1879	3.16	BC238	0.11	BF194	0.22	BY2291000	1.31	HA51338SP3	7.69	STK4132II	10.00		4.56	TIP3055 1.08
2SB649A	0.77	2SD1884	3.35	BC238B	0.16	BF195	0.07	BY255	0.14		14.32	STK4141II	10.23	TDA2270	12.08	TIP31A 0.36
258688	1.61	2SD1887	3.56	BC307	0.06	BF197	0.18	BY299	0.18	ICH28I	0.26	STK4142II	9.40	TDA2540	1.29	TIP32C 0.40
2SB698	0.35	2SD288	0.85	BC307B	0.15	BF199	0.18	BY397	0.20		15.79	STK4152II	10.95	TDA2541	1.12	TIP35C 1.82
2SB716	0.43	2SD350A	1.97	BC308	0.09	BF258	0.04	BY398	0.16	IRFBC40	5.98	STK4192II	14.64	TDA2577A	3.45	TIP41C 0.65
2SB772	0.50	2SD381	1.66	BC308A	0.09	BF420	0.21	BY399	0.12	KIA6210AH	6.15	STK5332	2.82	TDA2578A	3.20	TIP42C 0.52
2SB774	1.61	2SD400	0.34	BC308C	0.26	BF421	0.24		0.30	LA4270	2.73	STK5342	4.07	TDA2579A	4.91	TIPL761A 1.85
2SB891	0.60	2SD401A	0.77	BC309B	0.10	BF422	0.19	BYD14J	0.35	LA4280	3.12	STK5372H	6.84	TDA2581Q	2.57	TIPL791A 1.25
2SB892	0.35	2SD468	0.28	BC327	0.10	BF423	0.14	BYD33D	0.12	LA4282	5.11	STK5421	9.52	TDA2582	3.85	TL072CP 1.03
2SC1008	0.24	2SD667	0.38	BC328	0.14	BF459	0.43	BYD33J	0.12	LA4445	3.45	STK5421		TDA2593	1.12	TMP47C432AP8189
2SC124	0.48	2SD669A	0.64	BC337	0.14	BF471	0.43	BYD33M	0.16	LA4460			8.12	TDA2600	7.69	15.19
2SC1318	0.19	2SD718	1.90	BC338	0.14	BF487					2.50	STK7253	7.69	TDA2611A	0.64	TMP47C434N3537
2SC1473	0.19	2SD756	0.47	BC368			0.57	8YV10-40	2.55	LA4700	4.27	STK7308	6.41	TDA2611AQ	1.32	15.22
2SC1473 2SC1573					0.18	BF491	0.41	BYV95B	0.21	LA6324	2.05	STK7348	5.74	TDA2653A	4.70	TMP47C434N3555
	0.52	2SD837B	1.12	BC369	0.18	BF494	0.12	BYV95C	0.28	LA6510	2.94	STR11006	7.37	TDA3190	2.05	16.63
2SC1675	0.14	2SD856	0.79	BC372	0.53	BF759	0.38	BYV96D	0.27	LA7830	1.88	STR4211	9.40	TDA3330	14.21	TPU2732 10.05
2SC1685	0.21	2SD882	0.43	BC546A	0.11	BF869	0.38	BYV96E	0.53	LA7832	2.40	STR50020	9.38	TDA3505	2.40	U2829B 3.40
2SC1740	0.16	2SD898B	6.41	BC546B	0.12	BF871	0.41	BYW56	0.31	LA7835	2.99	STR50103	4.48	TDA3560	6.13	UC3842 1.46
2SC1815Y	0.11	2SD965	0.67	BC547	0.11	BF959	0.18	BYW95C	0.21	LA7837	4.19	STR50103A	5.56	TDA3561A	3.85	UC3844 1.20
2SC2001	0.23	2SD965R	1.05	8C547A	0.04	BF960	0.30	BYW96E	0.50	LC7132	4.70	STR54041	5.15	TDA3562A	4.62	UC3844N 1.91
2SC2023	3.18	2SK1117	3.40	BC547B	0.11	BF970	0.43		0.23	LED3G	0.10	STR5412	4.02	TDA3565	2.74	UPC1318AV 3.85
2SC2073	1.03	2SK1118	3.40	BC548	0.11	BFR90A	0.68	BZV10	1.34	LED3R	0.10	STR5B041	3.42	TDA3566	6.41	UPC1365C 1.70
2SC2078	1.00	2SK30A	0.35	BC548A	0.11	BFY51	0.39		0.15	LED3Y	0.10	STR59041	8.11	TDA3576B	10.31	UPC1378H 1.71
2SC2120	0.23	7407	0.69	BC548B	0.06	BR100	0.18		0.16	LM317T	1.29	STR6020	6.07	TDA3576B	4.60	
2SC2229	0.31	74HC04	0.88	BC548C	0.14	BR103	0.62		0.10	LM324N	1.48	STRD1816	7.69	TDA3592A	5.98	
2SC2230	0.55	7805	0.78	BC549B	0.11	BRX44	1.02		0.13	LM339N	0.50		10.64	TDA3640	11.04	
2SC2235	0.36	7806	0.60	BC550B	0.16	BRX49	0.43		0.28		11.85	T9053V	1.35			UPC1498H 2.31
2SC2236	0.36	7809	0.69	BC550C	0.09	BRY55	0.43		0.28	M5218L				TDA3653B	1.54	UPC574J 0.86
2SC2240	0.21	7812	0.52	BC556A	0.05	BSX20	0.28				0.69	T9064V	1.87	TDA3653C	2.82	X2402P 5.78
2SC2271	0.67	78L05	0.35	BC556B	0.11	BT139600	1.29		0.19	M54544L M58655P	2.04	TA7120P	0.66	TDA3653CQ	2.57	ZTK338 0.28
2002271	0.07	7000	0.33	000000	0.14	01133000	1.29	BENDIZU	0.19	MJ6033F	4.96	TA7280P	2.74	TDA3654	1.44	ZTX650 0.51

32 Temple Street, Wolverhampton, WV2 4AN, UK Tele ++ 44 (0)1902 773122 Fax ++ 44 (0)1902 29052

# ECONOMIC

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

over 100,000 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 RECBABYIO each \$ 3.00 TEA2018A BU208A X.5 \$3.75 BUT BU508A X.5 \$4.15 BUT BU508AF X.5 \$3.50 CNX BU508D X.5 \$4.45 UC30 Philips type 1.2 volt Back up battery X.5 Philips type 2.4 volt Back up battery X.5 **BUTIIAF** £1.75 BUTTIA CNX62A £3.00 UC3842 \$4.50 \$8.75 X 2 X10 Scart - Scart lead 1.5m Fully wired Standard video sensor lamp X10 X5 Std video sensor lamp + plug 3V29 etc. Belt kit 3V35/36 etc. Belt kit X5 X5 **S5.50** VT11E etc. Belt kit Positor PT37, TH98009 (White) Thorn TX100 Green spot LOPTX each \$12.95 (please add \$1.00 handling all + VAT) and now ask

Satellite division Satellite division Satellite o

# PSU repair - refurb kits

ETT1 84.95 Pace - PRD800,PRD900,PSR800,PSR900, Perguson SRD5,SRD16,Grundig STR1, Maspro SRE250S/1,S50S/1, Philips STU802/05M, Manhattan 850,950 Goodmans ST700, Toshiba TU-SD200,SAT99 ETT2 88.95 Pace - SS900,9200,9210,MRD920, Perguson SRVI, Grundig GRD2000,3000, Philips STU801, Network 900,9200, Bush IRD150, Nokia SAT1500, Maspro SRE2508,3508,4508,Alba SAT6600, Fintus SR5700, Thompson SRS4 ETT3 66.95 Amstrad - SR510,520,540,SRDR45,SRDS50 ETT4 66.95 Amstrad SRD 500 EIT4 86.95 Amstrad SRD 500 EIT6 86.95 Pace D100,120

KITS 86.95 Amstred SRX320,340 etc (export models) KITS 86.95 Churchill D2MAC decoder KIT9 29.45 Pace MSS200,300,Apollo

ETT11 25.95 Ferguson SRD4 ETT13 229.71 Echoetar SR6500,7700,8700

ETT15 ET.26 Milmitec (Sorenson PSU type only)
ETT16 85.95 Ametred SRD700\_SR950\_SR01100\_301\_501\_1002\_2001\_SRD2000\_SAT250

KIT12 #16.45 Echostar SR5500(early PSU with adjuster) ETT14 823.95 Amstrad SRD600 Treats and Office

ETT10 £13.11 Pace MSS500,1000

KITS 85.95 Pace MSS100

Satellite division Satellite division

X 2

X 2 X 5

X 2

STK5481

STR50103

TDA3653B

TDA3654

S2000AF

"The Satellite Repair Manual"

You could say that what Martin Pickering doesn't know about satellite receivers isn't worth knowing. What he does know has become legendary. Having been at it since the start of consumer satellite TV, he has built up a massive data base on satellite receivers. Not only on their faults, common and less common but also on modifications and upgrades. Martin brings in-depth expertise to the subject, having previously been involved with equipment reliability testing and component specification. This component specification. book has become established as a bible for satellite TV repair. But

SATELLITE REPAIR MANUAL

(strictly while stocks last)

£10.00

£5.90 £5.25

£1.80

£1.80

the subject doesn't stand still. New models, new faults - there is always something to add, So here we have the fourth edition, which has been completely updated and now has 240 pages - the previous edition had 135. In addition to receiver fault notes and general information you'll find many useful button sequences for resetting parental lock codes, resetting installation choices to factory defaults and other less well known operations, practical information on LNBs with typical current drains, a list of manufacturers and suppliers addresses and other useful material, all presented in a nice Wire-0 binding so that the book lies flat on the bench.

Recoup the cost with your first repair! £.16.95

32 Temple Street, Wolverhampton, WV2 4AN, UK Tele ++ 44 (0)1902 773122 Fax ++ 44 (0)1902 29052

# TELETOPICS

#### **DVD Marketing Developments**

The DVD Steering Committee has voted to make Dolby Digital audio (AC3) one of the manadatory audio specifications for PAL DVD discs. As a result, disc producers can encode PAL DVD discs with either Dolby Digital or MPEG-2 audio. The previous version of the DVD specification stated that discs for PAL territories would use MPEG-2 audio, other formats such as Dolby Digital being optional.

According to Dolby over 600 DVD titles have been launched, most encoded with Dolby Digital audio, while almost all the 600,000 DVD players that have now been sold worldwide have Dolby Digital. Over 250,000 5.1-channel

Dolby Digital decoders have been sold worldwide, 45,000 in Europe.

Many manufacturers plan to launch PAL DVD players with dual Dolby Digital/MPEG-2 audio decoders. Despite this agreement it now looks as if an autumn instead of a spring launch for DVD is Europe is more likely, because of lack of software (discs to play). The Hollywood studios have in turn put the blame on failure to provide MPEG-2 audio encoders and the problem of having to produce different versions of discs for different countries.

Nimbus Manufacturing (UK) plans to invest almost £3m on manufacturing DVD discs in Europe. The company has installed DVD production equipment plant at Cwbran in Wales. This is expected to become operational in March.

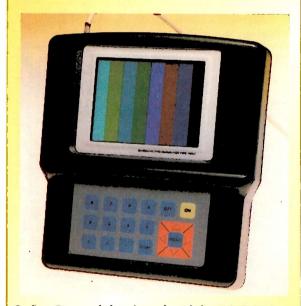
Microsoft and Toshiba are working together to make DVD and the Windows 98 PC operating system compatible. Toshiba is helping

Microsoft develop support for DVD navigation.

The US company Hide and Seek Technology has developed an alternative play-and-dispose DVD system. Discs are coated with a photosensitive polymer that darkens over time, making the disc unplayable. The previously announced Divx system uses a clock-controlled encryption system.

DVD's take-off in Japan has been slower than anticipated. To try to stimulate the market, Matsushita, Toshiba and Japan's largest video and CD rental group, Culture Convenience Club, have formed an alliance. CCC will rent software and players while Matsushita and Toshiba will each take a 19-9 per cent stake in a CCC subsidiary which owns software publishing rights.

There is still disagreement over the DVD-Audio specification. Launch of the format will be late this year at best.



Swires Research has introduced the TVA97 TV analyser. It's a portable spectrum analyser with built-in terrestrial and satellite TV demodulators. Designed specifically for cable and satellite TV installation and testing, the redesigned Swires' spectrum analyser provides increased versatility and can offer customer confidence by displaying the picture as it will be seen.

The TVA97 weighs less than 4kg. It provides three hours' continuous operation and a complete set of digital and anlogue functions.

For further information call Jason Kaplan on 01268 417 584 or fax 01268 419 083.

#### More Monitors

Acer, Taiwan's largest PC manufacturer, is investing £25m in a plant at Wentlooge near Cardiff to produce computer monitors and peripheral equipment. Production is expected to begin in August, and the plant will have a 2m a year monitor production capacity when

complete. Computer assembly is also under consideration.

ADI Manufacturing UK, another Taiwanese-owned company, is to establish a computer monitor plant at Cramlington near Newcastle upon Tyne. The investment will amount to some £10.5m.

#### **Cable TV**

The latest figures from the ITC show that broadband cable services are now available to well over ten million homes in the UK – there was an increase of almost three quarters of a million home passes during the third quarter of 1997, the largest increase in the history of the UK cable industry. Over three and a quarter million homes are now connected, the national connection rate being 32.4 per cent,

the highest ever. The total number of telephone lines installed by cable operators has also risen above the three million mark. A consortium of cable companies – Telwest, Diamond Cable, NTL and General Cable – has formed Front Row. This movies-on-demand service is due to be launched in the present quarter. Agreements have been reached with Warner Brothers and Columbia Tristar.

#### **FireWire**

You will probably come across the term FireWire increasingly often in the coming months. It's a high-speed serial data link that uses the IEEE1394-1995 standard. This was originally designed – in 1994 – for linking multimedia peripherals.

The first products to use the system are due to start appearing shortly. Intel is understood to be delivering prototype motherboards with the FireWire-1995 interface, using software by Microsoft. Sony has announced a digital colour camera, Model DFW-V300, with a FireWire port so that, for example, video data can be fed into a PC for processing. Sony hopes to launch another six image-sensing products with the FireWire facility later this year.

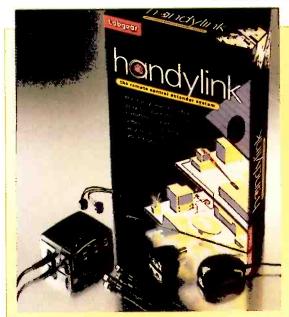
Texas Instruments has just introduced new chips (see photograph) that conform to IEEE1394-1995 and its enhancement 1394.a. These are an Open Host Controller Interface

(OHCI) and a new family of 400Mbits/sec physical layer interface chips. They will form part of digital signal processing applications in DVD players, digital VCRs and TV sets, and similar equipment.

The OHCI (an industry standard specification) interface controller, to be called OHCI-Lynx, co-ordinates reception, transmission and routing of data over the 1394 bus and manages bus interfacing with memory. The physical layer interface chips perform the transceiver functions of initialising the 1394 communications link, arbitrating access to the channel and placing data packets.

Texas Instruments can be reached on 01604 663 399.

We will be publishing an article on FireWire shortly. A more advanced specification, IEEE1394-1998 or -2000, is being discussed by industry and the standardisation bodies.



The Labgear Handylink remote-control extender system enables households with several TV sets connected to a distribution amplifier to control equipment from another room in the house. Satellite, video and hi-fi equipment can be controlled without having to point the handset at it. The system works by receiving the remote-control command then sending it via the distribution amplifier to a base unit, and from there to sender buttons attached to the VCR, satellite receiver etc. under control. These buttons retransmit the control signal, operating the equipment as if the handset had been pointed at it directly.

Handylink is compatible with most TV and standard IR remote-control systems. Only an existing coaxial link between the equipment to be controlled and the extra control site is required. Since the system uses existing coaxial cable, it's quick and easy to install and there is no risk of interference to other equipment. Some three million UK homes have coaxial distribution systems in place.

#### The IEEMIE

Earlier last year members of The Institution of Electronics and Electrical Incorporated Engineers (IEEIE) and The Institution of Mechanical Incorporated Engineers voted in favour of combining to form The Institution of Incorporated Engineers in electronic, electrical and mechanical engi-

neering. Since then The Institute of Engineers and Technicians has decided to join the combined Institution, creating a total membership of some 38,000.

The official launch of The Institution of Incorporated Engineers in electronic, electrical and mechanical engineering will be held on April 2nd, in London.

#### **DVB** Latest

The ITC has granted British Digital Broadcasting (BDB) Multiplex Service Licences B, C and D to provide digital terrestrial TV (DTT) services. There are several conditions to the licences, including agreement with programme supply companies to be limited to five years, a requirement to support non-exclusive technical standards for receiving equipment, and that Granada's equity stake in BSkyB doesn't affect competition between BDB and BSkyB. The granting of the licences follows discussions with the European Commission's competition authorities. This seems to mean that the EC has given its approval, though it won't say so formally.

The first DTT services are expected to be launched this autumn. BDB plans to offer fifteen channels initially, including three Pay-TV channels sourced from BSkyB. It is expected that BDB will shortly

announce the names of the companies which have been given licences to manufacture DTT set-top decoder boxes. The front runners are believed to be Philips, Panasonic, Pace, Toshiba and Amstrad.

BDB has also announced its commitment to the inclusion of interative features with its services. The company has been negotiating terms with internet television providers such as Web TV (Microsoft) and Navio (Oracle) for the inclusion of internet-based services.

The DVB Steering Board has reached agreement on a set of functional requirements for running applications on advanced set-top boxes, TV sets and multimedia PCs. This is the first step in developing open technical specifications for what is referred to as a Multimedia Home Platform (MHP). The specifications are expected to be complete by June this year. DVB says the goal is to provide an

"open solution" so that multiple service providers will be able to operate with compatible, cost-effective domestic receivers while recognising the investments already made by broadcasters and consumers in existing equipment. The DVB specification will include a receiver application program interface (API) and download mechanisms for applications, software and related functions.

The French Pay-TV company Canal Plus has demonstrated to members of the European Parliament and the CEC a new generation of digital decoders. The decoders, based on a new set of international standards, will give viewers access to digital services from various providers without having to worry about compatibility between different CA systems. The new boxes will also help in the development of interactive services and internet access.

# The Onwa TV Power Supply

Philip Blundell, AMIEEIE, and Stephen Brushforth on the operation of a power supply that has been causing a lot of problems

Chassis produced by the Chinese Onwa company have been imported in large quantities and sold under a wide range of brand names including Akai, Alba, Amstrad, Bush, Goodmans, Hinari, JVC, Matsui and Perdio. There are several slightly different chassis, with either 14, 20 or 21 in. tubes. What they all have in common is the same basic power supply, which has been giving service engineers a fair amount of trouble in recent times.

Fig. 1 shows a typical example. Although the circuit remains basically the same in all the chassis, the component reference numbers tend to differ. For example, C911 is C910 in some sets. It has also been C909 and C410, and there are sets that use 500 series numbers in the power supply.

#### **Circuit Operation**

It is worth considering the circuit's operation, since this may not be too clear at first sight – we've done our best to draw out the circuit logically however. We will use the component reference numbers shown in Fig. 1.

A conventional bridge rectifier, BR901 with its reservoir capacitor C906, produces some 320V at pin 7 of the chopper transformer T901. Q904 is the chopper transistor. When the set is first powered, Q904 receives forward bias at its base via R913 and thus switches on. Since its collector load is inductive, the current build up is gradual. Q904's current flows via its emitter resistor R914 and, a key component in the circuit's operation, R902. A sawtooth voltage waveform is therefore generated across R902.

Q902/903 form a pulse-width modulator/switch whose function is to switch Q904 off. A positive bias from the junction of R907 and R908 is applied to the base of Q902. As it's a pnp device this is reverse bias,

which holds Q902 in the cut-off state. The negative-going sawtooth developed across R902 when Q904 conducts is also applied to the base of Q902 however, via C908 and R909. At some point this sawtooth voltage will drive the base of Q902 negatively and it will switch on. Q903 is then forward biased via R910 and the two transistors momentarily lock on, placing an AC short-circuit across Q904's base-emitter junction, via C911. The negative plate of this capacitor receives a negative charge and Q904 switches off. There is now no voltage across R902, so Q902/903 switch off.

When Q904 switches off, the rectifier diodes on the secondary side of the circuit, D905 and D904, conduct. In this way energy is transferred from the transformer to the secondary side of the circuit. As a result of the current reversal in the transformer, a positive pulse appears at pin 10. This is applied to the base of Q904 via D901 and C911. Q904 switches on again, and the cycle is repeated.

D902, C910 and R912 provide pulse shaping. C912 and R915 form a simple snubber network.

#### Regulation

The bias for Q902 is controlled by Q901. This is the basis of the output voltage regulation. D903 produces across C909 a supply for Q901. This voltage is obviously proportional to the other output voltages produced by the chopper power supply. It is monitored at the base of Q901, whose emitter is held at a constant voltage by zener diode ZD901. As the conduction of Q901 varies with changes in the output voltages, so does the voltage across R906 and the bias at the base of Q902. Thus the point at which Q902 switches on during the sawtooth via C908/R909 is varied. The net result is pulse-width modulation at the base of Q904,

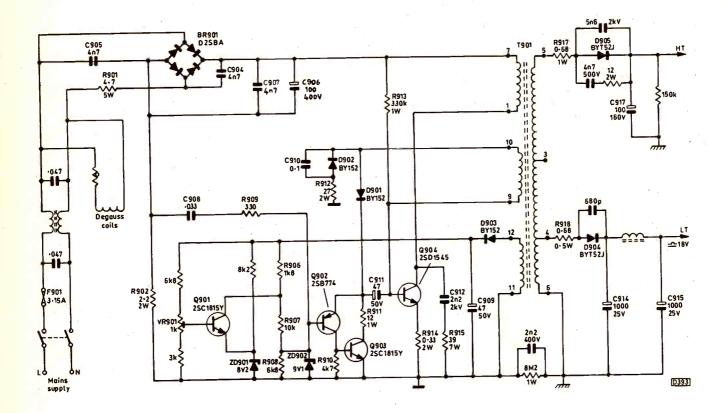


Fig. 1: The self-oscillating chopper power supply circuit used in a number of Onwa TV chassis. These have been used in many sets sold in the UK under various brand names. Note that there is considerable variation in the component reference numbers used. The on/off switch generally has a third pole.

whose switch-off time alters to stabilise the outputs. VR1 is used to set the HT voltage, which is usually about 112V with 14in. sets, 115V with 20in. sets.

#### **Faults**

There's a common fault pattern with these sets. Two of the electrolytic capacitors in the power supply are crucial to correct regulation, C911 and C909 (remember that the component reference numbers vary with different versions of the chassis). C911, the chopper transistor's base drive coupling capacitor, gives most trouble. Failure of this capacitor results in a substantial increase in the HT voltage. The result will be damage in the line output stage and in stages whose supplies are derived from the line output transformer.

Some versions of the chassis incorporate an overvoltage protection circuit, which is supposed to switch the set to standby when the HT voltage rises above a certain level. Because of certain design limitations however it doesn't always work.

The components that seem to suffer first when the HT voltage rises are the 12V, 1W zener diode ZD401 (may be ZD402 in some sets) and its  $5.6\Omega$ , 3W feed resistor R419 (may be R425, R436 etc.). The regulated 12V supply provided by ZD401 is used by the field output chip and other circuits. In some chassis a 7812 regulator chip is used instead. You may find that the set works with low width and brightness variations prior to the failure of ZD401/2. Other items that may fail include the line output transistor and the field output chip.

#### Kits

Two kits are available from component suppliers,

including Chas Hyde and Son Ltd. (phone 01759 303 068, fax 01759 303 620). An upgrade kit for a working set and a service kit which in addition includes the parts most likely to have failed.

Items that should be replaced as a matter of course are VR901, C909 and C911 (use types rated at 105°C), and C904/5/7 (upgrade to 1kV). If D905 is type RG2, change it to type BYT52.

To improve the operation of the overvoltage circuit where fitted, change R663 (may be R677) to  $47\Omega$  or short it out.

Other items to replace (service kit) when the set has failed are as follows: Q904; the 2SD1555 line output transistor (Q402, Q403 or whatever); C914 (upgrade to 40V) – in some chassis this is C920 or C406, 220 $\mu$ F, again upgrade to 40V; R902 (upgrade to 3W); R914; and the 0.68 $\Omega$ , 1W fusible resistor (R421, R434 or whatever) in the line output stage 12V rectifier circuit.

If the above is a bit confusing, our apologies: it is a bit difficult where so many chassis variations are involved. As one final variation, the Matsui 1455 uses 600 series component reference numbers in the power supply!

A service manual on Onwa TV sets, service code TV2, is available from Grove Farm Publications, Grove Farm, Long Lane, Barnby-In-The Willows, Newark, Notts NG24 2SG (phone 01636 626 895) at £18 including post and packing.

### **MANOR SUPPLIES**

#### QUALITY TV & VIDEO SPARES SUPPLIED FOR ENGINEERS BY ENGINEERS

#### LINE OUTPUT TRANSFORMERS p.p. £2.50

AKAI 5861, 6945 CT2571 CT2590	£20,80 £20,80 £20,80	51H8 51J7, 51J8 51K2, 51K3	£14.00 £17.20 £17.20	HITACHI C17-P118 C21-P720 C25-P750	£49.90 £55.00	4515-05 DD/ LOEWE		CT141, 3214009 CT142RX, CT142RX, 3214009 CT149TX/TXA CT149TX/TXA 3214009 3714002	£16
CT2890	£20.80	51K4, 51K5, 51K7	£19.50	C.23-P/39	£55.00	ART1 S24 S32 T21 T28	£16.80	CT149TX/TXA	£15
AKURA CX10	£16.00			C28-P759		Classic M24, S127, S28 Classic M27 Contur S124, S127, S128	£18.90	3714002	£16
CXII	£16.00	59B2, 59B3, 59B5, 59B8 59D2, 59D3	£16.65	CL2542	£23.00	Contur \$124, \$127, \$128 Contur \$24, \$28	£21.00	SAMSUNG	
CX11 CX18 CX30 CX4	£15.00	59H2, 59H3, 59H5		CMT2090	£23.00	Contur S24, S28 Contur M27 Contur T28, T24	£18.90	CB338	£24
ALBA		59J7 59K4	£16.65	CPT1444 CPT1446	£15.00	Profit S28	£71 00	CB349	£24
CTV10 CTV14RS CTV5	£16.00	59K5, 59K7 59L5BQ, 59L7 59M2	£15.00	CPT1455, CPT1456	£15.00	Profi T28 Studio S28, T24 Studio T24	£21.00	CB504	£24
CTVS	£16.00	59M2	£19.50	CPT1463 CPT1471-CPT1473	£15.00			CB505 CB512	£15
CTV704T	£19.80	59M5 59P7A 66B2, 66B3, 66B5, 66B8	£19.50	CPT1474	£14.00	5810110.01	£17.80	CB514	£15
CTV711	£13.00	66B2, 66B3, 66B5, 66B8	£16.65	CPT1623/4, CPT1626	£14.00	MATSUI 1410	£15.00	CB338 CB340 CB349 CB389 CB504 CB505 CB511 CB314 CB312 CC514 CF3312 CF3312 CF5052	£15
CTV741	£13.00	66D3 66H2, 66H5 66H3	£16.65	CPT1646 CPT2024, CPT2026, CPT2028	£15.00	1410 1420 1420A 1420B 1422 1435 1440B 1440B 1440B 1440B	£16,50	CF3312	£24
CTV742	C16 80	66H3 66M3 68K4	£18.90			1420B	£16,50	CF3312 CI5052 CI514	£15
CTV743, KFS60226B CTV744	£15.00	68K4 68M5	£15.00	CPTTALES.	£15.00	1435	£15.00	C1337	£15
CTV747 CTV752	£15.00	B78NT	£17.20	CPT2158 CPT2174, 2176, 2178	£17.00 £15.00	1440B	£16.50	CX514	£24
PTV10 PTV22	£16,00	51P8	£15.80	CPT2234, 2236, 2238 CPT2274, 2276, 2278	£15.00	1445	£15.00	FCG2045BL FCM1415AL FCM2015AL	£24
R&O		TX89	£16.50	CPT2476, CPT2478	£16.50		£15.00	FCM2015AL	£15
3101-3105 3116-3120	£15.00	TX98 TX90, 14", T9031, Red Spot TX90, 20", T9044, White Spot	£15.80			2091	£15.00	SANYO CBP2144	£20
3201, 3203, 3204, 3206, 3207	£16.60	TX90, 20", T9044, White Spot	£14.50 £13.50	CS2543 CS2552	£27.00	3214009	£17,70 £16.50 £15.00	CBP2145 CTP6144	£20
3212-3218 3421, 3422, 3423, 3425	£16.60 £17.80	TX100/110° T6033L, Green Spot TX100/110° FST, T6045L TX100/90° 243892, Yellow Spot	£16.65	CS2572	£55.00	3714002 5908-05009A-AA	£15.00	SENTRA	£20
LX2500, LX2800	£17.80	TX 100/90° 243892, Yellow Spot TX 100/90° T6031, Blue Spot 47235901	£14.00	FM503B	£52.50	MITSUBISHI		GX9000	£15.
M20 . M2000	£15.00	4/319/00		FM504FM513	£49.90 £55.00	CT2131 CT2145	£20.80	GX9200 GX9600 GX9700	£15.
ВЕКО	115.00	47328700 FIDELITY		CS2542 CS2543 CS2552 CS2572 CS2830 FM503B FM504 FM513 FM530 PM533 2432981 2433751	£55.00 £61.80	CT2146	£20.80	STX200	£15.
16228NX CTV58Y	£15.00	AV\$1600, AV\$2000	£15.00	2432981 2433751 2433752	£15.00	CT2155 CT2528	£20.80	STX500 STX600	£19.
CTV58Y TV77R TV79R		C14M06, C14R06- CTM1400	£15.00	2433752	£15.00	CT2529	£16.80	SHARP	£15.
BUSH		CTM2000	£15.00	2434002	£16.50	CT2539 334B08105	£16.80	C1410	£25.
154-125A	£16.50	CTV1404	£15.00			NEI	£20.80	DV5103 PTPNF1783DM77	
2020 . 2020, 2401204028		CTV20T ZX2000	10.00	2434494 2434593	£17.00	1451R	£13.00	RTRNF1783BMZZ RTRNF2001BHZZ	£17.
2114T	£17.80	ZX3000	£15.00	ITT/NOKIA Compact 80DST	£14.00	1451TX 1551TX 2042R	£13.00	RTRNF2000BMZ2 SOLAVOX	£17.
2152T 2157TX	£13.00	ZX4000 FCC2015BE FCC2015AE	£15.00	Compact 80R110°	£14.00	2131R	£13.00	14R19	£15.
2321T		GOLDSTAR		Compact B 110°	£15,90	2131TX	£13.00	16R19 20T19	£15.
2515T	£13.00	CBT2172	£15.00	ITT/NOKIA Compact 80DST Compact 80R110° Compact 80/90° Compact B 110° Compact B2 Compact B2 Compact B2 Compact B4 Compact	£17.20	NIKKAI Baby 10 NT 14 NT 20	£16.00	16R 19 20T19 22R19 22S19 22T09 22T09 22T19	£14.
2521T	£13.00	CBT2175 CBT2180 CBT2190, CBT2191	£20.00	Compact B2 PST Compact BNN Compact D2 Compact D2 Compact D2 Compact D2 L10°	£15.00	NT14 NT20	£15.00	22TO9	£14.
2714 2914	£13.00	CB19502	£15.00	Compact BNN Compact D2 Compact D2 FST Compact D4 FST Compact D6 FST Compact D6 FST Core 2 Core 2 SQ CF3104	£17.20 £17.50			CML14RC	£15
3114T AT2079/10		CBT9505, CBT9508	£16.50	Core 2	£16.00	TLG2800	£27.00	SONY	
CROWN		CBT9742, CBT9745	£17.70	CP3104	£15.00	NORDHENDE Please Quote Model Number			£15. £15.
CTV-1487R CTV-2037VR	£15.00	CBZ2172, CBZ2175	£15.00	CT2500/2 CT2512	£17.80	PANASONIC TI F14520F	£20.00	KV2090, 2092, 2096	£15.
CTV-B5063		CIT2168	£20.00	CT2600 CT3306	£14.00		£20.00	KV2052, 2056 KV2060, 2062 KV2090, 2092, 2096 KV21XMTU KV21XRTU, H.R. KV2212, 2215, 2217, H.R. KV2252, 2256, PE3, H.R.	£23.
CTV-B7270	£18.00 £18.00	CIT4783 CIT9322	£16.50	CT3326, 3327	£15.00	TLF14568F	£20.00	KV2212, 2215, 2217, H.R. KV2252, 2256, PE3, H.R.	£16.
DTV-9254	£17,50	CITOSOS CITOSOS	£16.50	Core 2 SQ CP3104 CT2500/2 CT2512 CT2502 CT3306 CT3306 CT3305 CT3335 CT3335 CT3335 CT3335 CT3335 CT3335 CT3335 CT3335	£15.90	TLF14584F TLF14585F TLF14586F	£20.00	KV2252, 2256, RX KV27XRTU	£15.
DAEWOO DCS-1634	£15.80			CT3835 CT6320	£17.50 £17.50	TLF14586F TLF14592F	£20.00 £20.00 £20.00	KV2704	£15
DECCA/TATUNG Chassis-145, 146, 147		154-125A/B	£16.50	CVC1100	£15.00	PERDIO		KV2705 KV2752, 2756, RX KV2752, 2756, PE3	<b>. 1</b> 10.
Chassis-145, 146, 147 Chassis-160, 161, 165, 166	£15.00	154-125C 154-177B/J	£15.00	CVC1175 CVC1200	£17.80	P1408	£13.00	KVE2522	£16.
85-9835-5	£15.00 £18.90	GOODMANS				P2004 P2005 P2101 P2102	£13.00	KVE2922	£23 £23 £23
FERGUSON		1401R 2043TT	£15.80	CVC1210	£14.00		£13.00	KVMZ311	£23
14C1, 14C2 16A1, 16A2 20A1, 20A2	£15.80	2875	£17.20	CVC1210 CVC1212,1215 CVC1222 CVC801, 803 DIGI 3 DIGI 3 FST FX 3448 FX 3448	£14.00	PHILIPS Anubis A/AB	£16.50	KVX21TU KVX25TU KVX2521	£23
20A3. 20A4	£14.50	CTV14RC	£15.80	DIGI 3 FST	£16.00	Anubis A/AC Anubis B/AA Anubis B/AB	£16.50		
20C3, 20C4 20E1, 20E2	£14.50	CTV2R/T CTV2180 TV20RC	£17.20	FX3448	£15.90	Anubis B/AB	£25.50	1-439-416-11/12/21/41 1-439-423-11/21	£23.
20G1, 20G2, 20G3	£14.50	GRUNDIG	£15.00	FX3448 FX3548 FX6320 FX6320 FX6330 Mini 2 Mini 2 ST2 Monoprint A Monoprint A Monoprint B Pico 1 Fico 1 Fico 1 Fico 5T2 Fico 5T2 Fico 5T2 Fico 5T5 FX3578 FX34878	£17.20	CFI CPI10 CP90 CTX E/S	£23.00		£23
20HI, 20H2, 20H3	£14.50	CUC2201 CUC2210 CUC2401	£18.90	FX6330 Mini 2	£18.80	CTX E/S	£13,00 £16.00 £24.80	TENSAI TCT100BG	£16.
22D1-22D4	£13.50		£18.90	Mini 2 ST2	£15.00	G90AE	£13.00	TCT1410 TCT1536 TCT2010 TCT2100	£15.
22H1, 22H3	£13.50	CUC2600 CUC2800	£15.00	Monoprint A	£15.00	GR1AX K40, 140-10246	£15.00	TCT2010	£15.
2323, 2343, 2353, 2373 2423	£13.50	CUC3300	£18.90	Monoprint B	£15.00	GRIAX K40, 140-10246 K40, 140-10269 KT4 H.R.	18.00	TCT2100 TCT362 TOSHIBA	£15.
2453	£14.50	CUC3600	£18,90	Pico 1 ST2	£17.80	Chassis ZA		TOSHIBA	
2463	£14.50	CUC4400	£22.50	SFN3578	£17.20	Chassis 2B Chassis 3A	£16.50	1400RB 150R6B 1510RB 155R9B	£15
26D1, T6045L 26D2, 26D3, T6033L	. £16.65	CUC4500	£22.50 £17.20	SFN5550	£15.90	PIONEER		1510RB 155R9B	£15.
		HINADI	I 1/.2v	SFN5581 SFN6380	£16.00	SD-21AVI SD-25AVI	£16.00 £17.50 £17.50	156R9B	£15
22G2, 22G3 26H2, 26H3	£16.65	CT14 CT17 CT18	£17.00 £17.00	SFX3578	£17.20	SD-28AV1 SV2101	£17,50	17/700	
36K3	£17.70	CT18 CT20RC	£17.00 £25.80	ST35467	£17.20	SV2103 SV2503	£16.50	2100RB	£15
37140, 37141 41H2	£15.80 £15.80	CT4	£15.00	ST3876	£16.00	SV2801	£15.00	216R9B	£15
51A0-51A5	£17.20 £14.00	HIT10R				SV2803	£16.50	216T9B	£20
51A8 51G2, 51G3	£14.00	TVA1 51-14184-1	£15.00	TX3446 TX3447	£21.60 £21.60	1400	£15.00	AT2079/17	£15
51H2-51H5	£14.00	51-13914-1	£15.00	4515-03	LA Latry	CT14R	£15.00	AT2079/23	£15

TRIPLERS EHT MULTIPLIERS p.p. £2.50

MANY OTHERS STOCKED, PLEASE QUOTE BG, OR TVK NUMBER

CRT TESTER & REACTIVATOR KIT - Checks emission & leakage, boosts tubes, analogue meter indication of tube condition, can be used with any type of tube. Price £68.00 p.p. £5.00

LINE OUTPUT TRANSFORMER TESTER - Price £25.00 p.p. £2.50

VIDEO (PAL) TO RGB CONVERTER - Video in, Phono - RGB+Sync out, scart. 12volts supply. Price £99.00 p.p. £5.00

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



238

### The Joule A-400 Radio Decoder

If you already service car audio equipment, the A-400 could prove to be a very valuable additional source of income for your company.

**Electronic Sound Systems** Hilton Road, Aycliffe Industrial Park Newton Aycliffe, Co. Durham DL5 6EN **United Kingdom** 

Tel: +44 (0)1325 307442 Fax: +44 (0)1325 300189

Email: elecsys@elecsys.demon.co.uk

#### For Your Radio Decoding Requirements

Please feel free to visit our Internet web site at elecsys.com where you can download full details, pricing information and demonstration software. Or, visit us for an on-site demonstration.

#### HOW DOES YOUR EQUIPMENT MEASURE UP? AT STEWART OF READING THERE'S ALWAYS SCOPE FOR IMPROVEMENT!



PHILIPS PM3217 (This is a proper scope)
Dual Trace 50MHZ Delay Sweep Incl 2 Probes
£400



HC3502 Dual Trace 20MHZ 5mV-20V/Div; 0.2 µ Secs - 0.5 v. X-Y; K5 magnifier; TV Sync etc Hardly Used £150 Un-used £200

#### THE CLASSIC TEKTRONIX 400 SERIES



466 Analogue Storage Dual Trace 100MHz Delay	£39
475 Dual Trace 200MHz Delay Sweep	£50
465 Dual Trace 100MHz Delby Sweep	£40
FLUKE PM3082 2+2Ch 100MHz Delay TB Cursors	£120
PHILIPS PM3296A Dual Trans 400MHz Dual TB Delay Cursors IEEE	£175
TEXTRONIX 2456A 4 Trace 350MHz Delay Sursors etc	£250
TEKTRONIX TASA65 Qual Trace 100MHz Delay Sursors	£90
TEXTRONIX 2215 Qual Trace 60MHz Delay Sweep	£41

TEXTRONIX ZZ15 DUAI 1406- GOMZ DUAY SWEED PHILIPS 3055 2-1 Ch SOWNED DUAI TEXPOLET ME PHILIPS PM97 DUAI TROCE SOMME SCOPEMETER DIE Storage... GOULD 051100 DUAITINGE SIAMME EZOO WITH Delay... GOULD 051100 DUAITINGE SIAMME AND REMEMBER ALL BUR EQUIPMENT IS TESTED PROPERLY!





FARNELL SSG520 Syn AM/FM Signal Gen 10KHz-520MHz
FARNELL PSG520 Syn AM/FM Signal Gen 10KHz-520MHz Portable
MARCONI 6311 Programmable Sweep 10MHz-20GHz
MARCONI 20226 AM/FM Signal Gen 10KHz-16Hz
H.P. 8556A Syn Signal Gen 0 1-990MHz
H.P. 8540B PhaseLock/Syn Sig Gen 500KHz-512MHz
H.P. 8540A AM/FM Signal Gen 500KHz-1024MHz
PHILIPS PM5193 Programmable Syn Func Gen 0.1MHz-50MHz
PHILIPS PM5192 Programmable Syn Func Gen 0 1MHz-20MHz
H.P. 3325A Sen Function Gen 21MHz
PHILIPS PMS134 Sweep Func Gen 0.001Hz-20MHz Sine/Sq/Tri etc
DUILIDS PM5132 Sween Func Gen () 1Hz-2MHz Sine/Sa/Tri etc





二座抗	RACAL COUNTERS 9918 10Hz-560MHz

RACAL 1998 Counter 1.3GHzRACAL 1991 Counter/Timer 160MHz RACAL 1990 Counter 120MHz	£650 £450 £300	200



SOLARTRON 7151 DMM 6% digit IEEE £450 SOLARTRON 7150 DMM 6% digit IEEE £300 True RMS

#### STEWART of READING





#### LOOK! **BRAND NEW OSCILLOSCOPES!** NEVER USED!! LIMITED STOCK!!



DMS 3850A Digital Storage/DMM
Handheld LCD display 2 Channel 50MS/S. Auto Range.
4 digit DMM/Capacitance/Frequency Counter. Battery
Opration or external 7.5-9VDC ie. AC Adaptor (Not suppied). RS232 Comes in Black Carrying Pouch complete
with 2 scope probes; DMM leads; manual.
New Boxed For Only \$400



DTS 40 Digital Storage

Dual Trace 40MHZ, 20MS/S Storage, Cursors + On S Readout, Sweep Delay: Interface etc. etc. Supp in original box complete with 2 Probes & Manual



DTA 20/40/60 Dual Trace with Alt Magnification; TV Trig etc. etc. Lots of Specification. DTA20 Dual Trace 20MHZ: £225 DTA40 Dual Trace 40MHZ - 12KV EHT: £300 DTA60 Dual Trace 60MHZ - 12KVB EHT: £375 All unused & boxed supplied with 2 probes & Manual



DTV 20 Dual Trace 20 MHZ: £200 All unused, boxed with 2 probes & manual

#### **NEW AND HARDLY USED**



PANASONIC VP8177A FM/AM SIGNAL GENERATOR 100KHz:100MHz; FM O-100KHz; object 19d8-99d8 AM 0-60%; 32 Preset Memory; Digital Display Frequency & Output.

PANASONIC VP7637A STERO SIGNAL GENERATOR Generates Broadcast FM-RDS/ARI. Preset memory; GPIB Used £400 Un-used £700



KENWOOD EL 180A WOW/ELUT-KENWOOD FLIBOA WOW/FLUT-TER METER 0.003%-10%; Freq 3KHz/3.15KHz RMS/AVERAGE/ PEAK: Weighted Filters; Digital Display of rpm; 4 digit Freq Counter (0.01kHz-9.999KHz/

0.01KHz-55KHz) Used £400 Un-used £500



POWER SUPPLY Model HSP3010 0-30Volts; 0-10 Amps Current Limiting. 2 Meters. Used £160 Un-used £200



GOODWILL GVT427 DUAL
CHANNEL AC MILLIVOLTMETER
10µV 300V in12 Ranges
Frequency 10Hz-1MHz
Used £100 Un-used £125



GROOWILL GAG-808G AUDIO GENERATOR Sine/Square



GOODWILL GFC 8010G FREQUENCY COUNTER Range 1Hz-120MHz 8 Digit Display 15mV RMS Sensitivity

ANALOGUE MULTIMETER Model HC260TR AC/DC Volts; DC Current 10Amps; 17 Ranges; Continuity Buzzer; Transistor Tester
Un-Used £15

STERED AUDID BALANCE TO UNBALANCED CONVERTOR

Used Equipment - GUARANTEED. Manuals supplied.

IPLE OF STOCK, SAE or Telephone for lists. Please check availability before ordering. This is a VERY SMALL SAM CARRIAGE all units £16. VAT to be added to Total of Goods and Carriage.



#### **Jack Armstrong**

#### **BT SVS300**

This receiver had been pizzafied. If you've ever left a pizza in the oven for slightly too long you'll know exactly what I mean!

I spent some time scraping away from the PCB what looked like burnt, melted cheese, then fitted the power supply repair kit. The receiver remained stubbornly dead – until I discovered two cracked tracks near the fuse. To remove the power supply PCB, which is wedged tightly in place, you have to wiggle and twist it. But I don't think I had been particularly heavy handed and assume that someone else had had a go before me.

With the receiver now working and producing pictures, I found that there were no decoder messages. Another half an hour passed while I replaced the decoder capacitors and other bits supplied in the kit. These kits usually save me a lot of time, but on this occasion the board didn't seem to work until it was heated with my hairdryer. My impression was that the board was damp. So I scrubbed it with isopropanol and then dried it thoroughly with hot air. Finally, since the area around the PTV111 chip seemed to be the most sensitive to moisture, I dripped hot beeswax around it, the bench and my trousers, leaving nice white

## WORKSHOP

stains. My wife gave gave me a funny look later. I can't imagine why – after all they were very old trousers...

Next morning was cold and damp. But the receiver worked perfectly.

#### Ferguson SRD6

You may recall that I repaired an SRD6 for Tom in the next town. The symptom had been low video level and no decoder messages. The cause was transistor TV04, which is connected to what I had thought was the video level adjuster PV01. In fact PV01 controls the de-emphasis, as I discovered once I had replaced TV04.

Two weeks later the same receiver bounced back with a fault report that said, unhelpfully, "same fault again". It wasn't. This time the pictures were washed out while the decoder messages, though present, were heavily distorted. The decoder was working perfectly.

Scope checks showed that the video level was correct until the signal emerged at pin 8 of the graphics generator chip ÎV02, where there should have been a 2V peak-to-peak composite video waveform superimposed on 1.5V DC. In fact the DC bias was 3V, and the video waveform was being clipped by TV22 on its way to the TV scart socket and the UHF modulator. Now the graphics generator is a TCE10117180 and, curiously, I didn't have one in stock. My solution to this problem was an empirically-contrived 'bodge': I soldered a  $330k\Omega$  resistor between pin 8 of IV02 and chassis. That fixed it!

According to Tom the customer indicated his gratitude, as customers do, by whining about being charged twice and muttering about "trading standards". I really must try this myself. Next time I get an engine fault I'll take my car to the garage which replaced my exhaust pipe. "It's the same fault" I'll say, "it makes a noise again." I wonder if they'll fix it free of charge?

#### **BT SVS250**

I bought ten 'scrap' SVS250 receivers recently for spares. I won't end up with many spares however, having mended the first two dead ones (fuse melted) and jumped up and down on the third one in frustra-

tion – well, they *are* frustrating machines!

The other day I had a letter from Peter Thorneycroft, a dealer in Telford, describing the problems he had had with a customer's SVS250. "The original problem was caused by a faulty EEPROM, the symptoms being out-of-range bars on the display and an LNB offset reading of 25.38 which, after correction, could not be stored. When I'd replaced the 24C04 chip with a used one and fitted the SatCure upgrade kit Relkit 17 (phone 01270 753 311 for details) the receiver was OK and the customer left happy. An hour later he phoned to say that the receiver was the same as before. It transpired that he had used the receiver for about two years with a UHF connection, and had now decided to try a scart connection instead. As soon as he fitted the scart connector the receiver went feet up. I had already checked it with our TV scart socket and found that it was OK. When I checked his TV set I discovered that there was 12V at pin 10 of the scart socket! The LNB offset read 25.38, indicating that the EEPROM had once again died. I had to cut the relevant wire before reinstallation. Incidentally the TV is a Beko one."

So the moral is: beware of scart connectors! I've come across similar problems with decoder scart connections in Amstrad receivers, but never with a TV scart. It seems that in the SVS250 a data line from the 24C04 chip is connected to pin 10 of the TV scart socket.

#### Pace MSS1000

Left to themselves these Pace receivers will give trouble-free use for years. But the designers failed to take into account the ingenuity of the average customer, who believes that equipment should be kept hot! And, in my experience, the more money the less common sense they have.

This particular receiver belonged to a gentleman I'll call, to save him from any embarrassment, Lord Potts. He designs clothing – or rather he employs others who design it for him. He thus has, so he tells me, "a feel for quality".

The MSS1000 had been squeezed into a custom-built brick fireplace arrangement, together with a 28in. TV set, two VCRs and a hi-fi audio

system. To ensure that there was absolutely no possibility of nasty drafts, or 'ventilation' as we call it in the trade, the chimney stack had been blocked and the whole affair was hidden behind velvet drapes.

The fault symptoms were obvious: the audio from both the left and the right channels was very faint and extremely distorted, and the vacuum fluorescent display flickered in time with the audio. Very pretty.

Back in the workshop I discovered that the fault vanished when the Dolby board was disconnected. Before I plunged in head first however I tried another Dolby board. The distortion returned. Hmm.

I decided to replace all the power supply electrolytics, as they looked decidedly black - there seems to me to be little point in trying to trace the cause of an obscure fault when such an obvious clue is present. Relkit 10 from SatCure (01270 753 311) contains all the high-reliability capacitors required, except for the 100µF, 400V one that seldom fails. I replaced the capacitors in turn, reassembling and testing after fitting each one. Since the symptom was new to me, I wanted to establish which part or parts contributed to the fault. In fact the culprit was C10 (100µF, 35V), the reservoir capacitor for the -21V supply, but I fitted the complete kit as a precaution. In addition I installed a miniature fan kit, as Lord Potts insisted that the receiver should be returned to its original oven.

The net result was an excellent picture and sound for Lord Potts and a nice big check for me!

#### Pace SS9200

This receiver lit up when it was plugged in, but the fault report from a local dealer simply said "dead". As I could get nothing but snow on most channels, my first impression was that the tuner might have died. Tuning was tricky, because the menus didn't appear on the screen. Clearly there was more than one fault.

I fitted a second-hand tuner. This made no difference, and I scratched my head in confusion. A few pictures appeared when I flicked through the channels, but only on the horizontally-polarised stations. Aha! Power supply noise was switching my universal LNB to high-band operation. I have seen this before, the cure being to replace all the electrolytic capacitors in the power supply. I did so, but the fault remained.

Looking at the circuit diagram, I traced the LNB supply path to the tuner and noticed that at this point a

Jack Armstrong is willing to try to sort out readers' satellite TV receiver problems via email. You can reach him via the internet at:

#### jack@netcentral.co.uk

One model per message – state make/model and fault symptoms. If you have no e-mail facilities you can write to him c/o Television, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Please enclose two first class stamps.

100µF electrolytic (C128) is used to decouple the supply. Replacement of this capacitor solved one problem – the vertically-polarised channels could now be received. But there were still no decoder messages, channel identifications or menus. I guessed that there were no sync pulses. I should have used my scope, but a guess is sometimes quicker – when you are right! I was right this time: a new TEA2029C sync separator chip restored normal operation.

Finally, for good measure, I upgraded C125 to 1,000µF to remove some horizontal streaking on decoded pictures. Sometimes a lot more capacitors need to be replaced to cure the problem, but this time I was lucky.

#### Test Case 422

It was just before Christmas. Sage had taken a day off sick, which is very unusual for him. The rest of the staff put it down to a surfeit of the wine he's so fond of, and this was not too wide of the mark.

As is usually the case in the run-up to the big day, there was a lot of equipment in the workshop awaiting repair, especially VCRs. The other members of the workshop team, mostly TV specialists, were having to get to grips with motors and mode switches, rollers and reels as Sage, alone in his bedroom, rolled his eyes and reeled across the landing to the loo, his system control in deep trouble.

The scratch video repair team managed all right until a Toshiba V411 came along. This machine had been throbbing away for six or so years without giving any trouble. It had then developed a 'nasty'. At first the problem didn't seem to be too bad: during playback the VCR would intermittently flick between the SP and the LP modes. It's a common enough fault, the cause usually being to do with poor signal pick-up at the control-track head. So for starters the CTL head was cleaned. There had been no visible deposit on the head however, and the treatment didn't make any difference. Next, the path of the tape across the face of the ACE head-stack was carefully checked while the fault was present. The tape was seen to be a fraction too high, so the worn pinch roller (no surprise about this after six years' service) was discarded and a new one was fitted.

This seemed to cure the problem. But as the fault had been intermittent the machine was left to run for a while, using the customer's tape – which had not been crinkled by the worn roller. No doubt Sage would have gone through the same

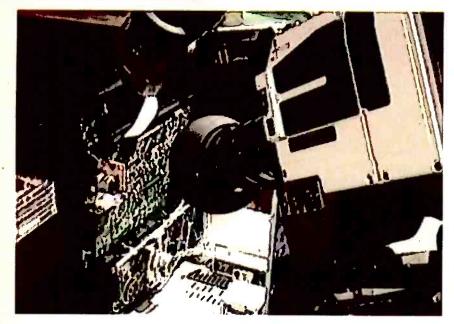
motions had he been there. But at that moment he was concerned about different motions altogether.

After a while the sound track of the Teletubbies recording went funny and the Tosh's front panel indicator once more flickered between SP and LP. Uh-oh! Examination of the tape path showed that the tape was running straight and true across the face of the still clean ACE head. Maybe poor head alignment was affecting the control-pulse transfer? The tilt screw behind the head was tweaked to make the head lean back a little. Its height was readjusted to compensate. But the fault had not been cured.

What next? The technicians were so engrossed with thoughts of head and pulse-readout faults that they didn't make any oscilloscope checks before coming to the conclusion that the head had to be faulty. A new one was ordered and the VCR was put to one side awaiting the parcel. The customer was provided with a loan machine.

Sage had recovered and returned by the time the new head arrived. He fitted and aligned it himself. At first the results were fine, but within half an hour of the start of a soak test the playback sound and picture became wobbly. The fault was back again! Well, the ACE head was not responsible anyway. Would Sage have condemned it without carrying out further checks? We can't answer that one. Certainly he had to do some further checking now. With his scope triggered by head flip-flop pulses and its probe in amongst the servo chips, Sage soon found and rectified the cause of the problem. Was it to do with the ACE head? Were any further components required to put matters right? For the solution to the problem, turn to page 291.

#### **Test Report**



#### **Eugene Trundle**

reports on the current range of training tapes available from Visions Video Productions

# **Service Training Tapes**



n the November 1994 issue of *Television* I reviewed an instructional video tape that had just been released by the then-new company Visions Video Productions. It covered the Akai VCRs of the period and I found it very good.

Since then Visions Video has produced a wide range of training and instructional cassettes for the benefit of bench technicians in the brown-goods servicing trade. There are now ten of them, and more are to come. They cover TV sets, VCRs, satellite receivers and camcorders from several manufacturers, who have all given their approval and co-operated in the production of the tapes.

#### **Current List**

The cassettes currently available are as follows:

VIS001. This was the original one previously reviewed, covering Akai VCRs of the period.

VIS002. Covers the Ferguson/Thomson ICC5 TV chassis.

VIS003. Deals with the Panasonic G deck, which is also used in Grundig, Philips and Sony VCRs.

VIS004. On Pace PRD-series satellite receivers.

VIS005. Covers Akai AX-GX series domestic VHS decks, which were produced from early 1994.

VIS006. Covers the Nokia M digital TV chassis, which was also used in Granada, Hitachi, ITT, Luxor and Salora models.

VIS007. On the GoldStar/LG D27 VCR deck.

VIS008. On the GoldStar/LG PC53A TV chassis.

VIS009. On the LG D17 VCR deck.

VIS101. This, the longest-running tape, deals with Akai 8mm camcorder models in the PV-M series.

Quite a selection! Ten hours and thirty-six minutes of viewing for me, but many hundreds of hours of painstaking work for those who designed and produced these training guides.

#### Content

A common thread runs through the design and production of these visual servicing courses: they are all practically based and tailored to meet the needs of a technician with a faulty piece of equipment on the bench in front of him – and perhaps a puzzled look on his face!

The tapes that deal with deck mechanisms take you through the entire dismantling and reassembly processes, with close-up shots of the work actually being done. The friendly running commentary mentions pitfalls as well as describing what is being done and the techniques involved. Phasing of the mechanics and for example the mode switch is described in detail. The beauty of this method of presentation is that you can freeze any frame on the tape while your repairwork is in progress, so that you can match what you are doing with what is shown on the screen. The tape path and head alignment procedures are very well done, with a view of the screwdriver adjustment in the main picture and an insert (PIP) section that shows its effect on an oscilloscope display or the running tape ribbon as appropriate.

The TV, particularly satellite, courses contain some

circuit description where this is relevant to diagnosis and repair. They are primarily concerned with what goes wrong in practice, with getting to the root of the trouble, then the repair and setting up. Once again a picture-in-picture technique is used, with scope traces and meter/counter readouts as insets to views of the main PCB and its preset controls. There are also off TV-screen shots to show menus, fault conditions and the effects of adjustments as relevant.

For the individual pieces of equipment we are shown such things as getting into the service mode, software addresses and the operation of VCR decks outside their cabinets. Many of the tapes have a 'hints and tips' section in which common faults, quirks, modifications and service/repair kit availability are covered.

All the tapes are indexed with time-counter readings per topic, so that for example we see that in the ICC5 programme EW problems are dealt with at 46 minutes in while the Akai camcorder tape explains the AF tracking adjustment at the 2 hour 26 minutes mark. All this is well thought out and quite accurate.

#### Verdict

It is increasingly difficult to find the time to attend conventional technical training courses, while with every year the number of friendly TLOs available for workshop visits diminishes. Even when you can take advantage of these facilities, the knowledge gained tends to fade with time. These on-tape guides have the advantage that they can sit on the shelf for use as and when necessary, then wound to and fro, frozen and released as required – unlike the human memory or printed notes!



A selection of the Visions Video Productions tapes.

And what conventional courses come complete to you on the workshop bench at a cost of typically £20?

My opinion of these training tapes is very high, but I will leave you to decide for yourselves about the background music with some of them!

Price and Availability

Most of the cassettes are priced at £19.95 plus VAT. But prices range from £15.95 plus VAT for VIS008 to £45 plus VAT for the two-and-a-half hour camcorder tape VIS101. The cassettes are available from leading component/spares suppliers and from Visions Video Productions themselves, who can also provide information on distributors in the Irish Republic and Australasia. The address of Visions Video Productions is 41 Sherwood Road, Addiscombe, Croydon, Surrey CR0 7DL, phone no. 0181 654 5773, fax 0181 656 7183.

#### BACK ISSUES

We have available a limited stock of the following back issues of *Television*:

July, August, September, October,

November and December

1995 January, April, May, June, July, August, September and

December

1996 January to September inclusive, November and December

> January, February, March, April, May, June, July, August, September,

October, November and December

1998 January

1997

Copies are available at £3.00 each including postage. Send orders to:

Television Back Issues, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Make cheques/postal orders payable to Reed Business Information Ltd.





#### PROMAX

#### **TEST EQUIPMENT**

#### **TELEVISION TEST** PATTERN GENERATORS



#### GV 698/11 **MULTI STANDARD**

PAL, SECAM and NTSC, all in one instrument. With NICAM, Teletext, VPS and remote control. Synthesized VHF & UHF

coverage, with video, R.F., R, G, B and other test signalling outputs.

#### **FUNCTION GENERATORS & AUDIO OSCILLATORS**





CRT REJUVENATORS & SWITCH **MODE POWER SUPPLIES** 





П

**ADY FOR** 

#### TV & SAT LEVEL METERS FOR **ANALOGUE & DIGITAL SIGNALS**

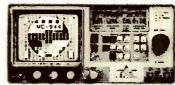














SPECIAL EDUCATIONALS SPECIAL PROPERTY FROM CALIBRATION **SALES** 

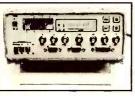
#### **GV 264 SATELLITE TV GENERATOR**

Simulates satellite TV signals, with output level control and voltage / load measurement. Repairs on satellite TV receivers can now be conducted under stable test signal conditions.



#### **GV 298 TV PATTERN GENERATOR**

Low cost VHF & UHF synthesized generator, with R.F., video and SCART outputs. Latest technology in pattern generation. Now a popular test instrument in workshops across the television world.



#### **GV 241 COMPUTOR MONITOR TEST GENERATOR**

Simulates the computer interface, offers user friendly connector arrangement, achieving widest range of monitor compatibility. Essential to all technicians who test monitors.



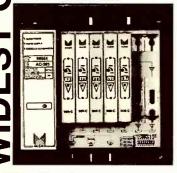
#### VG 90 & GC 981B **PORTABLE PATTERN GENERATORS**

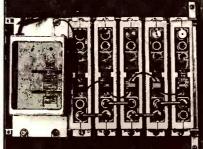
Internal rechargeable batteries means these pocket size generators can be used anywhere. Field staff can test with confidence. Supplied with carry case, cables and AC mains charger.



#### **TELEVISION CHANNELISED & MAST HEAD AMPLIFIERS**





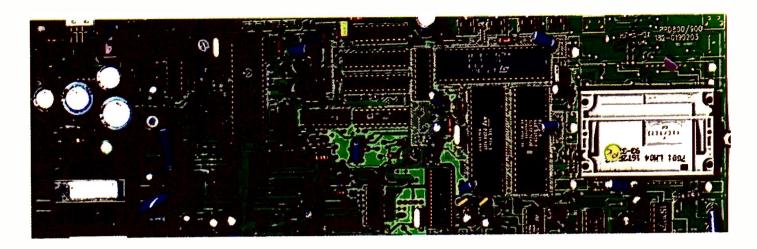




#### ALBAN ELECTRONICS LIMITED

6 CAXTON CENTRE, PORTERS WOOD, ST. ALBANS, HERTFORDSHIRE, AL3 6XT. TEL: 01727 832266 FAX: 01727 810546

**SERVICE** 



# A Pace PRD800/900 Modification

An unused microcontroller option in these satellite receivers can be used to control an external device such as an ADX channel expander. Martin Pickering, B.Eng., describes the modifications required

he simple modification described in this article should do the trick if you have one of these receivers and want to control say an external 22kHz tone inserter box on a 'per channel' basis.

There is, hidden in the microcontroller chip (U2) used in these receivers, an option to control a dual-bandwidth tuner. Since the PRD series receivers don't have a dual-bandwidth tuner, the option can be used for our own purpose.

The modification is simple: you don't even need to remove the PCB!

#### Components required

The following components and items are required to carry out the modification:

Three 0.25W resistors with values  $1k\Omega$ ,  $4.7k\Omega$  and  $100\Omega$ .

A 150mm length of insulated wire.

Thin solder and a fine-tipped soldering iron.

#### **Procedure**

Refer to Fig. 1 which shows where the extra resistors are to be added. Proceed as follows:

- (1) Tin the relevant IC legs with solder pin 1 of U2, pin 2 of U4, pin 14 of U3 and pin 5 of U18.
- (2) Tin the resistor leadout wires with solder.
- (3) Solder the  $4.7k\Omega$  resistor between pin 1 of U2 and pin 2 of U4.
- (4) Solder the  $1k\Omega$  resistor between pin 5 of U18 and pin 14 of U3.
- (5) Solder the  $100\Omega$  resistor to the junction of the added  $1k\Omega$  resistor and pin 14 of U3.

(6) Solder the 150mm length of insulated wire to the free end of the  $100\Omega$  resistor, then solder the other end of the length of wire to pin 14 of the decoder scart socket (on the top row, count four from the top sharpest corner of the socket).

Pin 14 of the socket has no connection to the circuitry beneath the board. It is therefore free for use – but, if you use a decoder, it is essential to cut the wire to pin

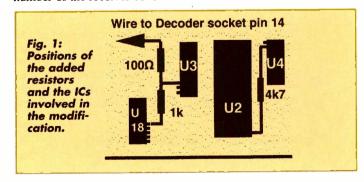
(7) You will now see a new feature, "IF BANDWIDTH: NORMAL", in the tuning menu for each individual channel

If you change this to "IF BANDWIDTH: NARROW" the modification will apply 12V to pin 14 of the decoder scart socket.

This 12V supply can be used to control an external device such as an ADX channel expander unit, a 22kHz tone inserter or an LNB switching box.

#### SatCure

For details of various satellite receiver modification and repair/upgrade kits, send two first class stamps to SatCure, PO Box 12, Sandbach, Cheshire CW11 1XA (01270 753 311). Be sure to state the make and model number of the receiver concerned.





#### More know-how from Toshiba, based on Technical Bulletins CDH68 and CDH69

#### **Televisions**

#### Model 2163DB (C6S Chassis)

Poor character width in the teletext mix mode: Cause is poor performance of the TV/text switch in the TB1229N video/colour/timebase generator chip Q501. Replace the chip with the improved type TB1229AN, part no. B0102070.

#### Models 2512DB and 2812DB (C91SB Chassis)

Lack of width with corrugated effect to side of picture: The value of C424 (4·7µF) on the DPC PCB has decreased. Replace C424, part no. 24676479.

### Models 2527DB, 2539DB, 2927DB, 2939DB, 3327DB and 3339DB (C2D Chassis)

Field bounce on channel change: Replace R329  $(22k\Omega, 1/6W)$ .

Reduced height from cold or field cramping at the top: Either C321 or C322 has probably fallen in value. C321 (18nF, 50V plastic film) is connected to pin 14 of IC302. C322 (2·2µF, 50V electrolytic) is connected to pin 15 of IC302. If capacitor replacement doesn't cure the fault, replace the TA8859P EW chip IC302, part no. B0384680.

#### Models 32W6DB and 32W6DG

When using the service park position the chassis must

be secured to the cabinet top using a back fixing screw – tighten over the slot in the plastic frame. The addition of a washer is recommended to provide more secure fixing: it will give greater surface contact at this point.

Note that the line output transformer part no. quoted in the service manual is incorrect: the correct part no. is 23236517.

#### **Spares**

The IR receiver (K901) used in Model 1752TB is incorrectly specified in the schematic diagram. It should be shown as type TFMS5380, part no. 23904750A.

To avoid PCB damage in transit, the power/deflection PCBs used in Models 2557DB, 2577DB, 2857DB, 2877DB, 3357DB and 3377DB are now supplied without the chopper transformer T803 (for the same reason they also come without the LOPT). The original or a replacement chopper transformer will therefore have to be fitted as appropriate.

#### Projection TV

Safety note: Do not attempt to operate a projection TV with the X-ray protection plate at the front removed – the plate is under the front plastic cover beneath the speaker grill. A safety interlock lead, which has to be disconnected to gain access to the CRTs, is attached to the protection plate. When this lead is open the power supply is disabled. Overriding this connector and removing the plate will expose you to harmful X-rays from the CRTs.

#### Models 48PJ6DB/DG and 55PJ6DB/DG (C5SS Chassis)

Convergence errors appear gradually with use. May

be corrected with digicon adjustment but reappear: Replace resistors R7716, R7721 and R7711 which are connected to the STK392 vertical convergence output IC Q751, or R7726, R7731 and R7736 which are connected to the STK392 horizontal convergence output IC Q752. These resistors tend to increase in value. The correct value is  $2\cdot 2\Omega$ , rating 2W. Part no. is 24323229.

If either of these output ICs has overheated and failed, the relevant three resistors specified above must be replaced in addition to the IC.

If the power 2/digicon chassis (left-hand side looking from the rear) has been removed during service it is easy to fit the two 4-pin plugs P621 and P712 in the wrong sockets at the rear edge of the PCB, especially as the shorter lead goes to the farther socket. The symptoms will be the power LED flashing green at six-second intervals and no sound or picture. No damage will be done.

Rubber grommets (inserts) for the speaker grill plastic location pins are not listed in the service manual: they are available under part no. 23451853.

#### Satellite TV

#### Model TS540

Dead, fuse FS1 (1A fast-blow) open-circuit: The usual causes are as follows.

- (1) One of the 1N4007 (part no. 1200400701) bridge rectifier diodes D1-4 short-circuit.
- (2) D55 (type BAS16, part no. 9120001651) leaky.
- (3) The STP4N90F1 MOS chopper transistor Q1 (part no. 1104910000) short-circuit and the  $10\Omega$ , 2W antisurge resistor R1 (part no. 1431007821) open-circuit.

No sound, distorted sound or only one sound channel working: Replace the MSP3400 sound processor chip U18 (part no. 1090340000).

No signal. The tuning voltage at pin 15 of the tuner does not vary with channel-change operation: Two likely causes are as follows.

- (1) The 4MHz clock signal at pin 12 of the Nicky chip U26 is missing because the 74LS74 oscillator chip U31 (part no. 1010007400) is faulty.
- (2) The Nicky chip U26 (part no. 1090960103) is faulty with no tuning voltage output at pin 16.

Grid of dots flashes on the screen, over the picture: The M550555 display chip U7 (part no. 1090505551) is faulty.

Test signal and text box are permanently displayed in the centre of the screen: This occurs when test point TST1 in the VideoCrypt decoder, between ICs U8 and U9, is dry-jointed or the track is broken. Resolder/repair as necessary.

#### VCRs

#### V3 Cat 1 and Cat 2 Chassis

These chassis are used in Models V205B, V215B,

V226B, V255B, V425B, V426B, V705B, V726B, V727B, V856B and V857B.

Dim clock display: CP041 (220 $\mu$ F, 25V) has fallen in value. Replace capacitor.

Dead, or pulsing outputs from the power supply: Two likely causes are as follows.

- (1) CP007 (10 $\mu$ F, 50V) or CP008 (100 $\mu$ F, 25V) has fallen in value. Replace both capacitors.
- (2) The U4614B chopper control chip IP001 (part no. 70011972) has failed.

While the above notes will help speed diagnosis and repair, the power unit is available from Toshiba spares at typically less than £30 trade. It may therefore be more cost effective to replace than repair the unit.

Crushed whites with playback via the RF modulator only: The 2SC2236-Y 12V regulator transistor TW003 is faulty with low output (11V). Replace the transistor, part no. A6325549.

Intermittent video and audio mute with both E-E and playback: The 17·7MHz crystal QT102 (QT001 in Cat 2 Hi-Fi models) is faulty. Replace the crystal, part no. 70012188.

#### Models V205B, V215B and V255B (V3 Cat 1 Chassis)

No E-E or playback picture or OSD, with no supply to the RF modulator: Check capacitor CW001 (100μF) in TW001's base circuit by substitution.

#### Models V226B and V426B

The main microcontroller chip IT001 in these models has been changed from the original type TMP90CS74DF part no. 70012656 to part no. 70012801. The only difference is that the new chip has additional software for a full-band modulator. This may automatically upgrade some early versions of these VCRs.

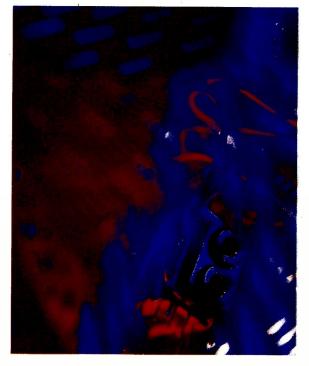
#### **Ribbon Cables**

Following requests Toshiba can now supply the following ribbon cables for V3 type VCRs.

Models V204B, V205B, V215B, V226B, V254B, V255B, V404B, V425B, V426B, V454B, V705B, V726B, V804B, V825B, V854B, V855B and V856B: 6-pin FFC from the main PCB to the loading motor and cam switch, part no. 70011821.

Models V204B, V205B, V215B, V226B, V254B, V255B, V404B, V425B, V426B, V454B, V705B, V726B and V856B: 14-pin FFC from the main PCB to the KDB PCB (key display), part no. 70011980.

Models V804V, V825B, V854B and V855B: 12-pin FFC from the main PCB to the KDB PCB (key display), part no. 70011818.



It's very helpful to have a means of testing line output transformers. This tester design by Charles Ritchie is based on a TBA920 line generator chip

# LOPT Tester

be the line output transformer. But when you order and fit a replacement it transpires that the original one had been OK. This has happened to me umpteen times, and no doubt has to most other readers as well. The last time it happened to me I swore "never again, there has to be a cheaper way of doing things". Then I remembered Ian Rees's LOPT tester design published in the September 1993 issue of *Television*.

In his circuit Ian used a CD4001 IC as the oscillator. As I didn't have one in stock, and neither did my supplier, I decided to use a TBA920 IC instead. Many older engineers will recall the use of this chip as the line generator in sets produced during the Seventies.

I also decided that it would be handier if I could use a multimeter rather than tying up an oscilloscope. And because of circuit differences, the ringing method devised by Ian was out. In addition there is no need to be able to alter the tuning capacitance since my circuit uses feedback.

R2

VR1

R3

1 13

C3

C4

C4

Primary winding

VR1

R6

R7

Scope output

D1

Meter output

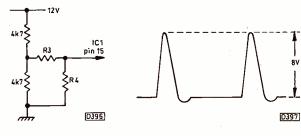
C5

D395

Fig. 1: The LOPT tester circuit. There are no connections to pins 3-8 and 10-12 of IC1.

Fig. 2 (left): Fixed potentialdivider alternative to VR1.

Fig. 3 (right): Typical waveform produced by a good transformer. See text.



**Circuit Description** 

The circuit I devised is shown in Fig. 1. IC1, with VR1, R1, R2, R3, R4 and C2, acts as a free-running oscillator. It produces a 10V peak-to-peak output at pin 2. Q1 is the switching transistor, which drives the primary winding of the transformer being tested. C4 tunes this winding and C3 applies feedback to pin 13 of IC1.

D1 and C5 rectify the pulses generated at the collector of Q1, providing a feed to the multimeter. R6 and R7 give a 10:1 reduction: this is the oscilloscope output.

The unit's power consumption is about 100mA. A fixed potential divider (see Fig. 2) could be used instead of VR1, but the control should be retained if you intend to use an oscilloscope – it helps with triggering.

Testing and Use

To test a transformer out of circuit, connect its primary winding across C4 as shown in Fig. 1. Connect your multimeter, switched to its 200V DC range, to the junction of D1/C5. Switch on the 12V supply. The circuit should then oscillate. A faulty transformer usually produces a reading of less than 50V.

For an in-circuit test, first make sure that the receiver's HT reservoir capacitor is discharged. Then either disconnect the line output transistor's collector or the HT feed to the transformer. Proceed as above. If you get a low reading, try reversing the connections. If you still get a low reading it may be necessary to unsolder all the transformer pins.

When testing a transformer, keep your hands clear – you can get a nasty shock (guess how I found out!).

Fig. 3 shows a typical waveform produced by a good transformer. Scope settings are 20µsec/cm and 2V/cm.

27kΩ 27kΩ 15kΩ
_ · · · · <b></b>
15kO
101/25
2·7kΩ
2·2kΩ, 0·5W
2·2MΩ
6·8MΩ
10k $\Omega$ linear
:1

Except for R5 the resistors are rated at 0.25W.



#### WIND GENERATORS 380 WATT

1.14 metre dia blades, carbon matrix blades, 3 year warranty, 12vdc output, 24v version available, control electronics included, brushless neodymium cubic curve alternator, only two moving parts, maintenance free, simple roof top installation, start up speed 7mph, max output (30mph) 380w. £499 ref AIR1

#### **PLANS**

PORTABLE X RAY MACHINE PLANS Easy to construct plans on a simple and cheap way to build a home X-ray machinel Effective device, X-ray sealed assemblies, can be used for experimental purposes. Not a toy or for minors! £6/set. Ref F/XP1.

TELEKINETIC ENHANCER PLANS Mystify and amaze your friends by creating motion with no known apparent means or cause. Uses no electrical or mechanical connections, no special gimmicks yet produces positive motion and effect. Excellent for science projects, magic shows, party demonstrations or serious research & development of this strange and amazing phychic phenomenon.

ELECTRONIC HYPNOSIS PLANS & DATA This data shows several ways to put subjects under your control. Included is a full volume reference text and several construction plans that when assembled can produce highly effective stimuli. This material must be used cautiously. It is for use as entertainment at parties etc only, by those experienced in its use. £15/set. Ref F/EH2

GRAVITY GENERATOR PLANS This unique plan demonstrates a simple electrical phenomena that produces an anti-gravity effect can actually build a small mock spaceship out of simple materials and without any visible means-

WORLDS SMALLEST TESLA COIL/LIGHTENING DISPLAY GLOBE PLANS Produces up to 750,000 volts of discharge, experiment with extraordinary HV effects, 'Plasma in a jar', St Elmo's fire, Corona, excellent science project or conversation piece. £5/set Ref F/BTC1/LG5

COPPER VAPOUR LASER PLANS Produces 100mw of visible green light. High coherency and spectral quality similar to Argon laser but easier and less costly to build yet far more efficient. This particular design was developed at the Atomic Energy Commission of NEGEV in Israel. £10/set Ref F/CVL1.

VOICE SCRAMBLER PLANS Minature solid state system turns speech sound into indecipherable noise that cannot be understood without a second matching unit. Use on telephone to prevent third party listening and bugging. £6/set Ref F/VS9

PULSED TV JOKER PLANS Little hand held device utilises pulse techniques that will completely disrupt TV picture and sound! works on FM too! DISCRETION ADVISED. £8/set Ref F/TJ5

BODYHEAT TELESCOPE PLANS Highly directional long range device uses recent technology to detect the presence of living bodies, warm and hot spots, heat leaks etc. Intended for security, law enforcement, research and development, etc Excellent security device or very interesting science project. £8/set Ref F/BHT1

BURNING, CUTTING CO2 LASER PLANS Projects an invisible beam of heat capable of burning and metting materials over a considerable distance. This laser is one of the most efficient, converting 10% input power into useful output. Not only is this device a workhorse in welding, cutting and heat processing materials but it is also a likely candidate as an effective directed energy beam weapon against missiles, aircraft, ground-to-ground, etc. Particle beams may very well utilize a laser of this type to blast a channel in the atmosphere for a high energy stream of neutrons or other particles. The device is easily applicable to burning and etching wood, cutting, plastics, textiles etc.

**DYNAMO FLASHLIGHT** Interesting concept, no battenes needed just squeeze the trigger for instant light apparently even works under water in an emergency although we haven't tried it yet! £6.99 ref SC152

ULTRASONIC BLASTER PLANS Laboratory source of sonic shock waves. Blow holes in metal, produce 'cold' steam, atomize liquides. Many cleaning uses for PC boards, jewllery, coins, small parts etc. £6/set Ref F/ULB1.

ANTI DOG FORCE FIELD PLANS Highly effective circuit produces time variable pulses of accoustical energy that dogs cannot tolerate £6/set Ref F/DOG2

LASER BOUNCE LISTENER SYSTEM PLANS Allows you to hear sounds from a premises without gaining access. £12/set Ref F/LLIST1

PHASOR BLAST WAVE PISTOL SERIES PLANS Handheld, has large transducer and battery capacity with external controls. £6/set Ref F/PSP4

INFINITY TRANSMITTER PLANS Telephone line grabber/ room monitor. The ultimate in home/office security and safetyl simple to usel Call your home or office phone, push a secret tone on your telephone to access either: A) On premises sound and voices or B) Existing conversation-with break-in-capability for emergency messages. E? Ref FfELEGRAB.

BUG DETECTOR PLANS is that someone getting the goods on you? Easy to construct device locates any hidden source of radio energy! Shiffs out and finds bugs and other sources of bothersome interference. Detects low, high and UHF frequencies. £5/set Ref F/

ELECTROMAGNETIC GUN PLANS Projects a metal object a considerable distance-requires adult supervision £5 ref F/EML2

ELECTRIC MAN PLANS, SHOCK PEOPLE WITH THE TOUCH OF YOUR HAND! £5/set Ref F/EMA1

PARABOLIC DISH MICROPHONE PLANS Listen to distant sounds and voices, open windows, sound sources in 'hard to get' or hostile premises. Uses satellite technology to gather distant sounds and focus them to our ultra sensitive electronics. Plans also show an optional wireless link system. £8/set ref F/PM5

2 FOR 1 MULTIFUNCTIONAL HIGH FREQUENCY AND HIGH DC VOLTAGE, SOLID STATE TESLA COIL AND VARIABLE 100,000 VDC OUTPUT GENERATOR PLANS Operates on 9-12vdc, many possible experiments £10 Ref



#### COLOUR CCTV VIDEO CAMERAS,

BRAND NEW AND, CASED, FROM £99.
Works with most modern video's, TV's,
Composite monitors, video grabber cards

Pal, 1v P-P, composite, 750hm, 1/3" CCD, 4mm F2.8, 500x582, 12vdc, mounting bracket, auto shutter, 100x50x180mm, 3 months warranty,1 off price £119 ref XEF150, 10 or more £99 ea 100+ £89



#### SUPERWIDEBAND RADAR DETECTOR 360 deg COVERAGE

Detects both radar and laser, X, K, superwide KA bands LED signal strength display Audio and visual alerts, Alert priority, Rear and front facing optical waveguides, Triplecheck verification, city mode, tutorial mode, dark mode, aux jack, volume control. These may be illegal to use in certain countries.

1 1"x2 7"x4 6"

Superband £149 ref RD2

PLACE YOUR ORDER VIA OUR WEBSITE AT BULL-ELECTRICAL.COM

#### BULL ELECTRICAL

250 PORTLAND ROAD, HOVE, SUSSEX. BN3 5QT. (ESTABLISHED 50 YEARS). MAIL ORDER TERMS: CASH, PO OR CHEQUE WITH ORDER PLUS £3.50 P&P PLUS VAT. 24 HOUR SERVICE £5.00 PLUS VAT.

OVERSEAS ORDERS AT COST PLUS 43:50 (ACCESS, VISA, SWITCH, AMERICAN EXPRESS) Phone orders: 01273 203500

FAX 01273 323077

E-mail bull@pavilion.co.uk



#### HELIOS PNB-2 RUSSIAN BORDER GUARD OBSERVATION BINOCULARS £1799

Intended for the medium to long range observation of air and ground targets and the determina tion of their angular co-ordinates. These grant binoculars are a thobute Russian optical ingenuity, with a performance that simply has to be seen to be believed. A large exit pupil diameter of 7.33mm provides exceptional light passing power, which when combined with its high

magnification of x15 allows the user to view over vast distances with delightfully bright, crisp, high resolution images. Robust and able in construction incorporating an uncomplicated yet thoughtfully designed mechanical layout ensuring ease of operation and quick precise targeting. These binoculars have a wide variety of applications and are suitable for use by coastiguards, law enforcement organizations, customs, farmers etc.

Specifications

x15 magnification, 110mm objective, 6 deg angle of view, Field at 100m=105m, focusing 10m-inf, fully coated precision ground optics, orange and neutral filters, rubber lens caps, rapid tergetting hand grips, padded headrest, screw in silica gel cartridges, wooden tripod, operating temperatures -40 c to +50 c, weight 25kg, (15kg without tripod), supplied in wooden carrying case



#### TZS4 INFRARED NIGHT SIGHT

One of our top most selling night sights is this Russian TZS4. This sight enable you to see in very low light levels, or with the aid of the built in infra red illuminator- in total darkness in 1/4 moonlight you would spot a man at 150m, in total darkness at 75m. Magnification 2 3x, 240x66x190mm,0.9kg, focusing range 1.5m-infinity, M42 camera mount included, runs on 2xAA batteries, 100mm focal length, 8 deg illuminator divergence, 50hrs continuous (no illuminator) 10hrs with, carryingcase and strap

TZS4 Nightsight £199 ref BAR61



Reports from
I. Field
Philip Blundell, AMIEEIE
Chris Watton
John Edwards
Roger Burchett and
Adrian Spridell

#### Wyse 60

These elderly ASCII terminals remain popular and are sturdy. We get two faults from time to time however. One is gate array failure, the other is failure of the  $3.3\mu F$ , 50V non-polarised electrolytic line scan coupling capacitor C205. When C205 fails, R214 (10 $\Omega$ ) in the dynamic focus circuit usually catches fire, burning a hole in the side of C206 (0.22 $\mu F$ , 100V).

File away the carbonised PCB carefully and fit a replacement resistor flat across the aperture, using its leads to repair the damaged print by bending them to the required shape. Replace C206 and clean the soot off the focus potentiometer. With regard to C205, an alternative to an electrolytic should prevent a recurrence of the trouble. I suggest a 4·7μF polycarbonate type, or possibly a polyester capacitor. These should be available from Farnell Electronic Components (phone no. 01132 636 311). Fit the capacitor on end, with a wire link from the top end to the other PCB hole. Secure with hot melt or silicone rubber. I.F.

#### Gateway 2000 Model CS1572FS

The problem here was a dull, milky raster. As normal checks revealed nothing amiss, I looked at the CRT's pins. They were well covered with oxide scale. You get this with all CRTs, and it occasionally causes problems. I find that using a glass-fibre pencil to brush around the accessible part of the pins, then

# Monitors

pushing the CRT base on and pulling it off a few times, will remove the oxide where the contacts rest on the pins. The fibre particles must be completely removed, using compressed air. The result is better than new! I.F.

#### Peacock/Nytec Model MN14P37

There was line collapse – a vertical line down the centre of the screen. I found that one of the solder connections to L401 had arced away. This magnetically-polarised inductor is in series with the line scan coils, at the earthy side. When refitting it after scraping the leads, note that the line mark on the body of the inductor lines up with the dot on the PCB screen-print symbol. I.F.

#### Philips 4CM2799/00T

If one of these colour monitors is dead with a clicking relay, check whether transistor Tr7605 or Tr7615 is short-circuit. If either transistor, or diode D6608, has failed replace all three components, also coil L5604. In addition, check that the value of C2609 is 5.6nF (part no. 4822 121 43677). P.B.

#### IPC VDVGA14#55N1

This monitor was dead. There was 320V at the output from the mains bridge rectifier circuit and at the collector of the chopper transistor. As usual, I didn't have a circuit diagram. What I do in such a case is to check for heavy loads across the outputs from the power supply. If none are present I check for a start-up supply of some sort on the primary side of the circuit. In this case the search brought me to R531 (560kΩ) which had failed. It's connected between the 320V supply and the junction of a zener diode and the base of a series regulator transistor. The latter provides power for the primary control stage. C.W.

#### Mitec L1450PD

This budget VGA-type monitor was

dead with no power supply operation. The PC engineer who had brought it in pleaded for a quick job and I was happy to oblige. One of the two  $47k\Omega$  start-up resistors R904/905 was open-circuit. J.E.

#### Capetronic CDS438K

The frame scanning would intermittently become distorted at the top and bottom, eventually collapsing to a height of less than half an inch. A tap anywhere would clear the fault – which wouldn't appear once the monitor had been dismantled! Only by flexing the board could any disturbance be seen. Resoldering the pins of the µPC1498H frame output chip IC201 didn't seem to have any effect. When the solder was removed from the IC's heatsink tag however the metal was seen to be eroded. Resoldering, with an added wire link, cleared the fault. R.B.

#### Chuntex 1565D

These monitors often have badly soldered joints at the pins of the line output transformer. In one case there was no HT supply at the collector of the line output transistor because of a solder 'blob' that failed to make contact with the print. **R.B.** 

#### **AST SVGA LR14**

The symptom was line cramping at the sides of the screen. I found that C350 was leaky. **A.S.** 

#### Taxan MV789LR

This monitor was dead. The BU2527A line output transistor and the FET Q808 were both short-circuit. The cause of the trouble was that the HT output from the power supply had risen from 84V to over 200V. Feedback resistor R820 (150k $\Omega$ ) was the cause: it had gone open-circuit.

If you get this type of fault, check D406 before you switch on again. It's under the LOP heatsink. If D406 is leaky, Q808 will blow immediately when power is reapplied. A.S.

### Whatever you do with your nose



### ...don't pay through it!

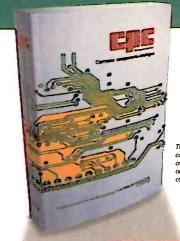
#### With CPC you're guaranteed top quality brands and savings of up to 25%

Simply by working more efficiently than our competitors, CPC offers you remote control handsets, video spares, computer products, tools and instruments, at prices which are up to 25% lower than other leading distributors. In fact, there's a choice of more than 62,000 products from over 300 of the world's leading brands.

That's why 10,124 companies have opened an account with us in the last 12 months.

Just call for your FREE copy of the new CPC catalogue

Tel 01772 654455 Fax 01772 654466



crammed with over 10,000 new

# The Language of Digital TV

With TV going digital, there are many new terms and abbreviations we'll have to get used to. Mark Paul has compiled the following list as a handy reference

igital technology will involve a new way of thinking about TV. We have already seen some use of digital techniques in the world of TV, with remote control, teletext, Nicam and, in a few chassis, signal processing, but we are now on the brink of something altogether different. There is to be a major design shift from the analogue to the digital approach, and this will require a new understanding – we are not just concerned with a bit of add-on technology.

The change has been compared with that from monochrome to colour, but is in fact more radical. It will bring with it new servicing techniques, a new set of fault conditions, new test equipment, new features, new product awareness, new customer education and a new language: Digispeak! The following is your guide to digital TV Digispeak. We'll start with abbreviations, then provide definitions for the new terms you'll be encountering.

#### **Abbreviations**

**AC3** A multi-channel audio system developed by Dolby Laboratories.

**ADC** Analogue-to-Digital Converter. Device for converting an analogue voltage waveform into a series of digital numbers.

**AF** Adaption Field. A data field used for adapting the PES (see later) to data transport packet length.

**ADPCM** Adaptive Differential Pulse Code Modulation.

**ASK** Amplitude Shift Keying. A digital amplitude modulation system with two states.

**AU** Access Unit. MPEG coded picture, sound or data frame.

**B** Bidirectional. Use of preceding and succeeding MPEG frames to derive a further frame (by interpolation).

**B** When used to refer to an MPEG video frame, the type that is derived from I and P frames.

**BAT** Bouquet Association Table. A table that relates DVB-SI services.

**BER** Bit Error Rate. Ratio of the number of erroneous bits to the total number of bits transmitted.

**BIT** BInary Digit, i.e. a logic one or zero. Binary means two-state, either one or zero.

**BUS** A group of conductors forming a circuit or route along which data or power can be sent between several ICs, circuits or pieces of equipment.

**BYTE** Digital 'word' consisting of eight bits – the standard size of a binary number.

**CA** Conditional Access. The means of restricting access to Pay-TV programmes.

**CAM** Conditional Access Message. Specific messages for conditional access, i.e. ECM and EMM.

**CAT** Conditional Access Table. A DVB MPEG-2 transmission table that identifies conditional access packets.

**CAZAC/M** Constant Amplitude Zero Auto Correlation. A reference symbol for terrestrial DVB.

**CCIR** Comité Consultatif International de Radiodiffusion. Organisation that controls international standards, frequencyes etc. Now known at ITU-R.

**CCIR-601** Recommended standard form of video signal digitalisation, with a sampling frequency of 13.5MHz and YUV signals in 4:2:2 format. Now known as ITU-R 601.

CCIR-656 Recommended way of interfacing CCIR-

601 signals. The most common arrangement is 8 bits parallel multiplexed YUV.

**CCITT** Comité Consultatif International de Télégraphe et du Téléphone. Now known as ITU-T.

**CIF** Common Intermediate Format. A compromise between the European and American SIF (see later) formats. The spatial resolution is taken from the 625-line SIF (360 x 288 pixels) and the temporal resolution from the 525-line SIF (30Hz). This compromise is the basis of video conferencing.

**C/N or CNR** Carrier to Noise Ratio. Received carrier power to noise power in the channel bandwidth expressed in dB.

**COFDM** Coded Orthogonal Frequency Division Multiplex. See OFDM. Modulation technique to be used for digital terrestrial TV transmissions.

**CRC** Cyclic Redundancy Check. Used to check the correctness of data.

**CSA** Common Scrambling Algorithm. The scrambling algorithm specified for DVB.

**CVBS** Composite Video Baseband Signal. This relates to analogue TV – it's the composite luminance, colour and sync PAL, NTSC or Secam signal.

**DAB** Digital Audio Broadcasting. The new European digital audio broadcasting standard.

**DAC** Digital-to-Analogue Converter. Device for converting a series of digital numbers into an analogue signal waveform.

**DAVIC** Digital Audio VIsual Council. The council, based in Geneva, has members from all the industries involved in the application of digital technologies to audio and video. It aims to define and specify interfaces to provide maximum interoperation between countries, applications and services.

**DBS** Direct Broadcasting by Satellite, i.e. from a satellite to individual dishes. The original DBS band reserved for TV broadcasting was 11·7-12·5GHz. Other sections of the Ku band have come into use for DBS, i.e. 10·95-11·7GHz and 12·5-12·75GHz.

**DC** Direct Current, also refers to the null-frequency coefficient in DCT (see below).

**DCT** Discrete Cosine Transform. JPEG/MPEG technique in which a pixel data block is converted from temporal to frequency form.

**DISEQC** Digital Satellite Equipment Control. Method of modulating a 22kHz tone to provide control of LNB etc. switching.

**DPCM** Differential Pulse Code Modulation. Method of coding a value in terms of its difference from the previous value.

**DRAM** Dynamic Random Access Memory. A read/write memory whose stored data requires periodic 'refreshment'. The most common type of memory, because of its low cost.

**DSM** Digital Storage Medium. Term given to such mass storage devices as a hard disc, tape or CD/DVD.

**DSP** Digital Signal Processor. Chip used for processing digitalised analogue signals.

**DTS** Digital Time Stamp. Indicator of the decoding time of an MPEG access unit.

**DVB** Digital Video Broadcasting. In Europe there are three variants, DVB-C (cable), DVB-S (satellite) and DVB-T (terrestrial off-air).

**DVB-CI** Digital Video Broacasting Common Interface. Used for conditional access modules in the PCMCIA format.

**DVB-SI** Digital Video Broacasting System Information. A group of tables with specifications additional to MPEG-2 programme specific information (see PSI).

**Eb/No** Ratio between the average bit energy Eb and the noise density No. It's related to C/N.

**EBU** European Broadcast Union. An organisation that brings together the main European broadcasters and, amongst other things, works on new standards which then require ETSI approval.

**ECM** Entitlement Control Message. The first type of conditional access message with the DVB standard.

**EEPROM** Electrically Erasable Programmable Read-Only Memory. ROM that can be both read from and written into. It's not suitable for use as a RAM as the write process takes considerable time. Also known as an EAROM – Electrically Alterable ROM.

**EIT** Event Information Table. A DVB-SI table that indicates a new event.

**EMM** Entitlement Management Message. The second type of conditional access message with the DVB standard.

**EPG** Electronic Programme Guide. A graphical user interface giving easy access to DVB programmes.

**EPROM** Erasable Programmable Read-Only Memory. A ROM that can be programmed/reprogrammed. Erasure is by UV light, programming by a device that supplies pulses to determine the state of individual memory cells. This device is software controlled.

**ES** Elementary Stream. The data output from an MPEG audio or video encoder.

**ETS1** European Telecommunications Standards Institute. The organisation that confirms European standards in the telecommunications field. Such a standard is called an ETS.

**FEC** Forward Error Correction, also known as Channel Coding. This is the addition of coding to the MPEG signal to enable errors to be detected and corrected at the receiving end of the transmission path.

**FFT** Fast Fourier Transform. Method of processing a digital signal.

**FIFO** First In First Out. Refers to the flow of information into and out of a type of memory used as a buffer.

**FSK** Frequency Shift Keying. Modulation technique that uses a frequency shift to indicate the change of state of a digital signal from zero to one or vice versa.

**GOP** Group of Pictures. An MPEG video 'layer', i.e. a group of twelve MPEG video frames (pictures) starting with an I (intraframe-coded) picture.

In-phase or Intra. The first relates to QAM (quadrature amplitude modulation), indicating the carrier on the 0° axis. The second relates to a complete MPEG frame (the first in a series of twelve) which is used on its own and then as a reference for further frames in the group.

PC Inter Integrated Circuits. IC interconnection system via a serial bus. Originally developed by Philips.

**l**<sup>2</sup>**S** Inter Integrated Sound. System for interconnecting digital sound ICs via a serial bus, developed by Philips.

**IEC** International Electrotechnical Commission. International organisation for standardisation in the field of electrotechnics, electricity and electronics.

**IEEE 1284** Bidirectional high-speed parallel data interface (an enhanced Centronics Interface).

**IEEE 1394** High-speed (up to 400Mbits/sec) serial data interface. Is likely to become the standard for digital AV links with consumer electronic equipment.

**IRD** Integrated Receiver Decoder.

**ISI** Inter Symbol Interference. Interference between successive symbols in a digital data transmission.

**ISO** International Standards Organisation. The international standards organisation within UNO.

**ITU** International Telecommunications Union – the world regulatory organisation for telecommunications. Previously CCIR/CCITT.

**JPEG** Joint Photographic Experts Group. The group that set the standard for video compression with still pictures.

**MP@ML** Main Profile at Main Level. The main DVB standard video format.

MPEG Motion Picture Experts Group. The group that has establish video compression standards for moving pictures. There have been four standards to date. MPEG-1 is designed for CD-ROM and CD-I applications. MPEG-2, providing higher quality, is designed for broadcast and DVD use. MPEG-3 was to be used for digital HD-TV but has been abandoned – the requirement is now catered for by upper levels added to the MPEG-2 standard. MPEG-4 is still being developed and is not expected until the year 2000. It will be used for low bit rate audio/video compression (10kbits/sec-1Mbits/sec for moving pictures, 2-64kbits/sec for the associated sound).

**MUSICAM** Masking Universal Sub-band Integrated Coding And Multiplexing. Coding process for MPEG-1 audio, layer 2, used for DAB and DVB.

**NICAM** Near Instantaneous Companded Audio Multiplexing. Digital sound system used with analogue TV. Employs QPSK modulation with two carriers at 6MHz and 6·552MHz (UK standard I).

**NIT** Network Information Tabel. DVB-SI table included in a transmission to provide information such as channel numbers and frequencies.

**OFDM** Orthogonal Frequency Division Multiplex. Modulation system in which the signal modulates a large number of carriers within the channel bandwidth. The carriers are all spaced apart by 90°, i.e. they are orthogonally related. There is therefore no interference between them.

**P** Predictive: refers to every fourth frame in an MPEG GOP. These frames are derived from the I frames and are in turn used to derive the B frames.

**PAT** Programme Allocation Table. A DVB table which indicates the PID of the data packets that comprise a programme.

**PCM** Pulse Code Modulation. Pulse modulation to convey information.

**PCMCIA** Personal Computer Memory Card International Association. Since renamed **PC-CARD**. The format used for PC extension modules and proposed by DVB for detachable CA modules using the DVB-CI (common interace).

**PCR** Programme Clock Reference. Information sent at regular intervals with an MPEG-2 transmission to synchronise the receiver's decoder clock with the clock of the programme being received.

**PES** Packeted Elementary Stream. MPEG data streams (elementary streams) when arranged in packets for transmission as part of a multiplex.

**PID** Packet IDentifier. Number used to identify packets in a DVB transmission (MPEG-2 multiplex).

**PMT** Programme Map Table. A DVB table which enables all the programmes in an MPEG transmission multiplex to be identified.

**PRBS** Pseudo Random Binary Sequence. A signal scrambling technique.

**PSI** Programme Specific Information. Information, such as CAT, NIT, PAT and PMT, included in a DVB MPEG transmission to keep track of the data in the multiplex.

**PTS** Presentation Time Stamp. Data that marks the timing of a presentation unit.

**PU** Presentation Unit. A decoded MPEG audio or video frame.

**Q** Quadrature. The relationship between two signals/carriers with a phase difference of 90°. In relation to QAM, the carrier on the 90° axis.

**QAM** Quadrature Amplitude Modulation. Amplitude and phase modulation of two carriers at the same frequency but with a 90° phase difference.

**QEF** Quasi Error Free. A channel in which the BET is less than  $10^{-10}$ .

**QPSK** Quadrature Phase Shift Keying. Modulation of one or both of two orthogonal (90° phase difference) carriers to obtain four possible signal conditions (phasors) at 45°, 135°, 225° and 315°.

**RISC** Reduced Instruction Set – Computer. System used to achieve more efficient use of computer ROM.

**RLC** Run Length Coding. Data compression system that exploits data repetition.

**RSC** Reed-Solomon Code. An abbreviated version of this error-correction technique is used for DVB transmission.

**RS232** An asynchronous serial data interfacing standard. Data transfer is relatively slow.

**RST** Running Status Table. An optional DVB-SI table that provides information on the current transmission status.

**SCR** System Clock Reference. Sync signal sent at regular intervals with MPEG-1 compressed information to synchronise an MPEG decoder's clock with the system clock.

**SDRAM** Synchronous Dynamic Random Access Memory. Memory used in MPEG decoders as a high-

speed RAM. The memory is 16- instead of 8-bit organised.

**SRAM** Static Random Access Memory. RAM that does not require data refreshment.

**SDT** Service Description Table. A DVB-SI table that provides information on the services in a transmission.

**SIF** Source Intermediate Format. The basis of MPEG-1 compresssion.

**ST** Stuffing Table. An optional DVB-SI table.

**TDT** Time and Date Table. A DVB-SI table used to updata a receiver's real-time clock.

**TPS** Transmission Parameter Signalling. Use of pilot carriers with DVB-T to indicate modulation and channel coding in the OFD multiplex.

**VLC** Variable Length Coding. Compression technique in which fewer bits are used to code frequently than less frequently occurring data patterns.

**VLIW** Very Long Instruction Word. A new method of microprocessor operation.

#### **Next Month**

So much for abbreviations and their meanings. We will continue next month with definitions of commonly used terms.

# **Repair Monitors?**

How many times have you been unable to fix a monitor because you can't get a part?

The Logitron catalogue is full of components specially selected for monitor repair. From Caps to Cables, Flybacks to Fuses, Schematics to Switches, Semiconductors to Solder; you name it, we have it in stock. We have over 7000 products for the repair of every popular brand from Acer to Zenith, and countless 'anonymous' Far Eastern types too.

Find out why every major monitor repair centre in Europe buys from Logitron. Call for a catalogue now!



7 0181 987 7000 Fax 0181 747 9112

**LOGITRON LTD** 

The Hogarth Centre Hogarth Lane London W4 2QN

# What a Life!

### Reminiscences of earlier times, then back to today's dud TVs and other matters. Donald Bullock's commentary

s I sat nursing an after-dinner whiskey over Christmas I found myself reflecting on the changes that have occurred in our trade over the years.

There was a time when the family TV set took pride of place in the nation's sitting rooms. When it went on the blink there was consternation all round. The relief was obvious if we could get it going in the house. Dark expressions turned to smiles, and we were often given something, from the garden say, in addition to our payment.

When the set had to be taken off, as was often the case, it was a different story. We would get suspicious looks, there would be dark mutterings about honesty and expense, and urgent entreaties about how long it would take.

TV engineers had to learn how to cope with such situations. Many who had entered the trade because of technical interest found that dealing with personal problems was part of the job – also backbreaking weight lifting. All this for very limited reward.

#### **Silent Sydney**

Many customers would resort to threats, bribes and various tricks to get their sets back quickly. When I was at a local GEC branch with a workshop at the back there was a character we called Silent Sydney. He would drive up to the front gates with a pocketful of silver halfcrowns. The gateman would be tipped to let him through, after which he would tip everyone else he came across until he reached the workshop. My half-crown came when I had lifted the set from the car. The resident engineer, who usually cleared his bench at once, got the jackpot.

Sydney was a tense and expectant man, but once his set came to life a gentle smile of relief would appear on his face. He communicated mainly with his eyes: I never heard him speak.

#### **Workshop Conditions**

The workshop conditions usually reflected the poverty of the job. One of my earliest jobs was as a bench engineer at a city branch of J & M Stone, a well-known multiple of that era. Most of the floorspace was taken up by a cheerful, brightly-lit showroom. At the back there was a tiny and basic lavatory – and my workshop, which was scarcely larger. It had a short, wide shelf, and a stool whose top had long since disappeared. The floor consisted of a couple of uneven flagstones. It was here that I learnt the cruelty of a mains-to-earth shock. But I was told that they keep you free from rheumatism for life, and my experience seems to bear this out.

#### Reuben and the Philips

An even earlier job was as an assistant to Reuben, an enthusiastic but small-minded electronic wizard. This was just after the war, when decent wireless sets were rare. One day a pre-war Philips radio was brought in for a complete overhaul. Now Reuben knew and respected Philips sets, as I came to do, and he tackled it as if it was some sort of vocation.

First he dismantled and thoroughly dusted it. Then he took out the dial glass and washed it. In went new valves, a new magic-eye indicator, a new tuning gang, a new dialdrive cord, pilot lights and many smaller items. Next came realignment, RF and IF, using a signal generator. Finally the cabinet was cleaned and polished. When he'd finished, the set shone and produced unbelievable sound quality. Reuben radiated contentment.

When the customer came to collect it, Reuben proudly demonstrated its quality on several programmes.

He then presented the bill. The customer complained that it was far too high. Reuben told him about the hours of dedicated work involved. There was an awful row, which ended when the customer ordered Reuben to unrepair the set. "I'll take it to Weatherby's" he shouted, "they'll do it cheaper."

Reuben unrepaired the set then some. He misaligned it, drilled tiny holes through the capacitors, pulled the speaker cone off-centre and, amongst other things, opened the huge IF transformers and painted their windings with battery acid. Next day the customer returned, full of apologies. "I've come to pay for your excellent work" he announced, "it was unforgivable of me. You'd worked wonders on the set."

Reuben sagged, then tottered out to the King's Head. The customer looked at me. "What's up with him?" he asked.

#### A Goodmans 2875

I could fill a book with such reminiscences – if it wasn't for the likes of Fanny Trotter. She came in and collared Steven.

"My set ain't half funny Mr Snodd, er, Bullhead" she said. "Can you be a dear and get him from the car?"

Steven looked outside. It was raining, hard.

"Where's the car?" he asked.
"Just across the road" she replied.

He followed her out. There was a parked car twenty yards up the road. Gritting his teeth, he followed her towards it. But she walked past, to another car thirty yards farther on.

When he came back he was soaked and puffing. It was the biggest set I'd ever seen. A 28in. Goodmans 2875.

"It's a funny sort of fault" she chortled, but we waved her out.

I got the set on the bench. There was no green content to the on-

screen graphics but there was green in the picture, which was wishywashy and flared. "One for you, Steven" I said, "er, I'll make the tea."

#### **A Vacuum Cleaner**

As I put the kettle on Steven called me to see Mrs Noggs. She was clutching a modern, upright Electrolux vacuum cleaner.

"I just done me rubber plant when he went 'fuzz' and cut out" she said, "he ain't all that old."

I don't like vacuum cleaners, especially Electroluxes with their clamped up motor-cum-fan units. This one was no exception, though I did manage to get to the motor brushes. To my surprise one was almost worn away while the other one seemed as good as new. But I was wasting my time. Enquiries proved that there are no motor spares for this model, just the complete motor/fan unit.

**Mr Dewey** 

Just then an ancient but brisk man walked in. "Name's Dewey" he said, "of Dewey, Squeezam and Howe, solicitors." He flicked at his watery eye. "My set's old, same as me. But don't you tell me to change it. It's got push-buttons and knobs, and I can work it. And it looks like a television set, not a storage bin."

It was a Ferguson Model 3792, which uses the TX9 chassis, and was dead. I found that the plugtop fuse was open-circuit in addition to the 1 6AT mains fuse in the set, FS1. Then I saw that the BU508A chopper transistor TR62 had blown its front off. Steven was busy with the Goodmans set, so I went to look for the circuit diagram. Steven noticed.

"There are about forty TX9 circuits, all different" he said, "aren't you lucky?"

The set was actually fitted with the 1044 non-remote control version of the chassis, the later version that has a chopper power supply. I eventually found the right circuit.

As R164  $(27\Omega)$  and D104 (1N4001GP) in TR62's base circuit had both died violently I decided to check the windings of the chopper transformer T1. They were short-circuit. We've had trouble obtaining these transformers in the past, so I fitted one from a scrap chassis. In addition to the blown devices it seemed logical to replace the TDA4600 chopper control chip IC57. Then I started the set up, gingerly, using the variac.

There were no shorts, but there was no HT output from the chopper

circuit either. "Check R165  $(300k\Omega)$  in the current-simulation network" rapped Steven authoritatively. It was virtually open-circuit. A replacement completed the repair, and the results were excellent.

Meanwhile Steven had been working on the CRT base panel in the Goodmans 2875 – where the TEA5101A RGB output chip lives. He found that R28  $(68k\Omega)$  in the green channel was open-circuit. In addition its counterparts in the red and blue channels, R26 and R29, had risen in value to about  $75k\Omega$ . Replacing all three restored correct displays.

#### **Return of Mr Dewey**

When Mr Dewey returned to collect his set he brought two more with him, a Sony KVM2121 (BE1 chassis) and an Hitachi fitted with the G7P Mk 2 chassis. "These belong to my two partners" he announced.

The Sony set was dead with the standby light pulsing. A check on the BU506DF line output transistor Q802 showed that it was leaky. After fitting a new one we discovered that circuit protector PS802 in the supply to the line driver and output stages was open-circuit. It's rated at 0.6A. A new one completed the repair.

Then Steven pulled up the Hitachi set. It was dead with the BUT11AF chopper transistor Q901 open-circuit. This is another TDA4600-type power supply (TDA4601 actually). The resistors in the current-simulation circuit are R932 (120k $\Omega$ ) and R931 (150k $\Omega$ ). They were both high in value at some 180k $\Omega$ . After replacing these items he started the set up via the variac. All was well.

Later, over a cup of tea, Steven pointed out that Mr Dewey, an intelligent man, refused to consider buying a new set because they are full of gimmicks and are unpleasant, if not impossible, for normal folk to operate. In addition they look so black and awful.

"I'm finding that more and more people, especially the mature ones, feel the same about modern sets. They don't like them and won't have them. When their existing sets need to be replaced they ask whether we can supply an older, reconditioned one. Since the population is rapidly ageing, there must be a fortune waiting for the first manufacturer sensible enough to produce a basic set that anyone can operate" he concluded.

#### **Rippling Picture**

Just then a thin, sharp-faced character hustled in carrying a Matsui 1436



"It was here that I learnt the cruelty of a mains-toearth shock."

portable. He put it on the counter, had a fight with his duffle coat, pulled out a red-spotted handkerchief and gave his nose a good blowing.

"Shall I ask him for an encore?" I asked Steven.

"This set, now" rang out the Modern Man. "It's never been really right since you last tried to do it, but I thought I'd give it time to settle down. I think it must be the valve or the transformer. Perhaps you fitted new ones last time. You'll have it in your records, I daresay. We were watching 'Are you being served' when it failed. My dog likes to watch that."

"When did we last do it?" Steven asked, reaching for our tray of cards.

"It was just before that last Cassius Clay fight" he said. "I wanted to watch it, the wife didn't and didn't we have a row. Well, wives are all the same, aren't they? Er, are you married Mr Duffer?"

"No" said Steven, "I've just got toothache."

Once he'd departed we pulled his set on to the bench. The entire right-hand side of the picture was rippling. This suggested an open-circuit or low-capacitance electrolytic in the power supply. But we found that the print at the positive side of the HT reservoir capacitor C666 (150µF, 160V) was cracked. Resoldering it cured the set's trouble, but there was still the customer . . .



Reports from
John C. Priest
Pete Gurney, LCGI
Blair McEwan
Chris Avis
Chris Watton
Michael Dranfield
Graham Colebourn and
Stephen Leatherbarrow

#### Beon CTV1403T

These sets tend to have problems with their power supply start-up circuit. First examine the PCB, above and below, for brown glue on and around components in the power supply and line output area. The glue will have become brittle and hard and needs to be removed. Once the board has been cleaned up you may find that the set works all right. If not, replace the start-up resistors -R508/9 (150kΩ, 0.5W) and R107/8  $(270k\Omega, 0.5W)$ . This should restore normal operation, but I have had one case where the CNX82A optocoupler D111 had to be replaced.

Check the long wire link between the microcontroller chip and the transistor that drives the optocoupler if the set sometimes fails to come out of the standby mode. J.C.P.

#### Memorex 1400

These sets were sold through Tandy outlets. The chassis is very similar to that in the Matsui Models 1455/1465 and the same service manual can be used. If a replacement remote control unit is required, the Konig HS00004 will operate all functions with the Matsui 1465 and these Memorex sets. There may be some buttons for functions not provided with the Memorex sets. J.C.P.

#### Panasonic Alpha 3 Chassis

There was severe EW bowing and none of the relevant controls had any effect. It's not an uncommon

# TV Fault Finding

fault with this chassis, the usual cause being the TDA8145 chip IC701, with R708 and/or L701 also failing. In this case R708 and L701 were OK. A new TDA8145 chip restored some operation of the width and parabola controls, but a full, linear scan could not be obtained and the trapezium control still had no effect. Further checks revealed that there was no voltage at pin 1 of IC701 because the associated 0.01µF, 50V disc decoupling capacitor had an internal resistance of 55Ω. A new capacitor finally cured the problem. J.C.P.

#### Philips NC3 Chassis

If there is intermittent loss of the picture – it fades off and on as the CRT heaters go out then come on again – check for faint haloes (dryjoints) at the base of the line output transformer. You may need a magnifier to see them. Don't just resolder the transformer's legs. Remove the transformer, as you will probably find that the legs are quite black above the PCB level. Scrape and retin them before refitting the transformer to the PCB. Also check the connections to the CRT's base panel. J.C.P.

#### Nikkai Tara 10

I've had a number of these sets with intermittent loss of luminance – a dark red/purple display. You usually find that the PCB is sensitive to tapping. The brightness, contrast and colour controls are part of a single assembly. Remove it, treat the tracks with a little contact cleaner, then clean off the print before refitting the assembly.

If this doesn't clear the problem, look at the print in the general area of the TDA3566 colour decoder chip. I've had several sets where the solder pad drilling has been well off centre – sometimes barely on the pad at all. It pays to remove the IC then clean up the whole area with desoldering braid and PCB cleaner

before refitting it. Take great care to ensure good connections to the solder pads.

The soldering in these sets leaves a lot to be desired: there is far too much solder on most of the connections and dry-joints abound. J.C.P.

#### Mitsubishi CT25A2 (Euro 12 Chassis)

The complaint was of intermittent Nicam crackling, more when the set had warmed up. On test it was obvious that the set was drifting off tune. Eventually the text was corrupted as well. This is becoming quite a common problem, the cause being bad joints in the IF unit, particularly around the two ICs, the SAW filters and the coils. When it's faulty the unit is not always sensitive to tapping. Resoldering cured the problem. **P.G.** 

#### Huanya 37C-2

This set came from another dealer, the complaint being no luminance. The D7193 colour decoder chip IC501 had been replaced, also several transistors in this area. A scope check at the base of the luminance delay line driver transistor Q302 displayed a suitable waveform, but voltage checks showed that the transistor was saturated – there was 9V at its collector instead of 4.5V. This in turn cut off the luminance emitter-follower transistor Q303.

The cause of the trouble was in the pedestal clamp stage. Transistor Q304 should have 10V at its emitter. This supply comes from the subbrightness control, via D306 (type 1S2076). Only 8V was present here. The cause of the fault was D306. It checked OK out of circuit, but a replacement restored the luminance and correct voltages. **P.G.** 

#### Toshiba 219T9

This set took a progessively longer time to start up. Eventually it died altogether – the power supply sat there with most of its voltages present though it wasn't working. I've had a few dried-up capacitor problems with this model. Replacing C818 (22μF, 100V), C814 (100μF, 50V) and C823 (10μF, 16V) on the primary side of the chopper power supply usually gets things going, and did in this case. It's also wise to check the capacitors on the secondary side of the circuit, using a scope, and to replace them as necessary. P.G.

#### Mitsubishi CT25A4STX (Euro 12 Chassis)

There was intermittent loss of sound and sometimes no picture. In most cases of this sort a good tap on the VIF module will produce results. When the module was removed I found that there were bad joints at both ICs and most of the capacitors. Resoldering all the joints and earths cured the fault. **P.G.** 

#### Sharp DV5103H

This set came in dead with a blackened mains fuse and the surge-limiter resistor R700 ( $8.2\Omega$ ) open-circuit. The short-circuit was still present when the chopper transistor had been removed. I subsequently found that the transformer was the culprit, with all the pins on the primary side shorted together. **P.G.** 

#### Daewoo T200

This set wouldn't come out of standby. You switch it to on by pressing the programme buttons at the front. In this case the relay clicked but not much else happened. While preparing to take some voltage measurements I noticed that C410 (1nF, 2kV) in the line output stage was puffing away merrily. The transistor proved to be OK, and a new capacitor restored the set to life. **B.McE.** 

#### **Grundig GT1401**

There was no sound or picture. The supplies were OK except for the 5V rail. D114's cathode connection wasn't through the print. Soldering it properly cured the problem. **B.McE.** 

#### Beon CTV1412R

If the sound blares intermittently, check for dry-joints at R140. This is, anyway, what it's marked on the PCB – it is actually a wire link. **B.McE.** 

#### Minoka MK1491A

There was a greenish raster with no video. A check on the RGB outputs from the TA8718 timebase generator/colour decoder chip IC201 showed that the red was OK but

there was no green or blue. A new chip cured the fault. **B.McE.** 

#### **JVC C141EK**

The problem was an intermittently bright raster with lack of height and width. The  $1k\Omega$  HT preset VR901 had bad tracking. A replacement cured the problem – the HT should be set for 112.5V. **B.McE.** 

#### Sharp DV5161H

This set wouldn't come out of standby. Checks revealed that the 12V supply was missing. D602 (1N4936) was open-circuit. **B.McE**.

#### Finlux 5025C26

There was either no sound via the scart socket or low, distorted sound would break through. The  $0.68\Omega$  fusible resistor RL74 on the back panel was open-circuit. It's in series with the 12V supply. **B.McE.** 

#### Hitachi CPT2808 (G7P Mk II Chassis)

There was a green raster with fly-back lines. I found that the green output transistor's  $22k\Omega$ , 0.25W load resistor R808 was open-circuit – so there was no voltage at the collector of Q802. **B.McE.** 

#### Sony KM2171U (BE4A Chassis)

The picture had become a wide pincushion and there was no response to the relevant service mode commands. Pincushion/width control originates at pin 8 of IC301, where there should be 0.6V. The voltage had risen to 1.4V and there was no sign of a parabolic waveform. It seemed logical to replace the chip (type MC44007P), which turned out to be the correct action. I then spent far too long playing with the digital picture adjustments in the service menu, something that's still a novelty here. C.A.

#### **Akura CX12**

The on-screen display and the sound were OK but the screen was otherwise blacked out. This can simply mean that the contrast is at minimum and not memorised. Adjust the contrast to a suitable level then memorise the setting by holding down switch S002, by the tuner, and putting the set into standby. C.A.

#### **Boots CTV1414R**

Why do people buy TV sets from a chemist? Perhaps I should open a pharmacy in the corner of my shop! Anyway, a channel number could be selected and tuned in, but the set would then memorise it on all

channel positions. The 32V tuning voltage via IC102 had risen to 38V. A replacement µPC574J chip cleared this bizarre fault.

The set is the same as the Matsui 1450/Saisho CT147R. C.A.

#### Mitsubishi CT2155STX (Euro 4Z Chassis)

There was intermittent loss of sound. The cause was eventually traced to the muting switch transistor Q706, a weird JA101QR – fortunately I was able to find one on a scrap board!

Other sets fitted with this chassis include the CT2153 and CT2553. C.A.

#### Samsung CI5013T (P58S Chassis)

Channels could be tuned in but not stored. This fault is usually caused by a defective EEPROM chip, but not this time. I found that the data signal between the microcontroller chip and the EEPROM was very poor. The cause was an increase in the value of the pull-up resistor RR53 – the correct value is  $3\cdot3k\Omega$ . Does anyone know why LOPT failure is so rare with Samsung TV sets? C.A.

#### B & O LS5500 (also LX/MX/L etc)

Snowy pictures, no sound and erratic colour suggested a possible tuner fault. But a high-tech investigation with a can of freezer showed that the severity of the symptoms was reduced when the TDA8120 chip IC6, which includes the IF section, was cooled. This chip also contains two voltage regulators and tends to run hot, demonstrated by the darkened board beneath it. A replacement chip restored the top-quality B & O performance. C.A.

#### Nokia 9291 Cinescreen

These large sets, which are fitted with the Euro-digital chassis, have an Ipsalo type power supply/line output circuit similar to that used in the Salora J, K, L and M chassis. This set was dead.

I usually find that the best way to check the power supply is to disconnect the collector of the line output transistor then force the set into the standby mode. Do this by switching the set on then connecting the mains supply. This will give you a clue. Check the ±15V supplies, which are marked on the PCB. The readings are usually around ±12V. If so, the power supply is probably OK and the line output stage components should be checked, i.e. transistor

T525, diode D523 and the associated components.

In this particular case the ±15V supplies were OK but the Ipsalo transformer was faulty. This may sound odd, but with these sets standby is achieved by effectively shorting out the line output transistor. The cost of the transformer is related to screen size, so the repair is an expensive one.

Incidentally a Jabco type tester can be used to check the transformer. Check between pins 14 and 15 for the line output primary winding and pins 1 and 2 for the power supply primary winding. C.W.

#### Sony KV27XRTU (SX Chassis)

This set was dead. Checks in the power supply showed that the 135V HT supply was missing while all the other outputs were low. The cause was simply that L651 was open-circuit, but in this set it turned out to be an N38 type ICP. C.W.

#### Nokia Euro Stereo 2BF110NN

If there's a screaming chopper transformer and ragged verticals from cold, replace C787 ( $10\mu F$ , 50V). As this capacitor sits right next to a very hot running  $220\Omega$  wire-wound resistor the replacement should be rated at  $105^{\circ}C$ .

C787 should also be replaced when you find that the line output transistor is faulty, as it will almost certainly have been the root cause of the problem – assuming that you have already attended to the dryjoints. **M.Dr.** 

#### Toshiba 2927DB

Excessive EHT was the problem with this Dolby Pro-Logic set – the anode cavity was sparking. The HT was also high, at 180V instead of 125V. The cause of the trouble turned out to be the TLP721 opto-coupler IC826 in the power supply.

Why hadn't the overvoltage trip shut the power supply down? Because transistor Q841 (2SA1015) in the trip circuit was leaky. Fortunately no other damage had been done. M.Dr.

#### **Philips CF1 Chassis**

This set had a very unusual fault. There was a three-inch band of very faint patterning about two inches from the left-hand side of the screen. When the aerial was disconnected the problem showed up as a dark patch through the snow. As the problem was worse at switch on, a tin of freezer was brought into

action. The cause of the fault was eventually traced to C2484 (4·7 $\mu$ F), which is connected to the emitter of the E-W modulator driver transistor. Tests showed that it had fallen to a very low value. A replacement rated at 105°C was fitted. **M.Dr.** 

#### Sharp DV3760

This set would trip back to standby after two seconds. Various items were disconnected from the power supply to establish the source of the trouble. This revealed that there was a heavy load in the line output stage. In fact the line output transformer was faulty. A genuine replacement from Willow Vale was priced at less that £12 plus VAT, a bargain. The cheapest genuine line output transformer we've ever bought was obtained from Philips recently - it cost £9.11 plus VAT. Could it be that the major manufacturers are trying to stamp out dubious-quality pattern parts? M.Dr.

#### **GoldStar CIT9325**

If there is sound and EHT but no picture, and the cause of the fault is not field collapse, connect the collector of one of the RGB output transistors to chassis via a  $10k\Omega$  resistor. If the picture returns and remains on until the set is switched off, replace the TDA3562A colour decoder chip. It's on a stand-up subpanel. **M.Dr.** 

#### Salora K Chassis

If the set is dead with a faint whistle coming from the Ipsalo transformer, check whether D603 (type PE2D) is short-circuit. **M.Dr.** 

#### Matsui 2091

If the power supply is working but the line output stage remains inactive, replace diode D401 (1N4007) in the line driver stage. It provides the start-up supply for the collector of the line driver transistor — when the set is up and running this stage obtains its supply from the line output transformer. A word of warning: D401 can become intermittent, so it's worth fitting a replacement whenever one of these sets comes into the workshop.

Incidentally the set is fitted with a GoldStar chassis. **M.Dr.** 

#### Hitachi C2118, C2119

If one of these sets appears to be completely dead apart from the standby light showing, or fails in this way intermittently, check the connections to the 9V regulator IC703. They may well be cracked, especially if the regulator has been

fixed with a blob of hot glue to steady it. This method of component fixing often results in premature failure of the soldered joints. So look out for this as a matter of routine. G.C.

#### Goodmans 2875

This 28in. set produced no sound or picture because the line output stage had failed. The soldered joint at one end of the E-W capacitor C134 had burnt out. Although the capacitor itself was unharmed, the S2055AF line output transistor had been destroyed. A replacement transistor and repair to the PCB restored normal operation. G.C.

#### Panasonic TX21V1 (Alpha 2 Chassis)

The picture would disappear intermittently, leaving a blank, dark grey raster. I found that the soldered joints at all three pins of connector B4 had cracked. This connector is right at the front of the chassis, under the CRT's rim. It's on the IF panel, which is beside the tuner. G.C.

#### Hitachi C2509 (G7PS Chassis)

The field scanning was very non-linear: the bottom of the picture was cramped while the top was stretched. The cure was to replace two electrolytic capacitors: C712 (2,200µF, 50V) which is the reservoir capacitor for the 28V supply used by the field output stage; and C606 (680µF, 16V) which is the field scan coupling capacitor. G.C.

#### Ferguson 51J7 (TX99 Chassis)

The owner of this set said that although it had not changed the programme number to which it was set, the station displayed changed randomly. When I checked there were no signals at all. The tuning control voltage was almost zero and resisted all attempts to increase it, so attention was turned to the TACS control panel on the left-hand side.

There was no voltage at the tuning supply stabiliser IC243 because one of the  $2k\Omega$  resistors in the feed chain (R234 and R254-8) was opencircuit. I replaced all six of them, using 1W types, to prevent further failures. Care is required to prevent the larger resistors clashing with the plastic frame when the board is refitted. G.C.

#### Philips GR2.3AA Chassis

This 16:9 aspect ratio set was dead. It didn't take me long to discover

that the mains fuse had failed and the BUT11AF chopper transistor was short-circuit. As a check on the surrounding circuitry didn't reveal anything amiss, a new fuse and chopper transistor were fitted. At switch on they went the way of the originals. The power supply control circuitry is on a subpanel, and incorporates a CNR50 optocoupler. As these devices have proved to be troublesome in other Philips chassis I replaced it, along with the fuse and BUT11AF transistor. This time the set worked.

The degaussing thermistor was also replaced as it was crumbling. It's not a standard device: one half is used as a surge limiter, as in some versions of the 2A chassis. S.L.

#### Ferguson IKC2 Chassis

This set was dead though the chopper power supply's HT output was normal – there was 111V at the cathode of DP50. The 7V output was at zero however, while the other outputs were approximately fifty per cent low. This situation means that there are no line pulses because the line output stage isn't working. In fact there was no line drive.

Further checks showed that the

safety circuit was in operation, with transistor TV01 (BC558C) conductive for no apparent reason. When I removed it for testing I found that there was collector-emitter leakage. Not much, but enough to reduce the 15V supply and shut down both the power supply and the line drive. This is comprehensive protection, but it does make fault finding difficult.

When TV01 had been replaced the set worked but there was no colour and an ominous ticking sound came from the line output transformer. The transformer had pinholes and occasionally arced. In view of these defects it seemed likely that the TA8659CN timebase generator/colour decoder chip IV01 was faulty. When this item had been replaced and a new line output transformer had been fitted the set worked well. S.L.

#### Granada C59FZ6

These sets, which are fitted with the Salora M chassis, always seem to come in with the same complaint: the S2000AF line output transistor is either leaky or short-circuit. A replacement will usually fail in the same way, especially from cold.

Replace the 220µF electrolytics C624 and C523, which are close by, and all should be well.

These sets also suffer very badly from dry-joints. It's usually necessary to blanket resolder the power supply and the line output stage.

S.L.

#### Osaki P146R

The customer complained about "lines on the screen". They started at the top left-hand corner and curved down towards the right-hand edge of the screen. It looked as if the flyback was slow. The cause of the trouble was C310 (4-7µF, 160V) which was virtually open-circuit. S.L.

#### Ferguson TX100 Chassis

This set was supposed to be dead though the HT and EHT supplies were present. But there was no 12V output from the MC7812CT regulator IC8. Its input is obtained from the line output transformer via a rectifier circuit that consists of D21 (RGP10G), surge limiter R145 (0.22 $\Omega$ ) and reservoir capacitor C135 (4.7 $\mu$ F, 40V). D21 was opencircuit and R145 read 20 $\Omega$ . I replaced these two items and, as a precaution, C135 and IC8. S.L.

# 1998 BONANZA ON **KONIG** VIDEO REPAIR-KITS AT REDUCED PRICES. Most Videos are due for M.O.T., so needs a service, **HURRY**, **HURRY**....

	[V]	1.0.	1., 50	nee	u5 (	u seiv	ice,	70
AKAI			VT7000/8/8500		= 1125	NV230	= RK7907	= 795
VS1/VS	= RK7941	= 1615	VT400/435	= RK7929	= 1125	NV688	= RK7909	= 1325
VS220/248	= RK7942	= 1695	VT 169/260	= RK17905	=	NVD48/80	= RK7936	= 1185
			ITT			NVG10/12	= RK7950	= 675
ALBA			VR3907	= RK7965	= 600	NV8600/8620	= RK7988	= 1250
VCR 5000/6000	= RK7947	= 1000	VR3908	= RK7966	= 615	PHILIPS		
VCR 4000/5000	= RK7949	= 1100			-013	VR6462	= RK7930	= 1000
AMSTRAD	,		GOLDSTAR	?		DV186	= RK7932	
			GHV8000/8215	= RK7945	= 975	VR6540	= RK7971	= 950
VC 7000	= RK7933	= 650	GHV1290	= RK7946	= 1500	VR44SB9/6	= RK7972	= 1095
VS1004/1104	= RK17921	=				VR7973	= RK7973	= 1095
FERG/JVC	?		HINARI			VR049SB6/20	= RK7974	= 500
3V00/01/16/22		= 1495	VXL20	= RK7934	= 695	004/1/0		
3V22	= RK7912	= 2275	VXL35/34	= RK7935	= 1000	SANYO		
3V29/3V30	= RK7913	= 1250	JVC			VHR1200	= RK7953	
3V31/32	= RK7914	= 1540	HRD540/550MS	DV7004	= 1650	VTC5000	= RK7956	
3V23	= RK7915	= 1500	HRD600/620	= RK7991 = RK7992		TLS1100	= RK7958	
3V24	= RK7916	= 1000	HRD600/620	= NK/992	.= 1525	VIIID450	= RK7960	
HR2650	= RK7917	= 1800	MITSUBI.	SHI		VHR153	= RK7959	=
3V35/3V36	= RK7918	= 1250	HS347/9/B10/3	0 = RK17903	= 1650	VTC5500	= RK7961	=
3V42/3V43	= RK7919	= 2000	HS337/338	= RK17904	= 1650	SAMSUN	G	
3V44/45	= RK7920	= 1675	Reel Drum Assy	/ = RK11424	- = 885	VB900/910	= RK7963	= 1300
3V58/3V65	= RK7921	= 850	*****			SV916/717	= RK7964	= 500
CIQUED			NEC			0.50/504		
FISHER			N9012/3/4/33/3	4 = RK7951	= 1095	SENTRA		
FVHP420/520	= RK7937	= 1285	DX2000/3000/			GX8000	= RK7948	= 1000
FVHP615/620	= RK7938	= 1250	N9055	= RK7952	= 1095	SHARP		
FVHP720/721	= RK7940	= 1300	PANASON	VIC.			D1/7000	4000
FHVD250/270	= RK7959	= 20.95		= RK7900	= 1100	VC381	= RK7923	
HITACHI			NV7000 NV2000	= RK7900 = RK7901	= 1650	VC7300/7700		
VT11/33	= RK7922	= 1395	NV7800/7200		= 1030	VC8000/8300 VC402/571	= RK7968 = RK7970	
VT52/61	= RK7922 = RK7924	= 1500	NV333	= RK7902 = RK7903	= 1125	VC402/3/ I	= UV/9/0	= 313
VT220/258	= RK7924 = RK7925	= 1550	NV777	= RK7904		TOSHIBA	!	
VT5000	= RK7925 = RK7926	= 1550	NV730	= RK7905	= 885	DV80B	= RK7983	= 685
VT6500/8000	= RK7927	= 1175	NV370	= RK7906	= 795	DV90B/96	= RK7985	= 700
¥10300/8000	- 111(7527	175	1110.0					

KITS ARE PREPACKED BY KONIG ON THEIR ORIGINAL PACKING AND CONTAIN FOLLOWING:

BELT KIT, PINCH-ROLLERS-APPRO. IDLER + CLUTCH, TENSION BAND, WASHERS.

NO NEED TO SEARCH FOR INDIVIDUAL PARTS.

*KONIG*QUALITY – REPUTATION



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

Trade Counter now open – Mon-Fri 9.00AM-5.00PM Sat 9.00AM-3.00PM

#### J.J. COMPONENTS

r/o 243-247 Edgware Road, The Hyde, Colindale NW9 Tel: Sales Hotline 0181 205 9055 Fax: Admin 0181 205 2053

Free fax orderline only : 0800 318 498

# John Edwards' Service Notebook

#### Samsung CI5937AN

This set was dead except for a high-pitched squeal that came from the chopper power supply. There was no line timebase operation because the outputs on the secondary side of the chopper transformer were all very low. With the set switched off (and unplugged) I disconnected each line in turn and checked for a short-circuit. The reading obtained across the 32V line, which feeds the TDA2161 audio output chip, was about  $10\Omega$  to chassis. When pin 7 of this chip was unsoldered the short cleared. A new TDA2161 IC restored the set to life.

The customer subsequently mentioned that just before the fault occurred he had connected two external speakers to the set. I decided to check them out and was glad I did. One very tiny, under-rated speaker was connected by threadbare wires joined in several places – the leads were just wrapped around the speaker terminals. The other speaker was not only of different size and impedance – it also had a ripped cone!

#### **Finlux 5025S**

This set has a built-in satellite receiver. It suffered from intermittent loss of picture because the tube's heaters would go out at random. As no obvious dry-joints could be seen, I resoldered the heater supply resistors, R929 on the tube base panel and Rz2 and Rz5 on the main board, hard wired between them, then resoldered the ribbon cable connections from the main board to the CRT base panel. There was no further trouble after that.

I was not impressed by the fact that the back cover provides, via two screws, the support for the satellite PCB. When the cover is taken off the PCB is free to move. A vertical plastic leg protrudes from the bottom of the satellite PCB and clips loosely on to a metal frame attached to the main board. But this doesn't provide sufficient support. You have been warned.

#### Akai CT2870UK

This set led me a merry dance. It would tune in the lower channels,

e.g. 23 and 26, but not channels 30, 33 and higher – the ones available in my area. I suspected the ZTK33B tuning voltage stabiliser, which according to the manual is D7102 and is connected to pin 7 of the tuner/IF module. I soon found that D7102 didn't exist, and that the print layout was slightly different from that shown in the manual. Yes the model number, and a few others, were clearly printed on the front cover of the manual, the chassis type being shown as the Nokia Compact D-E.

While scratching my head and preparing myself for a grand tour of the PCBs in a search for the diode I spotted the words "Compact D-2" etched in small type on the vertically-mounted audio output board. Naturally I didn't have the Compact D-2 manual in stock, so the grand tour began anyway.

There are so many plugs and sockets fixed to ribbon cables going here, there and everywhere that tracing the path from pin 7 of the tuner/IF module became too frustrating. I resorted to a visual check of the boards and eventually found the diode on the audio output board, where I began! The circuit reference is D901. Within minutes of fitting a replacement I had a normally working receiver.

I realised later that the reason I had so much difficulty finding the diode is that in this chassis the 33V tuning supply is not connected to the tuner/IF module directly. It's taken to an interface chip which in turn feeds the module.

#### Sanyo CBP3012 (A3-A14 Chassis)

I had three of these portables in for repair in quick succession, each with a different fault. I tackled the first one without a circuit diagram. Having learnt my lesson, I obtained one before delving into the other two.

Set number one's symptom was a very bright raster with flyback lines. The first anode control on the line output transformer had little effect. I eventually traced the cause of the fault to loss of the 130V HT supply to the RGB output transistors be-

cause the smoothing resistor R557  $(10\Omega)$  was open-circuit. It shouldn't have taken so long, but R557 is in the chopper power supply, which in this chassis supplies all the power circuits – audio, field and line. The line output transformer is restricted to generating the EHT, first anode and focus voltages, some pulses and the CRT's heater supply. Because I didn't have a circuit diagram I had been searching in the line output stage for the source of the supply for the RGB output transistors. We live and learn

The second set was dead, but life was easier now that I had a circuit diagram. The surge limiter resistor R502 ( $3.9\Omega$ , 6W) was open-circuit, so it was no surprise to find that the 2SD1710 chopper transistor Q513 was short-circuit. While checking in the power supply I found that Q553 (2SC536) was also short-circuit. It's the error voltage sensing transistor and in addition drives the PC1138 optocoupler D515. To be on the safe side I replaced both these items.

I then powered up the set slowly, using the variac and monitoring the 130V HT supply at the cathode of D551. At an input of about 150V AC the power supply sprang to life, delivering an HT of 175V. I shut down, to save all my hard work, and checked around again. Q512 (2SC3807), which controls the chopper transistor drive, was shortcircuit base-to-emitter. Although cheap, it's a little special because of its high base-to-emitter voltage rating, so there's no real equivalent. I resisted the temptation to experiment with different transistor types and ordered the correct replacement. Next day, with the new 2SC3807 fitted, the set worked normally.

The third set was stuck in standby. This time the chopper power supply was working correctly, delivering 130V to the line output stage. But there was no line drive because the line driver transistor Q431 had no 24V collector supply. This comes from the 2SB764 pnp-type transistor Q551, which was short-circuit base-to-emitter. It acts as a switch. I found that the BC640 is a suitable replacement.



# Grandata Ltd

distributor of electronic components

					Ш		9		Щ	<u> </u>	_		Щ			<u> </u>			
Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part LINEAR IC:	Price	Part AN6340	Price 600p	Part BA335	Price 55p	Part BA7004	Price 200p
BC107 BC108	8p 8p	BD434 BD435	30p 31p	BU126 BU128	65p 125p	BUV48AF BUV48C	325p 250p	MJ4502 MJ10012 MJ11015	300p 300p 250p	4N35	50p	AN203	210p	AN6341 AN6342	200p 325p	BA338 BA340	80p 75p	BA7007 BA7021	200p 180p
BC109 BC109C	8p	BD436 BD437	30p 28p	BU133 BU137	125p 150p	BUV50 BUV61	425p 1000p	MJ11016 MJ11032	300p	RECTIFIER DIODES		AN210 AN211	165p 150p	AN6344 AN6345	440p 400p	BA343 BA336	60p 175p	BA7022 BA7025L	350p
BC140 BC142	20p 20p	BD438 BD439	36p 40p	BU180 BU184	100p 100p	BUV70 BUV90 BUV93	200p 175p 375p	MJ11033 MJ15003	800p 800p 250p	BY127	8р	AN214Q AN217P	170p 95p	AN6346 AN6350	350p 610p	BA401 BA402	60p 50p	BA7107 BA7212S	475p 200p
BC143 BC147	20p 8p	BD440 BD441	40p 40p	BU204 BU205	65p 70p	BUW11A	200p	MJ15004	300p	BY133 BY164	8p 40p	AN228 AN252	280p 150p	AN6352 AN6356	450p 300p	BA511 BA514	145p 160p	BA7252S BA7604N	150p 100p
BC149 BC159	8p 8p	BD533 BD534	50p 38p	BU206 BU207	100p 150p	BUW11AF BUW12	225p	MJ15015 MJ15016	250p 350p	BY179 BY184	35p 32p	AN259 AN262	250p 140p	AN6359 AN6360	500p 320p	BA516 BA518	150p 150p	BA7751LS BA7752	150p 250p
BC160 BC171	30p 10p	BD535 BD536	38p 38p	BU208 BU208A	70p 75p	BUW12A BUW12F	150p 250p	MJ15022 MJ15023	250p 400p 400p	BY206 BY207	11p 20p	AN271 AN274_	230p 250p	AN6362 AN6363	400p 375p	BA521 BA524	100p 240p	BA7755 BA7767AS	150p 155p
BC172 BC177	10p 14p	BD537 BD538	40p 40p	BU208AT BU208B	200p 200p 130p	BUW13A BUW32A BUW48	200p 500p 550p	MJ15024 MJ15025 MJE340	700p 25p	BY227 BY228	19p 28p	AN277B AN278	400p 60p	AN6367NK AN6368	400p 275p	BA526 BA527	180p 95p	BA8504 BA15218	350p 60p
BC178 BC179	14p 14p	BD643 BD645	50p	BU208D BU209	90p	BUW49 BUW50	550p 400p	MJE350 MJE520	80p 30p	BY298 BY299	15p 18p	AN301 AN302	330p 650p	AN6371 AN6387	350p 480p	BA532 BA534	100p 220p	CA3140E CNX62A	38p 80p
BC182 BC182L	7p 7p	BD647 BD649	50p 50p 40p	BU225 BU226 BU312	120p 120p 90p	BUW81A BUW84	150p 75p	MJE2955T MJE3055T	65p 65p	BY329-1200 BY448 BYT11	150p 20p 25p	AN303 AN304	250p 360p	AN6550 AN6551	100p 50p	BA536 BA546	150p 160p	CNX82A CNX83A	60p 80p
BC183 BC183L BC184	7p 7p 7p	BD675 BD676 BD677	40p 38p	BU325 BU326A	55p 75p	BUW85 BUX10	85p 150p	MJE13004 MJE13005	100p 60p	BYT13-1000 BYV96E	30p 25p	AN315 AN316 AN337	210p 350p	AN6552 AN6554	45p 80p	BA612 BA614	120p 70p	CX136 CX139A	600p 750p
BC184L BC212	7p 7p	BD678 BD679	40p 40p	BU406 BU406D	60p 85p	BUX11 BUX12	200p 150p	MJE13007 MJE13009	100p 100p	BYW96E BYX10	36p 15p	AN360 AN362	600p	AN6555 AN6605	50p 35p	BA618 BA631	55p 280p	CX141 CX145	750p 725p
BC212L BC213	7p 7p	BD680 BD681	40p 45p	BU407 BU407D	55p 75p	BUX20 BUX21	350p 450p	MJE15028 MJE15029	200p 200p	BYX55/600 IN4001	25p 3p	AN363 AN366	140p 150p 150p	AN6612 AN6650	60p 45p	BA656 BA658	110p 350p	CX150B CX175	325p 325p
BC213L BC214	7p 7p	BD682 BD705	45p 50p	BÚ408 BÚ408D	60p 75p	BUX22 BUX23	450p 900p	MJE15030 MJE15031	250p 400p	IN4002 IN4003	3p 3p	AN610 AN3211K	160p 375p	AN6651 AN6652	45p 45p	BA681A BA682A	350p 300p 300p	CX187 CX804A CX867	825p 775p 575p
BC214L BC237	7p 7p	BD707 BD709	50p 50p	BU409 BU412	85p 175p	BUX37 BUX39	220p 450p	MJE18004 MJF18004	125p 175p	IN4004 IN4005	3p 3p	AN3215K AN3231K	350p 300p	AN6671K AN6676 AN6780S	425p 600p 80p	BA683A BA684 BA685	400p 400p	CX868 CX877	525p 300p
BC238 BC239	7p 7p	BD711 BD736	50p 50p	BU413 BU414B	175p 250p	BUX40 BUX41	210p 200p	MJF18204 OC28	350p 350p	IN4006 IN4007	3p 4p	AN3236K AN3310K	450p 325p	AN6870 AN6875	450p 150p	BA715 BA718	45p 45p	CX7925B CX20015A	550p 600p
BC300 BC301	20p 20p	BD826 BD828	50p 50p	BU415A BU426A	170p 70p	BUX42 BUX47A	200p 220p	OC29 OC35	250p 350p	IN4148 IN5400	2p 9p	AN3312 AN3313	350p 300p	AN6878 AN6879	65p 225p	BA728 BA806	55p 220p	CX20106A CX20109	75p 140p
BC302 BC303	20p 20p	BD839 BD897	55p 50p	BU433 BU500	120p 100p	BUX48A BUX55	150p 800p	OC36 S2000A3	250p 175p	IN5401 IN5402	8p 8p	AN3320K AN3331K	450p 450p	AN6880 AN6882	75p 300p	BA843 BA1310	130p 160p	CX20187 CXA1001AP	700p 1600p
BC304 BC327	25p 7p	BD899 BD977	50p 50p	BU500D BU505	225p 90p	BUX80 BUX81	180p 160p	S2000AF S2055A	130p 175p	IN5403 IN5404	8p 8p	AN3792 AN3794	300p 325p	AN6884 AN6888	200p 150p	BA1320 BA1330	75p 120p	CXA1019P CXA1019S	150p 225p
BC328 BC337	7p 7p	BDX33 BDX37	60p 100p	BU505D BU505DF	90p 90p	BUX84 BUX85	50p 50p	S2055AF S2530A	175p 100p 15p	IN5405 IN5406	11p 12p	AN3814K AN3821K	450p 600p	AN6889 AN6913	100p 60p	BA1332 BA1350	60p 130p	CXA1044P CXA1044BF	550p
BC338 BC441	7p 28p	BDX44 BDX47	100p 60p	BU506 BU506D	100p 70p	BUX86 BUX87 BUX98A	30p 50p 350p	TIP29 TIP29A TIP29C	22p 25p	IN5407 IN5408	12p 12p	AN3822K AN3830K	600p 800p	AN700 AN7010K	650p 250p	BA1355 BA1356	125p 100p	CXA1081 CXA1081M	275p 250p
BC446 BC477	8p 18p	BDX54C BDX62C BDX63C	75p 150p 175p	BU506DF BU508A BU508AF	100p 70p 95p	BUZ71 BUZ71AF	75p 100p	TIP29E TIP30	40p 25p	RGP10 RGP15 RGP30	25p 25p 16p	AN3990K AN3991K	300p 400p	AN7025K AN7060	90p 175p	BA1360 BA1404	160p 120p	CXA1081S CXA1082AS	300p
BC516 BC537	22p 25p	BDX64C BDX65	175p 175p 80p	BU508APH BU508D	80p 75p	BUZ72A	100p 100p	TIP30C TIP31A	25p 22p	SR2M	60p	AN5010 AN5011	250p 225p	AN7062 AN7072	300p 250p	BA1604 BA2266A	125p 250p	CXA1191M CSA1209P	400p
BC546 BC547 BC548	8p 8p 8p	BDX66C BDX67C	175p 275p	BU508DF BU508DR	85p 130p	BUZ72AF BUZ73A BUZ73AF	150p 60p	TIP31C TIP32	27p 24p	I.C. SOCKI	ETS	AN2020 AN5025	80p 250p	AN7081K AN7105	200p 170p	BA3306 BA3308	60p 70p	FT5754M FT5764M	600p 250p
BC549 BC550	8p 8p	BDX71 BDX77	70p 175p	BU508V BU508VF	110p 100p	BUZ76A BUZ80	110p 135p	TIP32A TIP32C	21p 28p	8 PIN	4р	AN5033 AN5034	400p 400p	AN7106K AN7110	135p 75p	BA3312 BA3402	60p 90p	HA1124 HA1125	125p 120p
BC556 BC557	8p 8p	BDX87C BDX88C	175p 150p	BU526 BU536	75p 100p	BUZ80AF BUZ83	200p 200p	TIP33 TIP33C	50p 60p	14 PIN 16 PIN 18 PIN	5p 6p 9p	AN5070 AN5071 AN5111	125p 100p 450p	AN7111 AN7112	100p 45p	BA3406AL BA3416BL	120p 80p	HA1137W HA1151	150p 175p
BC558 BC559	8p 8p	BDW24 BDW93	55p 50p	BU546 BU603	125p 125p	BUZ90A BUZ91A	180p 260p	TIP34 TIP34C	65p 60p	20 PIN 22 PIN	10p 12p	AN5132	250p	AN7114 AN7115	120p 110p	BA3422 BA3505F	350p 140p	HA1197 HA1199	130p 130p
BC560 BC637	8p 20p	BDW94 BDY29	50p 225p	BU606D BU608D	225p 120p	BY448 BYT11	20p 25p	TIP35C TIP36C	65p 65p	24 PIN 28 PIN	13p 13p	AN5135NK AN5138NK AN5150	400p 350p 400p	AN7116 AN7117	90p 65p	BA3506A BA3516	70p 120p 130p	HA1201 HA1202 HA1319	225p 125p 200p
BC639 BC640	20p 20p	BDY56 BDY58	225p 500p	BU626 BU705	120p 130p	IRF120 IRF130	225p 475p	TIP41A TIP41C	20p 22p	40 PIN	15p	AN5151 AN5210	200p 675p	AN7120 AN7130 AN7131	100p 75p 90p	BA3520 BA3521 BA3704	225p 200p	HA1338 HA1339A	300p 350p
BCY33 BCY34	200p 200p	BDY90 BDY92	125p 100p	BU706DF BU706F	175p 150p	IRF140 IRF230	550p 550p	TIP42A TIP42C TIP47	20p 22p 40p	ZENER DIG	ODES	AN5215 AN5222	100p 200p	AN7133N AN7134	325p 300p	BA3706 BA3812L	75p 80p	HA 1367 HA 1377	300p 120p
BCY70 BCY71	16p 16p	BF137 BF167	35p 30p	BU724A BU801	100p 70p 70p	IRF240 IRF250 IRF330	425p 375p 600p	TIP48 TIP50	40p 60p	400 mWate 2V7 to 39V	ts 5p	AN5250 AN5256	160p 150p	AN7140 AN7141	170p 70p	BA3822LS BA3824LS	80p 75p	HA1384 HA1388	600p 320p
BCY72 BD115	16p 30p	BF181 BF183 BF195	18p 20p	BU806 BU807 BU807F	60p 75p	IRF340 IRF350	325p 750p	TIP51	80p 80p	1.3 Watts 2V7 to 39V	9p	AN5260 AN5262	300p	AN7142 AN7145	80p 195p	BA3920 BA4110	300p 75p	HA1389 HA1392	210p 120p
BD124P BD131 BD132	50p 25p 25p	BF199 BF200	7p 8p 16p	BU808DF BU810	210p 110p	IRF450 IRF510	650p 110p	TIP54 TIP102	85p 70p			AN5265 AN5315	80p 600p	AN7146 AN7147	210p 180p	BA4210 BA4220	85p 60p	HA1394 HA1396	170p 650p
BD133 BD135	50p 20p	BF225 BF240	30p 16p	BU824 BU826	60p 120p	IRF520 IRF530	110p	TIP105 TIP106	65p 65p	VOLTAGE REGULATO	ORS	AN5352 AN5411	600p 450p	AN7148 AN7149	140p 160p	BA4234L BA4236L	70p 110p	HA1397 HA1398	200p 175p
BD136 BD137	20p 20p	BF245 BF254	25p 15p	BU826A BU902	160p	IRF540 IRF610	120p 120p	TIP107 TIP110	65p 40p	7805 7806	18p 18p	AN5421 AN5429	150p 420p	AN7154 AN7156	180p 240p	BA4402 BA4403	45p 220p	HA1406 HA11123	120p 350p
BD138 BD139	20p 20p	BF255 BF256	12p 18p	BU903 BU910	110p 80p	IRF611 IRF620	120p 160p	TIP111 TIP112	40p 35p	7808 7812	25p 18p	AN5431 AN5435	275p 125p	AN7158 AN7160	310p 350p	BA4405 BA4412	80p 50p	HA11211 HA11215	170p 350p 280p
BD140 BD144	20p 90p	BF257 BF259	18p 18p	BU912 BU920	100p 100p	IRF630 IRF640	110p 300p	TIP112H TIP115	50p 30p	7815 7818	25p 25p	AN5436N AN5512	160p 100p	AN7161N AN7163	375p 175p	BA5101 BA5102	350p 140p	HA11219 HA11221 HA11225	180p 130p
BD157 BD166	38p 30p	BF262 BF270	25p 18p	BU922 BU930	110p 130p	IRF642 IRF650	200p 200p	TIP116 TIP117	30p 30p	7824 7905	25p 25p	AN5515 AN5520 AN5521	160p 550p 100p	AN7166 AN7168 AN7169	350p 200p 225p	BA5115 BA5115L BA5204	75p 75p 200p	HA11235 HA11244	100p 375p
BD175 BD177	30p 30p	BF273 BF311	15p 21p	BU932 BU941	175p 250p	IRF710 IRF720	150p 150p	TIP120 TIP121 TIP122	37p 35p	7906 7908	30p 30p	AN5560 AN5601K	350p 750p	AN7170 AN7171K	260p 400p	BA5208AF BA5402		HA11247 HA11251	375p 120p
BD179 BD181	32p 45p	BF336 BF337	20p 20p	BU2508A BU2508AF	100p 110p	IRF730 IRF740	125p 125p	TIP125	30p 30p	7912 7915	30p 30p	AN5612 AN5613	200p 200p	AN7172K AN7173K	325p 450p	BA5406 BA5408	180p 180p	HA11412 HA11414	600p 300p
BD182 BD184	60p	BF338 BF362	20p 30p	BU2508D BU2508DF	130p 120p	IRF820 IRF830 IRF840	110p 110p 110p	TIP126 TIP127 TIP130	40p 35p 30p	7918 7924	30p 30p	AN5615 AN5620	300p 250p	AN7177 AN7178	375p 180p	BA5413 BA6104	225p 250p	HA11423 HA11440	110p 250p
BD187 BD201	30p 33p	BF367 BF371 BF421	13p 17p 18p	BU2520AF BU2520DF BU2525A	170p 225p 325p	IRF9140 IRF9510	1000p 150p	TIP131 TIP132	30p 30p	78L05 78L08 78L12	24p 24p 24p	AN5622 AN5625	275p 400p	AN7205 AN7213	35p 40p	BA6109 BA6110	110p 225p 75p	HA11485Bf	N 400p 330p
BD202 BD203 BD204	38p 42p 42p	BF422 BF423	21p 25p	BU2525AF BU2527AF	220p 400p	IRF9511 IRF9520	150p 150p	TIP136 TIP137	40p 65p	781 15	24p 24p 24p	AN5630	375p 350p	AN7216 AN7218	175p 60p	BA6125 BA6137	55p	HA11706	400p 280p
BD222 BD225	31p 31p	BF455 BF458	12p 19p	BUF405A BUH315	200p 200p	IRF9530 IRF9531	200p 200p	TIP162 TIP141	110p <b>65p</b>	78L24 79L05	24p 35p	AN5640	330p 500p	AN7220 AN7222	85p 75p	BA6138 BA6146	130p 150p	HA11710 HA11713	500p 250p
BD232 BD233	31p 30p	BF462 BF471	50p 28p	BUH315D BUH515	175p 200p	IRF9540 IRF9541	240p 200p	TIP142 TIP145	75p 50p	79L08 79L12	35p 35p	AN5/01	90p 150p	AN7223 AN7224	105p 75p	BA6149LS BA6154	60p	HA11715	250p 480p 700p
BD234 BD235	32p 28p	BF472 BF479	28p 30p	BUH515D BUH517	250p 275p	IRF9610 IRF9620	120p 110p	TIP146 TIP147	70p 80p	79L15 LM309K	35p 100p	AN5710 AN5712 AN5720	100p 180p	AN7225 AN7254 AN7256	175p 150p 250p	BA6208 BA6209 BA6218	175p 85p 85p	HA11718 HA11724 HA11741N	650p
BD236 BD237	30p 21p	BF494 BF495	16p 16p	BUH517D BUH715	175p 425p	IRF9622 IRF9630	200p 180p	TIP150	90p 60p	LM317T LM323K	100p 350p	AN5722	70p 140p 160p	AN7273 AN7310	75p 60p	BA6220	55p 130p	HA11744 HA11745	330p 330p
BD238 BD239	24p 30p	BF595 BF596	16p 16p	BUT11A BUT11AF	40p 40p	IRFD9220	280p 100p	TIP2955 TIP3055	50p 50p 100p	78H08KC 79H12KC	800p 700p	AN5732	120p 75p	AN7311 AN7312	90p 70p	BA6227	50p 130p		350p 1500p
BD240 BD241A	40p 40p	BF615 BF617 BF760	30p 30p 40p	BUT12 BUT13 BUT18	80p 310p 80p	IRFBC40	150p 250p 250p	TIPL760 TIPL762A TIPL763A	200p 200p	79HGKC	800p	AN5753 AN5763	130p 250p	AN7315 AN7330	40p 110p	BA6235 BA6238A	50p 130p	HA11752 HA11839N	325p T 375p
BD243A BD244 BD245	50p 50p 50p	BF763 BF870	40p 40p 22p	BUT18AF BUT30V	65p 1700p	IRFP150	300p 300p	TIPL791A 2N2369	80p 15p	LEDs		AN5790 AN5791	240p 225p	AN7362 AN7363	200p 225p	BA6239A BA6247	130p 150p	HA11847 HA12002	700p 220p
BD246A BD265	50p 50p 45p	BF871 BF960	22p 38p	BUT56A BUT76A	65p 80p	IRFP250 IRFP350	280p 325p	2N2646 2N2904	40p 20p	3mm RED	5p	AN5836 AN5862K	450p 225p	AN7410 AN7411	150p 50p	BA6248 BA6259	140p 170p	HA12003 HA12005	150p 180p
BD267 BD269	45p 45p	BF961 BF964	35p 38p	BUT90 BUT92	1300p 1200p	IRFP450 IRFP460	325p 775p	2N2905 2N2906	20p 18p	GREEN	8p 8p	AN608P	130p 125p	AN7414 AN7415	275p 70p	I BA6290A	200p	HA12010 HA12016	300p 120p
BD278 BD311	50p	BFQ232 BFQ252A	75p 60p	BUV18 BUV20	650p 650p	IRFP9140 IRFP9240	1450p 350p	2N2907 2N3019	18p 28p	RED	5p	AN620 AN6130	250p 130p	AN7470 AN8053	100p 200p	BA6302A	250p 150p	HA12017 HA12026 HA12038N	100p 125p ⊤ 140p
BD314 BD315	100p 150p	BFR90 BFR91	85p 99p	BUV21 BUV23	400p 475p	IRFPC50 IRFRC20	600p 250p	2N3053 2N3054	18p 40p	YELLOW GREEN	8p 8p	AN6209	120p 350p	AN8370	250p 1000p 400p	BA6305	120p 140p 250p	HA12044	350p 280p
BD317 BD331	150p 40p	BR100 BR103	14p 37p	BUV24 BUV25	350p 110p	IRFZ42	65p 275p		38p 50p			AN6250 AN6247	50p 200p	AN8387	350p	BA6328	250p 250p 75p	HA12047	450p 320p
BD332 BD361	40p 60p	BR303 BU105	85p 80p	BUV26 BUV27	150p 125p	IRFZ44 MJ2501	160p 100p	2N3440 2N3441	45p 175p	/ EDc	ULAR	AN6270 AN6300 AN6306	400p 600p 380p	BA222 BA225 BA314	65p 100p 40p	BA6410	220p 250p	HA12088	375p 130p
BD362 BD370	60p 30p	BU108 BU109	100p 80p	BUV28 BUV37	110p 175p	MJ3000	55p 100p	2N3442 2N3771 2N3772	85p 85p 90p	5mm x 2.5	5mm 5p	AN6306 AN6310 AN6320	200p 180p	BA301	55p 80p	BA6418N	100p 425p	HA12411 HA12412	175p 175p
BD371 BD410	30p 50p	BU110 BU111	90p 100p	BUV46A BUV47	75p 120p 175p	I MJ4032	100p 175p 175p	2N3773	100p 29p	YELLOW	8p 8p	AN6326N	250p 320p	BA313	60p 80p	BA6993	150p 150p	HA12413	70p 200p
BD433	28p	BU124	60p	BUV48A	1/5p	MJ4035	175p	1 2143019	7.2b	OUFER	ор	_ /····//	JEOP	1 0, 1000		1			

K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY, WEMBLEY, MIDDLESEX HA9 0HB, ENGLAND Telephone: 0181-900 2329 Fax: 0181-903 6126 E-Mail: grandata.ltd@btinternet.com



# PLEASE PHONE US FOR TYPES NOT LISTED AS WE HAVE OVER 50,000 ITEMS IN STOCK. QUOTATIONS GIVEN FOR LARGE QUANTITIES



# Price Part STR16006 STR17006 STR20015 STR20015 STR20015 STR30110 STR30115 STR30123 STR30123 STR30130 STR40115 STR40190 STR40190 STR41090 STR41090 MC33021 MC3401 MC3401 MC3401 MC3401 MC3423P MC34063AP MC3406AP MC3406 SAB3029 SAB3029 SAB3029 SAB3036 SAB3036 SAB3036 SAB3036 SAB3036 SAB3036 SAB3042 SAB3042 SAB3209 SAB3209 SAB3209 SAB3210 SAB3209 SAB3210 SAB3209 SAB3210 SAB3209 SAB3210 SAB32005 SAB32005 SAB32005 SAB32005 SAB32005 SAB32005 SAB32005 SAB32006 SAB320 HA13001 HA13001 HA13006 HA13006 HA13006 HA130108 HA130108 HA13018 HA13118 HA1318 HA13118 HA131 LA2800 LA3150 LA3150 LA3150 LA3150 LA3150 LA3150 LA3150 LA3150 LA3151 LA3226 LA3231 LA3226 LA3237 LA3273 LA3273 LA3273 LA3273 LA3273 LA3273 LA3275 LA3276 LA3280 LA3401 LA34101 LA34101 LA34102 LA34101 LA34101 LA34102 LA34102 LA34101 LA34101 LA34101 LA34102 LA34101 LA3410 LA7096 LA7113 LA7116 LA7117 LA7121 LA7121 LA7121 LA7121 LA7121 LA7122 LA71225 LA71294 LA7121 LF353 LF355 LF357 LF398 LF397 LF398 LF397 LF398 LF397 LF398 LF397 LF398 LF397 LF398 LF391 LF319 525pp 275pp \$\frac{5}{5}\frac{1}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac STK5478 STK5478 STK5478 STK5487 STK548 110p 200p 400p 300p 280p 175p 140p 140p 350p 400p 450p 500p 200p 160p 200p 200p 200p 200p 200p 325p 450p 75p 70p 100p 120p 175p 200p 120p 120p 200p 130p 80p 90p 200p 70p 300p 300p 300p 1250p 150p 160p 1125p 1130p 125p 1150p 125p 1150p 125p 1150p 125p 1150p 125p 1150p 1150 20079 12099 STRA91113 STRA41115 STRA45111 STRA45111 STRS6020 STRS6020 STRS60103A STRS60113 STRS60113 STRS60113 STRS60113 STRS60113 STRS60113 STRS6041 STRS6041 STRS5041 STRS5041 STRS5041 STRS5041 STRS6061 STRD1066 TA7326 TA7326 TA7330P TA7331 TA7333 TA7333 TA7333 TA7333 TA7333 TA7333 TA7333 TA73341 TA73431 TA73431 TA73439 TA7341 TA7348P TA7348P TA7348P TA7348P TA7348P TA7348P TA7358P TA7349P TA7349P TA7349P TA7349P TA7349P TA7411P T \$TK/7576 \$TK/7576 \$TK/7576 \$TK/7576 \$TK/7576 \$TK/8250 \$TK 350p 325p 700p 200p 280p 326p 750p 400p 280p 380p 380p 750p 400p 200p 200p 200p 200p 300p 300p 375p 400p 375p 400p 375p 550p 425p 425p 425p 650p 425p 650p 425p 130p 550p 425p 130p 550p 425p 130p 550p 425p 130p 550p 425p 550p 1350p 550p 1450p 1550p 1550p 1650p 1650p 1750p 1750 300p 90p 170p 300p 300p 420p 110p 220p 400p 90p 140p 65p 100p 400p 325p LB1620 LB1639 LB1639 LB1640 LB1641 LB1641 LB1648 LB1648 LB3500 LC7120 LC7120 LC7120 LC7131 LC7131 LC7131 LC7131 LC7132 LC7131 LC7131 LC7131 LC7131 LC7131 LC7131 LC7131 LC7131 LE21/AS 16506 LA1130 LA1130 LA1130 LA1130 LA114150 LA114150 LA1190 LA1190 LA1205 LA1205 LA1201 LA1205 LA1201 LA1205 LA1206 LA1201 LA1205 LA1206 LA120 100p 100p 400p 450p 475p 200p 425p 100p 150p 400p 300p 150p 200p 125p CC7207 LC7215 LC7217 LC7218 LC7230 LC7267 LC7364 LC7364 LC7365 LC7537A LC7537A LC7537A LC7537A LC7582 LC7537A LC7582 LC7537A LC7582 LC7583 110p 110p 70p 250p

Please add £1 P&P and VAT at 17.5% to all orders

All brand new components

We accept payment by Access, Switch, Visa, Cheque and Postal Order. (Government, College etc orders accepted)

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

,, =				LI	NEA	AR I	Cs/	JAP	AN	ESE	TR	ANS	SIS	TOF	RS				
Part TA8164P	Price 100p	Part TDA1180	Price 120p	Part TDA2760	400p	Part TDA4661	Price 225p	Part TDA8391	Price 675p	Part UPC1004C	Price 130p 950p	Part 2SA771 2SA773	Price 90p 50p	Part 2SA1177 2SA1179	Price 25p 20p	Part 2SB561 2SB562	Price 30p 20p	Part 2SC738 2SC739	15p 150p
TA8184P TA8189P TA8200AH	350p 130p 325p 300p	TDA1185A TDA1190 TDA1200B TDA1220	190p 80p 80p 50p	TDA2780 TDA2791 TDA2795 TDA2822M	600p 275p 150p 60p	TDA4670 TDA4680 TDA4685 TDA4700A	475p 350p 275p 750p	TDA8395 TDA8405 TDA8415 TDA8416	360p 550p 650p 625p	UPC1009 UPC1018 UPC1020 UPC1023	170p 200p 60p	2SA777 2SA778 2SA781	35p 100p 150p	2SA1182 2SA1184 2SA1185	20p 120p 200p	2SB564 2SB566 2SB596	15p 90p 50p	2SC761 2SC762 2SC783	110p 150p 85p
TA8201AK TA8205 TA8207K TA8210	220p 175p 260p	TDA 1235 TDA 1236 TDA 1251	300p 240p 150p	TDA2824 TDA2840 TDA3047	85p 200p 100p	TDA4714C TDA4716C TDA4718A	350p 450p 250p	TDA8417 TDA8421 TDA8425	550p 300p 500p	UPC1024H 2 UPC1025 UPC1026	75p 230p 95p	2SA786 2SA794 2SA798	25p 50p 30p	2SA1186 2SA1198 2SA1201	500p 40p 40p	2SB598 2SB600 2SB601	30p 500p 60p	2SC790 2SC792 2SC805	50p 380p 225p
TA8211AH TA8214K TA8215	200p 260p 300p	TDA1270 TDA1327 TDA1405	150p 200p 50p	TDA3048 TDA3082 TDA3083	130p 200p 200p	TDA4725 TDA4800 TDA4810	750p 300p 250p	TDA8432 TDA8433 TDA8440	550p 600p 300p	UPC1028 UPC1031H UPC1032	90p 150p 60p	2SA812 2SA814 2SA816	15p 60p 70p 20p	2SA1202 2SA1204 2SA1206	25p 225p 60p 25p	2SB605 2SB631 2SB632 2SB633	25p 40p 45p 80p	2SC828 2SC829 2SC839 2SC867	20p 15p 20p 900p
TA8216H TA8217P TA8220AH	300p 120p 500p	TDA1410 TDA1412 TDA1506	220p 35p 275p	TDA3190 TDA3301B TDA3310	100p 400p 120p	TDA4814A TDA4850 TDA4851 TDA4852	300p 475p 325p 325p	TDA8442 TDA8443 TDA8444 TDA8451	200p 350p 200p 325p	UPC1035C UPC1043C UPC1158H UPC1161	110p 125p 70p 110p	2SA817 2SA825 2SA836 2SA837	20p 20p 20p 200p	2SA1207 2SA1208 2SA1209 2SA1210	70p 100p 120p	2SB641 2SB647 2SB648	12p 20p 45p	2SC870 2SC897 2SC900B	100p 175p 30p
TA8221AH TA8225H TA8225L TA8227	600p 475p 475p 250p	TDA1508 TDA1510 TDA1512 TDA1514A	175p 170p 140p 325p	TDA3410 TDA3420 TDA3501 TDA3502	150p 200p 300p 360p	TDA4860 TDA4866 TDA4881	200p 275p 200p	TDA8452 TDA8453 TDA8461	200p 350p 950p	UPC1167 UPC1170 UPC1173	125p 150p 200p	2SA839 2SA841 2SA844	110p 20p 20p	2SA1215 2SA1216 2SA1217	600p 550p 100p	2SB649 2SB673 2SB676	35p 100p 85p	2SC930 2SC936 2SC941	15p 300p 15p
TA8229K TA8400P TA8410K	200p 200p 200p	TDA1515A TDA1516Q TDA1517	200p 350p 150p	TDA3504 TDA3505 TDA3506	300p 275p 260p	TDA4935 TDA4940 TDA4942	300p 200p 200p	TDA8490 TDA8540 TDA8702	225p 250p 275p	UPC1176C UPC1178H UPC1180C	120p 250p 200p	2SA847 2SA854 2SA861	25p 30p 45p	2SA1220 2SA1221 2SA1222 2SA1226	75p 70p 50p 25p	2SB688 2SB703 2SB705 2SB707	90p 90p 200p 200p	2SC944 2SC945 2SC950 2SC959	140p 10p 40p 225p
TA8410P TA8432 TA8605N TA8606N	200p 200p 350p 350p	TDA1519 TDA1519A TDA1520 TDA1521	200p 200p 275p 210p	TDA3507 TDA3510 TDA3520 TDA3530	450p 200p 250p 250p	TDA4944 TDA4950 TDA5030A TDA5140A	175p 100p 100p 200p	TDA8703 TDA8708 TDA8730 TDA8732	500p 600p 225p 300p	UPC185H2 UPC1186 UPC1187 UPC1188H	400p 80p 150p 350p	2SA872 2SA872A 2SA879 2SA884	25p 50p 30p 100p	2SA1227 2SA1232 2SA1237	250p 180p 25p	2SB716 2SB718 2SB727	20p 60p 100p	2SC980 2SC982 2SC983	40p 20p 120p
TA8607P TA8611AN TA8615N	320p 250p 480p	TDA1522 TDA1524 TDA1526	110p 200p 225p	TDA3540 TDA3541 TDA3560	200p 175p 260p	TDA5330T TDA5331T TDA5332T	300p 200p 150p	TDA8735 TDA8740 TDA8741	175p 625p 550p	UPC1191 UPC1197 UPC1198H	300p 140p 200p	2SA885 2SA886 2SA887	35p 45p 20p	2SA1238 2SA1239 2SA1240	30p 30p 45p	2SB733 2SB734 2SB737 2SB739	75p 35p 20p 22p	2SC1000 2SC1001 2SC1008 2SC1010	20p 950p 20p 225p
TA8628N TA8631 TA8632N	350p 500p 550p	TDA 1540 TDA 1541	2000p 420p 500p	TDA3561 TDA3561A TDA3562 TDA3562TF	300p 300p 260p	TDA5500 TDA5600 TDA5660P TDA5700	400p 450p 250p 200p	TDA8808T TDA8809T TDA9045 TDA9080	325p 350p 300p 400p	UPC1210 UPC1215V UPC1222 UPC1225H	150p 125p 130p 220p	2SA893 2SA896 2SA899 2SA900	15p 25p 40p 45p	2SA1242 2SA1244 2SA1245 2SA1246	80p 120p 55p 80p	2SB744 2SB750 2SB753	55p 60p 100p	2SC1012 2SC1013 2SC1014	75p 170p 140p
TA8644N TA8646 TA8653N TA8659AN	425p 375p 1500p 900p	TDA 1542 TDA 1543 TDA 1552Q TDA 1553AQ	250p 200p 350p 325p	TDA35621F TDA3563 TDA3564 TDA3565	300p 350p 325p 220p	TDA5701 TDA5708 TDA5709	200p 275p 375p	TDA9102C TDA9403 TDA9500	250p 130p 750p	UPC1227V UPC1228HA UPC1230	225p 45p 200p	2SA904 2SA907 2SA909	20p 650p 500p	2SA1248 2SA1249 2SA1252	35p 100p 20p	2SB754 2SB764 2SB765	80p 30p 70p	2SC1030 2SC1046 2SC1047	150p 250p 20p
TA8690N TA8691N TA8701AN	700p 450p 275p	TDA 1555Q TDA 1557Q TDA 1558Q	375p 300p 300p	TDA3566 TDA3567 TDA3569	280p 350p 300p	TDA5800 TDA5820 TDA5832	850p 370p 125p	TDA9503 TDA9513 TDA9800	550p 225p 225p	UPC1237HA UPC1238 UPC1241H	70p 120p 150p 150p	2SA912 2SA913 2SA914 2SA915	70p 100p 90p 30p	2SA1253 2SA1256 2SA1257 2SA1258	30p 30p 30p 70p	2SB772 2SB774 2SB775 2SB776	25p 50p 100p 110p	2SC1050 2SC1051 2SC1061 2SC1069	280p 250p 85p 175p
TA8718N TA8720 TA8739P TA8872N	550p 525p 450p 450p	TDA1560Q TDA1571 TDA1572 TDA1574	675p 300p 175p 125p	TDA3570 TDA3580 TDA3586 TDA3590	375p 300p 750p 250p	TDA5850 TDA5930 TDA6100Q TDA6101Q	175p 225p 150p 120p	TDA9821 TEA0652 TEA0653T TEA0655	200p 150p 80p 300p	UPC1242H UPC1245V UPC1270H UPC1274V	130p 250p 250p	2SA916 2SA921 2SA928A	30p 40p 25p	2SA1261 2SA1262 2SA1263	150p 110p 280p	2SB788 2SB791 2SB794	35p 130p 40p	2SC1070 2SC1079 2SC1080	65p 300p 225p
TAA550 TBA120S TBA396	25p 40p 70p	TDA1576 TDA1578A TDA1579	170p 210p 130p	TDA3591 TDA3592A TDA3601Q	360p 300p 375p	TDA6111Q TDA6200 TDA6600-2	225p 750p 700p	TEA0665 TEA1002 TEA1007	300p 650p 120p	UPC1277 UPC1278 UPC1288V	240p 240p 230p	2SA933 2SA934 2SA935	30p 30p 40p	2SA1264 2SA1265 2SA1283	280p 200p 50p	2SB795 2SB810 2SB816	45p 15p 160p	2SC1096 2SC1098 2SC1106	40p 120p 180p 415p
TBA520 TBA530 TBA540	120p 100p 90p	TDA 1589 TDA 1591 TDA 1596	275p 275p 200p	TDA3602 TDA3611 TDA3640	225p 450p 350p	TDA6610-2 TDA6612-2 TDA7000 TDA7010T	1100p 900p 170p 120p	TEA1009 TEA1015P TEA1017 TEA1019	100p 110p 280p 130p	UPC1297CA UPC1298 UPC1313H A UPC1316C	320p	2SA937 2SA939 2SA940 2SA942	20p 140p 50p 60p	2SA1284 2SA1286 2SA1289 2SA1290	60p 60p 50p 150p	2SB817 2SB819 2SB822 2SB824	175p 60p 40p 60p	2SC1114 2SC1115 2SC1116 2SC1124	280p 290p 270p
TBA560 TBA800 TBA810AS TBA820	90p 40p 40p 55p	TDA 1598 TDA 1600 TDA 1602A TDA 1670A	160p 200p 400p 200p	TDA3645 TDA3651 TDA3652 TDA3652-TX	400p 200p 400p 10800p	TDA7020T TDA7021T TDA7050	175p 200p 100p	TEA1024 TEA1035 TEA1039	150p 200p 150p	UPC1318 UPC1330HA UPC1335V	300p 80p 320p	2SA949 2SA950 2SA951	70p 18p 60p	2SA1293 2SA1294 2SA1295	110p 450p 500p	2\$8825 2\$8826 2\$8827	135p 75p 200p	2SC1161 2SC1162 2SC1164	110p 30p 600p
TBA820M TBA920 TBA950	35p 100p 100p	TDA1675 TDA1701 TDA1771	200p 300p 200p	TDA3653 TDA3654 TDA3654Q	85p 80p 85p	TDA7052 TDA7053 TDA7056	120p 200p 200p	TEA1045 TEA1060 TEA1061	300p 225p 175p	UPC1350 UPC1352C UPC1360C	115p 450p 200p	2SA952 2SA953 2SA954 2SA957	30p 60p 30p 185p	2SA1301 2SA1302 2SA1303 2SA1304	260p 300p 400p 110p	2S8828 2S8829 2S8835 2S8857	200p 200p 75p 80p	2SC1165 2SC1166 2SC1170 2SC1172	750; 100; 180; 150;
TBA990 TC5020 TC5081AP	60p 200p 80p	TDA 1870A TDA 1872A TDA 1904 TDA 1905	200p 275p 80p 80p	TDA3710 TDA3720 TDA3724 TDA3725	300p 175p 300p 300p	TDA7057Q TDA7072 TDA7077 TDA7211	225p 100p 175p 100p	TEA1062 TEA1064 TEA1067 TEA1068	250p 250p 150p 350p	UPC1362C UPC1363 UPC1363C UPC1364C	250p 190p 300p 350p	2SA958 2SA963 2SA965	60p 120p 30p	2SA1304 2SA1306 2SA1307 2SA1309	110p 100p 50p	2SB861 2SB863 2SB865	110p 220p 25p	2SC1173 2SC1195 2SC1212	33p 210p 35p
TC5082P TC5090A TC9125BP TC9130P	170p 230p 410p 150p	TDA 1908A TDA 1910 TDA 1910 TDA 1940	90p 160p 180p	TDA3730 TDA3740 TDA3750	400p 400p 400p	TDA7220 TDA7222 TDA7230A	65p 100p 150p	TEA 1080P TEA 1087 TEA 1101	170p 40p 425p	UPC1365 UPC1366C UPC1370C	250p 130p 300p	2SA966 2SA968 2SA970	25p 55p 25p	2SA1315 2SA1317 2SA1318	100p 30p 20p	2SB882 2SB885 2SB891	180p 45p 35p	2SC1213 2SC1214 2SC1215 2SC1216	10p 15p 25p 200p
TC9134 TC9135P TC9137P	750p 125p 500p	TDA 1941 TDA 1950 TDA 2002	300p 175p 50p	TDA3755 TDA3760 TDA3765V	425p 350p 225p 460p	TDA7231A TDA7233 TDA7240 TDA7241	80p 60p 175p 250p	TEA1330 TEA1511 TEA2000 TEA2014A	65p 150p 500p 80p	UPC1373 UPC1377C UPC1378 UPC1379C	85p 200p 400p 170p	2SA979 2SA984 2SA985 2SA988	35p 25p 60p 25p	2SA1319 2SA1320 2SA1321 2SA1327	25p 45p 80p 130p	2SB892 2SB895 2SB908 2SB926	25p 60p 70p 30p	2SC1216 2SC1222 2SC1226 2SC1237	15p 75p 250p
TC9138AP TC9142 TC9143 TC9145	150p 320p 300p 150p	TDA2003 TDA2004 TDA2005 TDA2006	65p 150p 150p 70p	TDA3771 TDA3780 TDA3791 TDA3800	400p 200p 250p	TDA7245 TDA7250 TDA7255	225p 400p 400p	TEA2018A TEA2019 TEA2025B	110p 600p 75p	UPC1382 UPC1384 UPC1387C	110p 425p 250p	2SA991 2SA992 2SA993	30p 30p 50p	2SA1329 2SA1346 2SA1348	200p 20p 45p	2SB941 2SB950 2SB951	60p 180p 190p	2SC1247A 2SC1252 2SC1278	35; 850; 110;
TC9148 TC9149 TC9150	200p 225p 425p	TDA2007 TDA2008 TDA2009	120p 100p 160p	TDA3803A TDA3810 TDA3825	500p 200p 150p	TDA7256 TDA7262 TDA7272	400p 325p 170p	TEA2028 TEA2028B TEA2029A TEA2029C	325p 375p 650p 270p	UPC1394 UPC1397 UPC1403CA UPC1406HA	120p 350p 650p	2SA995 2SA999 2SA1005 2SA1006	60p 30p 25p 90p	2SA1352 2SA1353 2SA1356 2SA1357	100p 100p 100p 65p	2SB953 2SB975 2SB985 2SB986	90p 100p 30p 40p	2SC1279 2SC1308K 2SC1312 2SC1318	30; 350; 40; 10;
TC9151P TC9152 TC9153 TC9154AP	425p 425p 300p 225p	TDA2010 TDA2020 TDA2030 TDA2030H	150p 120p 80p 100p	TDA3827 TDA3840 TDA3842 TDA3843	110p 200p 200p 200p	TDA7273 TDA7274 TDA7275 TDA7282	80p 45p 75p 50p	TEA2031A TEA2037 TEA2114	125p 200p 200p	UPC1420CA UPC1421CA UPC1423CA	450p	2SA1008 2SA1009 2SA1010	125p 200p 225p	2SA 1358 2SA 1359 2SA 1360	130p 45p 45p	2SB1009 2SB1010 2SB1012	110p 25p 55p	2SC1325 2SC1327 2SC1328	400 20 15
TC9156 TC9158P TC9162	300p 450p 275p	TDA2040 TDA2048 TDA2051V	140p 600p 450p	TDA3845 TDA3856 TDA3857	225p 300p 200p	TDA7284 TDA7302 TDA7310	100p 450p 800p	TEA2117 TEA2130 TEA2164	450p 350p 160p	UPC1470 UPC1474HA UPC1484CA	200p 75p 300p	2SA1011 2SA1012 2SA1013	80p 85p 100p	2SA1362 2SA1370 2SA1371	25p 50p 100p	2SB1015 2SB1016 2SB1017	60p 130p 40p	2SC1342 2SC1343 2SC1345 2SC1346	15; 200; 15; 100;
TC9163 TC9164 TC9167P	375p 400p 100p	TDA2052V TDA2054M TDA2107	525p 110p 250p	TDA3950 TDA4001 TDA4050	225p 250p 150p	TDA7313 TDA7318 TDA7330A TDA7350	650p 550p 700p 300p	TEA2260 TEA2261 TEA2262 TEA3717DF	225p 185p 275p 160p	UPC1488H UPC1498H UPC1505C UPC1513HA	115p 500p 400p 70p	2SA 1015 2SA 1016 2SA 1018 2SA 1020	10p 30p 100p 30p	2SA1376 2SA1380 2SA1381 2SA1382	30p 75p 100p 120p	2SB1018 2SB1020 2SB1039 2SB1066	130p 120p 65p 40p	2SC1358 2SC1359 2SC1360	270 15 70
TC9172P TC9174P TC9176P TC9177P	300p 325p 500p 225p	TDA2148 TDA2151 TDA2170 TDA2220	325p 375p 260p 200p	TDA4052 TDA4060 TDA4092 TDA4100	500p 500p 250p 150p	TDA7359 TDA7360 TDA7361	300p 700p 175p	TEA3718S TEA5030 TEA5040	175p 135p 650p	UPC1514CA UPC1515CA UPC1520CA	250p 250p	2SA1021 2SA1023 2SA1026	35p 60p 90p	2SA1385 2SA1386 2SA1387	180p 400p 75p	2SB1068 2SB1077 2SB1098	160p 180p 80p	2SC1364 2SC1368 2SC1382	25 75 40
TCA9940 TCEP100 TD62308AP	100p 100p 200p	TDA2270 TDA2320 TDA2501	250p 80p 300p	TDA4173A TDA4180 TDA4190	F 325p 145p 180p	TDA7370V TDA7374V TDA7770	325p 350p 140p	TEA5101A TEA5110 TEA5114A	175p 175p 200p	UPC1521HA UPC1536C 2SA329	120p 550p 75p 40p	2SA1029 2SA1036 2SA1037 2SA1038	60p 60p 50p 40p	2SA1396 2SA1399 2SA1400 2SA1423	120p 25p 150p 30p	2SB1099 2SB1109 2SB1123 2SB1133	75p 40p 50p 50p	2SC1383 2SC1384 2SC1393 2SC1394	25; 20; 20; 15;
TD62382 TD62506 TD62705 TD6304AP	200p 200p 250p 300p	TDA2502 TDA2503 TDA2504 TDA2505	175p 200p 200p 220p	TDA4200 TDA4210 TDA4260 TDA4280	300p 160p 250p 320p	TDA8114 TDA8115 TDA8116 TDA8120B	225p 200p 350p 400p	TEA5116 TEA5116 TEA5170 TEA5500	220p 220p 200p 325p	2SA467 2SA473 2SA483 2SA484	29p 90p 80p	2SA1048 2SA1051 2SA1052	25p 300p 15p	2SA1428 2SA1441 2SA1442	35p 110p 110p	2SB1134 2SB1135 2SB1140	65p 60p 45p	2SC1398 2SC1399 2SC1400	55 <sub> </sub> 100 <sub> </sub> 50 <sub> </sub>
TD6306P TD6350P TD6359P	350p 200p 300p	TDA2506 TDA2507 TDA2507T	400p 450p 450p	TDA4282 TDA4283T TDA4290	360p 450p 125p	TDA8124 TDA8134 TDA8135	250p 225p 225p	TEA5501 TEA5550 TEA5560	225p 150p 130p	2SA489 2SA490 2SA493	50p 45p 25p	2SA1060 2SA1061 2SA1069 2SA1073	120p 300p 150p 375p	2SA1443 2SA1450 2SA1459 2SA1462	130p 30p 40p 25p	2SB1143 2SB1151 2SB1162 2SB1163	40p 75p 400p 370p	2SC1403 2SC1407 2SC1413 2SC1419	500 <sub> </sub> 50 <sub> </sub> 150 <sub> </sub> 50
TDA 1001 TDA 1002 TDA 1003 TDA 1005A	200p 200p 150p 175p	TDA2510 TDA2514A TDA2515 TDA2530	450p 500p 450p 300p	TDA4400 TDA4420 TDA4421 TDA4426	175p 120p 300p 170p	TDA8136 TDA8137 TDA8138 TDA8138A	225p 200p 200p 130p	TEA5570 TEA5580 TEA5581 TEA5591	85p 165p 200p 200p	2SA495 2SA496 2SA505 2SA509	40p 30p 120p 35p	2SA1075 2SA1076 2SA1077 2SA1080	230p 300p 125p	2SA1469 2SA1475 2SA1488	100p 95p 150p	2SB1168 2SB1182 2SB1185	50p 40p 50p	2SC 1426 2SC 1429 2SC 1431	700 50 400
TDA1010A TDA1011 TDA1012	80p 75p 120p	TDA2532 TDA2540 TDA2541	100p 150p 70p	TDA4427 TDA4431 TDA4433	200p 150p 100p	TDA8138B TDA8139 TDA8140	200p 200p 200p	TEA5620 TEA5630 TEA5640E	300p 225p 750p	2SA537 2SA539 2SA544	170p 20p 650p	2SA1081 2SA1082 2SA1083	80p 80p 20p	2SA1489 2SA1490 2SA1491 2SA1492	300p 225p 300p 260p	2SB1202 2SB1203 2SB1204 2SB1205	45p 45p 45p 40p	2SC1444 2SC1445 2SC1446 2SC1447	275 350 55 70
TDA1013A TDA1015 TDA1016 TDA1020	110p 85p 140p 110p	TDA2542 TDA2543 TDA2544 TDA2545	110p 210p 200p 120p	TDA4437 TDA4439 TDA4440 TDA4442	125p 220p 180p 240p	TDA8143 TDA8145 TDA8146 TDA8160	160p 120p 200p 125p	TEA5701 TEA6000 TEA6100 TEA6200	650p 400p 350p 225p	2SA550 2SA562 2SA564 2SA571	150p 30p 15p 650p	2SA1084 2SA1085 2SA1091 2SA1093	100p 75p 100p 180p	2SA1492 2SA1493 2SA1494 2SA1516	500p 500p 450p 280p	2SB1223 2SB1243 2SB1274	60p 40p 40p	2SC1449 2SC1450 2SC1454	120 200 250
TDA 1022 TDA 1023 TDA 1024	330p 130p 150p	TDA2546A TDA2548 TDA2549	200p 200p 300p	TDA4443 TDA4445 TDA4450	250p 220p 225p	TDA8170 TDA8172 TDA8173	170p 200p 175p	TEA6300 TEA6310T TEA6414A	500p 425p 425p	2SA603 2SA606 2SA608	100p 200p 15p	2SA1094 2SA1095 2SA1096	190p 300p 80p	2SA1519 2SA1523 2SA1535	20p 45p 175p	2SB1282 2SB1318 2SB1375	300p 40p 45p	2SC1470 2SC1472 2SC1473	120 40 15
TDA1025 TDA1028 TDA1029	320p 175p 200p	TDA2555 TDA2556 TDA2557	175p 230p 225p	TDA4452 TDA4453 TDA4480	250p 275p 280p	TDA8174 TDA8175 TDA8178	200p 300p 650p 750p	TEA6415B TEA6420 TEA8172 TL431	525p 360p 125p 45p	2SA614 2SA628 2SA634 2SA636	150p 20p 50p 50p	2SA1102 2SA1103 2SA1104 2SA1105	130p 130p 140p 250p	2SA1538 2SA1540 2SA1598 2SA1599	55p 50p 220p 220p	2SB1382 2SB1468 2SC182 2SC372	350p 100p 75p 25p	2SC1474 2SC1501 2SC1505 2SC1507	45 70 55 45
TDA1035 TDA1038 TDA1041E TDA1041P	160p 500p 250p 180p	TDA2558 TDA2574V TDA2575A TDA2577A	400p 350p 100p 200p	TDA4481 TDA4482 TDA4500 TDA4501	215p 200p 300p 280p	TDA8179S TDA8185 TDA8190 TDA8191	180p 200p 425p	TL494 TLO61 TLO64	100p 40p 80p	2SA639 2SA640 2SA642	60p 60p 50p	2SA1106 2SA1111 2SA1112	160p 90p 150p	2SA1600 2SA1601 2SA1625	250p 200p 40p	2SC372 2SC380 2SC388A 2SC394 2SC403	10p 25p 60p	2SC1509 2SC1514 2SC1515	35 35 60
TDA1044 TDA1047 TDA1048	110p 200p 200p	TDA2578A TDA2579A TDA2582	200p 210p 130p	TDA4502 TDA4503 TDA4505A	400p 250p 300p	TDA8192 TDA8196 TDA8205	200p 120p 1250p	TLO71 TLO74 TLO83	38p 80p 55p	2SA643 2SA673 2SA677	25p 15p 35p	2SA1115 2SA1120 2SA1123	30p 40p 40p	2SA1626 2SA1640 2SA1652 2SA1667	90p 100p 70p 175p	2SC403 2SC454 2SC458 2SC460	25p 15p 10p 10p	2SC1520 2SC1541 2SC1545 2SC1567	45 110 120 40
TDA1053 TDA1054 TDA1057 TDA1059B	300p 180p 60p 40p	TDA2590 TDA2591 TDA2591Q TDA2593	170p 110p 150p 80p	TDA4505E TDA4505K TDA4505N TDA4510	275p 450p	TDA8213 TDA8214B TDA8215H TDA8217	175p 225p 300p 225p	TLO84 TMP47C-434 TPU2732 TPU2735	70p N 1250p 800p 500p	2SA678 2SA683 2SA684 2SA699	26p 25p 25p 100p	2SA1124 2SA1127 2SA1133 2SA1135	60p 50p 120p 130p	2SA1668 2SA1671 2SA1673	180p 310p 425p	2SC461 2SC495 2SC496	15p 45p 25p	2SC1568 2SC1569 2SC1570	35 55 40
TDA1060 TDA1062 TDA1068	140p 140p 75p	TDA2594 TDA2595 TDA2600	300p 200p 400p	TDA4532 TDA4555 TDA4556 TDA4557	200p 275p 370p	TDA8303 TDA8304 TDA8305	250p 400p 500p	UC3524 UC3842N UC3843	100p 80p 125p	2SA705 2SA706 2SA708	70p 140p 50p	2SA1141 2SA1142 2SA1143	200p 100p 15p	2SA1680 2SA1706 2SB175	40p 25p 45p	2SC497 2SC515 2SC535	85p 100p 30p	2SC1571 2SC1573 2SC1576	50 25 550
TDA1072 TDA1074 TDA1077	150p 280p 250p	TDA2611A TDA2616 TDA2630	100p 250p 300p	TDA4560 TDA4565	200p 270p 150p	TDA8340 TDA8341 TDA8349A	150p 250p 350p	UC3844 UPC20C UPC554 UPC555	70p 220p 130p 60p	2SA711 2SA715 2SA719 2SA720	280p 50p 50p 20p	2SA1145 2SA1146 2SA1151 2SA1152	40p 200p 30p 150p	2SB324 2SB337 2SB474 2SB492	40p 150p 250p 80p	2SC536 2SC605 2SC619 2SC641 2SC644	20p 100p 100p 80p	2SC1580 2SC1583 2SC1586 2SC1617	600 25 540 340
TDA1082 TDA1083 TDA1085 TDA1087	275p 95p 170p 60p	TDA2640 TDA2653A TDA2654 TDA2658	350p 200p 200p 300p	TDA4566 TDA4568 TDA4570 TDA4580	250p 225p 200p 400p	TDA7350C TOA8351 TDA8360N TDA8361N	200p 13 800p	UPC556H UPC571	80p 220p 60p	2SA725 2SA726 2SA733	80p 20p 15p	2SA1153 2SA1154 2SA1156	30p 22p 90p	2SB511 2SB525 2SB527	55p 65p 130p	2SC647 2SC681	10p 300p 250p	2SC1619 2SC1623 2SC1624	50 60
TDA1092 TOA1097 TDA1151	100p 475p 40p	TDA2670 TDA2690 TDA2710-1	150p 100p 400p	TDA4600 TDA4600II TDA4601	200p 160p 120p	TDA8362AN TDA8362N3 TDA8366N2	1200p 1200p 1500p	UPC575C2 UPC577 UPC592	90p 64p 95p	2SA740 2SA742 2SA747A	90p 450p 425p	2SA1162 2SA1163 2SA1169	30p 15p 500p	2SB531 2SB536 2SB537	400p 80p 90p	2SC683 2SC708 2SC710	35p 100p 15p 15p	2SC1626 2SC1627 2SC1628 2SC1634	55 15 75 50
TDA1154 TDA1170 TDA1170N TDA1175	50p 85p 85p 175p	TDA2721 TDA2730 TDA2740 TDA2750	200p 200p 300p 200p	TDA4605 TDA4610 TOA4650 TDA4660	190p 370p 300p 200p	TDA8372A	200p 275p	UPC1001	190p 190p 220p 130p	2SA748 2SA764 2SA769 2SA770	60p 200p 80p 200p	2SA1170 2SA1173 2SA1174 2SA1175	500p 60p 25p 30p	2SB544 2SB546 2SB549 2SB560	22p 45p 50p 25p	2SC730 2SC732	350p 40p 40p	2SC1667 2SC1669	450 100 15

GRANDATA LTD

Tel: 0181 900 2329 Fax: 0181 903 6126

265

						IA	PAN	IESI	7 1 1	RAN	IST	STO	RS						
Part	Price	Part	Price	Part	Price		Price	Part	Price	Part	Price	Part		Dourt	Drice	Dont	Duine	David	Prince
2SC1675	90p	2SC2261	700p	2SC2719	25p	2SC3263	280p	2SC3798	220p	2SD257	195p	2SD880	Price 40p	Part 2SD1327	Price 150p	2SD1763/	Price 4 60p	Part 2SK312	Price 750p
2SC1678 2SC1683	80p 100p	2SC2267 2SC2270	90p 60p	2SC2721 2SC2724	120p 15p	2SC3264 2SC3269	390p 50p	2SC3807 2SC3808	120p 70p	2SD287 2SD291	250p 250p	2SD882 2SD889	25p 35p	2SD1328 2SD1330	60p 50p	2SD1764 2SD1765	70p 70p	2SK315 2SK320	70p 120p
2SC1684 2SC1685	30p 30p	2SC2271 2SC2274	25p 15p	2SC2738 2SC2749	200p 350p	2SC3270 2SC3271	<sup>1</sup> 50p 75p	2SC3811 2SC3831	80p 250p	2SD313 2SD315	25p 75p	2SD892A 2SD894	75p 35p	2SD1347 2SD1348	70p 65p	2SD1769 2SD1773	110p 100p	2SK323	130p
2SC1729 2SC1730	900p 10p	2SC2276 2SC2278	50p 70p	2SC2750 2SC2751	300p 270p	2SC3277 2SC3279	280p 30p	2SC3832 2SC3833	135p 250p	2SD325 2SD330	30p 65p	2SD895 2SD896	100p 200p	2SD1350 2SD1376	150p 60p	2SD1776 2SD1783	70p 70p	2SK332 2SK359	175p 40p
2SC1735 2SC1740	70p 10p	2SC2283 2SC2290	700p 1800p	2SC2752 2SC2767	75p 300p	2SC3280 2SC3281	200p 200p	2SC3851 2SC3852	100p 80p	2SD348 2SD350	300p 320p	2SD898B 2SD900	225p 400p	2SD1378 2SD1379	60p 100p	2SD1785 2SD1789	160p 210p	2SK363 2SK364	50p 40p
2SC1741 2SC1755	35p 90p	2SC2291 2SC2298	40p 35p	2SC2769 2SC2773	400p 700p	2SC3284 2SC3293	600p 85p	2SC3853 2SC3855	220p 220p	2SD357 2SD358	40p 40p	2SD905 2SD916	450p 130p	2SD1380 2SD1382	100p 60p	2SD1796 2SD1802	120p	2SK367	40p
2SC1756 2SC1758	35p 30p	2SC2307 2SC2308	300p 10p	2SC2774 2SC2785	500p 40p	2SC3298 2SC3299	50p 120p	2SC3857 2SC3858	500p 550p	2SD359 2SD361	50p 100p	2SD917 2SD921	300p	2SD1384 2SD1390	50p	2SD1802 2SD1806 2SD1812	75p 75p	2SK369 2SK373	30p 40p
2SC1760 2SC1775	70p 10p	2SC2312 2SC2314	300p 70p	2SC2786 2SC2787	20p 10p	2SC3300 2SC3303	400p	2SC3866 2SC3868	275p	2SD362	100p	2SD923	320p 360p	2SD1391	350p 250p	2SD1815	45p 50p	2SK374 2SK386	45p 600p
2SC1781 2SC1789	20p	2SC2316	150p	2SC2791	500p	2SC3306	130p	2SC3870	100p 200p	2SD371 2SD380	240p 650p	2SD946 2SD947	120p 100p	2SD1392 2SD1395	85p 80p	2SD1825 2SD1827	60p 120p	2SK389 2SK400	115p 700p
2SC1809	100p 40p	2SC2320 2SC2324	10p 120p	2SC2792 2SC2793	220p 700p	2SC3307 2SC3309	600p 150p	2SC388A 2SC3883	25p 210p	2SD381 2SD382	50p 75p	2SD950 2SD951	300p 200p	2SD1396 2SD1397	120p 100p	2SD1843 2SD1846	70p 350p	2SK405	450p
2SC1810 2SC1815	250p 10p	2SC2328A 2SC2310	25p	2SC2808 2SC2810	40p 360p	2SC3310 2SC3316	125p 280p	2SC3884A 2SC3885	200p 250p	2SD386 2SD388	70p 150p	2SD957A 2SD958	520p 60p	2SD1398 2SD1399	120p 300p	2SD1847 2SD1849	275p 280p	2SK414 2SK415	550p 500p
2SC1819 2SC1826	70p 60p	2SC2315 2SC2329	175p 480p	2SC2812 2SC2814	40p 40p	2SC3317 2SC3326	350p 50p	2SC3885A 2SC3886A	290p 275p	2SD389 2SD400	60p 14p	2SD965 2SD970	35p 170p	2SD1400 2SD1402	280p 120p	2SD1850 2SD1853	325p 40p	2SK423 2SK427	75p 50p
2SC1827 2SC1829	60p 500p	2SC2230 2SC2331	300p 50p	2SC2824 2SC2825	75p 900p	2SC3327 2SC3328	60p 50p	2SC3890 2SC3892A	150p 250p	2SD401 2SD402	50p 120p	2SD972 2SD973	40p 60p	2SD1403 2SD1405	225p 80p	2SD1856 2SD1857	40p 75p	2SK430	200p
2SC1833 2SC1834	27p 50p	2SC2333 2SC2334	200p 80p	2SC2826 2SC2827	200p 130p	2SC3330 2SC3331	20p 25p	2SC3893 2SC3895	225p 325p	2SD414 2SD415	45p 55p	2SD973A 2SD982	70p 90p	2SD1406 2SD1407	60p 60p	2SD1858 2SD1863	40p 35p	2SK511 2SK513	450p 325p
2SC1841 2SC1844	12p 50p	2SC2335 2SC2336A	55p 125p	2SC2832 2SC2834	300p 280p	2SC3333 2SC3345	120p 100p	2SC3896 2SC3897	400p 400p	2SD424 2SD426	350p 150p	2SD985 2SD986	120p 120p	2SD1408 2SD1409	125p 170p	2SD1864 2SD1877	85p 175p	2SK526 2SK531	160p 350p
2SC1845 2SC1846	15p 35p	2SC2344 2SC2347	150p 35p	2SC2837 2SC2839	250p 40p	2SC3346 2SC3352	130p 200p	2SC3907 2SC3927	250p	2SD427 2SD438	350p	2SD998	70p	2SD1411	85p	2SD1878	160p	2SK534	700p
2SC1847 2SC1855	45p 85p	2SC2353	120p	2SC2853	70p	2SC3353	280p	2SC3940	250p 40p	2SD467	35p 15p	2SD1010 2SD1012	40p 40p	2SD1412 2SD1413	75p 60p	2SD1879 2SD1880	275p 360p	2SK537 2SK538	900p 350p
2SC1856	25p	2SC2360 2SC2361	120p 150p	2SC2873 2SC2877	60p 120p	2SC3355 2SC3356	50p 120p	2SC3943 2SC3944	75p 80p	2SD468 2SD471	15p 20p	2SD1020 2SD1021	40p 120p	2SD1415 2SD1417	190p 75p	2SD1881 2SD1884	350p 300p	2SK539 2SK544	1100p 30p
2SC1865 2SC1870	700p 700p	2SC2362 2SC2365	50p 280p	2SC2878 2SC2879	20p 3200p	2SC3358 2SC3376	50p 300p	2SC3950 2SC3953	120p 50p	2SD476 2SD525	100p 50p	2SD1022 2SD1024	250p 850p	2SD1425 2SD1426	260p 135p	2SD1886 2SD1887	300p 225p	2SK552	250p
2SC1871 2SC1875	425p 220p	2SC2369 2SC2371	100p 25p	2SC2882 2SC2883	60p 60p	2SC3377 2SC3378	50p 120p	2SC3955 2SC3964	60p 100p	2SD526 2SD545	70p 18p	2SD1027 2SD1030	850p 75p	2SD1427 2SD1428	160p 180p	2SD1894 2SD1895	300p 225p	2SK553 2SK555	225p 320p
2SC1881 2SC1890	70p 15p	2SC2373 2SC2383	210p 50p	2SC2898 2SC2899	200p 50p	2SC3379 2SC3381	1200p 130p	2SC3972 2SC3973	250p 210p	2SD549 2SD551	120p 300p	2SD1031 2SD1036	70p 600p	2SD1430 2SD1431	280p 200p	2SD1910 2SD1911	175p 300p	2SK556 2SK557	500p 400p
2SC1895 2SC1904	500p 125p	2SC2389 2SC2407	45p 110p	2SC2909 2SC2910	60p 25p	2SC3383 2SC3393	80p 80p	2SC3975 2SC3987	210p 160p	2SD554 2SD555	225p 500p	2SD1046 2SD1047	200p 180p	2SD1432 2SD1433	400p 300p	2SD1913 2SD1929	50p 50p	2SK559	600p
2SC1906 2SC1907	15p 20p	2SC2408 2SC2412K	120p 50p	2SC2911 2SC2912	80p 120p	2SC3397 2SC3399	20p 50p	2SC3996 2SC3997	600p 1250p	2SD556 2SD558	225p 200p	2SD1051 2SD1055	130p	2SD1438	60p	2SD1930	50p	2SK560 2SK566	580p 475p
2SC1909 2SC1913	250p 90p	2SC2440 2SC2458	200p 10p	2SC2921 2SC2922	650p	2SC3400 2SC3401	35p	2SC3998 2SC4006	800p	2SD560	50p	2SD1060	60p 130p	2SD1439 2SD1441	165p 220p	2SD1933 2SD1939	45p 60p	2SK606 2SK612	70p 80p
2SC1914	30p	2SC2459	50p	2SC2923	480p 75p	2SC3402	50p 40p	2SC4020	100p 150p	2SD571 2SD575	20p 530p	2SD1062 2SD1063	150p 200p	2SD1442 2SD1445	80р 200р	2SD1941 2SD1944	350p 50p	2SK684	950p
2SC1921 2SC1922	15p 175p	2SC2466 2SC2486	55p 275p	2SC2928 2SC2929	550p 280p	2SC3405 2SC3409	130p 400p	2SC4023 2SC4029	325p 350p	2SD592 2SD596	25p 25p	2SD1064 2SD1065	250p 160p	2SD1446 2SD1450	300p 60p	2SD1958 2SD1959	80p 210p	2SK685 2SK699	1150p 100p
2SC1923 2SC1929	10p 180p	2SC2492 2SC2470	50p 65p	2SC2934 2SC2937	75p 250p	2SC3416 2SC3417	30p 90p	2SC4043 2SC4046	45p 40p	2SD600 2SD601	30p 40p	2SD1069 2SD1073	150p 350p	2SD1451 2SD1452	200p 275p	2SD1978 2SD1984	50p 60p	2\$K719 2\$K724	300p 500p
2SC1940 2SC1941	110p 27p	2SC2481 2SC2482	120p 20p	2SC2939 2SC2944	400p 300p	2SC3419 2SC3420	120p 80p	2SC4056 2SC4059	200p 400p	2SD602 2SD612	60p 50p	2SD1088 2SD1094	150p 375p	2SD1453 2SD1455	140p 250p	2SD1991 2SD1994	50p 200p	2SK725	550p
2SC1942 2SC1944	350p 350p	2SC2483 2SC2484	120p 185p	2SC2958 2SC2962	50p 800p	2SC3421 2SC3422	45p 75p	2SC4064 2SC4106	140p 150p	2SD613 2SD617	70p 300p	2SD1110 2SD1111	225p 20p	2SD1457 2SD1458	165p 50p	2SD1996 2SD2006	45p 75p	2SK726 2SK727	425p 475p
2SC1945 2SC1946	350p 1500p	2SC2485 2SC2491	400p 200p	2SC2979 2SC2987	160p 250p	2SC3423 2SC3425	60p 65p	2SC4107 2SC4123	175p 230p	2SD633 2SD636	70p 10p	2SD1113 2SD1128	225p 200p	2SD1459 2SD1468	60p 40p	2SD2010 2SD2011	250p 60p	2SK739 2SK758	400p 300p
2SC1947 2SC1953	450p 45p	2SC2498 2SC2500	50p 25p	2SC2988 2SC2995	150p 60p	2SC3446 2SC3447	150p 130p	2SC4124 2SC4125	200p 275p	2SD637 2SD638	15p 15p	2SD1133 2SD1135	65p 75p	2SD1487 2SD1494	225p 150p	2SD2012 2SD2018	50p	2SK769	500p
2SC1957 2SC1959	70p 10p	2SC2502 2SC2503	140p 600p	2SC2999 2SC3001	50p 1400p	2SC3456 2SC3457	200p 125p	2SC4137 2SC4138	40p 200p	2SD639 2SD640	20p 350p	2SD1138 2SD1140	40p 40p	2SD1496 2SD1497	300p	2SD2033	65p 80p	2SK786 2SK787	200p 800p
2SC1962 2SC1967	175p 1300p	2SC2512 2SC2517	20p 120p	2SC3019 2SC3020	320p	2SC3459 2SC3460	180p	2SC4157	400p	2SD655	18p	2SD1142	350p	2SD1497-0		2SD2061 2SD2066	100p 250p	2SK791 2SK792	225p 300p
2SC1969 2SC1970	160p	2SC2517 2SC2519 2SC2527	60p	2SC3022	1450p 1850p	2SC3461	130p 275p	2SC4159 2SC4161	100p 125p	2SD661 2SD666	60p 25p	2SD1145 2SD1148	25p 175p	2SD1505 2SD1506	90p 50p	2SD2125 2SD2136	180p 85p	2SK793 2SK794	300p 315p
2SC1971	100p 400p	2SC2534	300p 150p	2SC3025 2SC3026	500p 450p	2SC3466 2SC3468	225p 70p	2SC4169 2SC4199	60p 400p	2SD667 2SD669	20p 35p	2SD1153 2SD1159	30p 65p	2SD1508 2SD1509	60p 100p	2SD2144 2SD2151	35p 175p	2SK796	600p
2SC1972 2SC1973	600p 150p	2SC2535 2SC2538	300p 100p	2SC3030 2SC3037	300p 125p	2SC3481 2SC3482	300p 275p	2SC4204 2SC4231	60p 250p	2SD673 2SD676	350p 250p	2SD1160 2SD1163A		2SD1511 2SD1519	75p 250p	2SD2255 2SD2331	175p 250p	2SK809 2SK812	850p 150p
2SC1975 2SC1980		2SC2540 2SC2542	1900p 300p	2SC3038 2SC3039	125p 80p	2SC3486 2SC3502	275p 50p	2SC4235 2SC4236	300p 450p	2SD717 2SD718	180p 85p	2SD1164 2SD1168	75p 270p	2SD1521 2SD1525	70p 450p	2SD2333 2SD2340	150p 225p	2SK817 2SK851	325p 550p
2SC1983 2SC1984	150p	2SC2545 2SC2546	55p 25p	2SC3040 2SC3042	260p 300p	2SC3503 2SC3504	50р 120р	2SC4237 2SC4242	500p 120p	2SD722 2SD725	240p 200p	2SD1169 2SD1173	280p 350p	2SD1526 2SD1541	100p 350p	2SJ48 2SJ56	425p 700p	2SK872	650p
2SC1985 2SC1986	100p 100p	2SC2547 2SC2550	65p 50p	2SC3052 2SC3057	30p 150p	2SC3505 2SC3506	240p 250p	2SC4278 2SC4288A	175p 650p	2SD726 2SD731	275p 250p	2SD1185 2SD1186	280p 400p	2SD1545 2SD1546	275p 350p	2SJ74 2SJ76	60р 220р	2SK875 2SK903	475p 500p
2SC2001 2SC2002	15p 15p	2SC2551 2SC2552	70p 60p	2SC3068 2SC3070	60p 35p	2SC3507 2SC3509	650p 750p	2SC4300 2SC4301	200p 300p	2SD732 2SD734	250p 15p	2SD1189 2SD1191	55p 120p	2SD1548 2SD1554	400p 170p	2SJ77 2SJ79	350p 225p	2SK904 2SK951	500p 275p
2SC2003 2SC2004	20p 20p	2SC2553 2SC2555	200p 120p	2SC3071 2SC3073	25p 100p	2SC3514 2SC3518	170p 120p	2SC4304 2SC4313	225p 600p	2SD741 2SD743	120p 130p	2SD1192 2SD1196	90p 150p	2SD1555 2SD1556	150p 225p	2SJ103 2SJ109	75p	2SK952	275p
2SC2022 2SC2023	110p	2SC2562 2SC2563	90p 200p	2SC3074 2SC3075	200p 150p	2SC3519 2SC3526	250p 45p	2SC4381 2SC4382	150p 200p	2SD757 2SD760	120p 70p	2SD1197 2SD1198	150p	2SD1565	75p	2SJ113	200p 1050p	2SK955 2SK956	750p 600p
2SC2026	30p	2SC2568	120p	2SC3077	120p	2SC3528	750p	2SC4386	275p	2SD762	100p	2SD1207	60p 40p	2SD1571 2SD1572	170p 100p	2SJ114 2SJ116	1150p 1200p	2SK962 2SK1023	700p 550p
2SC2027 2SC2036	50p	2SC2570 2SC2571	30p 350p	2SC3086 2SC3089	150p 130p	2SC3531 2SC3549	225p 200p	2SC4387 2SC4408	425p 50p	2SD763 2SD768	140p 180p	2SD1210 2SD1211	280p 120p	2SD1575 2SD1576	200p 150p	2SJ117 2SJ119	550p 700p	2SK1036	450p
2SC2037 2SC2053	120p	2SC2577 2SC2578	110p 170p	2SC3101 2SC3112	750p 35p	2SC3552 2SC3568	270p 200p	2SC4429 2SC4431	275p 90p	2SD772 2SD773	200p 20p	2SD1213 2SD1218	220p 75p	2SD1577 2SD1579	250p 80p	2SJ162 2SJ175	680p 200p	2SK1057 2SK1058	600p 800p
2SC2055 2SC2058	150p 20p	2SC2579 2SC2580	110p 175p	2SC3114 2SC3116	40p 75p	2SC3577 2SC3584	275p 200p	2SC4466 2SC4467	325p 175p	2SD774 2SD777	30p 400p	2SD1223 2SD1225	75p 70p	2SD1589 2SD1590	60p 100p	2SJ182 2SJ200	150p 625p	2SK1081 2SK1082	700p 450p
2SC2060 2SC2061	75p	2SC2581 2SC2588	225p 600p	2SC3117 2SC3122	120p 50p	2SC3591 2SC3595	200p 220p	2SC4468 2SC4517	250p 200p	2SD784 2SD786	650p 100p	2SD1227 2SD1229	40p 250p	2SD1591 2SD1593	310p 125p	2SJ307 2SK19	175p 45p	2SK1102 2SK1117	375p 250p
2SC2068 2SC2071	60p 140p	2SC2590 2SC2591	40p 50p	2SC3148 2SC3149	145p 180p	2SC3597 2SC3599	75p 140p	2SC4517A 2SC4531	225p 450p	2SD787 2SD788	20p 30p	2SD1237 2SD1238	300p 300p	2SD1595 2SD1608	70p 210p	2SK33 2SK40	40p 50p	2SK1118	225p
2SC2073 2SC2075	40p	2SC2592 2SC2603	200p 10p	2SC3150 2SC3151	100p 175p	2SC3600 2SC3606	175p 100p	2SC4532 2SC4542	1000p 400p	2SD789 2SD792	20p 400p	2SD1244 2SD1246	25p 20p	2SD1609 2SD1632	45p 320p	2SK55 2SK68	100p	2SK1120 2SK1190	550p 350p
2SC2078 2SC2085	95p	2SC2610 2SC2611	60p 30p	2SC3152 2SC3153	130p 175p	2SC3607 2SC3608	150p 65p	2SC4742 2SC4744	275p 350p	2SD794 2SD795A	33p 140p	2SD1247 2SD1251	40p 180p	2SD1637 2SD1647	50p	2SK73	75p	2SK1191 2SK1217	800p 700p
2SC2086 2SC2092	60p	2SC2621 2SC2625	70p 190p	2SC3156 2SC3157	350p 200p	2SC3616 2SC3636	45p 280p	2SC4744 2SC4745 2SC4747	550p	2SD798	175p	2SD1254	55p	2SD1649	40p 260p	2SK97 2SK106	200p 40p	2SK1221	200p
2SC2094	1200p	2SC2626	600p	2SC3158	260p	2SC3642	225p	2SC4757	375p 200p	2SD799 2SD809	150p 45p	2SD1263 2SD1264	90p 55p	2SD1650 2SD1651	150p 150p	2SK107 2SK109	40p 150p	2SK1275 2SK1296	275p 350p
2SC2097 2SC2099	2500p	2SC2630 2SC2631	1800p 20p	2SC3159 2SC3164	200p 270p	2SC3657 2SC3659		2SC4762 2SC4769	300p 220p	2SD811 2SD819	450p 300p	2SD1265 2SD1266	75p 180p	2SD1656 2SD1663	250p 350p	2SK117 2SK118	50p 50p	2SK1299 2SK1317	450p 900p
2SC2118 2SC2120	10p	2SC2632 2SC2634	35p 10p	2SC3169 2SC3170	150p 300p	2SC3668 2SC3675	100p	2SC4770 2SC4820	250p 225p	2SD820 2SD821	250p 550p	2SD1267 2SD1271	55p 55p	2SD1666 2SD1667	50p 120p	2SK125 2SK133	100p 650p	2SK1338	250p
2SC2122A 2SC2131	550p	2SC2636 2SC2637	40p 120p	2SC3173 2SC3175	180p 150p	2SC3678 2SC3679	140p	2SC4826 2SC4891	70p 800p	2SD822 2SD826	290p 30p	2SD1271A 2SD1272	225p 200p	2SD1668 2SD1669	90p 85p	2SK147 2SK152	160p 40p	2SK1341 2SK1342	500p 500p
2SC2141 2SC2153	40p	2SC2640 2SC2653	1800p 100p	2SC3178 2SC3179	125p 70p	2SC3680 2SC3685	450p	2SC4923 2SC4924	400p 250p	2SD829 2SD836	375p 50p	2SD1273 2SD1274	50p 80p	2SD1677 2SD1680	200p 225p	2SK161 2SK163	30p 40p	2SK1350 2SK1356	200p 225p
2SC2166 2SC2168	80p 120p	2SC2654 2SC2655	180p	2SC3180 2SC3181	175p 200p	2SC3687 2SC3688	300p	2SC4927 2SC5002	500p 300p	2SD836A 2SD837	50p 55p	2SD1275 2SD1276	50p 60p	2SD1683 2SD1684	45p 70p	2SK168 2SK170	40p 50p	2SK1357	350p
2SC2188 2SC2200	70p 250p	2SC2656 2SC2660	550p 100p	2SC3182 2SC3198	120p 30p	2SC3692 2SC3715	150p	2SC5003 2SC5027	350p 100p	2SD838 2SD841	500p 110p	2SD1277 2SD1279	190p 600p	2SD1706 2SD1707	325p 400p	2SK184 2SK192	35p 45p	2SK1358 2SK1377	400p 150p
2SC2209 2SC2216	50p	2SC2665 2SC2668	200p 10p	2SC3199 2SC3202	40p 25p	2SC3717 2SC3729	120p	2SC5048 2SC5044	300p 250p	2SD844 2SD850	200p 170p	2SD1288 2SD1289	175p 250p	2SD1707 2SD1708 2SD1710	375p 200p	2SK193 2SK195	40p 150p	2SK1400 2SK1404	250p 290p
2SC2221 2SC2228A	650p	2SC2681	100p 170p	2SC3202 2SC3209 2SC3210	120p 550p	2SC3746 2SC3747	100p	2SC5086 2SC5129	250p	2SD856	48p	2SD1291	280p	2SD1718	275p	2SK197	140p	2SK1461	220p
2SC2229	15p	2SC2682	70p	2SC3211	220p	2SC3748	100p	2SC5148	300p 300p	2SD858 2SD863	250p 23p	2SD1292 2SD1293	60p 70p	2SD1729 2SD1730	230p 275p	2SK212 2SK214	35p 170p	2SK1462 2SK1487	425p 250p
2SC2230 2SC2233	100p	2SC2688 2SC2690	60p	2SC3212 2SC3225	260p 50p	2SC3752 2SC3781	150p	2SC5149 2SC5250	300p 300p	2SD864 2SD866	200p 120p	2SD1297 2SD1302	300p 20p	2SD1732 2SD1739	250p 180p	2SK216 2SK223	200p 50p	2SK1507 2SK1529	300p 700p
2SC2235 2SC2236	20p	2SC2694 2SC2705	3500p 40p	2SC3242 2SC3244	30p 45p	2SC3782 2SC3783	300p	2SD188 2SD198	350p 140p	2SD866A 2SD867	140p 350p	2SD1306 2SD1308	45p 80p	2SD1740 2SD1748	125p 90p	2SK240 2SK241	140p 30p	2SK1537 2SK1544	400p
2SC2237 2SC2238	45p	2SC2706 2SC2710	250p 50p	2SC3246 2SC3259	50p 350p	2SC3787 2SC3788	60p	2SD199 2SD200	195p 180p	2SD868 2SD869	260p 150p	2SD1309 2SD1310	140p	2SD1756 2SD1758	275p 60p	2SK246 2SK300	30p 25p	2SK1767	900p 275p
2SC2240 2SC2258		2SC2712 2SC2714	20p 20p	2SC3260 2SC3261	220p 230p	2SC3789 2SC3790	75p	2SD201 2SD213	260p 250p	2SD870 2SD871	140p 260p	2SD1311 2SD1313	65p	2SD1760 2SD1761	80p 60p	2SK301 2SK303	40p 40p	2SK2038 2SK2039	295p 750p
2SC2259		2SC2716	50p	2SC3262	280p	2SC3795		2SD234	90p	2SD879	60p	2SD1326		2SD1762	50p	2SK304	25p	2SK2134	300p

March   Prop   Mode   Prop		REPLACI	EMENT VIDE	O HEADS	
Column   C	Model Price	Model Price	Model Price	Model Price	
Section 1.5	VS105, 112, 115, 116, 120, 125, 126, 201,	VHSAY3 1200p	HRD250, HRD257 2300p 3V32, 8942, HR7655 2200p	NVFS1 4850p	VHR120, 130, 14, 141, 143G, 14SP, 151, 15, 16, 171, 220, 23, 244, 274, VHR310,
West   Company	250, 301, 303, 304, VSP8, VSP82 1000p	VHSBP1 850p VHSBY3 2600p	HRD180, 190, 230, 610, 3V59, FV12L, FV20B, 26, 30, 32, 33, VC141L <b>2050p</b>	N9011, 9012, 9013E, 9014E, 9014G, 9015, 9016, 901A, 902A, 9033, N9034, 9040,	4500, 5080, 5100,
Comparison   Com	VP7100, VS9300, VS9500 <b>650p</b> VP7200, VS9700, VS9800 <b>1200p</b>	VHSEH2, VHSDH2 1600p	2300p	906, 9077.	7300, 8070, 8100, 8101, 8200, VHR7800,
THE STATE OF THE S	VS2 1200p	VHSPS1, VHSFS2 1300p	HRD910, FV14T, FV57H <b>3100</b> p GRC1, GRC2, 3 V41 <b>2800</b> p	N911A, 914C, 915A, 916A, 917, 9110, 9120 [	4500, 4600, VHRD4610, 6700, 4800 <b>3100p</b>
Website   Webs	VS10 1350p VSP1 2100p	VHSFB3 1300p   VHSTJ1, VHSTJ2, VHSTJ3, VHSWJ3,	660, 670, 720, 730, 740, 820	PV2300, 2400, 760, 794, 770,	VHR5300, VHR6500, VHR7400 4500p
March   Marc	1765, 766, 767, 768, 865, 867,	VHSVH4, VHSWH1, VHSXH1, VHSYH2	HRD950, HRD960, HRD980,	N380, N381, N830, N831, N832, N833,	VHR16, 235, 335E, 4150, 4160, 4350, 7250, 7260, 8250 1950p
VARIABLE	450, 455, 480, 490, 497,	VHSWJI VHSXJ3 700p	HRS5000, HRS5500, 5800, 9000, FV395.BRS600, SRS368E <b>5550p</b>	82611AH1 (FOR MODEL DX3000), DX4000, N9610, NS7000 3000p	SHARP
STOCK   ADD 207-110.   The STOCK   ADD 207-110	VXS470 2250p VS512, VS515, VS516 2250p	VS 410, 415, 435, 450, 456, 460, 500, 505, 510, 520, 521, 530, 546 <b>1600p</b>	FV42 2600p	N9052, N9530, DX2000 3400p	VC488 4200p
25.   1.5	15EOH, 300, 301, 310, IVSF320, 330, 340, 350, VSG30,	SE5100, 6100, 6110, 9100	FV67HV, FV68TX, FV77 3800p R2000 SERIES 4500p	PVC2300, 2400, 740, 744, 760, 764 1400p	VC789, VC790 2900p VC200, 220, 300, 381, 383, 384, 385, 386,
April 1999   1	33, 34, 35 <b>2300p</b> VS11, VS12 <b>1200p</b>	500, 505, 510, 518, 600, 610, VS5180, VS6190, 700, 900, 901, 902,	FV42L £101.00p	DS6000 3500p D5600 3500p	3300, 8381, 9100, 9300, 9400, 9500, 9600,
See And See Apr. 27, 74, 74, 74, 74, 74, 74, 74, 74, 74, 7	VSX9 2250p	SE2100, 5110 1400p	HRJ200, HRJ205 3300p HRJ600FG HRJ600FK HRJ605FG.	VH900,	VC108, 208, 382, 402, 405, 408, 500, 550, 571, 573, 581, 582, 583, VC5W20E, 600,
VESTAS, 1983. 1997. 22 AZ 200000000000000000000000000000000	560, 580, 590, 600, 650, VS G60, 64, 65, VS G70, 73, 74, 75,	VS5480 3000p	HRJ605UK, HRJ610EK 7100p	VH1, VH2A 700p D1000, D1100 1600p	683, 684, 402,
22. de 26. pt 17. pt 17	VS155, VS165 2300p	930, 940 <b>2400p</b> VS120 <b>2300p</b>	HRJ615, HRJ715, HRJ815 9200p	D1200, D2000X, D5000 1600p	700 772 7810 782 7822 VC783 8481.
28. A. S. C.	427, 485, VSF10, 11, 180, 190	VS160, VS740 4400p	OEK, HRJ415, HRJ416 5850p	VR6420 <b>725p</b>	104, 105, 106, VCA111, 113, 116, 131, 140, 202, 203,
9621 1702 22 3 3 4 5 4 5 5 5 1 1000 1700 1700 1700 1700 1700 1	261, 262, 265, 270, 275, 280, VSF290, 510, 550, VSG20, 204, 205, 206,	MVS660, SE6160, VERONA, VS660,	VX500E, 800A, 810A, 820, 80A, 770B, 773B <b>1200p</b>	VR6440 <b>2500p</b> VR6441, VR6540, VR6541, VR6640,	VCB311N, 320, VCD801, 802, VCM73,
VESSED CENT LATER VORTION DECORATION TO THE VORTION OF THE VORTION	VSG217EOG , 23, 24, 25, 405, 411, 415,	MVS710, 720, 910, SE7120, 9120, VS710,	VX735, VX755, VX990 1500p	DV761 VR512 522 5229 63SB7.	VCTS313 1100p VC6000, 6200, 6300, 7300,
## WASTER AND CARESON CARROLL	VSP88, 88KC, 8111, VSP9, VSR100, 100EDG, 100EM, 110, VSX400 1250p	VS922, 9291, GV210, 211, 220, 2292,	VX600 1100p VX900 2650p	7200p VR6920 2750p	7700, 7750, 8000, 8300 1800p VC793 3000p
Visige   V	VSR9 VS 109, VS603, VS606, VS607 <b>2500p</b>	HINARI VXI.2 3 4 20 25 35 1000p	MITSUBISHI HS303, HS304, HS320, HS700 1400p	6880 <b>1600p</b>	VC699, VCA501, VCA602 <b>2800p</b> VC585, VC685 <b>2000p</b>
450. 456. 450. 450. VISSION J. 1980. VIS	VS965, VC967 3450p	VXL5, V20H 1050p VXL6 1200p	HS307 2300p	20DV1, 20DV2, 20RW7, 21DV1, 21DV2, 21DV3, 2SB01, 02, 11, 12, 30DV2, 31DV1,	VC90ET 3900p VFH815 2800p
172 / 173 /	450, 45S, 480, 490, 497, VSX450, 470 <b>2850p</b>	VXL8, 9, 10, 11, 19, 90, VCR34H, VTV 100,	HS330 2300p HS400 2800p	31DV2, 31DV3, 3SB02, 03, 05, 11, 12, 13, 68SB4, 71SB4, 86SBI, 91SB2, 92SB2,	VCH882 2700p VCH80, VCH81, VFH815 2800p
SGATE, VGGTESS, VGG	212, 215, 217, 225, 23, 24, 25,	HITACHI VT11 14 15 16 30 33 34 330 340 503	31, 32, HSM33, 34, 35, 37G <b>2150p</b>	202, 203, 2115, 212, 213, 223, 231, 232, 302, 303, 305, 311, 312, VR313, 3210,	VCA33, VCA36, VCA43, VCA44, VCA46, VCA49 1500p
VSSP1000 XFF 2010 VSFF1000 S800 S800 S800 S800 S800 S800 S800	VSG415, VSG415EA, VSG425 2800p	640, 5030, VTP10, 30 <b>1000p</b> VT7, VT17, VT18, VT19 <b>2000p</b>	HSE30, HSB30 2000p HS338 1900p	3219, 322, 3229, 323, 501, 6180, 6182, 6185, 6290, 6291, VR6293, 6362, 6367,	VC570 2800p
VCP1900, 7900, 8900, 8900, 190	VSF1000, VSF1010, VSF1030 <b>5800p</b>	VT35, VT350, VT38, VT39 <b>2300p</b> VT100, 110, 111, 112, 113, 115, 118, 120,	HSB10. HSB20 2100p	VR3260, 6349, 6442, 663, 6448, 6449,	DSR-19R FOR SL-T 9ME 3100p
MESTRAD. CRISCO., VCR800. 1006 MESTRAD. CRISCO. VCR800. VCR800. 1006 VCR800. Sept. S	VDR3000, VCR4000, VCR5000, VCR6000 1650p	VT410, 413, 414, 415, 416, 418, 510, 515, 517, 518, 520, 525, 526,	HS273, HS550Q	VR601 1800p 49SB6, VR6548, VR6648,	DSR-35R FORC20, C30, C40, SLF1UB, SLF1E2 PIN, SLC24PS, 33E, 34, 44PS,
## 641122 ## 12410 ## 1250 ##	VTV10 VCR7000, 7800, 8000, 8800 1100p	VTM625, 626, 725, 210, 211, 215, 726, 727, 728, 820, 821, 825, 920.	HS337, HS347 1400p HSB12, HSE12, HSE22, HSM16G, 18,	VR6843 2750p SAISHO	SLT20ME, 30ME, SL100
Control   Cont	VCR4500, VCR5200, VCR9000,	VT3000 650p VT4000, VT4200, VT5000, VT5500,	HS411EZ, HS411GZ 2600p	1200 1600 12 <b>00</b> p	SL5100, SL3000 1 PIN, SLC6E, SL36ES, SL37E 1300p
860, 8902, 8700, 9005, 5008, 500, 89	VCR7000 1000p	VT5600 1100p VT77, 680, 6500, 6700, 6800, 7000, 8000,	HSB52, HSE50, 52G, HSM36, 50, 54, 55, 57, 58, 60 3300p	VR3200, VR3500 1400p	SL3000, SL8000, SL8080, SLC5E, SLT7ME 1600p SLV201, SLV202 2000p
VCR8804 VCR8804 VCR8904 VCR8907 VCR8907 VCR8908 VCR890	18600, 8602, 8700, 9005, DD8900, DD8904, TVR4	VT8700, 9000, 9300, 9500, 9700,	HSE51 3000p HS410 3250p	VR2000, VR3300, VR3600 1400p VR2500 2650p	SLK95, SLT50ME 2900p SLV275, SLV373VB, SLV410,
VCR3940, VCR3942, VCR3942, VCR3942, VCR3942, VCR3942, VCR3944, VCR3942, VCR3944, VCR39444, VCR3944, VCR39444, VCR394444, VCR3944444, VCR394444, VCR394444, VCR394444, VCR3944444, VCR394444, VCR3944444, VCR3944444, VCR3944444, VCR3944444, VCR3944444, VCR3944444, VCR3944444, VCR3944444, VCR3944444, VCR39444444, VCR39444444, VCR39444444444444444444444444444444444444	TVR2, TVR3, VCR4600, VCR4600 MKII, VCR400 1100p	VT8, 9, 56, 57, 570, 575, 576, 580, 585, 588 3200p	HS5300, HS5424, HS5600 <b>3050p</b> HSM20, HSM55 <b>2250p</b>	SALORA	SLV412, SLV427, SLV474
VCR9340, VCR9342   2550p   3469p   3	VCR8603, VCR8604, VCR8704, VCR8714 1350p	VT65 <b>2400p</b> VT130, 135, 138, 145, 250, 255, 258, 420,	HSM40 2850p HSM59, HSM68E 6050p	SV7300, SV8200, SV8300, SV9200 <b>1500p</b>	SLV656, SLV715, 725, 727, 757, SLV777,
\[ \frac{1}{1} \frac{1} \frac{1}{1}	VCR9140, VCR9142 <b>2550p</b> VCR9340 <b>3650p</b>	425, 426, 428, 430, 431, 435 VT438, 535, 536, VTL30, 301, VTM630, 635, 636 <b>1900p</b>	2010, 3000, 7000, 7200,7500, NV7800,	SV7400, SV8400 <b>1600p</b> SV8100 <b>1200p</b>	SLV353UB 2600p CCDF340E, CCDF500E, CCDV90E,
Fisher   F	UF020, 22, VCR3000, 3002,	VT52, VT60, VT61E, VT62E, VT63, VT64, VT640 1100p	625p NV777, NV330 1150p	SV601, SV611, SV6910 1500p SV800, SV810 2800p	CCDV95E, CCDSP5E 4800p SLV801, SLV802 3550p
622,710,711,715,716,716,720,916,920,926,927,720,722,322,925,936,936,937,936,936,936,936,936,936,936,936,936,936	FISHER FVHP420, 510, 520, 530, 615, 618, 620,	(4 HEAD) 2200p	NATIONAL PANASONIC	SV6700, SV8710, SV8750 <b>1500p</b> 623N, SV6800, SV6900, SV8850, SV8870,	SLV335   SLV210, SLV212, SLV270, SLV273,
968. 910. 911. 919. 918. 918. 918. 918. 918. 918	622, 710, 711, 715, 716, 720, FVHP721, 722, 730, 830, 905, 906, 907,	VT522, VTM212, 620, 622, 720, 722, 822, 922, 925 1650p	460, 465, 470, 480, 650 <b>1600p</b> AG6010, AG6015 <b>2500p</b>	SV8970 1750p SV88110, SV8910 2650p	SLV285, SLV300 1150p SLV125, 213, 225, 252, 255, 262, 280,
VBS2000, VBS7100, VBS9000   VBS7000, VBS9000   VBS7000, VBS70100, VBS9000   VBS7000, VBS7100, VBS9000	FVHP5000, 5001, 5005, 5050, 5075 1100p	VT570, VT575, VT580, VT585, VT588,	AG6840 2400p NV100, NV200, NV370, NV380,	923N 4500p SV8600 SV8700 1550p	SLV363, SLV416, SLVX50, SLVX55 2750p
FVHP980	VBS3500, 7100, 7500, 7600, 9900, VBR330	VT540, 545, 546, 548, VTD660, 665, VTM598, 640, 645, 646,	NVD80 NVH65 3400p	SV8420 2400p SV8620 2100p	SLVX75, SLVX90, SLVX95 SLV282, SLVX30, SLVX35 <b>3000p</b> <b>2025p</b>
FVHP726, FVHP800, FVHP900	FVHP500, 711, 715, 721, 722, 730, 830, 5100, FVHD720 1100p	VTM730, 731, 735, 736, 740, 745, 746, 748, 753, 754, 830, 831, 835, 838, 840,	3200p NVF51 4200p	SV8830 2200p SV8720 2250p	SLVE7, SLVE8, SLVE9 5150p SLVE90 5150p
VTHP975 FVHD0407, FVHP104, FVHP10, FVHP10, FVHP10, FVHP10, T190, FVHP200, VTP80, VTF180, VTF18	FVHP725, FVHP830, FVHP980 <b>2500p</b> FVHP990 <b>2700p</b>	VTF770, 774, 775, 860, 861,	NVG19 2300p NVJ30, NVHJ33, NVL10, 20, NVL21,	SV8520 1900p SAMSUNG	SLV615, SLV625, SLVE600, SLVE700, SLVE800 3450p
Fig. 200, 210, 21	FVHD407, FVHD140, FVHP1, FVHP10, FVHP20 1150p	VT85, VT86, VT88 2600p	NVJ35, NVG46 1700p	SVX301, VB900, 910, VVT510, VT320,	V63 1500p
FVHP310, 410, 420   7700p   7710p	FVHD230, FVHP1100, 1200, 130, 1340, 1410, 2000, 200, 210, 300,	VTF350, VTF351 5150p	NVM1, NVM3, NVM5 4200p AG2100, AG2200 700p	I 970, 971, 972, SV716, 717, SVX303, 305,	V8600, V8650, V8700 <b>3000p</b> V21, V31, V32, V33, V50, V51, V52, V53,
Head	FVHP310, 410, 420 <b>1800p</b> FVHD250, 270, 370, FVHP1500, FVHP250	VTS390E 5150p J.V.C. & FERGUSON	NVSD25, NVSD3 1000p NV730, NV730F, NV770	VB510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 710, 971, V1520, 616, 621, 626,	V9600 1450r V55, V57 700r
EVHP370S, FVHP430S 1950p GOLDSTAR 1900p GOLDSTAR 1900p GVH5120, 12031, 1204, 11240, 12031, 1204, 11120, 121, 120, 128, 120, 1850, 18	FVHP132, 1400, 1440, 320, 440, 445 3550p	HR2200, 3300, 3320, 3330, 3350, 3360, 3660, 3750, 3860, 4100	4 HEAD 1450p NV366 1850p	SVX319, VB770, V1710, 730, 731, 735,	V71, V73, V74, V75, V77, V80, V81, V82, V83, V841V85, V86, V87,
GOLDSTAR 9000 3HSSDB, GHV121, RQ2011, 2031, 1900p (SH51, GWH152, VCP4000, VCP4100, 1100p (GWH51, GWH152, VCP4000, VCP4100, 1100p (GWH51, 124, 1242, 1243, 1244, 1242, 1243, 1244, 1242, 1243, 1244, 1242, 1243, 1244, 1242, 1243, 1244, 1244, 1246, 1266, 1290, 1291 (GHV1229, 1296, 1891, 1810, 1824, 1846, 1846, 1290, 1291 (GHV1295, 1296, 1891, 1810, 1846, 18	FVHP470S, FVHP475HV <b>4800</b> p FVHP1250, FVHP430S <b>1950</b> p	8928, 3V01, 3V06, 3V22 <b>600p</b> HR3660, 7600, 7610, 7650, 7700, HRD110,	NV7881 2500p NV810, NV8301 2400p	1 XR20 1900p	DV90, 96, 97, NM3, V108, 109, 199, 200, 202, 205, 207, 209, 80,
## AG6024, NVG33, 46, NVL23, 25, 28, NVG20, 21, 21, 213, 1241, 1242, 1243, 1244, 1243, 1240, 1244, 1243, 1244, 1243, 1244, 1246, 1266, 1290, 1291, 1294, 1246, 124	8000 3HSSDB, GHV121, RQ2011, 2031,	111, 120, 121, 220, 225, HRS100, 8904, 8923, 8924, 8925, 8929,	NV850, NV950 <b>2750p</b> NV870, NV890, NV970 <b>3200p</b>	VX1560, VX1561, VX1580 2200p	93, 94 1450; V5470, V5480 1300;
GHV1232, 1233, 1241, 1242, 1243, 1244, 1243, 1245, 1246, 1266, 1269, 1291 156, 157, 158, 160, 5101 11, 124, 143, 150, 152, 1246, 124	GVH51, GVH122, VCP4000, VCP4100, VCP4200 1100p	8935, 8941, 8943, 8944, 3V16, 3V233V24, 3V31, 3V35, 3V36, 3V38,	AG6024, NVG33, 46, NVL23, 25, 28, NVJ47,	PXP30, PXR30, VX 1260, SVX503, SX3230, 3231, 3260, 3261, VK30, 300,	V880MS 2600; V700G 3700;
1240, 1241, 1242, 1248, 2145 VCP400, VCP4100, 4300, 4301, 4305, 4304, 4315, 4316, 43	GHV1232, 1233, 1241, 1242, 1243, 1244, 1245, 1246, 1266, 1290, 1291	BR1600, HRD140, 141, 142, 143, 150, 152, 156, 157, 158, 160, 5101	400, 44, 45 NVG10, 11, 12, 14, 16, 120, NV250, 280,	1230, 1260, 1261, VK30R, 31R, 32R, VXK300, 301, 306, 320,	V500G, V509G <b>2500</b> V9680 <b>2900</b>
4306, 4311, 4315, 4316,	1240, 1241, 1247, 1248, 2145 VCP400, VCP4130, 4300, 4301, 4305.	3V46 3V47 3V52 3V64	450, 465	1260, 1261, 7120, 7121, 7220, SX7221,	V309G <b>2550g</b> V61, V63 <b>1700g</b>
CZ11, GRV13947, 1898F, 1900F, 1290, 12910, 12920, 129310, 1298P, 129310, 1293	4306, 4310, 4311, 4315, 4316, VCP4320, 4321, 4325, 4326 1100p	HRD154, 170, 171, 210, 211, 217, 310,	NVD48 1700p NVG50, NVG300 2000p	7230, 7301 1900p SANYO	V110, V120, V130, V140, V210, V211, V212.
20005, 2000, GSEC200, CSEC200,	C211, GHV1392P, 1393P, 1900P, 1290, 1291PQ, 12931Q, 1295P,	HRD527, 540, 550, 560, 590, 770, HRDX20, HRDX22, 8950, 8951,	NVG45 1450p NVH70 3600p	I VTC5000, 5400, 600, 6000, 6010, 6500,	V711, V880 3850
GSEG12, 204, 20, 22, Pa16P, PS00P AGS102, 204, 20, 22, Pa16P, PS00P AGS103, 201SY22, CUISY24, RC205P, RG11P, RG20, RG2001, RG20, RG2001, RG20, RG2001, RG200, RG2001,	20005, 2000, GSEC200, GSEC205, 211, 2301, GSEG2301,	1300p	NV600 1050p AG6800, AH6810, AG6820 2600p	5400, VTC5350, 5370, VTCNX10, VTCNX15, 20,	V312, V322, V412 2600
RQ204HP, RQ241, VCP100P, GSEG10 1600p GSEG404P, QUISY40, RC405P 2350p RV4000, 4400, GSE-Q404P, QUISY40, RC405P 2350p RV40000, 4400, GSE-Q404P, QUISY40, RC405P 2350p RV40000, 4400, GSE-Q404P, QUISY40, RC405P 2350p RV40000, 4400, GSE-Q404P, QUISY40, RC405P 2350p RV4000, 4400, GSE-Q404P, QUISY40, RC405P 2350p RV40000, 4400, GSE-Q404P, QUISY40, RC405P 2350p RV40000, 4400, GSE-Q404P, QUISY40, RC405P 2350p RV4000000000000000000000000000000000000	GSEQ12, 204, 20, 22, P416P, P500P QUISY22, QUISY24, RC205P, RG11P,	HRD725, HRD755, 3V43, 3V53 2850p 8930, 8931, 8933, 8940, 3V29,	AG6100, AG6200, AG6300 <b>2600p</b> NVG7, NVG9, NV230 <b>1050p</b>	30, VPR5800 1800p VTC5500, 5550, 9100, 9300, 9350, 9355,	V91G 4600; V609, V610V610B, V610UK, V611,
GHV4400, 4400, GSE-Q404P, QUISY40, RC405P 2350p PV31, FV41R 1500p NVJ45, NVJ47 2000p 3400, 3310, 3110, 3150, 3300, V96G 800	RQ204HP, RQ241, VCP100P, GSEG10 1600r	3V30 <b>700p</b> 8945 <b>2400p</b>	NVG 15, NVG400 2600p	VHR1110, VHR1150, VHR1300, VHR1700, VHR2300, VHR2370 1200p	V312, V403T, V413G 9200 V703W, V813G 5200
	GHV4400, 4400, GSE-Q404P, QUISY40, RC405P 2350;	8922 1000p FV31, FV41R 1500p	NVF70 <b>5200p</b> NVJ45, NVJ47 <b>2000p</b>	VHR3200, 3270, 3100, 3110, 3150, 3300, 3400, 3310, VHRD500 1500p	V95G <b>8000</b> j
R02051 1950p BR7000E, BR7000E, BR7000, BR7000, NVF75, NVF77 4750p VHR2700 2450p GRANDATA LTD		FV37, FV43H, HRD860 3100p BR7000E, BR7000S, BR7030,	NVSD40 2250p NVF75, NVF77 4750p	VHR1500, VHR2500, VHR3330 2100p VHR2700 2450p	GRANDATA LTD
4000H, 4001H, 4002H 1200p HR7200, 7350, 7350, 7350, 2650, 700p NVFS200, NVFS88, NVSF90, 4600p VHRS700, VHR7700E, 4700p NVFS00 NVFS88, NVSF90, 4600p VHRS700, VHR7700E, 4700p NVFS00 NVFS	4000H, 4001H, 4002H 1200s V4001H, V4004, V4100 1200s	HR7200, 7300, 7350, 2650,	NVFS200, NVFS88, NVSF90, NW8000 4600r	VHR5700, VHR7700E, VHRD4710 <b>2700p</b>	
V4005H 1500p HR0455 2000p NVHD30, NVHD 100, NV HD 101, NVHF 101, N	V4005H 1500p	P HRD455 2000p HRD520 1400p	NVHD90, NVHD 100, NV HD 101, NVHF 100 3100g	VHR150E, 153, 154, 1501R, 240, 250, 251, 27, 350, 474, 5350E, 7500, VHR7530,	FAX: 0181-903 6126
CSI DS2 1800p HR0300, 400,580,600,620, VHSAH1 1100p HR0300, 400,580,600,620, VHSAH3 2400p HR0300 HR0	VHSAH1 1100	640, 650 <b>2000p</b>	AG7330, AG7350, AG7355,	6550 <b>3850p</b>	

ALL TV & VIDEO PARTS SOLD ARE REPLACEMENT PARTS

			V	CR BELT KIT	TS	3	
Model	Price	Model	Price	Model Price	e Mo	odel Price	Model Pric
AKAI		TX3650, VCR3000, VCR3002,		406, 407, 4092, 410, GV411, 412, 414, 415,	N.E.		V1710, 730, 750, 970, VX710, 712, 720, 730,
VP7100, VS9300, VS9500, VS970	00, VS9800 120n	VCR9500	75p	416, 417, 4192, 4200, 420, 430, 434, 435, GV437, 440, 450, 4592, 460, 464, 470, 500,	N830	10, N831, N832, N833	970, 971, 972 100 VX9880 110
VS1, VS2, VS3, VS5, VS12, VS15		FISHER VBS7000	245p	501, 5050, 5095,		95 <b>80p</b> 22300, PVC2400 <b>180p</b>	VX9880 110 SX7121 95
VS10	65p	VBS9000	120p	GV5105, 511, 530, 5395, 540, 560, 5695,	I DX1	1000, 1600, 1800, 2000, 3000, N9012, 9013.	SANYO
VSX9, VS105, 112, 115, 116, 120		FVHP520, FVHP530, FVHP420	60p	MV4005, 4105, SE4100, 4104, 4120, 5102, 5104, 5106, TVR37001 70r	9014 10 9056	4, 9016, N9033, 9034, 9053, 9054, 9055, 6, 9066, 9096, 9110, 9120,	VTC5000, 5150, 6000, 6500, VTCM10, 11, 20,
155, 165, 205, 220, VS24, 240, 24 248, 250, 512, 515,	14, 245, 247,	FVHP615, 618, 620, 622, 710, 711, 715, 7721, 722, 725, 730,	720,	HINARI	N95	10, 9520, 9530, 9610 80p	21, 30, 31, 50 65 VTC5300, VTC5350, VTC5400,
516	200p	FVHP830, 840	60p	VXL2 80		TIONAL PANASONIC	VPR5800 80
VS22, VS23, VS25, VS35, VS37,		FVHP905, 906, 907, 908, 910, 911, 915, 9	916,	VXL7, VXL8, VXL9, VXL10, VXL11, VXL19, VXL90, VCR34, VTV 100,	NV3	300, NV330PX, NV332, NV333 NV340, 366 100p	VTC5500 70 VTC9100, VTC9300 140
VS55, VS66 VS4, VS6, VS8, VS9	80p 95p	918	75p	200 100c		777, NV788 100p	VTC9100, VTC9300 140 VTC1100, 1300, 1500, VHR1100, 1110, 1150,
VSA77	120p	VBR330, VBS7500, VBS7600, VBS9900	100p	VXL4, VXL35, VTV300 70r	NV2	2000, NV2010, NV3000 80p	1200, 1300,
VSS99	105p	VBS3500	75p	VXL5, VXL6 100p		7000, NV7200, NV7800 <b>75p</b> 3600, NV8610, NV862 <b>145p</b>	VHR1500, 2370, MVR220 80; VHR2100, VHR2300, VHR2500,
ALBA	- 1	FVHD140, FVHD40, FVHD55, FVHP1, FV	HP10,	VXL3, VXL20 90p	NV2	230, 250, 280, 430, 431, 433, 450, 460, 465,	VHR2700 100,
VCR40000 VCR5000, VCR6000	130p	FVHP20 FVHD230, 250, 270, 370, FVHP1100, 120	110p	VT11, 14, 16, 17, 19, 33, 330, 34, 35, 350, 38,	470,	, 650, 730, NV770, 810, 870, 890, 970, AG	VHR3100, 3110, 3150, 3300, 3310, 3400, 3500, 370
VCR161, VCR222	105p 100p	1250, 130, 132,	,,,	39, 88, 165, 5030 <b>75</b> p	P NV3	0, 1050 870, NV380, NV480, NV630, NV780,	3800, VHRD500, 700, TLS1000, TLS1001 65, VHR120, 130, 14, 141, 143, 14, 150, 151, 153,
VCR3000X, VCR4000, VCR4000X	75p	FVHP1340, 1400, 1410, 1440, 1500, 2000	), 200,	VT5000, VT5500, VT18 120r VT7000, VT8000, VT8030, VT8040, VT8300,	IP   NV8:	30, NV850 70p	154, 15, 16, 171, VHR194, 220, 23, 235, 240,
VCR7000, VCR7800, VCR8000, VC		210, 250, 3, 300,		VT8500, 8700 60p	NV6	600, NV688, AG6010, AG6015 85p	244, 250, 251, 274, 297, 310, 330, VHR335, 390
VTV10	105p	310, 320, 2000, 410, 420, 430, 440, 445, 475, FVSD2905	4/0, 85p	VT680, VT6500, VT6800, VT9300, VT9500,	1400	37, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, NVH70 50p	4100, 4105, 4150, 4200, 430, 4300, 4350, 474, VHR4770, 5080, 5100, 5200, 5300, 5350, 5700
AMSTRAD TVR123, VCR4600, VCR4700,	- 1	FVHP5000, 5005, 5050, 5075, 5100, 975,	980,	VT9700, 9900 75p VT52, VT57, VT61, VT62, VT63, 64, 65, 85, 86.	P NVF	V1, NVM10, 3000, 3300, 40, 7, 9000, 9900,	6850, 7100, VHR7200 7250, 7260, 7300, 7400,
VCR5200	80p	990	95p	640 60p	14414	WS1, 4 70p W 1, NVM3, NVM5 70p	7500, 7520, 7530, 7530, VHR7540, 7700, 774, 7800, 7810, 8000, 8100, 8200, 8250,
VCR7000	80p	G.E.C.		VT3000 120p	P   10010	M 1, NVM3, NVM5 70p	8500, VHR8800, 8801, VHRD4400, 4410, 4500,
VCR1000, 2000, 6000, 6100, 6200 8603, 8604.	, 8600, 8602,	4005 V4004	150p 100p	VT100, 110, 111, 113, 115, 118, 120, 125, 128, 130, 135, 138,		460, VR6920 170p	4600, VHRD4610, 4710, 4890, 6700 601
VCR8700, 8704, 8714, 8800, 8804		V4007	80p	VT145, 150, 168, i70, 175, 220, 225, 250, 255,	VR65	540 100p	VMD66, VMD68P 80 VTR1000 70
9244, 9340,	,, 0000, 0000,	GOLDSTAR		258, 260, VTL30 <b>60</b> p	P MP2	442, VR6542 <b>70p</b> 025, VR2580 <b>100p</b>	VTC6010 75
DD8900, DD8904, TVR4	100p	GHV1221, 1232, 1233, 1240, 1241, 1242,	, 1243,	VM500 VM600 90p	P DV18	86, 190, 286, 291, 292, 468, 471, 562, 571,	SHARP
TX3650, UF20, 22 24, VCR3000, 3 9500	3002, 4000, <b>75</b> p	1244, 1245, GHV1246, 1247, 1248, 1250, 1266, 51, 80	,,, I	J.V.C. HR3300, HR3330, HR3360, HR3660,	761,	VR201, 202, 203, 211, 2115, 212, 213, 223,	VC200, 381, 384, 385, 386, 388, 390, 393, 838, 9100, 9300, 9500, VC9700
VS1004	105p	8200, 8210, 8215,	000,	HR4100 130p	p 535.	312, 313, 3210, 3219, 322, 32, 29, 323, VR20DV1, 20DV2, 20RW7, 21DV1, 21DV2,	9100, 9300, 9500, VC9700 <b>80</b> 1 VC7300, VC7700, VC7750, VC7800,
BLAUPUNKT		VCP4100, VCP4130	80p	HR7200, HR7300 50p	p 21D,	. V3, 25BO1, 25BO2, 11, 12, 302, 303, 305,	VC8000 110
RTV100	200p	GHV1290, 1291, 1295, 1296, VCP4000, 4 4300, 4301,	200,	HR7350, HR7600, HR7610, HR7650, HR7655 50p	31D\	VI, 31DV2, 31D, V3, 3SB11, 3SB12, 3SB13, B8, VR30DV2, 35BO2, 35BO3, 635B7,	VC8300 115 VC300, 387, 471, 473, 481, 482, 483, 486, 488,
RTV200, RTV222, RTV224	90p	VCP4305, 4306, 4310, 4311, 4315, 4320,	4321	HR7700 50p	715B	B4, 715B5, 715B8, VR865B2, 915B2,	496, 8481 80
RTV202, RTX200 RTV322, RTV248	150p 100p	4325, 4326	120p	HRD110, 111, 120, 121, 220, 225,	925B	B3, VR6180, 6182, 6185, 6285,	VC402, 500, 571, 573, 581, 582, 583, 584, 585,
RTV306, 307, 309, 310, 311, 312,	328, 414,	GRANADA		BP5000 <b>60p</b> HRD140, 141, 143, 150, 152, 157, 158, 160,	P 6290	0VR6291, VR6293, 6362, 6367, 390, 6391, 6393, 6467, 6468, 6470, 6561,	VCSF3, VC8581 80 <sub>1</sub> VC108, 405, 408, 550, 600, 651, 674, 681, 682,
434, 444, 707	135p	VHSH1, VHSAH3	100p	190, 250, 257, 310, HRD455, 565, 566, 725,	6570	o, 6581, 6670, VR6676, 6710, 6760, 6761,	682, 684, 685, 693
RTV211, RTV214 RTV324, RTV32565p	140p	VHSVH4, VHSWH1, VHSXH1 VHSYH2	60p	755, HRP50 45p	p   6762 9258	2, 6870, 6970, 6975, VR68SB4, 86SBI, B3 75p	VC700, 750, 783, VC6F3, VC6V3 70, VC208, 671, 772, 779, 780, 781, 782, 785, 786,
RTV324, RTV32505p RTV315, RTV316, RTV319, RTV32	20.	VHSBH1, VHSCH 1	150p	HRD170, 171, 180, 210, 21 1, 217, 230, 300, 320, 321, 330, 337, HRD350, 370, 400, 430,		45B9, VR445B920, VR445B922, VR6443.	787, 793, 800, VC7810, 7822, VCA100, 102,
RTV317	50p	VHSBP1	135p	440, 44 1, 500, 530, 700, 750,950,	6843	3, 6843, VR6943 100p	103, 104, 131, 140, 170, 202, 03, VCA234, 501
RTV301, RTV333, RTV338, RTV40		VHSAN3 VHSDS2	110p 125p	HRS5000, 5500, 8000, 9000, BR9060, BRS600,		260, 6349, 6448, 6449, 6548, 6648, B620, 644869S, 49SB6 110p	502, 602, 5011, VCB311, 361, VCD801, 802, VCH851, 852, 882, VCM73, VCT72 65
RTV424 FERGUSON	85p	VHSAY3	125p	605, 920, 925 <b>45p</b> HRD227, 520, 52 1, 522, 527, 600, 610, 620,		6850, VKR6855 70p	VCA10, 103, 105, 106, 113, 11613, 211, 234,
3292, 3V00, 3V01, 3V16, 3v22, 89	100 8901	VHSBY3	100p	637, 641, 650, 830,	VR50		244, 254, 30, 33, 35, VCA36, 37, 40, 43, 454,
8902, 8903, 8904,		VHSEY1, VHSEY2 VHSCC1	70p 100p	HRD840, HRDX20, 22, HRJ200, 205, 300, 305, SR330, HRS10 125p	SE41	6800, VKR6810, VKR6820 <b>70p</b> 104, VR231, 2310, 2319, 231, 232, 2329,	48, 50, 505, 51, 52, 53, 54, 55, 56, 57, 58, VCA60, 605, 615, 67, 68, 1031, VCB320,
8906, 8909, 8912, 8922	120p	GRANADA	тоор	HRD840, 550, 560, 580, 590, 640, 660, 670,	237,	23, 241, 2410, 2419, 242, 243, 245, 2469,	VCBS97, VCD805, VCD806, 810, 815, VCH80,
3V23, 8923, 8924, 8929 3V29, 3V30, 8930, 8931, 8933,	50p	VHSDP1, VHSFV2	80p	720, 730, 740, 770, HRD820, 860, 870, 880,	247,	2479, 251, 252, 256, 257, 258, 33, 19, 332, 9, 333, 337, 339, 3419, 342, 343, 3469, 347,	81, 85, 865, 910, VC51000, VCT212, 310, 410, 610, VCT1314, VCTS312,
8940	65p	VHSTJ1, VHSTJ2 VHSTJ3	150p 65p	910, 960, 980, HRDX20, 25, HRJ2 10, HRJ215, 315, 316, 318, 400, 405, 407, 410,	3479	9, 35, 1, 352, 357, 358, 422, 4229, 432, 437,	313, VC790ET 80;
3V31, 3V32, 8941, 8942	60p	VHSWJ1, VHSWJ2	120p	411, 415, 416, 507, HRJ6 10, 615, 715, 97,	442,	4229, 432, 437, 442, 44, 5, 4469, 447,	VCC10 70;
3V35, 3V36, 3V38, 3V39, 3V49, 89 8944		VHSXJ3	85p	HRS4700, 5800, SR3200, SRS368E 60p	P   6270	9, 451, 452, 457, 458, 459, 512, 522, 5229, 9, 642, 647, 722, 7229, 723, 7379, 747,	SONY SLC6, SLJ10, SLT6ME 140
0944 3V42, 3V43, 3V44, 3V45, 3V48, 3\		VHSFJ2 VHSFJ2	80p 140p	LOGIK 40p	8389	9, 948, 9489 <b>70p</b>	SLC6, SLJ10, SLT6ME 140; SLC5, SLC7, SLJ7, SLJ9, SLT7ME 140;
3V55, 3V57,		VHSFS1, VHSFS2 VHSFG1, VHSFG2, VHSFG3,	130p	VR955 180p	SAIS	SHO 000, VHL3 90p	SLC9, SL8000, SL8080, SLT50 165p
8945, 8947, 8948 3V58, 3V43, 3V44, 3V59, 3V64, 3\	45p	VHSFG1, VHSFG2, VHSFG3, VHSFG4, VHSF63	180p	MATSUI		000, VHL3 90p 800, 3200, 3300, 3500, 3600, 3650.	SL8000E, SL8080E, SL8200, SL8600 175  SLV255, 125, 213, 225, 262, SLVX1,
8951, FV10, FV11, FV12, FV13, FV	/14, FV20,	GRUNDIG	<del></del>	VX600, 730, 735, 750, 755, 765, 850, 6000,	VRS4	4400, 5000 <b>75p</b>	20, 3 95
FV21, FV22, FV26, FV32, FV39, V	C141L 45p	MVS400, 440, VS400, 410, 415, 435, 440		VS888 75p VX1000, VX2000, VX2500, VX3000,			TOSHIBA
FV31R FV61L, FV62, FV67, FV68, FV70, F		450, 456, 460 VS180, 200, 220, 226, 262, 265, 267, 2X4	55p 10800.	VX6000 80p	P SV71	MSUNG 16, 717, V1616, V~621, V1626, VX616,	V55, V57 V33, V31, V32, V51, V52, V53, V9600,
FV74, FV77	50n	0850, 0880,		VX800 70p	P VX61	17, VX619, X626, VX627, VX629,	V9680 85i
FV43H, FV44L, FV46T, FV57H	1200	1600, 2000, 2080, 2200, 2280, MVS200RC	90p	MITSUBISHI HS200 200p	VX71	75p 20, 510, 610, 616, 617, 619, 620, 626, 627.	V61, V63, V65, V66, V67 <b>150</b> ; DV80B, DV80D, V71, 73, 74, 75, 77, 81, 83, 85
FV37H 3V52	OUP	VS150	160p	HS300, 301, 302, 307, 310, 337, 338, 347, 349,	629	V1510, 520, V1611, 616, 621, 626, 627, V1510, 520, VX510,	DV80B, DV80D, V/1, /3, /4, 75, /7, 81, 83, 85, 86
3V52 FV41R, FV42I		VS310, 311, 315, 320, 326, 340, 345, 380,	, 385,	411, 412, 421, 480, HSB10, 20, 30, HSE10, 20,	511,	520, VT320, 5600 80p	V108, 109, 110, 120, 130, 140, i99, 209, 210,
FIDELITY	-	445 VS150	85p 75p	30, 70 <b>80p</b> HS303, HS304, HS306, HS307, HS330, HS400,		00, VB910, V1900, V1910 110p 80, 981, 982, SE9001, SV9001, SVX307,	211, 220, 221, 411, V421, 609, 610, 611, 659, 660, 711, 880 120
HQS200, VCR1000, 2000, 600, 60	00,	LC290N, LC295SN, SVS 180, VS 170	70p	HS700 110p	p 319, 3	322, VB750, 770, 8220, 8225, V1770, 790,	V91 G, V95G 115
6100 VCR100	180p	VS 160, BARCELONA, FLORENZ, GV400	00,	HS318, HS319, HS410 110p	p 8220.	), 8225, VK8220, VPX31, VX750, VX770,	V212, 213, 22-2, 3i2, 322, 403, 412, 413, 610,
VTR1000, VTR1001		4000, 4001, GV4002, 400, 401, 4010, 402, 403, 404, 4	.05.	HSM1000, 16, HSM23, 25, 33, 34, 35, 37, 54, 55, 57, 58, 59, 68 55p		8220, 8225, SE9000, 9001 90p 301, 303, 305, SX7301, VB710, 971,	703, 813 <b>50</b> p VCPB1E <b>110</b> p
		,,,,,,,		Oup	E I SAV	,,,,, +0/ 10, -//,	

Make	Models	Description	Make	Models	Description
	VT11, 14, 17, 19, 33, 34, 35, 38, 39, 52, 57, 61, 62, 63, 64, 65, 85,		Ferguson	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930,	Take Up Clutch PU 51380
Order Code:	86, 330, 350, 640, 16S, 5030	FF Rew Idler 6886792 Price 100p		8931, 8933, 8940, 8941, 8942, 8943, 8944	
	VT680, 6500, 6800, 9300, 9500VT9700, 9900	Play Idler 6861482 6861481 Price: 180p	J.V.C.	HR7200, 7600, 7650, 7655, 7300, 7350, 7610	Take Up Clutch PU 53462A PU 51380
		Idler	Order Code:		Price: 200p
bidupulikt	414, 424, 434, 444, 478, 707	lulei	Philips	DB532, VR6520, 6843, 644	Reel Idler
Goldstar	GHV1221, 1232, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, GHV1248, 8000, 8200, 8210, 8215, GVHP51, VCP4100, 4130	ldler	Sharp	VC600, 651, 681, 682, 684, 685, 693, 699, 700, 783, 6FR, 6V3, 6F3	Idler Assembly NPLYV0107GEZZ
Grundig		Idler	Order Code:	: IDL88	Price: 615p
	NV230, 250, 260, 280, 370, 380, NV430, 431, 433, 450, 460, 465, 470, 480, 630, 650, 730, 780, NV810, 830, 850, 870, 890, NV67, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, 400, AG1000, AG1050, 1200 1500, 1810, AG2100, 2200, NVH65, 70		Philips Sharp	VR6843, 6943, 44SB9, VR44SB920, 44SB922, 6943 VC772, 780, 781, 782, 785, 786, VC787, 800, 793, 799, 7810, 7822, VCA100, 102, 104, VCA131, 140, 170, 202, 203, 234, 501,	Reel Drive Unit Idler NPLTV0111GEZZ
Philips Order Code:		Idler Arm 40340162 Price 100p		VCA602, 5011, VCD801, 802, VCH851, 852, VCH882, VCM73, VCT72, VC782MK11	
		Idler 150280	Order Code:		Price: 700p
•		Idler NIDL0005GEZZ	N.E.C.	N911, 915, 916, 917, 9012, 9013N9014, 9016, 9033, 9034, 9053, N9054, 9055, 9056, 9066, 9096, N9110, 9120, 9510, 9520, 9530,	
Order Code:		Price: 100p	ì	N9610, DX1000, 1600, 2000, DX3000, PX1200	idler Arm Assembly
	VR6540 VC300, 387, 402, 471, 473, 477, VC481, 482, 483, 486, 488, 496.	ldler	Order Code:	IDL245	Price: 270p
	500, 571, 573, 581, 582, 583, 584, 585, 8481, 5F3, 5W20E	Idler NIDL0006GEZZ	Philips	DV186, 190, VR211, 2115, 212, 213, 223, 286, 291, 292, 311, 312, 313, 3210, 3219, 322, 3229, 323, 535BO, VR486, 471, 562,	
Order Code:	THE PARTY OF THE P	Price: 100p		582, 571, 761, 201, 202, VR203, 302, 303, 305, 6180, 6182, 6185	),
Ferguson	3V23, 3V29, 3V30, 3V31, 3V323V35, 8923, 8924, 8929, 8930,	Reel Idler Reel Idler PU48967		6285, 6290, 6291, 6293, VR6362, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581VR6670, 6676, 6710, 6760, 6761, 6762, 6870, 6970, 6975, 86B1, 63SB7, 68SB4, 71SB4, 71SB5,	
	HR7200, 7300, 7350, 7600, 7610, 7650, 7655, 7700	Reel Idler PU48967 Price: 175p		72SB8, 72SB8, 92SB31, 20DV1, 20DV2, 20RW7, 21DV1, 21DV2 2SB01, 2SB02, 2SB11, 2SB12, 30DV2, 31DV1, 31DV2, 31DV.	
	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930, 8931, 8933, 8940, 8941, 8942, 8943, 8944	Take Up Idler PU 51402		33SB02, 3SB03, 3SB05, 3SB11, 3SB12, 3SB13	
J.V.C.	HR7200, 7600, 7650, 7655, 7300, 7350, 7610, HRD110, 111, 120, 121, 225	Take Up Idler PU 51402A	Toshiba	V91, V95	Pressure Roller Assembly PS403-40205
Order Code:		Price 100p	Order Code:	PR232	Price: 300p

		N.		CDM	ועו.		LERTY	INL	<u> </u>
Akai	M32773	IT01	Ferguson	PU51380	IT07		VXP0433	IT15	
	MZ366960J2	IT02		PU51402A	IT08		VXP0463	IT16	Price:
Goldstar	VXP0521	IT17		PU55373	IT09		VXP0521	IT17	20p each
litachi	6861471	IT03		PU55374	IT10		VXP0581	IT18	16p each pack of 5
	6861482	IT04	National	VXP0329	IT11	Sanyo	1430662T15620	IT19	13p each pack of 10
	6886971	IT05	Panasonic	VXP0343	IT12	Sharp	NIDL0005GEZZ	IT20	
IVC	PU48697B	IT06		VXP0344	IT13	•	NIDL0006GEZZ	IT21	Packs are for each model
				VXP0401	IT14		NPLY0107GEZZ	IT22	Packs are for each model



		NCH ROLLE		~	
del Price	Model Price	Model Pri		Todel Price	
LICENSE LICENSE LICENSE	FVHP615, 618, 620, 622, 710, 711, 715, 716,	BRS600, 605, 747, 777, 920, 925 HRS10		S7000 140p	681, 682, 684, 685, 693, VC699, 700, 772, 750, 779, 780, 781, 7810
, VS9300, VS9500, VS9700, VS9800, 00, VP77 140p	720, 721, 722, 725, 730, FVHP810, 830, 840 <b>140p</b>	BP5000, HRD110, 111, 120, 220, 225,	VH	H1, VH2 140p	782, 782MK2, 7822, 783,
VS2, VS3, VS4, VS5, VS6, VS8, VS9,	FVHP905, 906, 907, 908, 910, 911, 915, 916, 918, 970, 975, 980, 990, FVHP 5000, 5005,	455 1100 PINCH ROLLER ASSEMBLY		C150, 180, VH3, 33, 200, 201, 205, 212, 250, 54, 288, 300, 303, 312,	VC785, 786, 787, 793, 800, 7810, 7822, VC VC6F3, VC6V3, VCA 100, 102, 104, 131, 14
, VS15 140p 5, 112, 115, 116, 120, 125,	5050, 5075, 5100 140p	HRD140, 141, 142, 143, 150, 152, 157, 158,	VH	H404, 555, 700, 704, 712, 770, 780, 844, 900,	170, 202, 203, 211, 234, 303, 501, 502,
155, 165, 205, 220, 240, 244, 245,	VBR330, VBS3500, 7000, 7100, 7500, 7600, 9000, 9900 140p	160, 565, 566, 725, 755, HRP50 135		000, 2948, 3030, 3312 HF2A, VP2948 140p	VCA602, 5011, VCD801, 802, 851, 852, 88 882, VCM73, VCT73, VCT72,
.7, 248, 250, 512, VS515, 516,	9000, 9900 140p FVHD230, 250, 270, 370, 2000D, FVHP3, 210,	PINCH ROLLER ASSEMBLY	l cc	OMB 15000, 16000, HV03, LVH50, NEVH,	VCB361
1, 301, 303, 304, 603, 606, 607, VSP8,	250, 300, 310, 1100,	HRD 1520, 510, 520, 521, 522, 525, 527, 560, 600, 610, 620, 637, 641,		EVHM, NEVHML,	VC220 1
140p 25, VS155, VS165, VS220, VS240, VS250,	FVHP1200, 1250, 130, 132, 1340, 1340, 1400, 1410, 1440, 1500, 200,	HRD650, 720, 830, 840, 910, HRJ205,	36	VP230RC, VCP, VH04, 30, 103, 300, 358, 360, 62, 400, 416, 512,	VCA10, 30G, 60, 103, 105, 106, 111, 113, 211, 244, 254, 33, 35, 36,
2 140p	FVHP320410, 420, 430, 440, 445, 470, 475,	HRS5800 35 PINCH ROLLER ASSEMBLY		H530, 532, 535, 536, 600, 630, 635, 640, 666, 30, 735, 744, 774, 790	VCA37, 39, 40, 42, 454, 46, 47, 48, 50, 505
, 23, 25, 35, 37, 38, 53, 66, 75, 422, 425, 427, 462, 465, 467,	FVSP290S, 495, 2905 140p FVHD140, FVHD40, FVHD55, FVHP1, FVHP10,	BR7030, BRS600, HRD160, 170, 171, 180, 15	90, VH	H800, 820, 850, 888, 893, 900, 930, 940, 942,	52, 53, 54, 55, 57, 58, 505,
5, 765, 766, 767, 768, 865, 867, 965, 967,	FVHP20 140p	210, 211, 217, 227, HRD230, 271, 300, 310, 320, 321, 330, 337,		74, 1012, 1040, 1050,	VCA60, 605, 615, 62, 63, 67, 68, 1031, 110 VCB311, 320, VCBS97, VCD805, 806, 810
7, VSA650, 0, 11, 12, 15, 180, 190, 200, 210, 220,	FVHD140, 40, 55, FVHP1, 10, 25, 30, 40, 4000, FVHS10, 30 1350p	350, 400, 430, 440, 441,	15	H1060, 1070, VH1100, 1120, 1204, 1440, 500, 1660, 1800, 2004,	VCH80, 81, 865, 910, VCS 1000, VCT310,
22, 230, 240, 30, 33	PINCH ROLLER ASSEMBLY	HRD470, 500, 530, 700, 750, 950, HRS5000,	_   VH	H2151, 2308, 22042400, 2500, 2600, 2700,	VCT410, 610, VCT 1314, 5313, VC790 VC780, 790, VCA10, 103, 1031, 105, 106,
30, 4, 500, 550, VSP88, VSR100, VSX400, 170 140p	GOLDSTAR GHV51, 1221, 1232, 1233, 1240, 1241, 1242,	PINCH ROLLER ASSEMBLY	. Vi-	142960, 2970, 3050, 143060, 4000, 4008, 4010, 4012, 4015, 4015,	244, 254, 255, 30, 35,
60, 261, 262, 265, 270, 274, 275, 280,	1243, 1244, 1245, 1246,140p	HRD540, HRD550, HRD580, HRD660, HRD8	160,   40	020, 4300, 5020,	VCA340, 43, 47, 50, 60, 605, 615, VCD80
40, 350, 410, 420, 43C	GHV1247, 1248, 1250, 1266, 1290, 1291, 1295,	HRD960 70 PINCH ROLLER ASSEMBLY		P 10, 200, 220, 225, 245, VR821, 925, 1032, 949, 2959, 2957, 2966, 2979, 2980, VTV300,	815, VCH80, 81, 83, 85,
11, 440, 450, 455, 480, 490, 497, 510, 80, 590, 599, 600,	1296, 1392, 1393, GHV1891, 1900, 2145, 3000, 3010, 4400, 4410,	HRJ600, HRJ605, HRJ815,	l vo	XL20, 25, 30	VCH865, 87, 910, VCS 1000, VCT212, 31 510, 610, VCTI314,
0, 21, 23, 24, 25, 30, 33, 34, 35, 51, 54,	51, 8000, 8200, GHV8210, 8215, 8430			PHILIPS	VCTS313
i, 64, 65, 70, 73, 74, 75, 10, VSX560, VSX580 <b>140</b> p	GHVP1240, 1241, 1247, 1248, 1290, 1291, GHVP1295, 1296, VCP4000, 4100, 4130, 4200,	MATSUI VX6000, 730, 735, 750, 755, 765, 800, 850,		'R6460 VR6920 140p 'R2020, VR2021, VR2022, VR2023,	PINCH ROLLER ASSEMBLY
20, 22, 23, 24, 25, 26, 27, 35, 37, 38, 53,	4300, 4301, 4305, VCP4306, 4310, 4311, 4315,	VS888 14		/R2024 140p	SAISHO
A77 775p ROLLER ASSEMBLY	4316, 4320, 4321, 4325, 4326, 4350, GSE 1290, 1291, 1295, 1296, 1297, 1891, 1910, 20005,	VX1000, VX2000, VX2500, VX3000, VX6000A 14	VF	/R6711 140p	
, 425, 426, 427, 462, 465, 467, 485, 498,	2000 140p	MITSUBISHI		/R6540 140p 0V856, 586, VR702, 703, 6485, 6585, 6589,	VR3400
66, 767, 768, 865,	HITACHI	HS12, 5300, 5424, 5600, HSB11, 12, 16, 21,	. 27.   67	785, 6880, 6948 140p	SAMSUNG
65, 967, VSA650, VSF10, 11, 12, 14, 15, 90, 200, 210, 220,	VT7, 11, 14, 16, 17, 18, 19, 33, 34, 35, 350, 38, 39, 88, 330, 680, 4200,	31, 32, 41, 51, 52, 82, HSE 12, 16, 17, 21, 22, 27, 31, 32, 41, 51, 52,		/R445, VR6442, VR6542, VR6643, VR6843, /R6943, 44SB9 140p	SV716, 717, VB510, 520, 610, 616, 617, 0
22, 230, 240, 30, 300, 301, 310, 320, 33,	VT5000, 5030, 5500, 6500, 6800, 7000, 8000,	82, HSM1000, 110, 120, 15	D\	0V464, 662, VR2220, 2300, 2324, 2330, 2334,	620, 626, 627, 629, 900,
, 500, 510, 600, 10, VSX100, 400, 450, 470 <b>800p</b>	8300, 8500, 8700, 930, VT9500, 9700, 9900, VM600 140p	0, 16, 170, 190, 210, 23, 25, 250, 27, 33, 34,	35, 23	340, 2350, 2414, VR2480, 2485, 2486, 2489, 490, 2498, 2840, 6462, 6463, 6464, 6560,	V910, V1510, 520, 611, 616, 621, 626, 90 910, VX510, 520, 616,
ROLLER ASSEMBLY	VM600 140p VT8, 52, 57, 61, 62, 63, 64, 65, 85, 86, 88, 100,	36, 37, 370, 380, 45, 450, 5 4, 55, 555, 57, 58, 59, 68, HSMS2, 9, HSS11	1, VI	/R6660, 6860, 6861, 6862, 6863 140p	VX617, 619, 626, 627, 629
9 140р	110, 111, 113, 115, 118,	14, 15, 17, 19, 25, 5600, HV	N-	140p	
140p	VT120, 122, 125, 128, 130, 135, 138, 145, 150, 168, 170, 175, 220, 225.	F125, 150, 303, 85, SV8900, 8930 75 PINCH ROLLER ASSEMBLY PART NO:		/R2025, VR6580, VR6581 <b>140p</b> I9SB6, VR3260, 6349, 6448, 6449, 6548,	750, 770, 971, 8220, VB8225, V1710, 730 770, 790, 8220, 8225, 970, VX710, 712,
000, VCR6000 140p	VT250, 255, 258, 260, 400, 405, 410, 413, 414,	948D020010	66	648 <b>140p</b>	VX720, 730, 750, 770, 790, 825, 8225, 97
61, VCR222 140p	415, 416, 418, 420, 425 VT426, 428, 430, 431, 435, 438, 450, 498, 510,	HSE11, 12, 16, 17, 21, 22, 27, 31, 32, 41, 51,		PRESSURE ROLLER ASSEMBLY PS403-40205 DV186, 190, VR211, 2115, 212, 213, 223, 286,	
000, VCR7800, VCR8000, 800 140p	515, 517, 518, 520, 525,	52, 5300, 5424, 5600, HSB11, 12, 16, 21, 27 31, 32, 41, 51, 52, 82, HSM1000, 110, 120, 1	150, 29	291, 292, 311, 312, 313,	9001, SX7120, 7121, 7220, 7221, 7230, SX7301, VK8220,
0 140p	VT526, 530, 535, 536, 540, 545, 546, 548, 570,	HSM16, 170, 18, 190, 210, 23, 25, 250, 27, 3	30,   VI	/R3210, 3219, 322, 3229, 323, 535BO, 486,	VPX31
TRAD	575, 576, 580, 585, 588 VT640, 830, VTF660, 665, 70, 770, 774, 775,	33, 34, 35, 36, 37, 370, 38, HSM380, 40, 45, 450, 50, 54, 55, 555, 57, 58, 59, 60, 68,	,   4,	171, 562, 582, 571, 761, /R201, 202, VR203, 302, 303, 305, 6180, 6182,	VX9880
1000, 2000, 4500, 4600, 4700, 5200, 6000, , 6200, 8600,	780, 785, 860, 861, 865,	HSMS2, 9, HSMX1, 18, 19, 2, HSS11, 12, 1	14, 61	6185, 6285, 6290,	PX31 R, 32R, PXR30, SV80, SX3230, 32 3260, 3261, VS390, VX30, 31, 32, 3560,
8602, 8603, 8604, 8700, 8704, 8714, 8800,	VTL30, 1000, 2000, VTLC50, VTM598, 620,	15, 17, 19, 21, 25, 5600, HVF125, HVF150, 3 85, SV8900, 8930		/R6291, 6293, 6362, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561	370, 375, 380, VXK300, 301, 306, 307, 3
, 9000, 9005, 9244, 9340, DD8900, 8904,	622, 625, 626, 630, 635 VTM636, 640, 645, 646, 720, 722, 725, 726,	85, SV8900, 8930 HS200, HS300, HS301, HS302, HS303, HS3		/R6570, 6581VR6670, 6676, 6710, 6760, 6761,	VXK321, 326, 330, 331, 336, 337, 350, 3
, 2, 3, 4 140p	727, 728, 730, 731, 735,	HS310, HS320, HS330, HS360,	67	5762, 6870, 6970,	356 PX990, 991, 992, S11230, 1240, SVX400
7000 140p 900, DD8904, VCR6000, 6100, 6200, 8600,	VTM736, 740, 745, 746, 748, 753, 754, 820, 821, 822, 825, 830, 831,	HS700 14 HS306, HS307, HS318, HS319, HS337, HS3	338. 72	/R6975, 86BI, 63SB7, 68SB4, 71SB4, 71SB5, 72SB8, 72SB8, 92SB31, 20DV1, 20DV2,	504, 600, SX1230,
, 8603, 8604,	VTM835, 838, 840, 841, 845, 920, 921, 922,	HS347, HS349, HS400, HS410, HS411, HS4	412,   20	20RW7, 21DVI, 21DV2, 2SB01, 2SB02, 2SB11,	SX1231, 1260, 1261, 1566, V11560, VPK
3700, 8800, 900>9, 9140, 9244,	925, 930, 931, 935, VTS80, 85, 890, 895VM200, 2300, 2380, 3200,	HS421, HS480, HS710, HSB 10, HSB20, 30, HSE 10, 20,		2SB12, 30DV2, 31DVI, 31DV2, 31DV33SB02, 3SB03,	VX1230, 1260, 1261, VX1560, 1561, 1850
<b>700p</b> H ROLLER ASSEMBLY PART NO: 153148	3280, 500, VMS7200 140p		40p 3	3SB05 3SB11 3SB12 3SB13 280p	SONY
550, UF20, VCR3000, VCR3002, VCR4000,	VT3000 140p VT410, 420, 428, 430, 450, 498, 518, 520, 522,	NATIONAL PANASONIC	1	VR231, 232, 332, 422, 4229, 512, 5229, 722, 7229, 723 <b>140p</b>	
9500 300p H ROLLER ASSEMBLY PART NO:	530, VTF770, 780,	NV100, 180, 300, 330PX, 332, 333, 340, 366 600, 688, 777, 788, 3321,		VR501 PR38 140p	SLT6ME, SLT7ME
966	VTM598, 622, 722, 740, 748, 753 650p	AG6010, 6015, 6100, 6200, 6400, 6800,		SANYO	SLC9, 20, 24, 30, 33, 44, SLHF100, SLF
000, 9904, TX3650, UF20, 22, 24, 0000, 3002, 9500 140p	PINCH ROLLER ASSEMBLY VTF150, 155, 180, 185, 250, 255, 260, 265, 280,			VHR1100, 1110, 1150, 1200, 1300, 1500, 2100, 2300, 2370, 2500,	20, 25, 30, 35, 60, 100, SLF200, SLF60PS, SLF90E, SLFH150, 8
000, 3002, 9500 <b>140p</b> 04 VS1104 <b>140p</b>	285, 350, 351, 355,	NV230, 250, 260, 280, 370, 380, 430, 431, 4 450, 460, 465, 470, 480	V	VHR2700, 3330, MVR220 140p	SLK88, 95, SLT20ME, SLT30ME,
GUSON	VTF360, 365, VTM140, 141, 145, 145, 210, 211, 212, 215, 220, 221,	NV630, 650, 730, 770, 780, 810, 830, 850, 8	870, V	VTC5000, 5150, 5300, 5350, 5400, 5500, 6000, 6010, 6500, 9100,	
, 3V01, 3V16, 3V22, 3V23, 3V24, 3292, , 8901, 8902, 8903, 8904, 8906, 8909,	VTM230, 231, 235, 284, VTS390 140p			VTC9300, VTCM10, 20, 11, 21, 30, 31, 40, 50,	BMC 100, BMC200, BMC500 SLV201, 202, 301, 302, 401, 402, 801,
8922, 8923, 8924, 8925, 8929 140p	HINARI	8300, 8400, 8500, 8600	V	VPR5800 140p	802
, 3V30, 3V31, 3V32, 3V52, 8930, 8931,	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, VTV100, 200 140p	NV8610, 8620, NVG11, 14, 16, NVG7, 10, 1 15, 18, 30, 130, 400,		VHR3100.3300, 3310, 3400, 3500, 3700, 3800, VHRD500, 700 140p	SLV210, 270, 273, 275, 300, 353, 373, 4
8940, 8941, 8942 <b>140p</b> 3V36, 3V38, 3V39, 3V42, 3V43, 3V44,	VXL2, VXL3 140p	AG 1000, 1050, 1200, 1500, 2100, 2200, 65	500, IV	VTC3000 140p	474, 656, 715
3V48, 3V49, 3V53, 3V54, 3V55, 3V56,	VXL4, VXL20, VXL35 140p VTV100, VXL10, VXL11, VLX9,	6810, 7500, 7510, NVH70 14	40p   1	VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, 194, 22	SLV757, 777 SLV255
3V58, 3V59, 3V65, FV10, FVII, FV12, 8943, 8944, 8945, 8947, 8948 140p	VXL90 700p	NVG9, NVG120 14	40p   0	0VHR23, 235, 240, 244, 250, 251, 274, 27, 297,	SLV275, 282, 315, 325, 353, 363, 373, 4
140p	PINCH ROLLER ASSEMBLY	AG6840, 6720, 7150, 7330, 7350,	3	310, 330, 335, 350, 390, VHR4100, 4105, 4150, 4200, 430, 4300, 4350, 4400, 474, 4770, 5080,	416, 474, 625, 656, SLV715, 725, 727, 7
8951, FV10B, 11R, 13H, 14T, 20B, 21R, 26D, 31R, 32L,FV33H, 39S, 41R, 42L, 50B,	V20H, VXL5, VXL6 MOD KIT 275p	7355, 7650, NVH65, 75, NVJ30, NVL20, 23, 28, NVG300, NVF65, NVF70, NVFS1 NVFS	s ii v	VHR5100, 5200, 5300, 5350, 5600, 5700, 6850,	815, 825, SLVX30, 50, 55 SLV125, 213, 225, 252, 255, 262, SLVXI
52L, VC141L 140p	J.V.C. HR2200, 3300, 3330, 3360, 3660, 4100,	100, NVG 19, 20, 25, 33, 40, 50,	7	7100, 7200, 7250,VHR7260, 7300, 7400, 7440,	20, 3
H, FV44L, FV46T, FV43H,	7700 140p		40p   7 40p   0	7500, 7520, 7530, 7540, 7700, 774, 780, 0VHR7810, 8000, 8070, 8100, 8200, 8250,	SLV215, 216EE, 275, 282, 315, 325, 353
3V36, 3V38, 3V39, 3V49, 8943,	7655 140p	NVJ700PX 14	40p 8	8500, 8800, VHRD4400, 4410, 4500, 4600,	363EE, 373, 393, 410, 415, SLV416EE, 474, 494EE, 555UC, 559, 57
1100p	HRD110, 111, 120, 121, 140, 141, 142, 143,	NVHD100, NVHD101, NCHD90, NVSD30,	25p   V	4610, 4710, 4890, 6700, VHRS700 140p VCR100 140p	579, 585HF, 595HF, SLV60W, 615, 625,
H ROLLER ASSEMBLY , 3V43, 3V44, 3V45, 3V48, 3V53, 3V54,	150, 152, 156, 157, 158, HRD160, 220, 225, 250, 257, 445, 455, 565,	PINCH ROLLER ASSEMBLY	v	VHR120, 135, 150, 190, 4150, 4160, 4350,	676UC, 686HF, 696HF, 715, 725, 727, 75
, 3V56, 3V57, 8945, 8947, 8948 1350p	566, 725, 755, HRP50, BP5000, BR7000,	AG5150, 5250, 5700, 6024, NVD38, 48, 80, NVF55, 65, 70, 75, 77,	, 5	5200, 5240, 5350, 7200, 7250, 7260, 7700, VHRD4410, 4610, 4710, 4890, 5450,	SLV767B, 777, 815, 825, SLVE7, 8, 9SLVX30AS,
H ROLLER ASSEMBLY , FV57, FV58 350p	BRS611, 811 140p HRD520, 540, 550, 560, 580, 600, 610, 620,	NVFS1, 100, 200, 88, 90, NVG 19, 20, 21, 2	22, V	VHRS700 975p	SLVX35AF, SLVX50AS, SLVX55DH,
H ROLLER ASSEMBLY	637, 640, 641, 650, 660,	25, 28, 300, 33, 40, 45, 46,	P	PINCH ROLLER ASSEMBLY VHR3100, 3200, 3300, 3310, 3400, 3700, 3800,	SLVX65BR, SVO140, 160
R 140p	HRD670, 720, 730, 740, 770, 820, 830, 840,	NVG50, NVH65, 75, 77, NVJ30, 33, 35, 37, 42, 45, 47,	١٧	VHRD500, 7000 1350p	PINCH ROLLER ASSEMBLY PART NO: X37277701
H ROLLER ASSEMBLY	860, 870, 880, 910, 960, HRD980, HRDX20, 22, 25, HRJ200, 205, 210,	NVL20, 23, 25, 28, NVW 1 3	100p   <u>P</u>	PINCH ROLLER ASSEMBLY	- SLV210, 212, 270, 273, 275, 285, 300, 3
, 3V59, 3V64, 3V65, FV10, 11, 12, 13, 14,	215, 300, 315, 316, 318	PINCH ROLLER ASSEMBLY		SHARP VC200 281 382 384 385 386 388 390 393	425, 427
1, 22, 26, 30, 32, 33 ), VC141L <b>875</b> p	HRJ400, 405, 407, 410, 411, 415, 416, 507, 600, 605, 610, 615, 715, 815	N.E.C. N830, 831, 832, 833, 895	440m   8	VC200, 381, 383, 384, 385, 386, 388, 390, 393, 800, 2300, 3300, 6000,	PINCH ROLLER ASSEMBLY SV6700.8750, 9700, VHR3100, 3200, 33
H ROLLER ASSEMBLY	HRJ97, HRS4700, 5800, 5900, 6800, 6900,	PVC2300, 2400, 740, 744, 746, 760, 764,	· 1	VC6200, 6300, 7300, 7700, 7750, 7800, 8300,	3310, 3400, 3700, 3800, VHRD500, 700
3H, FV44L, FV45X, FV46T 700p	SR3200, 330, 368 140p		140p 8	838, 9100, 9300, 9400, VC9500, 9600, 9700, 9800 <b>140</b> p	PINCH ROLLER ASSEMBLY
CH ROLLER ASSEMBLY 1, FV62, FV67, FV68, FV70, FV71, FV72,	HRD170, 171, 180, 210, 211, 217, 230, 300, 320, 321, 330, 337, 350,	9014, 9016, 9033	. V	VC300, 387, 402, 471, 473, 477, 481, 482, 483,	I SL100, 200, SLC20, 30, 33, 34, 40, 44, 8
4, FV77 <b>775</b> p	HRD370, 400, 430, 440, 441, 470, 500, 530,	N9034, 9053, 9054, 9055, 9056, 9066, 9096	6, 4	486, 488, 496, 500, 571,	9, SLF1, 20, 25, 30, 35, 45, SLF60, 65, 7 SLHF100, 150, 950, SLK85, 95, SLO170
CH ROLLER ASSEMBLY HER	_   700, 750, 950,   HRS5000, 5500, 8000, 9000, BR7030, 7040,	9110, 9120, 9510, 9520, N9530, 9610, PX 1200 1	40p   \	573, 581, 582, 583, 584, 585, 8481, VC5F3, VC5W20E, VCA1031 140;	p   SLS550, SLT0, 30, 50
		DS6000G, DX4000, N9077	11	VC108, 208, 405, 408, 550, 600, 651, 671, 674,	, PINCH ROLLER ASSEMBLY
<sup>2</sup> 420, 520, 530 <b>140</b> g	3000,	D000000, D714000, 110077			

Models & Description	Order Code	Price	Models & Description Orde	r Code	Price	Models & Description Or	rder Code		Models & Description	Order Code	
UNIVERSAL VIDEO LAMP 9V	VL01	25p	AIWA, AKAI, ALBA, AMSTRAD,	VL05	100p	AKAI, GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912,	VL01	25p	AUTHENTIC (N850), DECCA	VL07	40p
80mV (310mm WIRES)			BLAUPUNKT, FERGUSON, FIDELITY, FISHER, FUJITSU, FUNAI, G.E.C.,			VRP3833), JVC (HR2200, 3300,			(VR8300), GRANADA (VHSTJ3,		
PANASONIC VIDEO LAMPS	VL02		GOLDSTAR, GRANADA, GRUNDIG,			3330, 3660), MITSUBISHI (HS200),			WJ1, WJ3), ITT (VR3913, 3914,		
SHARP VIDEO LAMPS	VL02		HINARI, HITACHI, ITT, JVC (HRD SERIES), MATSUI, MITSUBISHI,			TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301	).		3963) JVC (HT7200, 7300, 7350		
HITACHI 5381682 (VT63, VT64) VIDEO LAMPS	VL04	135p	NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA,			FERGUSON (3V00, 16, 22, 24, 3292 8900, 8901, 8902, 8903, 8909, 5912	2,		7700) TELEFUNKEN (VR450, 52		
AKAI IVS10),GRANADA (VHSXJ3), TT (VR3993,3994), JV		40p	SAMSUNG, SANYO, SHARP, SIEMEN, SONY, TELEFUNKEN,			8922, 8925)			529, 540, 549, 620, 640, 920, 19	20),	
(HR2650, 7600, 7610, 7650, 7655) TELEFUNKEN (VR530, 535, 539,	),		THOMSON, TOSHIBA			BLAUPUNKT, ORION (VH1, 2A), NATIONAL (NV200,2010, 3000,	VL02	30p	THOMSON (V4100, VK308, 309	, 312,	
630, 650), THOMSON (V309, 316	, 357,		GRANADA (VHSAY3),SHARP	VL08	45p				410), FERGUSON (3V23, 29, 30	,	
VK309, 411,TX8000), FERGUSON (3V31, 8941, 8942)	N		(VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700)			8620), SHARP (VC2300, 6000, 6200 6300, 7300, 7700, 8300)	,, 		8923, 8924, 8929, 8930, 8931, 8	940)	

			VIDEO SI	ERVICE K	ITS	
AMSTRAD			HITACHI			Ţ
VCR700 Contents			VT11/VT33 Contents			l
BELT SET. PINCH ROLLER. REEL IDLE Order Cade: SK41	ER. VIDEO LAMP	£5.50	BELT SET. PINCH ROLLER. TENSIC Order Code: SKO8	ON BAND. IDLER TYRES	£5.00	l
FERGUSON & JVC			VT11/VT33			l
3V42/43			Contents	Economy Kit Contents		ļ
HRD455/HR0725			BELT SET. T/UP REEL TABLE TYRE. SUPPLY REEL TABLE	BELT SET. PINCH ROLLER. FF/REW IOLER TYRE. T/UP REEL		ı
	Economy Kit Contents BELT SET, PINCH ROLLER		TYRE. PINCH ROLLER. FF/REW	TABLE TYRE. SUPPLY REEL		١
	SUPPLY CLUTCH, TAKE UP		IDLER. CLUTCH PLATE. TENSION BAND	TABLE TYRE		ı
	CLUTCH Order Code: SK38	£9.00		00 Order Code: SK46	£3.75	l
	Older Gogo. Side	23.00	VT52/61/62/63/64/65/85/86/640			ļ
3V58/59/64/65 HRD170/180/210/230/300/320/370/400/	#20 E 20 E 00 E 0		Contents	Economy Kit Contents		l
HRS5000	430/530/100/150		BELT SET, PINCH ROLLER, FF/REW ARM. CLUTCH PLATE.	BELT SET, PINCH ROLLER FF/REW IOLER		١
Contents			TENSION BANO			Ì
BELT SET, PINCH ROLLER, IOLER ARM Order Code: SK44	M, TENSION BAND	£7.00	Order Code: SK49 £14.0	00 Order Code: SK50	£3.00	ı
			VT400/405/410/13/14/15/18/420/25/2			ı
3V29/3V30 HR7200/7300/7350			510/520/25/26/530/35/36/540/545/46 Contents	5/48/570/75 <mark>/576/58</mark> 0/85/88		ı
Contents			TIMING BELT. PINCH ROLLER. FF/I	REW ARM. CLUTCH BASE.		ı
BELT SET, PINCH ROLLER, TENSION	BANO, IOLER TYRES		TENSION BAND Order Code: SK52		en 15	I
Order Code: SK05		£5.00	Order Code: 3K32		£9.75	ı
3V35/36, 38/39/49			VT100/110/111/113/115/118/120/125			ı
HRD110/111/120/225 Contents			175/220/225/250/255/258/260/VTL30 Contents	J		ı
BELT SET, PINCH ROLLER, TENSION	BAND, IDLER TYRES		BELT SET. PINCH ROLLER, FF/REW	/ ARM. CLUTCH PLATE.		ı
Order Code: SK04		£5.00	TENSION BAND Order Code: SK51		£14.00	ł
3V31/3V42						1
HR7600/7610/7650/7655			PANASONIC NV2000/NV2010NV7000/NV7200/N	V7800		ı
	Economy Kit Contents BELT SET, T/U REEL TABLE		Contents	Economy Kit Contents		Ì
	TYRE. PINCH ROLLER, REEL		BELT SET. PINCH ROLLER. TENSION BAND. IOLER TYRES	BELT SET. PINCH ROLLER. TENSION BANO. IOLER TYRES		l
	IOLER TYRE. T/U IOLER TYRE.			00 Order Code: SK02	£5.00	l
	T/U CLUTCH Order Code: SK34	£5.00	NV300/NV330/NV333/NV340/NV360	8		ł
		20.00	Contents			ı
3V35/36/38/39/49 HRD110/111/120/121/225			BELT SET. PINCH ROLLER. TENSIO Order Code: SK01	ON BAND. IDLER TYRE	£5.00	
	Economy Kit Contents				1.0.00	L
	BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE		NV2000/NV2010 Contents	Economy Kit Contents		l
	TYRE. PINCH ROLLER, T/U		BELT SET. PINCH ROLLER. FF	BELT SET. PINCH ROLLER.		l
	CLUTCH. T/U IDLER TYRE. REEL		IDLER. PLAY IOLER. TENSION BAND. VIOEO LAMP	IDLER TYRE. PULLEY TYRE		l
	IDLER TYRE Order Code: SK36	£5.50		00 Order Code: SK14	£3.50	l
			NV7000/NV7200/NV7800			l
3V29/3V30 HR07200/7300/7350			Contents	Economy Kit Contents		l
Contents	Economy Kit Contents		BELT SET, PINCH ROLLER, IOLER UNIT, PLAY IDLER.	BELT SET, PINCH ROLLER IDLER TYRE, CLUTCH TYRE		l
	BELT SET. T/U REEL IDLER Tyre. Supply reel table		TENSION BAND			H
	TYRE. PINCH ROLLER, REEL		Order Code: SK11 £8.5	60 Order Code: SK12	£3.25	Н
	IDLE TYRE, T/U IDLER TYRE. T/U CLUTCH		NV300/NV330/NV333/NV340/NV366			Ш
	Order Code: SK32	£5.00	Contents BELT SET, PINCH ROLLER,	Economy Kit Contents BELT SET, PINCH ROLLER		ľ
			IDLER UNIT, PLAY IDLER.	IOLER TYRE. PLAY IOLER		
3V44/45/48/53/54/55/57 HRP50/HRD140/150/158/160			TENSION BAND Order Code: SK15 £7.0	0 Order Code: SK16	£3.25	l
HRD250/257/565/566/755					2023	
	Economy Kit Contents BELT SET. PINCH ROLLER		NVG7/NVG9/NVG10/NVG11/NVG12 NVG18/NVG30/NVG120/NVG130/N			۱
CLUTCH MECHANISM. TENSION	JEB I MIGH MULLEN		AG1810 (P/K)			۱
BAND Order Code: SK39 £15.00	Order Code: SK40	£9.50	Contents LOADING BELT. CAPSTAN	Economy Kit Contents LOADING BELT, CAPSTAN		11
Order Code: 2823 £15.00	OIBE: GUUE, AR4U	£3.50	BELT. PINCH ROLLER, IDLER	BELT. PINCH ROLLER. IDLER.		11
FISHER			TENSIDN BAND Order Code: SK27 £6.0	TYRE 10 Order Code: SK28	£3.00	11
FVHP905/906/907/908/910/911/916/918 Contents	Economy Kit Contents				29.00	1
BELT SET. PINCH ROLLER.	BELT SET. PINCH ROLLER.		NV332 Contents	Economy Kit Contents		I
IDLER, GEAR IDLER UNIT.	IDLER TYRE		BELT SET, PINCH ROLLER,	BELT SET, PINCH ROLLER		I
	Order Code: SK58	£5.00	PLAY IDLER. FF/REW IDLER. TENSION BAND. FF/REW TYRE	PLAY IDLER TYRE. FF/REW IDLER TYRE		1
FVHP615/618/620/622/710/711/715/716/	D20U21U22U2E1			O Order Code: SK30	£5.10	-
730/830/840	1100/121/124/123/		NV230/250/260/280/430/450/460/470	0/650/810/890/		
Contents Economy Kit Contents	DELT COT DIMOU DO CO		AG1200PK/AG1500PK			Il
	BELT SET. PINCH ROLLER. Idler tyre		Contents BELT SET, PINCH ROLLER.	Economy Kit Contents BELT SET, PINCH ROLLER		1
TENSION BAND			IDLER. TENSION BAND	IDLER TYRE		l
Order Code: SK68 £11.00 (	Order Code: SK69	£300	Order Code: SK23 £6.0	O Order Code: SK24	£3.25	Ľ

Economy Kit Contents
BELT SET, PINCH ROLLER
PLAY IOLER TYRE, FF/REW Contents BELT SET, PINCH ROLLER, PLAY IOLER. FF/REW IOLER, TENSION BAND INLER TYRE Order Code: SK25 £12.00 Order Code: SK26 £6.00 NV730/NV770 Economy Kit Contents
SLOT IN BELT. LOADING BELT. Contents
SLOT IN BELT. LOAOING BELT PINCH ROLLER. IOLER UNIT. TENSION BAND PINCH ROLLER, IQLER TYRE £5.50 Order Code: SK20 £3.00 NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK Economy Kit Contents
BELT SET, PINCH ROLLER
IOLER TYRE
£5.00 Order Code: SK22 Contents BELT SET, PINCH ROLLER, IOLER. TENSION BAND Order Cade: SK21 £2.75 NV777/NV788 Economy Kit Contents
BELT SET, PINCH ROLLER
IOLER TYRE
£6.00 Order Code: SK18 BELT SET, PINCH ROLLER, 10LER UNIT. TENSION BAND Order Code: SK17 SHARP £4.00 VC381 Economy Kit Contents BELT SET. PINCH ROLLER REEL IOLER TYRE BELT SET. PINCH ROLLER. REEL IOLER. TENSION BAND. VIOEO LAMP Order Code: SK47 £8.00 Order Code: SK48 £3.25 VC500/VC571/VC581/VC582/VC583/VC584/VC5F3 Economy Kit Contents
BELT SET. PINCH ROLLER
REEL IOLER Contents
BELT SET. PINCH ROLLER.
REEL IOLER. TENSION BANO Order Code: SK60 £9.50 Order Code: SK61 £5.00 Economy Kit Contents BELT SET. PINCH ROLLER REEL DRIVE UNIT. TENSION REEL DRIVE UNIT TYRE Order Code: SK64 £13.50 Order Code: SK65 £3.75 VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700 Economy Kit Contents BELT SET, PINCH ROLLER Contents BELT SET. PINCH ROLLER. REEL DRIVE UNIT. TENSION REEL DRIVE UNIT TYRI 8AND Order Code: SK62 £13.50 Order Code: SK63 £5.00 **FOR MORE DETAILS OF OVER 500** 

NV600/NV688

# TYPES OF SERVICE KITS ... **PLEASE RING US!**



Name	Models	Code	Price	Name	Models	Code	Price	Name	Models	Code	Pric
KAI	V\$35, V\$53, V\$55,			1000 00	FV31R	CH19	4300p		VCA103, 103GV, 106, 106GVM,		
	VS56, VS75	CH18	3200p		HR0515, 520, 527, 540, 550, 580,				254GVM	CH23	2500
GRANADA	VHSDP1	CH05	1100p		600, 610, 620, 660, 670, HR0830,				VCS211, 244, 5055, 605, VCB230,		
	VHSYJ2	CH01	2800p		840, 850, 860, 4050, 6600, FV37H	CH20	2200p		VCD806G, 810G, VCT212, 310,		
GOLOSTAR	GHV1290P, 1291P, 1295P, 9400,			1	HRD540, 580, 830, 860, 910, 960,				410G, 610	CH24	2500
	73401, GSE1295P, GSE1891P,				HRD970, HRDX20,			TELEFUNKEN	VR2970	CH02	2800
	20001Q, 20051Q, VCP4200, 4300,			FERGUSDN	FV57H	CH27	2400p	THOMSON	V320, 321, 323, 326, 4200, 4300	CH01	2800
	4301, 4305, VCP4306, 4311, 4315,			LT.T.	VR3605, VR3905	CH01	2800p		V342, 343, 352, 353, 360, 364, 368,		
	4316, 4320, 4321, 4325	CH25	2000p		VR3916, 3926, 3946, 3948, 3976,				4210, 4230, 4260, 4400, V5500,		
	GHV51, 1221, 1232, 1240, 1241,				3986, 3995, 3997, 6948	CH02	2800p		6000, 8540	CH02	2800
	1242, 1244, 1246, 1248, GHV8000,				VR3916, 3926, 3946, 3948, 3976,			TOSHIBA	V55, V57	CH01	2800
	8200	CH26	2900p		3986, 3995, 3997, 6948	CH02	2800p		V65, V66	CH02	2800
ERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951,			NATIONAL PANASONIC	NV730	CH06	4300p				
	3V35, 3V36, 3V49, HRD 110, 111,			N.E.C.	N830EG, N831EG, N831EG, N832,			A-A-A-A-A		A_A_	A. A
	120, 121, 225	CH01	28 <b>00</b> p		N833EG	CH01	2800p	MMMMM	**	M M I	N TO
	3V42, 3V43, 3V44, 3V45, 3V48,				N895	CH02	2800p	A BACO	CD A D MAOD	C TOTAL	1
	3V53, 3V54, 3V55, 3V57, 8945,			PHILIPS	CASSETTE LIFT ASSEMBLY (6912038	56)		AMS	TRAD MOD	KII	X
	8947, 8948, HRD 140,				DV186, 190, 286, 471, 562, 761,			*			
	141, 150, 157, 158, 160, 250,				VR6180, 6182, 6185, 6285, VR6290,						N
	HRD257, 455, 565, 566, 725, 755	CH02	2800p	İ	6291, 6293, 6362, 6367, 6393, 6467,			FITS:			A
	8948, 8950, FV10B, 12L, 13H, 14T,				6468, 6470, VR6561, 6670, 6760,			VCR 4500 . 46	500,4700,5200,TVR	1.2.3	~
	20B, 21R, 22L, 26, 395, HRD230,				6761, 6870, 6970	CH05	1100p	*	, , , , , , , , , , , , , , , , , , , ,	-,-,-	A
	430, 530	CH03	28 <b>00</b> p		VR6443	CH22	2900p	* 1			M
	3V58, 3V59, 3V64, 3V65, FV11R,				VR6448	CH23	2500p	RICE PRICE	E: £2.25 + VAT e	ach	*
	8950, 8951, HRD 170, HRD 180,				49SB6	CH24	2500p	P 3			
	HRD370	CH04	2800p	SHARP	VCA100, VCH851, VCH852	CH22	2900p	***	* 农农农农农农	* * *	* *

NV2000, 2010, 7000, 7200, 7800 (VS50048)

NV230, 260, 430, 810, 870, 2300, 4300

(VSS0110)

NV830 (VSS0091)

NV300, 333, 340, 366, 688, 777, 778

(VSS0060

NVG21, 25, NVH65, NVD80 (VSS0175A)

AMSTRAD ORIGINAL NO: 150751

£3.50

£2.25

£2,10

£3.75

£2.00

Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4600MKII, 4700, FUNAI VS2, VCR4600, 4800, 5200, 5600, 6600, VIP3000, 5000

Also fits: FIDELITY, FUNAI, HINARI, PROLINE, SCHNEIDER, ORDER CODE: AH01 PRICE: 1350n

AMSTRAD ORIGINAL NO: 153134

Used on: AMSTRAD DD8900, 8904, VCR2000, 6000, 6100, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 8800, 9005, 8244 Also fits: ANTECH, BONDSTEC, CASIO, CROWN, FIDELITY, GOLD-HAND, GRANADA, HINARI, MARQUANT, OMEGE, PROFEX, SCHNEI-DER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA, UNIVERSUM ORDER CODE: AH02 PRICE: 1450r

Replacement Audio Control Video Sound Head for National Panasonic

IROL HB

PART NUMBER MODELS 875p NVG7 etc VBR 0091 875p VBR0050 NV300, NV340 etc NV777 etc 875p VBR0061 NV250, NV450 etc 625p VBR0103A 625p VBR0125

**SET OF 8 ALLEN KEYS** 

0.90mm

1.50mm

2.00mm

3.00mm

0.77mm

1.27mm

1.60mm

2.40mm

# VIDEO TOOLS

# **VIDEO CLEANING STICKS**

Price 17p each 15p each pack of 10pcs 13p each pack of 25pcs Order Code: SP14

# **VIDEO MAINTENANCE TOOLS**

Set of 8 Allen keys packed

in a plastic wallet
Order code: TOOL 9, Price 125p Specifically designed for video maintenance

### UNIVERSAL HEAD EXTRACTOR

Hand tool designed for extracting hard to remove heads without damage to either the head or the mounting assembly. Adjustable so as to suit various heads. Order code: TOOL 8, Price 600p

# **VCR ALIGNMENT KIT**

**CONTAINS: SET OF 7 HEAD & TAPE PATH ALIGNERS** 

- RCA TYPE AUDIO & CONTROL HEAD POSITIONING TOOL
- RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS
- RCA TYPE BACK TENSION TOOL

Price: 75p

Price: 135p

- TENSION ADJUSTMENT TOOL FOR VARIOUS USES
- VCR ADJUSTMENT TOOL

**3 REVERSIBLE SCREWDRIVERS** SPRING HOOK

**CIRCLIP PLIERS** MICRO SCREWDRIVER

VCR HEAD EXTRACTOR Order code: TOOL 10, Price 2900p

# TRANSPARENT REPAIR/ADJUSTMENT CASSETTE

This transparent videocassette replaces a normal videotape during measurements, adjustments and inspection. The mechanical parts come into sight and become accessible. Order code: TOOL 23, Price 500p

# BACK UP BAT TERIES

# **PHILIPS**

Part Nos: 138 - 101138, 138 - 10313 1.2v 90mAH

Order Code: BB01

Part Nos: 138 - 10229, 2.4v 100mAH

Order Code: BB02

**FERGUSON** 

Part No: 00E6 - 067 - 001 1.2V 100mAH

Order Code: BB03

Part Nos: 00E6 - 606 - 8001 2.4V 100mAH

Order Code: BB04

Price: 150p

Price: 90p

# SATELLITES

MAKE & MODEL	CODE	PRICE
PACE PRD800, PRD900	SATPSU1	600p
PACE SS9000, 9200, 9010, 9210, 9220	SATPSU2	550p
AMSTRAD SRD510, SRD520	SATPSU3	600p
AMSTRAD SRD500	SATPSU4	600p
AMSTRAD SRX340, SRX345, SRX350	SATPSU5	600p
PACE D100/150	SATPSU6	650p
CHURCHILL D2MAC	SATPSU7	650p
PACE MSS100	SATPSU8	730p
		1

# **SATELLITE TUNERS**

PACE PRD800/MSS200 2Ghz (221-2077062) ORDER CODE: TUNER01 PRICE: 1400p + VAT

PACE PRD900/MSS1000 2Ghz (221-21770112) ORDER CODE: TUNER02 PRICE: 1400p + VAT

# **SWITCH MODE TRANSFORMERS**

**PACE 9000** 

ORDER CODE: PACE9000 PRICE: 800p

PRD800/PRD900

ORDER CODE: PRD800 PRICE: 550p

_		
MAKE & MODEL	CODE	PRICE
PACE MSS200/300 APPOLL	SATPSU9	900p_
PACE MSS500/1000	SATPSU10	1230p
FERGUSON SRD4	SATPSU11	650p
ECHOSTAR SR5500	SATPSU12	1600p
ECHOSTAR 6500/7700/8700	SATPSU13	2750p
AMSTRAD SRD600	SATPSU14	2600p
MIMTEC (Surensen)	SATPSU15	700p_
AMSTRAD SRD700, SR950, SRX100, 301, 501, 502, 1002, 2001, SRD2000 SAT250	SATPSU16	650p

### **SATMETER**

The Satmeter is a professional portable satellite strength meter designed for the installation and maintenance of satellite TV systems. The Satmeter can be used as stand alone with powering the LNB as well as in loop.

Through operation with satellite RX powering the LNB.

- \* Acoustical signal: On signal strength \*LED indicator: Vert/Hori
- \* Frequency Range: 900 to 2050 Mhz \*Input impedence: 70 Ohm \*Detection Range: -60 to -10 DBM \* Power amplifier: 18db
- \* Max. input signal: -10 DBM

**ORDER CODE: TOOL22** 

PRICE: 8500p

# ACEMENT

# **GRUNDIG**

PART No: 29703, 29102

USED ON:

C7500, C8500. C8502, C8712 . . .ETC

Order Code: SW1

Price: 140p

# **PHILIPS**

USED ON:

(30, K35, K40, KT3, KT4 Order Code: SW13

Price: 95p

# SONY

USED ON:

KV1612, KB1612, KV1614, KV2052, V2056 KV2062, KV2067, KV2212 . . .ETC Order Code: SW5 Price: 150

USED ON: KV1400, KV1440, KV2040, KV2060 (POWER SWITCH 26mm)

Order Code: SW12

Price: 125p

# SONY

USED ON:

(POWER SWITCH 21mm +Remote) Price: 200p

Order Code: SW6

**SONY 2 PIN FUNCTION SWITCH** 

Order Code: SW9

Price: 35p

		<b>FUSES</b>	OUGV PLOW	
	TIME LAG (20mm)		QUICK BLOW (20mm)	
CURRENT RATING	ORDER CODE	PRICE	ORDER CODE	PRICE
100mA	FUSE36	75p	FUSE37	60p
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	60р	FUSE32	50p

CERAMIC PLUG TOP								
CURRENT RATING	ORDER CODE	PRICE						
3A	FUSE33	100p						
5A	FUSE34	100p						
13A	FUSE35	100p						

32 mm CERAMIC SLOW BLOW								
CURRENT RATING	ORDER CODE	PRICE						
8A	FUSE44	185p						
10A	FUSE45	185p						
15A	FUSE46	185p						

NB. All fuses are made in the UK and fully meet BS4265 & BS1362 safety standards and should not be compared with cheap imported types

FUSF47

CURRENT RATING	ORDER CODE	PRICE
6.3A	FUSE38	100p
8A	FUSE39	100p
10A	FUSE40	100p
3 15A	FUSE41	85p
4A	FUSE42	85p
5A	FUSE43	85p

38mm CER	<b>AMIC TIME</b>	ELAG
CURRENT RATING	ORDER CODE	PRICE
10A	FUSE48	825p
	CEC ARE FOR PACKE	

# **VOLTAGE TESTER**

A terminal screwdriver incorporating continuity & voltage with Euroslot

**ORDER CODE: TOOL11** 

PRICE: 220p

# **SPRING HOOK**

Spring Hook, to unlock springs in audio tape recorders & VCRs

**ORDER CODE: TOOL20** 

PRICE: 265p

# BOOKS

Satellite Fault Finding Guide Issue 1. Listing about 1,000 faults for over a range of 24 different brands.

Order Code: BOOK05. Price £8.50 - No VAT.

#### TELEVISION **Edition 6**

Lists more than 8,450 faults with 460 pages covering 58 different brands Price: 1600p only - no VAT. Order Code: BOOK02

# Satellite Repair Manual Edition 4

A comprehensive guide to receiver reviewing, featuring stock faults and installation tips.

Price £15.00 Only No VAT Postage 100p Order Code: BOOK03

#### SEMICONDUCTOR COMPARISONS 1997/8 Listing more than 31,600 Semiconductors with suitable alternative complete with descriptions and base information.

Price: £15.50 - No VAT. Order Code: BOOK04 SEMICONDUCTOR COMPARISONS 1997

The new 1997 Jaeger Semiconductor with 952 pages packed with information on over 80,000

emiconductors in much greater detail plus mar

keting data on SMD devices and a separate

generic table of all type designations.

Price: £40.00 only - No VAT (+ £5 Postage).

# Video Recorders Edition 5 1997

Over 300 pages packed with more than 5500 faults for different brands

Price £15.00 - No VAT. Order Code: BOOK01

SERVICE AIDS

VDLUME

176M

200M

CODE PRICE

SP01

SP03

125p

140p

170p

DESCRIPTION

VIDEO HEAD CLEANER

SWITCH CLEANER

SILICONE GREASE

# SOLDERING ACCESSORIES

DESCRIPTION	CODE	PRICE
ANTEX SOLDERING IRONS 25 WATT 240 VAC (XS25W 240V)	S101	000+
15 WATT 240 VAC (XS15W 240V)	S101	900p 900p
25 WATT SPARE ELEMENT 15 WATT SPARE ELEMENT	S103	450p
SOLDERING STAND & SPONGES	S104	450p
SOLDERING STAND (MADE BY ANTEX) SPARE SPONGE	S108 S109	350p 55p
SOLDER		
18 SWG 500 GRAMMES	S110	500p
20 SWG 500 GRAMMES 22 SWG 500 GRAMMES	S111 S112	650p 700p
DESOLDERING AIDS		
SOLDER MOP STANDARO GAUGE 1.2MM X 1.5M	S107	80p
SOLDER MOP 1.2MM X 10M	S113	400p
DESOLDERING PUMP	S105	320p
SPARE NOZZLE	S106	60p

# Order Code: BOOK06 I.C. PROTECTORS

ICPF10, ICPF15, ICPF20, ICPF25, ICPF38, ICPF50, ICPF75 ICPN5, ICPN10, ICPN15, ICPN20, ICPN25, ICPN 38, ICPN50, ICPN75

**PRICE: 30p EACH ONLY** 



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 2-5 cans 500p for more than 5 cans



CAN'T FIND WHAT YOU'RE LOOKING FOR?

RING US...AS THIS IS ONLY A SELECTION OF THE ITEMS THAT WE STOCK

Tel: 0181 900 2329

Fax: 0181 903 6126

# **CASSETTE DC MOTORS**

**6V MOTOR** 9V MOTOR 12V CW MOTOR 12V CCW MOTOR **13.2V MOTOR** 

170p 170p 170p 170p 290p

# **CASSETTE TAPE HEADS**

MONO HEAD STEREO HEAD 110p 150p MINI HEAD 200p AUTO REVERSE HEAD

# CD PICK LIPS

	CD	FI
Models & Description	Order Code	Price
ATWA XC007	KSSS151A	1900p
DX-990A, DX-DIA	KSS152A	1600p
CXL60, CXL66G, CXL80, CXN3100, CXN320, CXN3300, CXN360, CXN400, CXN430, CXN540,		
CXN550G, CXN990, CXN999, CXNV20, CXSL70, DXZ9100M, FDN636, FDN6636, FDN939,		
LCX60, LCX66G, LCX70M, LCX80, M7400, M75, NSX320, NSX360, NSX400, NSX430,		
NXS990, NSX992, NSX999, NSXD636, NSXD939, NSXV20, SXFN550.SXFN520, XC300,	NCC1504	4000-
XC550, XC750, XC900, XC950, XCN992, XG320, XG360, XG400, XG990, ZD3000M, ZD3100M	KSS152A	1600p
LCX8G, LCXAP1, XC002, XC004, XC005, XC777	KSS2108	2000p
XP31, XP33, XP55, XP80G	KS220A	2500p
XP6.XP7	KSS331A	3400p
AKAI		
CD73, DC93	KSS151A	1900p
CD25, CD26, CD27, CD32, CD36, CD37, CD52, CD55, CD57, CD650, CD670, CD69, CD750, CD79,		
CDM480, CDM600, CDM670, CDEM770, CDM959, MX550, MX570, MX650, MX670, MX750, MX950	KSS210A	1800p
DENON	W00.511	
DCD1500II, DCD1520, DCDE3520	KSS151A	1900p
DCD1400, DCD600, DCD800	KS152A KSS210A	1600p 1800p
DCD1420, DCD520, DCD610, DCD620, DCD660, DCD810, DCD820, DCD860, DCD910, DCD920 DCD1015, DCD1290, DCD2060, DCD2060G, DCD315, DCD480, DCD580, DCD615, DCD715,	A332 IVA	IOUUP
DCD825, DCD890, DCD895, DN2000F	KSS240A	3000p
GOLDSTAR		
CD952A, CD952AJ, CD952LJ, CD952SJ, FFH101KL, FFH101WL, FFH222A/L, FFH272L,		
FFH333L, FFH373K, FJ606, FR606L	KSS210A	1800p
CD320A/L, CD630S/L, FFH212A/L.FFH212E	KSS210B	2000p
GRUNDIG		
CD360, CD435	HOPM3	2150p
CCD300, CD101MCD904, MC10, NEW ORLEANS CD	KSS210A	1800p
KRCD100, RR1900CD, RR3100CD, RR4000CD, RR610CD, RR700CD	KSS210B	2000p
CDP60, CDP90	KSS220A	2500p
CDP65	KSS331A	3400p
CD905	OPTIMA5	3000p
HITACHI	нормз	2150p
DAW560	KSS210A	1800p
AXC10	KSS210B	2000p
J.V.C.		
1990-1992, LATE 1987-1988 - XLE300BK, XLE31BK, XLE51BK, XLE900BK, XLME91BK, XLV101BK,		
XLV211BK, XLV222BK, XLV311BK, XLV333BK, X:Z1010TN, XLZ411BK, XLZ444BK, XLZ555BK, XLZ611BK	OPTIMA3	4000p
CDRADIO CASSETTE, MINI SYSTEMS - MODELS 1990-1992	OPTIMA4S	5000p
CA-C33, CA-MX30BK, CA-MX33BK, UX-A5, UX-A6, XL-M309, XL-M403BK, XL-M408, XL-M409,		
XL-M504BK, XL-M505TN, XL-M508, XL-M509, XL-M705TN, XL-V131BK, XL-V151TN, XL-V221BK,		
XL-V241TN, XL-242BK, XL-V251TN, XL-V252BK, XL-Z1050TN, XL-Z551TN, XL-Z552BK	OPTIMA5	3000p
1994 ONWARDS - CAE48BK, CAMCG7, CAMXG9, CAS20BK, CAS30BK, VAS50, CAS60RBK,		
MXS20, MXS30, MXS60, PCX105, PCX130, PCX95, RCX230, RCX320, RCX520, RCX620,		
RCX720, UXA4, UXA5, UXA55, UXC7, UXT1, UXT3, XLF115, XLF116, XLF215, XLF216, XLMC100/M, XLMXG7, XLMXG9, XLV163TN, XLV164BK, XLV174, XLV263TN, XLV264BK,		
XLV274BK, XLZ463TN, XLZ464BK, XLZ574, XLZ674, XTMXG7, XTMXG9, XTS60	OPTIMA6S	3300p
KENWOOD	•	
DP47, DP660SG, DP8020, DP87, L1000D	KSS 152A	1600p
DP1030, DP1510, DP2010, DP2030, DP3010, DP3030, DP3050, DP4030, DP491, DP5010, DP5030,	7,00 7,00	
DP5040, DP520, DP7030, DP7040, DP7050, DP730, DP920, DP930, DP950, DPM650, DPM6630,		
DPM7730, DPM850, DPM991, DX6620, M225, M25, M450, M850, PD3030, PDM991, RDX25,		
RXDC3, RXDC3L, UD202, UD302	KSS210A	1800p
DPC42, DPC72, DPC77, DPC80, DPC92	KSS220A	2500p
DP1050, DP2050, DP3060, DP501, DP5060, DP722, DP76, DP85, DP89, M77A, PD3060,	VCC2404	2000
UD502, UD70, UD701, UD90, XE5	KSS240A	3000p
DPC321, DPC521, DPC531, DPC631K, DPC721, DPC731	K\$\$331A RH8136A	3400p 4500p
DP1060, DP2060. PART No: RCTRH8136AFZZ	nno i Jun	40000
PANASONIC SLP177A, SLP202A, SLP212A, SLP222A, SLP277A, SLP377A, SLP477AK, SLP477A,		
SLPG100A, SLPG200A, SLPG400A, SLPG500AK, SLPG500AS, SLPJ24A, SLPJ26A,	1	
SLPJ27A, SLPJ28A, SLPJ325A, SLPJ325A, SLPJ37A, SLPJ38A, SLPJ46A	691-30209	5500p
an arise an arase an agrant an agrant an agrat an agast an agast	50. 55253	

K UPS		
Models & Description	Order Code	Price
SAD30, SLCH9, SLP150, SLP170, SLP200, SLP202, SLP222, SLP230, SLP250, SLP333,		
SLP370G, SLP400C, SLP555, SLP777, SLP999, SLPA10, SLPC20, SLPC25, SLPJ25,		
SLPJ26, SLPJ27, SLPJ37, SLPJ45, SLPK25, SLPK26, SLPS50, SLPS70, SLPS700, SLPS840, SLPS900	SOAAD70A	2350p
PHILIPS		
AZ8304, CD070, CD080, 690, 910, 920. PART NO. 4822-691-20768	4822-691	3100p
CD100, CD130, CD1380, CD1482, CD200, CD204, CD210, CD300, CD303, CD304, CD380,		
CD480, CD482, CD500, CD502, CD582, CD583, CD584, CD610, CD620, CD630, CD780,	****	
CD781, CD782, CD840, CD883, CD960, CDF104, CDM4/19, FCD185	691-30209	5500p
AS440, AS445, AS540, AS640, AZ8048, AZ8640, CD070, CD080, CD091, CD163, CD165, CD690, CD710, CD720, CD732, CD740, CD750, CD910, CD920, CD935, FW17, FW21,		
FW26, FW330, FW36, FW360, FW3801, FW40, FW41, FW46, FW56, FW66, FW68	CDM12.1	1800p
CD1210/40	CDM12.4	2200p
AZ8006	KSS210B	2000p
FW11	OPTIMA6S	3300p
PIONEER		
PIONEER PDM400, PDM410, PDM500, PDM510, PDM600, PDM610, PDM700, PDM710, PDM730,		
PDT303, PDT403, PDT503, PDX940M, PDX950M. PDZ560T, PDZ72T, PDZ73T, PDZ81M,		
PDZ82M, PDZ83M, PDZ960M, XDZ53T, XDZ54T	KSS151A	1900p
N32, N90M, PD101, PD201, PD32, PD41, PD4500, PD4700, PD52PD5700, PD65, I PD6500, PD6700,		
PD7700, PD8700, PD970, PDCP420, PDCP520M, PDCP520T, PDJ400T, PDJ500T, PDJ800M, PDJ900M,		
PDM430, PDM450, PDM550, PDM630, PDM650, PDM750, PDM901, PDP710T, PDP720T, PDP910M.		
PDP920M, PDS501, PDS601, PDS701, PDS701G, PDS901, PDT310, PDT510, PDZ, PDZ570T, PDZ74T,		
PDZ84M, PDZ970M, PXA1349, S125CDT, S135CDT, S303CDM, S303CDT, S505DM, S505DT, S707DM,		
S707DTM, S909DM, S990DT, XCP410M, XCP410T, XDZ54T, XDZ55T, XDZ64M, XDZ84T, XRP310, XRP320	PEA 1030	4400p
PDM400, PDM410, PDM500, PDM510, PDM600, PDM610, PDM700, PDM710, PDM730,		
PDT303, PDT403, PDT503, PDX940M, PDX950M, PDZ560T, PDZ72T, PDZ73T, PDZ81M,		
PDZ82M, PDZ83M, PDZ960M, XDZ53T, XDZ54T, XDZ55T, XDZ62, XDZ62M, XDZ630, XRZ82	PWY1009	4800p
SAMSUNG		
CD20	HOPM3	2150p
CD1200, CD1310, SCM-6000, SCM6900	KSS210A	1800p
RCD1200, RCD1300, RCD1350, RCD1600, RCD2600, RCD990, RCD995, SCM6900	SOH90T4N	3600p
SANYO		
DCFS3, DCT55, DCX502, DCX701, DCX702, DCX802, DCX891, DCX891N, MCDZ10.		
PART No. 6142186855	614218	2300p
DCFS5, MCD450K, 660K, MCDZ30L, 60F. PART No. 6142205006	614220	5600p
DCX1000MD, DCX1003, DCX900MD, DCX903, DCX915	KSS210A	1800p
DCD10, DCD11U, DCD20, DCD30, DCD30AT, DCD6, DCD8U, DCMS1, DCX110, DCX120,		
DCX210, DCX220, DCX993, DCX994, MCDMS40L, MCDMS50L, MCDMS660L, MCDZ1L,	614239	3300p
MCDZ2L, MCDZ3L, PART No. 6142391303 DCD12, PART No. 6450055966	645005	3700p
MCDZ31L, MCDZ41L, MCDZ61L, MCDZ71L	KSS210B	2000p
SHARP		
CD-111, CD-301, CD-302, CD-304, CD-310, CD-C3, CD-L700, CD-L800, CD-U1, CD-U10, CD-X10,		
CD-X12, CD-X15, CD-X16, CD-X17, CD-X20, CD-X9, CKL650, CMS95CD, DX-150, DX-160, DX-450, DX-460, DX-461, DX-650, DX-660, DX-999, DX-A3, DX-N45, DX-R554, DX-R7, DX-R75, DX-R750,		
DX-R77, DX-R770, DX-R820, DX-R840, DX-Z100, DX-Z1000, DX-Z1500, GFCD55, QT-30CD, QT-33CD,		
QT-350CD, QT-37CD, QT-38CD, QT-CD20, QT-CD33, RS95, SC-77CD, SC-99CD, SC-RS95, SG-A1,		
SG-W1CD, SG-W2CD, SYS302, ZCD7CD. PART No. RCTRH8122AFZZ	RH8122A	5750p
QT-SOCD, QT-60CD, QT80CD, PART No. RCTRH8124AFZZ	RH8124AF	2900p
DXR-840B, PART No. RCTTRH8130AFZZ	RH8130AF	2900p
CDS360E, 360H, 370, 450H/E, CMS150CDH, CMSR400CDH, CP150, CPR400, CPS360, 370.		
PART No. RCTRH8136AFZZ	RH8136AF	4500p
SONY		
KSS240A	KSS240A	3000p
KSS121A	KSS121A	3500p
KSS151A	KSS151A	1900p
KSS210A	KSS210A	1800p
KSS210B	KSS210B	2000p
KSS220A	KSS220A	2500p
KSS331A	KSS331A	3400p
KSS360A	KSS360A	2600p
TECHNICS		
SLP200, SLP230, SLP250, SLP333, SLP555, SLP777, SLP999, SLPA10, SLPC20, SLPJ25,		
SLPJ45, SLPS700, SLPS900	SOAD70A	2350p

# REMOTE CONTROLS

				VI U I	L	CONTROLS					
Description	Code	Price	Description	Code	Price	Description	Code	Price	Description	Code	Price
AKAI			A512120/230	RC900	650p	PANASONIC			SONY		
RC-V10A	RC876	650p	A514790	RC901	650p	EUR51200	RC200	650p	RM604, RM605, RM606	RC140	650p
RCV 37 B	RC891	650p	A5088470	RC902	650p	TC2200	RC204	650p	32 CHANNEL	RC140	650p
V25A	RC896	650p	A518612	RC903	650p	VSQ0357/NV730	RC202	650p	RM613	RC141	650p
DECCA			SCL002	RC904	650p	TNQ1621	RC203	650p	RM632, RM636	RC160	600p
RC70	RC894	650p	C2096	RC905	650p	PHILIPS			TATUNG		
FISHER			A511940	RC906	650p	RC5002,5154	RC134	650p	FXA	RC877	650p
RC9058	RC879	650p	655602H	RC1920	650p	KT3 NON TEXT	RC135	650p	RC70	RC883	650p
	NC0/3	ОЗОР	ιπ			69117032 69117194	RC178	650p 650p	FX70 FASTTEXT	RC894	650p
GRANAOA	00000	CEO.	IFB13, 14, 15	RC143	650p	RC5991-UNIV	RC180 RC300	550p	TELEFUNKEN		
UNIVERSAL TEXT	RC309	650p	FS4	RC148	650p	RC38	RC301	650p	FB632	RC632S	ST 650p
MK4 TEXT, 70155G, 70115G, 70133G	RC880	650p	RG305	RC305	650p	КТЗ ТЕХТ	RC5301		FB639	RC639	650p
95288E 94490D	RC882 RC884	650p 650p	RG306	RC306	650p	RC5352	RC5352		THORN/FERGUSON		
	NC-004	озор	FS9/1-10/1	RC307	650p	RC5375	RC5375	650p	3V35-42	RC342	600p
GRUNDIG	00407	050	VS5 RUK	RC308	650p 650p	RC5 STANDARD	RC300	550p	3V31-32	RC344	650p
TP160E	RC107	650p	VS4-1 MULTICONTROL (17C20)	RC308 RC311	650p	RC5903	RC5903	650p	3V57-58	RC628	650p
TP200, TP300	RC380 RC401	650p 600p		ncarr	ooop	SALORA			TX10 TEXT	RC732	
TP400 TP590-600	RC600	650p	LOEWE	20110		SERIES L	RC190	650p	TX10 STEREO TEXT	RC738	
TP390, TP610	RC610	650p	DC11	RC146	650p	86173	RC882	650p	TC9-90-100	RC740	600p
TP621	RC612	650p	MATSUI			SANYO			3V55, FV11	RC783	
TP630, TP650	RC650	650p	010270601	RC889	650p	RC218, RC222, RC228, RC238	RC140	650p	TX100 FASTTEXT	RC789	650p
TP666	RC660	650p	VX770	RC892	650p	JXGE	RC878	650p	TX100 ST, FASTTEXT	RC789	650p
TP661	RC661	650p	NOKIA			JXDE VHR2300	RC884 RC890	650p 650p	PROFESSIONAL	RC790	650p
HITACHI		****	SATELLITE	RC550	650p	RC628	RC865	650p	TOSHIBA		
CLE800-CLE830	RC140	650p	ORION			SHARP	,,5005	ооор	CT937	RC950	650p
A617402/655602	RC1920		RC53	RC892	650p	G0121CESA, 123CESA, 204, 251	RC140	650p	CT9117	RC951	650p
MO17702/033002	1101020	Joop	1		Joop	,,,,			•		•

# WE STOCK REMOTE CONTROLS FOR OVER 5,000 DIFFERENT MODELS RING FOR MODELS NOT LISTED ABOVE ON 0181 900 2329

# 8 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: 8 WAY

PRICE: 1450

PRICE: 1450p + VAT

# 2 way Preprogrammed Universal Remote

Replaces up to 2 remotes (TV/Satellite)
Simple key arrangement
Set-up by library review
Order Code: 2 WAY

PRICE: 925p

#### REPLACEMENT LINE OUTPUT TRANSFORMERS LOT169 1500p LOT137 1600p LOT136 1600p LOT169 1500p LOT180 1550p TLF 14520 F TLF 14521 F TLF 14567 F TLF 14568 F TLF 14584 F TLF 14586 F TLF 15606 F HITACHI 2424593 2432101 2432461 LOT59 LOT59 LOT186 LOT245 LOT186 1-439-303-31 1-439-303-32 1-439-311-00 1-439-311-11 Part No. AKAI 45150344 101-214017-03 LOT278 LOT72 101-220005-03A 1-439-311-13 LOT27 LOT80 094-01057/1.1 610.018.6620 LOT95 D 053/3 2432761 LOT180 1-439-311-32 LOT95 LOT56 2432981 2432981 TLF 70012 TLF 70012 1-439-331-22 LOT96 D 059/3 LOT200 1-439-331-41 LOT98 LOT39 LOT202 2432982 LOT37 LOT178 1-439-332-00 ECM 2015 AL LOT168 LOT274 FCM 2015 AL FERGUSON 00 D-3-508-001 00 D-3-508-002 00 D-3-515-001 1-439-332-11 1-439-332-21 1-439-332-41 1-439-332-42 1-439-332-52 1-439-333-10 1-439-333-11 1-439-333-12 2433012 LOT30 1250r RTRNE 1783 CEZZ LOT38 LOT38 LOT276 LOT276 LOT79 LOT79 LOT 174 2433014 TLF 70161 LOT278 RTRNF 1786 BMZZ LOT72 LOT72 LOT72 2433212 LOT22 TI F 70162 TLF 70162A TLF 70162B TLF 70162G TLF 77001 B 2433291 LOT172 LOT192 RTRNF 2000 BMZZ 2433301 4515 03 19 LOT30 1250 RTRNF 2002 BMZZ 2433441 LOT188 LOT190 1650; 1550; RTRNE 2002 CE27 LOT307 TLF 77001 B PHILIPS PHILIPS PHILIPS PHILIPS R822 140 101142 4822 140 10146 4822 140 10146 4822 140 10151 4822 140 10151 4822 140 10171 4822 140 10171 4822 140 10178 4822 140 10198 4822 140 10236 4822 140 10236 4822 140 10247 4822 140 10254 4822 140 10254 4822 140 10254 4822 140 10254 2433442 LOT191 LOT196 LOT308 1550p 1550p 1250p 2433451 LOT81 LOT194 LOT307 00 D-4-235-002 1-439-363-11 1-439-363-21 2433452 LOT82 10T22 LOT142 1800p LOT308 1400p 1450p 1450p 1600p 1600p 1600p 00 D-4-235-002 HTI IOT198 00 D-4-235-00201G LOT81 1-439-387-11 RTRNF 2007 BMZZ RTRNF 2023 BMZZ 243345 LOTEZ I OT112 00 D-4-260-004 HTI LOT38 1-439-387-21 LOT311 2433531 2433581 2433751 2433752 2433752 2433891 2433892 2433893 2433952 2434002 2434141 2434141 2434274 2434274 2434473 LOT310 00 H-0-701-2400 LOT182 1-439-416-11 LOT255 LOT179 LOT207 LOT56 LOT193 LOT27 LOT200 LOT56 LOT196 LOT56 LOT56 LOT201 LOT275 1500p LOT91 1600p LOT91 1600p LOT92 1700p LOT229 1700p LOT229 1700p LOT229 1700p LOT48 1600p LOT48 1600p LOT48 1600p 06 D-3-083-001 LOTR2 LOT255 1-439-416-12 1-439-416-21 1-439-416-23 1-439-416-41 1-439-416-51 1-439-430-21 154125A TOSHIBA 37010 3753100 1-439-243-00 1-439-243-11 1-439-243-12 1-439-243-31 1-439-243-41 1-439-244-00 1-439-244-11 1-439-244-31 LOT82 LOT255 LOT275 1500p 06 D-333-512-00° 37010 37011 FETX 100 90 DEG LOT131 1450p LOT131 1450p LOT27 FETX 90 WHITE 37012 4822 140 10269 4822 140 10271 4822 140 10274 LOT27 LOT210 LOT208 FETX 100 100 DEG 37013 LOT131 LOT56 LOT22 LOT131 LOT131 LOT131 LOT131 LOT131 LOT131 LOT131 LOT55 LOT01 37014 1250p 1-439-256-11 4516 16 01 MITSUBISH LOT123 LOT153 1750 37015 4822 140 10282 4822 140 10283 4822 140 10294 LOT153 LOT140 LOT149 LOT60 LOT163 LOT61 LOT62 LOT62 LOT63 LOT86 LOT122 LOT104 1-439--256-21 29201.000.0 37016 1450p 1450p 1450p 1450p 1400p 1300p 1350p 1300p 1450p LOT122 1300p LOT124 1500p LOT125 2150p LOT110 1200p LOT51 2434455 I OT234 1550p 2434593 276-16399 LOT49 LOT50 15000 1-439-276-21 1700 4822 140 10306 4822 140 10326 4822 140 10326 4822 140 10326 4822 140 10328 4822 140 10339 4822 140 10349 4822 140 10349 4822 140 10367 4822 140 10367 4822 140 10389 4822 140 10389 4822 140 10389 4822 140 10421 4822 140 10421 4822 140 10421 4822 140 10421 4822 140 10421 4822 140 10421 4822 140 10306 2435062 LOT296 334 B 07803 1450r 1-439-280-00 LOT92 1600p 1300p 1300p 2435121 2435131 LOT87 334 B 078030 334 B 08104 LOT50 1450p LOT132 1-439-280-13 LOT251 LOT74 LOT122 1300p LOT46 2435131 2435141 2435301 2435671 2436201 2436202 2432101-2 2433451H 334 B 08108 334 P 18506 334 P 18507 1-439-286-11 1-439-286-12 1-439-286-13 I OT282 LOT29F 1600 LOT124 1250p LOT88 LOT89 LOT51 LOT75 LOT106 LOT46 1300 1500p 1500p 1500p 1500p 1700p 1300p 29201.022.01 I OT284 LOT46 23236023 23236052 1-439-286-13 1-439-286-21 1-439-288-12 1-439-289-00 1-439-289-01 1-439-289-21 1-439-294-21 1-439-294-01 1-439-294-11 1-439-303-00 1-439-303-11 LOT89 LOT109 LOT109 LOT79 LOT81 LOT82 LOT23 LOT84 29201.022.02 LOT166 LOT165 10170 LOT284 LOT46 LOT286 LOT109 LOT128 29201.022.03 D 108/37 DCF1577 LOT49 LOT228 1400p 29201.022.04 LOT165 10T273 23236198 DCF1577 DCF2077A KFS 60226B MSH-1FBW08 NIKKAI BABY10 LOT273 LOT279 LOT78 29201.022.04A LOT165 1350 LOT47 23236255 LOT289 1500p LOT129 1400p LOT128 LOT127 LOT116 LOT73 LOT109 LOT103 29201 024 01 LOT65 1500p LOT164 1400p 23236424 LOT129 1400p LOT288 1400p LOT289 1500p LOT131 1450p LOT131 1450p LOT293 1550p LOT281 1300p LOT281 1300p 23236425 23236428 23236428 3122113837011 150F6D TFB 4039 AD TFB 4048 AD TFB 4048 BD LOT24 LOT24 LOT24 LOT24 LOT24 LOT67 1450p 1850p

\*\*\* \* ☆ **NIKKAI BABY 10** \* REGULATOR A **ORDER CODE: BABY 10** \* PRICE: £10.00

\*\*\*\*

# UNIVERSAL TRIPLER PRICE: £5.00 EACH



PLEASE PHONE US FOR ANY TRANSFORMERS NOT LISTED, AS THIS IS JUST A SELECTION OF THE PARTS THAT WE STOCK

# INTRODUCING

# The world's first TV Simulator for Diode Split Transformers diagnosis

# Features & Functionality:

- Deferred measurement of the HIGH VOLTAGE
- Monitor the waveform shape on any winding
- LED warns of fault condition
- Digital readout identifies actual fault condition
- Real simulation of the low voltage horizontal deflection stage 

  Analysis of Diode Split Flyback Transformers without the TV set
  - Tests transformers without having to remove it from the TV set
  - Facility to release measurements without applying high voltage
  - Aid for diagnostic at TV repair
  - Compact, functional unit

ORDER CODE: LOTMETER. PRICE: £75 + VAT POSTAGE: £5 + VAT



# GRANDATA LIMITED

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

Telephone: 0181 900 2329 Fax: 0181 903 6126 E-Mail: grandata.ltd@btinternet.com OPEN Monday to Friday 09:00 - 17:30 Saturday 09:00 - 14:00

# HELP WANTED

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

Wanted: A Panasonic NV430 VCR, also a TDA5651 IC. Peter Ward, Petgra, Forest Corner, Ringwood, Hants BH24 3JW. 01425 475 445.

Wanted: Name, address and phone/fax number for a UK distributor of spares for Gelhard products, believed to be of German manufacture. Eddie Cox 01489 782 885 (phone/fax).

Wanted: Information/spares to rectify white video dropouts present before and after head replacement with a Sony SLC9 Beta VCR. Also, can anyone help identify a GoldStar VHS VCR model badged as the Susumi XR1. Alan Stubbings, 7 Church Road, Saxilby, Lincoln LN1 2HH. 01522 702 601 (evenings/weekends), 01522 583 373 (daytime).

Wanted: Service manual/circuit diagram for the Shivaki TV/VCR Model VT14, also a tuner. Am trying to convert this unit to PAL I format. Robert Crawford, 44 Castle Park Drive, Fairlie, Ayrshire KA29 0DG. 01413 327 777.

Wanted: Three video boards and one logic board for the Sony VO2630 U-Matic VCR; a Sony SLC30 Beta VCR; and a Sanyo VTC-M3 Beta VCR, Japanese home market version, or circuit diagram in English for this. N.D. Wenham, 17 Sheringham Court, Swindon, Wilts SN3 6HJ. 01793 526 744.

Wanted: Chopper transformer for the Zanussi Model 22ZT505 or complete power supply panel. G.R. Goldsmith, 2 Stanley Close, Verwood, Dorset BH31 6EX. 01201 824 398.

Wanted: Working power supply PCB (in good condition) for the Amstrad SRD500 satellite receiver. Also copies of *Television* for January to December 1994. John Whittle, 12 Manet Square, Fairlands, Bognor Regis, Sussex PO22 9BC.

Wanted: Lower head drum motor for the Sony SLO1700 industrial

Betamax VCR, or information on a source of supply for this item. P.R. Marshall, MVS Video Productions, Rehoboth, Alkham Valley Road, Folkstone, Kent CT18 7EH. 01303 891 468.

Wanted: DC-to-DC converter for the Sony Betamax C9 VCR, or a fully-working C9 with handset! Also interested in servicing/repair manuals for any or all Betamax machines (photocopies would do). Lee Lewis, Glanhowy House, Park Place, Tredegar, Gwent NP2 4LD. 01495 722 446 (evenings) or e-mail l.lewis@rocketmail.com.uk

Wanted: Service manual for the Mitsubishi Model CT3701TX. J.H. Roberts, Roughlee, Bull Bay, Anglesey LL68 4DF. 01407 832 229

Wanted: 22in. TV set fitted with the Ferguson TX100 chassis, working or not. Can collect in the S. London/Surrey area. Paul Farnfield, 24 Hillside Road, Ashtead KT21 1RX. 01372 275 351.

Wanted: Circuit diagram/service manual, copy or loan, for the Philips PM3212R 0-25MHz oscilloscope. F. Bathurst, 75 Lisher Road, Lancing, Sussex BN15 9EY. 01903 752 163.

Wanted: IC type TLP581Y (IC602) for the Sony Model KV27XRTU or a complete power supply board. Colin Tooze, 8 Pear Tree Close, Bell Green, Coventry CV2 1JL. 01203 685 085.

Wanted: Remote control and teletext (Fastext) board 1637-001, using an MAB8461 chip (IC1806), for the Ferguson TX100 chassis. Also front control flap for the same TV (Model 59G3). R. Walton, Rogers Television Service, 44 Johnson Street, Cleethorpes, NE Lincs DN35 7NA. 01472 362 071. Wanted: Secam board 6911-19-35, PAL board 6911-29-02 and text decoder board 6911-19-54/82 for the ITT Compact 80 chassis. Also any information on upgrading the Philips CTU900 D2-MAC decoder for a better picture. I. Mackintosh

(Mac), 7 Wellington Court, Trearddur Bay, Holyhead LL65 2LJ, 01407 860 864.

Wanted: JVC HRD660/540/520 or Ferguson FV37H or similar VCR with VPT facility: timer-display, syscon and PSU must be working. Ian Jackson, Flat 6, The Grange, 5 Harlow Oval, Harrogate HG2 0DS. 01423 508 197.

Wanted: Can anyone suggest alternatives for the Y1044 (SCR1) and Y1043 (SCR2) thyristors used in the early version (PC1001) of the Ferguson TX9 chassis. Also require a TDA1035T sound chip (IC53). Roy Bailey, 22 Grebe Close, Waterlooville, Hants PO8 9UT. 01705 783 811.

For disposal: ITT CVC40 type TV for spares or repair; Ferguson 9653 TV for spares or repair plus box of 9600 series panels; Ferguson 24in. 1500 chassis set in working order but tube rather soft; two mechanical tuners for the Ferguson 1500 chassis; about 30 elliptical TV speakers, various sizes, ex-equipment. Token payment please and prospective owner(s) to collect. M.K. Hayter, 24A St. Albans Road, Moseley, Birmingham B13 9AS. 0121 449 5508

Wanted: SBX-M904A IT055 control module for the JVC Model CS2180EK. Also a chopper transformer for the Hitachi Model CPT2508 (G7P chassis). Good salvaged components OK. R. Waller, 25 Laceby Close, Bramley, Rotherham, S. Yorkshire S66 0YF. 01709 544 079.

Wanted: Service manual and operator's manual for the Philips PM3211 oscilloscope, photocopy OK. J. Southwell, Aquarius Electronics, 125 Honeysuckle Road, Bassett, Southampton, Hants S016 3BT. 01703 396 567.

Wanted: Circuit diagram or service

Wanted: Circuit diagram or service information for the Orla Prestige Electronic Organ. Donald McIntosh, 11F Colonsay Terrace, Soroba, Oban, Argyll PA34 4YN. 01631 563 337.



Reports from
Pete Gurney, LCGI
Stephen Leatherbarrow
Bob McClenning
V.W. Cox
Brian Storm
Michael J. Cousins
Michael Dranfield
P.J. Roberts and
Chris Watton

# **JVC HRD820**

The original fault had been no play-back picture. So someone had fitted new heads. This hadn't cured the fault and in addition there was now no colour with prerecorded tapes. The colour problem was the easiest one to deal with – the heads had been fitted 180° out. These drums have an index hole in both the head and the lower cylinder boss. They don't align next to each other. If in doubt, look at the mounting surface when the head is removed: there is usually a ring of dust where the index hole had been.

I was now back to square one, with what admittedly looked like a head problem at first glance. The picture sometimes returned however, and when it did the head switching varied between its correct point and somewhere half way up the picture. I've had similar problems before, caused by the lower drum – specifically C6, which is a 3·3µF surface-mounted capacitor. A dose of freezer proved its guilt. Once a replacement had been fitted and the head switching had been set up the machine produced a good picture.

Note that the lower drum drive PCB is common to quite a few JVC Models. P.G.

#### Alba VTV10

This little TV/VCR combination kept on trying to load a tape that wasn't there, then shut down. It looked like a mode switch problem,

# VCR Clinic

which is becoming increasingly common with the type of deck this model uses. As the deck is not the easiest to work on without an extension lead set I replaced the mode switch on spec. No luck. After a lot of searching about I eventually discovered that there was an end-stop sensor fault – no illumination because of a hairline crack around the IR-emitting diode D01. Resoldering cured the problem.

Note that any faults which result in deck shut down will also switch the TV to standby.

I've also had several loading motors go open- or short-circuit, with the result that the TV switches off after ten seconds or so because the deck is unable to initialise. The same deck is used in the Matsui VX735A/Saisho VR3300 and related models. **P.G.** 

# **Sharp VCH841**

This machine came in several times over a period of a month or so with the complaint that it would shut down, refuse to respond to the controls and trap a cassette inside. But each time it appeared in the workshop it would reset then work fault-lessly.

Clutching at straws, I replaced the mode switch. This made no difference. Eventually the machine came to a complete halt: the cause was immediately traced to a seized capstan motor. A strip down and clean cured the problem. **P.G.** 

# Ferguson FV82

This dead machine had no functions or clock display. There were no shorts or obvious open-circuits in the power supply, so I decided to check the two electrolytics on the primary side. As is so often the case, the cause of the problem lay here. CP007 (10µF, 50V) had gone very low in value. I decided to replace CP008 (100µF, 25V) for good measure. Capacitors rated at 105°C were used. They are asso-

caited with pins 9 and 11 respectively of the power supply chip IP001 (U4616B). S.L.

# **Baird 8940/JVC HR7350**

Following a service this venerable machine produced no E-E or play-back sound. After checking for any obvious switch position sillies I traced the audio output from the IF strip to the AN6394 chip IC2. The signal was present here but got no farther because this chip's supply at pin 14 was missing. It's derived from Q11 (2SC2673). There was no 11V supply at its emitter because of an open-circuit junction. S.L.

# Hitachi VTF860E

This VCR failed to start up after disconnection from the mains supply. I found that C6 (1µF, 250V) which supplies the kick-start to Q1 in the power supply was low in value. **B.McC**.

# **Grundig VS510**

If the machine is dead with the solenoid clicking, replace C1325 (1µF) in the start-up circuit. **B.McC.** 

# Aiwa FX1500

There were no record problems but occasionally the playback disappeared, as though the head amplifiers had failed. The fault would come and go with the slightest movement but, despite this, the cause was tricky to find. There are some straggling wired-on extras close to the LA7449 video processor chip. One, a resistor, was only in contact and had never been soldered. V.W.C.

# Panasonic NVHD605

This machine would accept a tape then go straight into the rewind mode. Apart from tape ejection that's all it would do. Suspecting a faulty end sensor I removed the main PCB and found that the  $0.1\mu F$  capacitor fitted across the end-sen-

sor transistor Q6003 was leaky. B.S.

# Panasonic NVFS90

This S-VHS machine's E-E pictures were over-white and distorted. Oscilloscope checks brought me to the ceramic module IC303, which had become damaged by capacitor leakage. A new module, part no. VCR0389, cleared the fault. **B.S.** 

# Panasonic NVHD650

This machine produced neither menus nor a test signal. When a tape was inserted F05 was displayed, indicating loss of reel drive. The 2SD1996STTA 5V regulator transistor Q1002 in the power supply had failed. A replacement restored the missing functions. **B.S.** 

# Panasonic NVHS1000

This machine was completely dead. There was no display – nothing at all. Fearing extensive component failure in the power supply, I gloomily removed the module. Fortunately all that had failed was the 2SD1996STTA transistor Q1102 in the 5V regulator circuit. **B.S.** 

# Ferguson FV67/77HV

This Nicam VCR was dead, with no display and no functions. Power supply checks revealed that the voltages on the secondary side of the circuit were very low. So the capacitors on the primary side were checked. CP11 in the start-up supply to the chip, IP01, was low in value at 90µF instead of 220µF. A replacement restored normal operation. M.J.C.

# Daewoo DVR5172P

This machine wouldn't come out of standby. As the 5V supply to the microcontroller chip was OK I checked the power control pin 41, which was stuck high – it should go low at switch on. The 12MHz clock (pins 31-32) was running, but a check at the reset pin 29 produced a low-voltage reading of 2.5V instead of 5V. Replacing the three-pin reset chip IC603 made no difference however.

This left only two items that could be faulty, either the microcontroller chip itself or C515 (10nF) which decouples its reset pin. C515, which is a small brown disc capacitor, turned out to have a  $1.6k\Omega$  leak. M.Dr.

# Samsung VI621

This machine wouldn't switch on. The clock was OK, but pressing the power button did nothing. As a first step I removed the front panel – a stuck-down button can cause this fault. Not this time however. The cause was R7  $(1.5k\Omega)$ , which was open-circuit. It's in the power supply and is part of the power control circuit. M.Dr.

# Ferguson FV10

There was low playback sound. The E-E sound was also low, though it was OK via the scart socket. Checks revealed that the modulator was at fault: the 0·1µF non-polarised audio coupling electrolytic capacitor C3 had failed. M.Dr.

# **Panasonic NVG10**

There was a chroma fault – the symptom varied between flashing colours and no colour. Luckily I remembered a similar fault we'd had with a Matsui VCR. The item to replace is C2 (100µF, 35V) in the power supply. It's next to the power regulator chip on the main board – no wonder it dries out. M.Dr.

# Aiwa HVGX350

This VCR wouldn't play tapes. While testing it on the bench I noticed that it would occasionally lock up. After this it would work only when the mains supply had been disconnected then reconnected. As the cause of the trouble seemed to be a reset fault, I replaced the KIA7033P reset chip IC504. The machine then worked normally.

Next day it failed again. This time the machine was dead with no outputs from the power supply. The fuse was intact, and there was 320V across the mains bridge rectifier's reservoir capacitor and at pin 7 of the chopper transformer. A scope check on the drive waveform at the gate of the chopper transistor FEP01 showed that its frequency was very low (50Hz). At this point I noticed a very fine break in the PCB track between RP04 (0.47Ω) and FEP01. Once this had been repaired the machine sprang back to life. After a good soak test it was returned to the customer. P.J.R.

# Aiwa VXT1420

This tele-video wouldn't play tapes. I stripped the unit down and noticed that once a tape had been threaded up the machine would shuffle it back and forth then eject it – I was using a prerecorded tape. While this was going on the drum and the capstan rotated. So a new mode switch was fitted and the deck alignments were checked. This failed to cure the problem.

The power supplies and reset etc. were next checked and found to be OK, and replacing the reel sensor made no difference. As the syscon chip's drum, capstan and reel sensor inputs were fine, the chip itself (IC1001) seemed to be the culprit. When a replacement (part no. SE-C90-28B-8BO, type OEC6025A) was obtained and fitted the machine worked normally. P.J.R.

# **Amstrad TVR2**

The VCR section appeared to be stuck in the forward search mode, but was actually in the play mode with the capstan motor running too fast. A check showed that there was no capstan motor FG signal at pin 1 of connector CL-FG on the main PCB. There should be a 250Hz (approximately) sinewave at about 0.5V p-p here. As a new motor is expensive, I prised the lid off and checked the coil. The enamelled wire inside wasn't connected, so a repair was possible. C.W.

# Ferguson FV30

"Can't set the clock" was the complaint with this elderly VCR. All other functions were fine, and the playback picture and sound were good. They don't make them like that now! The cause of the fault was glue beneath the tuner/timer PCB, where a disc capacitor is fixed to the foil side. Correct operation was restored when the glue had been removed. Manufacturers should surely know about the effects of this type of glue, so why do they still use it? Who knows?! C.W.

# Panasonic NVJ40

The card said that this machine was dead. In fact it came on for about a minute, and during this time a tape could be played. There was no picture however, though the sound was all right. The E-E picture was also OK. I noticed that the drum was running slowly, and when I tried the machine again the E-E picture was covered with swirling lines of white dots. Then the machine went dead.

The power supply seemed to be the obvious place to look. C1110 ( $10\mu F$ , 400V) and C1127 ( $330\mu F$ , 10V) were both found to be low in value. After replacing them the machine seemed to work all right, but further checks revealed that C1131 ( $330\mu F$ ), C1126 ( $10\mu F$ ) and C1125 ( $680\mu F$ ) were faulty – they all read about half the correct value. After replacing them I put the machine on test for a day. The symptoms had all been cured. C.W.



# Satellite Notebook

# Philips STU3601

The customer complained about this receiver's poor pictures. It was only about a year old. On test I found that after several hours the picture started to develop a jitter and shadows appeared. Tapping anywhere produced interference.

Resoldering dry-joints in the power supply didn't seem to make much difference. It looked like a modulator fault, which was confirmed by the fact that reception via the scart socket was OK. So I removed the modulator and had a look inside. There was an earthing plate that had cracked solder at one end. After resoldering this and some other suspicious-looking joints I replaced the modulator and gave the receiver a long soak test. Everything was now OK. A.J.R.

# Pace PRD800+

If the channel number and identification displays tear and appear for only a couple of seconds at channel change, and the menu graphics tear and go off after a second menu, suspect the sync separator transistors Q23, Q24 and Q25. In the most recent case Q25 (ZTX314) was leaky. J.C.P.

# **SVA1 Sky Decoder**

The problem with this unit was intermittent decoding. While checking around the power supply I noticed that, judging by their condition, the two presets had already been twiddled (sorry, adjusted!). PP02 fell to bits when I tried to set it up for 5V at TP01. Replacing them both restored normal operation. For good measure I also replaced the two large electrolytics CP01 and CP03 as they were rather discoloured.

The decoder had been installed in a cabinet with little room for ventilation – a sure way to get trouble! **H.C.** 

# Dish Sharing

A number of our customers share a dish. Installation is usually no problem, but difficulties can arise with horizontal/vertical polarisation switching – more often than not a Pace SS9000/9200 receiver is the cause of the trouble.

The situation is as follows: the two receivers work fine when they are both operating with vertically-polarised signals, but when one receiver selects the higher 17-18V horizontal-polarisation voltage the other one won't receive the vertically-polarised channels. If the vertical/horizontal selection is reversed however the results are as they should be. The receivers generally share a twin-output LNB, and are not connected to a 'magic switch'.

The cause of the trouble is that the higher horizontal-polarisation voltage from one receiver results in loss of vertical-polarisation reception by the other one. The cure is simple enough: insert two silicon diodes in series in the offending receiver's feed to the LNB. This will reduce the supply by just over 1V: normal operation should then be resumed.

After doing this, check all permutations and combinations of channels with both receivers. Make sure that the horizontal-polarisation voltage from the modified receiver is about 17V.

With SS9000/9200 receivers the easiest way to add the two diodes is to cut link LK210, which is adjacent to crystal X7 near the front of the board, and fit them here with

their cathodes pointing towards the tuner assembly. Note that fitting them here will reduce both the horizontal- and vertical-polarisation supplies, though I've never found that this affects the vertical-polarisation performance. You could however fit the diodes in series with the supply to Q3, reducing only the horizontal-polarisation supply.

The problem can come and go with LNB temperature variation. If the problem returns in the evening, a third diode can be added. I had to do this recently with an SS9200 that was paired with a Bang and Olufsen satellite receiver.

In another recent case a Pace SS9000 and an SS9200 shared the dish, the source of the problem being the SS9000 receiver. Two diodes in series put things right.

The effect doesn't, in my experience anyway, show up with multiple receiver IF distribution systems. In this case the problem is more often lack of the horizontallypolarised channels. What usually happens is that only one receiver is in operation, the LNB is a 'twin' type (with horizontal and vertical output at each socket) and the magic switch fails to provide approximately 17V at its horizontal output to make the LNB switch over. It's much better to use a 'dual' type LNB (with the horizontalpolarisation supply at one socket and the vertical-polarisation supply at the other). It then doesn't matter, within reason, what voltage is passed to the LNB from the magic switch. The receiver will generally provide enough voltage to make the switch select the horizontal signals.

With a large IF system, it's better to install a DC power injector so that the LNB is powered indepen-

Reports from

Alan J. Roberts

**Hugh Cocks and** 

Michael Dranfield

John C. Priest

dently. This avoids trouble – some older receivers don't like to supply too much LNB current.

When installing a new receiver and an older one together we sometimes use the original 10GHz LNB oscillator frequency. The older receiver can then be used in the normal way, the new Pace receiver being used to tune down to 700MHz to provide Astra 1D reception. Sometimes Channel 5 is a requirement with the older receiver. In this case the LNB's local oscillator is adjusted to give Channel 5 at an IF of around 955MHz, Sky Sports 3 appearing at around 1,700MHz.

With the IF shifted by some 30MHz and the local oscillator frequency at about 9.97GHz, I assumed that it would be simple to key this frequency in the new Pace receiver's LNB oscillator frequency selection menu. But life isn't that simple, because in the 'variable-frequency mode' the receiver's tuner won't go below 950MHz. The answer to this is to keep the receiver set to the 10GHz oscillator frequency and increase each channel frequency by some 30MHz. This sounds like a lot of work, but I keep 'offset-frequency files' for the purpose in the memory of my Pacelink receiver PC tuning system, so immediate downloading of the channel-frequency information is available.

With a multiple-receiver system and distribution via a magic switch, the 700-950MHz IF may not be passed by the switch. So keep to a standard 9.75GHz enhanced LNB. If an older receiver is connected, use a frequency extender to convert the 1,750-2,000MHz IF so that it is within the receiver's tuning range. H.C.

# Pace PRD800

Reception of the horizontally-polarised channels was intermittent, together with some patterning. The 18V supply's reservoir capacitor C23 (2,200µF) was open-circuit and bulging. **H.C.** 

**Digital Upgrade** 

The Dutch digital package via Astra has been available for more than a year now. Not so long since the national terrestrial Netherlands 1, 2 and 3 channels were added, also a "summer TV" channel aimed at Dutch expatriates and holiday-makers around Europe. A Pace DVR500 is generally used for reception, but strangely enough its on-screen menus and subscription

messages are all in English.

While at a customer's house recently I checked the "software upgrade" message box and saw that one is available. On-screen advice told me that it would take eleven minutes to complete and asked me whether I wanted to continue – it didn't however say what the nature of the upgrade was. As the customer was keen to see what it was, 'OK' was pressed to start the upgrade procedure.

The receiver then turned off its video output, and the display at the front went repeatedby from 1 through to 7, accompanied by a circular movement beside the number (this is similar to the default frequency search display but is more rapid).

True to its word, after exactly eleven minutes the receiver went back to the standby mode. When it was switched back on the channels reappeared, though in a different order to that prior to the upgrade (they are easily set in the preferred order however). But the main change was that the menus and onscreen messages were now all in Dutch, while the main menu had had a Canal Plus logo added to it. This used to be Filmnet in the Benelux and Scandinavian areas, but they have now merged. Receiver operation is otherwise exactly as before.

It was always odd that the DVR500 didn't have a Dutch menu option – the Italian version has English/Italian switchable language facilities. H.C.

# Shift from 601

BBC TV Prime and its predecessors have in the past been available via Intelsat 601 at 27.5°W. This satellite is now ending transmissions, but BBC Prime in MAC continues via Intelsat 707 at 1°W – frequency around 11.67GHz, with horizontal polarisation. A new MAC-D2 viewing card is being issued, by a Norwegian company. It allows only those viewers outside Scandinavia to receive BBC Prime.

A lot of old, fixed dishes were in use for 27.5°W reception. It has sometimes been quite a battle to persuade a rather corroded 1.8m dish support structure to move around to the new position. In some cases the ancient coaxial cable, which was quite happy coping with the relatively low (approximately 1GHz) IF from the old satellite, fails miserably with the new IF at just under 1.7GHz (assuming that the original 10GHz local oscillator

LNB is still in use). The highest IF that this cable would previously have been required to handle would have been CNN at around 1.15GHz. CNN left Ku band via 601 when it moved to Astra back in 1991 (it's still available in C band at 27.5°W however). So it's essential to take new coaxial cable along to these jobs – plus plenty of WD40 to free the dish support! H.C.

# **BT SVS300**

Poor video with rolling was the complaint with one of these receivers. I found that the pictures from the video and decoder scart sockets were OK, but the picture from the TV scart socket was bad. The cause was C207 (0·47µF, 50V), which had dried up. It couples the video input to the onscreen display chip. M.Dr.

# Pace SS9000

At power up the standby and stereo lights came on together. Apart from this the receiver remained lifeless. Checks at the microcontroller chip's clock and data pins 15 and 38 revealed that they were both at 0V. As a first step the chip's reset capacitor C146 (1µF) was replaced, but this made no difference. The 5-62MHz clock (pins 2 and 3) was OK, and there was 5V at pin 1. The next step was to disconnect the clock and data lines. Disconnecting the clock line brought back some activity, and the disconnected data line was found to be at 5V. The culprit was in fact the Z86E21 microcontroller chip U4.

I feel that the repair kits for these receivers are becoming a bit of a waste of money. To do a quality repair, you need twice as many capacitors as are included in the kits. When we repair one of these receivers we replace all the electrolytic capacitors on the primary and secondary sides of the power supply plus a handful around the tuner. Cost is not a problem when you get your electrolytics from Farnell Electronic Components in Leeds (01132 636 311) who do a bulk discount on a hundred 10µF, 105°C capacitors made by Panasonic. In general we use 105°C electrolytics for replacement purposes. To improve reliability, we replace both the electrolytics associated with the Pace satellite tuner: in the 2·2μF position we use a solid aluminium type rated at 125°C, Farnell part no. 577-406; for the 47µF subminiature type we use Farnell part no. 490-738 which is rated at 105°C. M.Dr.

# **Thomson TX805 Technology**

# The Thomson TX805 small-screen TV chassis is used in Ferguson and Goodmans models. J. LeJeune takes a look at the technology and circuitry employed

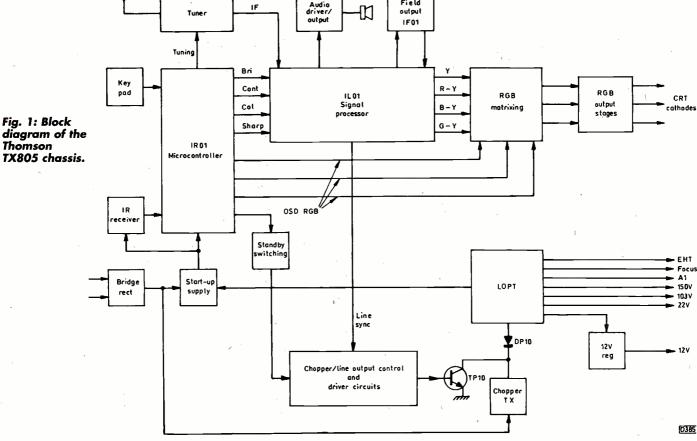
The Thomson TX805 chassis is used in the Ferguson Models D14R and T14R, also the Goodmans Model 1410. It has similarities to the older, successful TX80, and follows that design in having a 'hot' chassis and a combined line output/chopper power supply of the Wessel type. The tuner therefore has an isolated aerial socket.

Much of the circuitry is contained in two large ICs, the TMP47C834-47C634 microcontroller IR01 and the M52038-SP (PAL) signal processor chip IL01. The latter incorporates the IF strip, the colour decoder and the sync and field timebase generator sections. It provides luminance and colour-difference outputs which are matrixed externally to produce RGB signals to drive the output stages on the CRT base panel. There's a discrete component audio driver/output stage, while for field output an LA7830 chip (IF01) is used. Fig. 1 shows a block diagram of the chassis.

#### The Tuner

We'll begin with the tuner, which is a Thomson type MTP-BG-2024. A block diagram is shown in Fig. 2. The original version has a VHF section, which is omitted for UK sets. There are four stages, starting with a BF998 MOSFET RF amplifier. The input to this is fairly broadband: there's bandpass tuning in its output circuit, using varicap diodes. The following mixer stage is based on an earthed-base transistor, with the local oscillator and UHF input signals both being applied to its emitter circuit. Earthed-base operation is also used in the local oscillator stage, with feedback from a capacitive tap across the oscillator coil. The mixer transistor's collector feeds a bottom-coupled bandpass filter. This is followed by an emitter-follower buffer stage (TH93).

The tuner uses a voltage swing of 0.5-30V to cover the



Thomson TX805 chassis.

range 470-860MHz. It's a variant of the tuner used in the Thomson IKC2 chassis.

The IF Strip

The tuner's IF output is fed to a SAWF driver transistor, TI02 (BF959), which uses selective feedback in its emitter circuit to provide frequency compensation. The SAWF, QI01, provides a balanced output which is fed to pins 8 and 9 of the signal processing chip IL01, see Fig. 3.

Within the IC a differential amplifier converts the signal to the normal unbalanced state. This is followed by a gaincontrolled (AGC) amplifier then a linear amplifier, after which the signal is at a suitable level for application to the

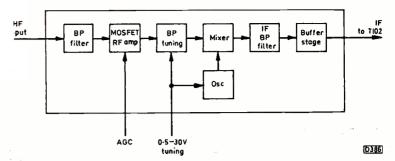


Fig. 2: Block diagram of the tuner.

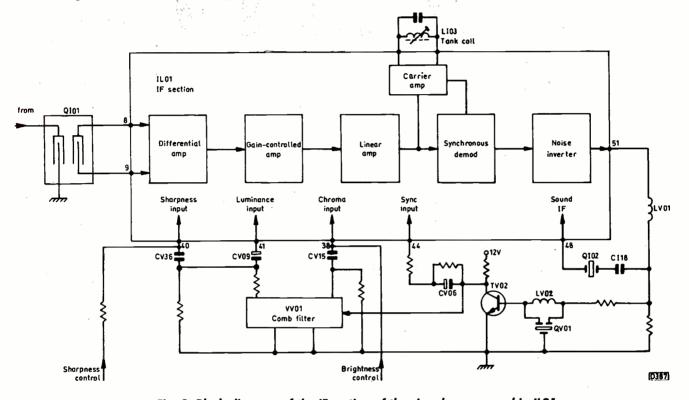


Fig. 3: Block diagram of the IF section of the signal processor chip IL01.

synchronous demodulator. Demodulation of this type is basically a switching process: the signal is sampled at the IF carrier peaks to extract the video information. The demodulator therefore requires a second, switching input. For this purpose the IF carrier drives a 'tank' coil, LI03, which produces a pure sinewave at the carrier frequency. LI03 should normally be left well alone: if adjustment is needed, it should be done using a good oscilloscope to observe the sharpness of the video transients at pin 51 of IL01.

The IC produces, at pin 52, a negative-going AGC voltage for the MOSFET RF amplifier transistor in the tuner. This is effective up to high-level inputs. The internal AGC system is of the forward type and can be monitored at pin 5 which is connected to the filter capacitor CI07.

The demodulated output at pin 51 of IL01 is filtered by LV01. It also contains the 6MHz FM sound signal. The latter is fed via CI18 to the 6MHz ceramic filter QI02, reentering the chip at pin 48.

**Luminance Signal Processing** 

The video component of the signal is fed via filter QV01/LV02 (to remove the 6MHz signal) to TV04 which drives the comb filter VV01. This separates the luminance and chrominance components of the video signal, providing separate feeds to pins 38 (chroma) and 41 (luminance) of

IL01. VV01 also provides the luminance signal delay required.

The first process when the luminance signal re-enters IL01 is sharpness control. For this purpose an HF filter (CV36 and RV41) provides a second input at pin 40. The arrangement is shown in Fig. 4. It involves three voltage-controlled amplifiers. Amplifier A receives the full bandwidth luminance signal, amplifier B a signal with reduced HF content and amplifier C the HF input at pin 40. This pin also receives the DC sharpness control voltage, which is obtained from pin 6 of the microcontroller chip IR01. The outputs from the three amplifiers are added then fed to the following contrast control stage. The gain-control characteristics of the three amplifiers are tailored to provide a smooth transition from a 'soft' picture to a sharp, somewhat overshot one, over the range of the electronic sharpness control.

Sharpness control is followed by contrast control then brightness control. A simple video amplifier whose gain is controlled by the DC voltage applied to pin 36 of IL01 is used for contrast control. Brightness is controlled by adjusting the clamp potential on which the video signal sits – the clamp reservoir capacitor is connected to pin 39, while the DC brightness control voltage is applied to pin 38. Note that pins 36 and 38 both serve two purposes: pin 36 is also used

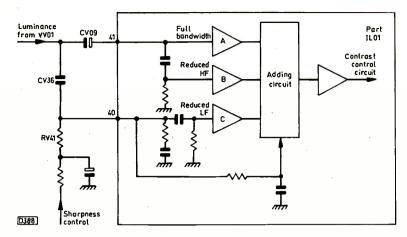


Fig. 4: The sharpness control arrangement.

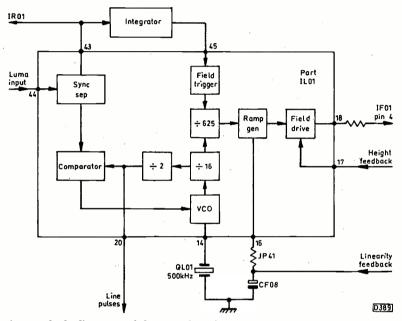


Fig. 5: Block diagram of the sync/timebase generator section of IL01.

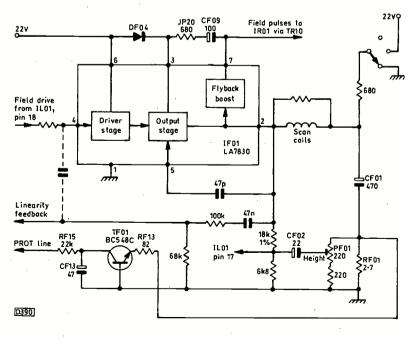


Fig. 6: The field output stage.

for the burst filter while pin 38 is also the chroma input pin. The IC's 'official' brightness control pin is pin 42: beam current limiting is applied here, also to the contrast control pin.

The luminance signal is finally fed via an open-emitter buffer stage to output pin 22 – by open-emitter we mean that the emitter load resistor is an external component, RV25. There is also a further, external emitter-follower buffer transistor here, TV05, which provides current amplification and impedance matching to the RGB matrixing stages. On-screen display (OSD) blanking is also applied to the base of TV05, to insert a rectangular black box for the graphics. The OSD blanking originates at pin 25 of the microcontroller chip, and is shaped by the circuitry around TR02 and TR13 to enhance the edge sharpness.

# **Colour Decoding**

IL01 also incorporates the PAL colour decoder, which operates in the conventional manner. The chroma input is at pin 38. Pin 34 provides an output to the chroma delay line circuit which in turn provides R – Y and B – Y inputs at pins 27 and 28 respectively. The 4-433MHz crystal is connected to pin 32.

The only slightly unusual thing here is the origin of the pulses for the ident switch. They are obtained from the heater winding on the line output transformer and fed via CP61 (1 $\mu$ F) and RP46 (39k $\Omega$ ) to pin 26, where they are fed to a flip-flop circuit.

#### More ILO1 Functions

IL01 also contains the 6MHz FM sound detector, volume control and audio preamplifiers stages, with output at pin 4, and the sync and field timebase generator system, see Fig. 5.

The heart of the sync and field timebase generator section is a voltage-controlled 500kHz crystal oscillator – the crystal is connected to pin 14. Division by 16 then 2 provides line-frequency (15·625kHz) pulses at pin 20. We will see how these are used when we come to the Wessel circuitry. The sync separator receives a video input from the collector of TV04 at pin 44. It provides a sync pulse output to the field sync integrator at pin 43 and in addition feeds pulses to the comparator stage. This also receives the line-frequency pulses, generating an output to control the VCO. In the absence of a video input at pin 44 the receiver will free-run at frequencies very close to normal. The sync output at pin 43 is also fed to pin 36 of the microcontroller chip to control the OSD.

The integrated field sync pulses return to IL01 at pin 45, where they are applied to a trigger circuit which resets a divide-by-625 counter. This in turn restarts a ramp generator connected to pin 16. CF08 is charged via JP41 from an internal current source to produce the ramp. Linearity feedback from the field output stage is applied to the junction of CF08 and JP41. The linear ramp is fed to a driver stage which also receives feedback for height control at pin 17. The field drive output appears at pin 18.

# The Field Output Stage

An LA7830 chip is used in the field output stage. As usual with such devices, it contains a drive amplifier, an output stage and a flyback boost circuit – see Fig. 6. A 22V supply that's derived from the line output transformer is fed to pin 6. This is inadequate to produce the flyback, hence the boost circuit which operates as follows, see Fig. 7.

A pulse drive is applied to the bases of transistors Qf and Qs. During the scan period Qs is held conductive and boost capacitor C charges via D from the 22V rail. During the flyback period Qf is switched on and Qs switches off. The 22V supply thus appears at the negative plate of capacitor C,

which retains its 22V charge, and diode D switches off. The supply to the output stage is now approximately 44V – the 22V supply plus the charge across C. In the TX805 circuit C is CF09 (100 $\mu$ F) and has a 680 $\Omega$  resistor in series (JP20) to provide current limiting.

DC can be fed to the scan coils to provide shift adjustment. A three-position switch gives either no shift, slightly

upwards or slightly downwards shift selection.

Protection for the field scan coils is provided by transistor TF01. Should the field scan coupling capacitor CF01 go short-circuit, a negative voltage will be developed across RF01. This will forward bias TF01, applying the negative voltage to the protection (PROT') line. This line is connected to the base of TR07, whose role is described below.

# **Signal Output Stages**

The RGB and audio output stages are quite conventional. Colour-difference signal and luminance signal matrixing is carried out by the BC546A transistors TV101/2/3 on the main panel: they receive colour-difference signals at their bases and the luminance signal at their emitters, where the RGB OSD signals are also applied. TV101/2/3 drive the emitters of the BF422 RGB output transistors on the tube base panel.

The complementary-symmetry audio output stage (a pair of pnp/npn transistors, TA03/4) delivers 1.5W to the  $16\Omega$  speaker. TA05 is connected between the bases of the audio output pair to stabilise their operating points. Bootstrap feedback is applied to the driver transistor's load circuit.

# The Microcontroller Chip

The dedicated microcontroller chip IR01 fulfils several functions: it decodes the infra-red remote control commands and the front panel key operations; it supplies onscreen graphics to accompany operation of the receiver controls; it provides pulse-width modulated outputs for brightness, sharpness, colour and contrast control; it provides audio muting; and it carries out channel selection using a phase-locked loop for tuning.

Fig. 8 shows the system control circuitry associated with IR01. When the set is switched on at the mains, LED DK01 lights and the 'LED2' supply (at the earthy side of DK01) appears at the collector of TR08, whose base is forward biased by RR50 and DR05. TR08's emitter then provides an output voltage for the microcontroller's power supply pin 42, via DR01, and the IR receiver's power supply pin, via RR91. This is the standby state, with IR01's on/standby pin 20 at 5V.

When an on command is received, the voltage at pin 20 of IR01 falls to zero. This controlls the emitter of transistor TP12 in the power supply. It switches on, in turn switching TP11 on. The chopper/line output circuit then starts up. This circuitry will be shown in Part 2 next month.

When the mains supply is disconnected, there is no longer a voltage feed to the collector of TR08. TR08, zener diode DR04 and TR07 switch off, while TR06 switches on (CR20 is still charged). As a result, the 'start' line goes low. CR14 discharges, switching TR12 off momentarily. IR01's reset pin 33 goes high for 1msec, allowing it to store the user settings before the 5V supply decays.

TR07 is normally on, being forward biased via DR04 and RR48. Thus TR06 is held cut off. As a result IR01's hold pin 34 and the start line, which is connected to the base of TP12 in the power supply, are in the high state. TR07's base is also connected to the PROT' line. When this goes low, TR07 switches off and TR06 switches on. The start line goes low, switching off TP12 with the result that the receiver shuts down.

The PROT' line is linked to TF01 (see above) and the excess-current detection circuit in the power supply. It goes

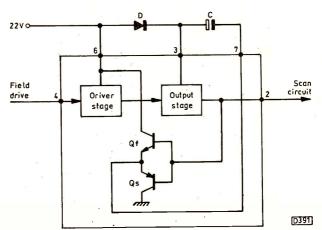


Fig. 7:
Operation of the field flyback boost circuit.

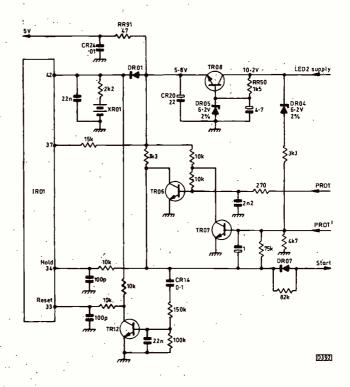


Fig. 8: System control circuitry associated with the microcontroller chip IRO1.

negative when a fault is detected, overriding the bias via DR04. Thus TR07 switches off and TR06 switches on, with the results described above.

There's no mains switch at the front of the receiver, but a substantial rocker-type switch is fitted at the rear for mains switch-off if required.

# **Next Month**

The main section of the receiver not so far touched on is the combined power supply/line timebase circuit. We will be dealing with it in the concluding instalment next month.

# We welcome letters from our readers and try to publish as many as we can. You can send them typed, handwritten, or on disc. Address them to the Letters Editor, Room L302,

**Electrical Safety** C.N. Cory (Letters, November) raised the subject of the electrical safety of consumer electronic products. It should be of concern to the general public and service personnel alike. Some reduction in the level of safety can be blamed on the effects of CENELEC harmonisation of the various European standards and the introduction of certain EEC directives. The main cause however is poor design and a lack of understanding of basic safety principles.

Quadrant House, The Quadrant,

Sutton, Surrey SM2 5AS.

Products made by major manufacturers generally exceed the legal safety requirements by a good margin, but some products from Asia and other developing countries are downright dangerous. A good example is a pair of Chinese-made 'Multi-Media' speakers, in which the only insulation between the live mains supply and the audio connectors was the varnish on the transformer wires!

All electrical products sold in Europe and the UK are covered by The Low Voltage Directive, which requires the product to comply with the "essential" safety requirements of an appropriate CENELEC standard such as EN60065 (BS415). It's up to the manufacturer or importer to decide which parts of the standard are "essential", and the company can then self-certify its product(s) if it thinks that they comply. This is obviously open to

Reputable companies normally

# Letters

have their products tested by an independent test house to ensure that they comply with the whole of the relevant standard, and will also have a good quality-control system in place. Organisations such as BEAB in the UK, TÜV in Germany and UL in the USA also offer an approvals and production monitoring service. This ensures that a high safety level is maintained. Unfortunately there is no compulsion in Europe to join such

So why are modern TV receivers designed without earthing or aerial isolators? The EN60065 safety standard accepts either Class I construction, with an earthed chassis, or Class II construction, with double insulation. There are several reasons why only Class II is in practice

John Woodgate's letter December) pointed out a problem in Germany, with circulating currents that can melt aerial leads. This is because of the widespread use of TN-C or TN-C-S mains supply systems, with a combined neutral and earth that can float above 'true earth' by a significant amount. When a TV set is connected to a communal aerial system which is grounded to 'true earth', or to another part of the supply system at a different earth potetial, high circulating currents can arise.

Another problem in Continental Europe is the lack of a standard three-pin plug. The two-pin "Europlug" will fit any socket in Europe. There are at least seven different and non-compatible three-pin plug systems in use however, and the correct plug or adaptor would have to be supplied with each set. There are some combinations of plugs and sockets that can cause a potential hazard, such as exposed pins or no earth connection.

The other factor that affects the design of sets is the EEC directives. One requires that all mains-powered sets are fitted with a scart (Peritel) socket. Because of this the designer has to use an isolated, non-live chassis (it would be very difficult to isolate all the signal and switching connections if the chassis was live).

The EMC directive also imposes restrictions on the mains cable and aerial socket. For reasons of safety EMC filters, whether part of the chassis or incorporated in the mains plug, usually don't filter the earth conductor. Computer monitors are usually earthed, and it is surprising how much interference can travel down the earth lead unless expensive countermeasures are taken.

The aerial socket must pass the aerial immunity test, which means that it must be located close to the tuner and that any aerial isolator unit is well screened. The easy way to guarantee compliance is to use a tuner with an integral aerial socket. J.R. Allison,

Bradford, West Yorkshire.

I am encouraged by John Woodgate's response (December) to my letter (November) and hope that other influential readers have taken note. I can now report on developments since I originally wrote to you.

In the first receiver the degaussing coil had been tightly tiewrapped to the CRT rimband. When the tie-wraps were cut, it was found that the PVC tape on the coil bore deep grooves made by the tiewrap's ratchet profile and that cuts had been made by the sharp metal edge. The outcome of this method of construction is inevitable, bearing in mind the enegetic vibration of the coil each time the AC mains supply is applied. In this case a static test during manufacture is clearly irrelevant. The aerial socket was not isolated, which was one of the concerns raised in my first letter.

The retailer has replaced the receiver with a brand new model of the customer's choice. I have been told that the defective set is now being investigated by Trading Standards officers. The importer does not have BEAB approval for his TV sets, and I was surprised to learn that this is not mandatory. The importers are reluctant to discuss the matter - I have still had no written response from them.

The second receiver was exactly as John Woodgate predicted, the problem being caused by faulty reassembly following a cabinet change. It is unlikely that we will be able to trace the person responsible, though this is being attempted. I shall certainly in future inspect the degaussing coils in all sets brought to me for repair.

There is quite a lot of exposed metalwork involved in this case. The TV set's loop aerial, a metalcased aerial changeover switch, and of course the aerial plugs/sockets in the system. Don't forget that the covers of VCRs and satellite receivers are usually metal and are connected electrically by springs or contact-screw arrangements to the chassis and aerial socket. The customer mentioned that her daughter had reported receiving a tingle from the VCR. I still get a knot in my stomach when I think about it.

If an aerial cable melts because of an earth loop, this surely indicates that there is a serious installation problem. It should not result in us throwing away our safety earth.

The isolation provided by a

mains or chopper transformer is bypassed by the degaussing system, to which equal importance must be attached. If there are two insulated paths in parallel and failure of either can result in a lethal hazard, is the product really double-isolated?

I see no reasonable excuse for the use of non-isolated aerial sockets. All the TV sets in my workshop have been fitted with simple ferrite transformers. At UHF these are small, virtually lossless, simple to make and of little cost.

Finally, in my experience coincidences regularly occur. This is however the first time I've lost sleep over one.

Chris Cory, T.Eng., MIQA, Tekelex, Thatcham, Berks.

### Microwave Oven Problem

The following problem caused us so much trouble that I think it's worth a mention. It involved a Thorn Multiwave MH1080 microwave oven with twin halogen grill. When it was plugged in the cavity light came on, also the magnetron cooling fan which ran continuously. A time could be entered, but there was no response to the start button.

We had no service information, so a lot of time was spent on finding the cause of the fault: the  $1M\Omega$ resistor R6 on the power PCB was open-circuit. It's connected to the lower latch switch, and tells the microcontroller chip whether the door is open or closed. When R6 is open-circuit the oven assumes that its door is open, disables the cook button and turns the fan and light on. Michael Dranfield, Buxton, Derbyshire.

# **Doming**

I was recently asked to look at a Panasonic TX212V TV set, the problem being very bad purity at the centre of the left half of the screen. It seems that the tube's shadowmask is buckled. A note written by another service engineer said the fault is "doming". He suggested keeping the contrast and brightness at minimum to prevent overheating the shadowmask. Shouldn't the beam limiter have prevented this? It seems that a lot of work has already been done on the set. Any comments? Jim Littler. Wigan, Lancs.

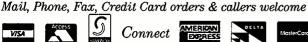
Is looking for . . .

# ICs TRANSISTORs SEMIs an up hill struggle?

A phone call to us could get a result. We stock a very wide range . . . and with a World-wide database at our fingertips we are able to source even more. We specialise in devices with the following prefix (to name but a few): 2N 2SA 2SB 2SC 2SD 2P 2SJ 2SK 3N 3SK 4N 6N 17 40 AD ADC AN AM A BA TO BD BY BDV BDW BDX BF BFR BFS BFT BY WILL BFY BLY BLY BY BRX BRY BS BSS BSV BSV BSV BT BTA BTB BTV BU AUK BUT BUV BUW BUX FUY BUZ CA CD CX (XA DAU DG DM DS DTA DTC CL, CM HA HCF HD HCF ICL ICM IRF J KA KIA L LA LBLC LD LF LM M MAM MA MAB MAX MB MC MDA J MJE MJE MM MN MPS MPSA, JPSH MPSU MRF NJM NE OM OP PAPAL PIC PN RC S AA SAB SAD SAJ SAS SDA SG SI SL SN 80 STA STK STR STRD STRM STRS SVI T TA TAA TAG FBA TC TCA PDA TDB TEA TIC TIP TIPL TEA TL TLC TMP TMS TPU U UA UAA UC UDN ULN UM UPA UPC UPD VN X XR Z ZN ZTX + others. We can also offer equivalents (at customers' risk). We also stock a full range of other electonic components.















# Cricklewood Electronics Ltd

40-42 CRICKLEWOOD BROADWAY LONDON NW2 3ET TEL 0181 452 0161 & 450 0995 FAX 0181 208 1441

# P.V. TUBES

104 ABBEY STREET, ACCRINGTON, LANCS. BB5 1EE Tel: 01254 390936/236521 Fax: 01254 395361

TRADE COUNTER OPEN MON-FRI 9-5, SAT 9.30-12 NOON, CLOSED ALL DAY WED. Please add VAT 17.5% to all prices. We accept payment by cheque, Cash, Access, Visa. Add £2 pp for orders up to 11K. Heavier parcels add £4. Next day delivery on LG. Consignments POA. Goods will be despatched on the day we receive your order. If we are out of stock we will inform you ASAP. Please allow up to 28 days deliver.

PV Tubes has been established for 20(0) years and has supplied the TV and electronics trade with omponents and service ai it began. In a continuing effort to maintain the industries requirements it is our intention to make available an increasing rang of specialised service aids and skills.

The PV1 multi-purpose degaussing The PV1 multi-purpose degaussing coil is an example of our commitment to supply quality product at competitive prices. The PV1 degaussing coil is intended for use with a 2400 mains supply. although a 120v version is available upon request. This compact and cost effective unit will have major interest to TV Service Departments, TV manufacturers, TV Sales and Rental Companies TV Broadcasting Authorities Universities and Colleges, The Armed Forces, Aviation and Computer Companies.

Specialised degaussing systems can be designed and manufactured to suit specific applications within many engineering environments. As part of the strategy in supplying specialised skills within the electronics industry, we are able to offer design, consultancy, and manufacture of electronic products specific to those larger customer

# SILLY CLEARANCE SALE

THE FOLLOWING PARCELS ARE OFFERED IN COMPLETE LOTS AND ARE ALL SUBJECT TO AVAILABILITY UNTIL FEB 28TH 1998

1	
100 TO3 Mounting Kits for	£10.00
125 FM Plugs for	£15.00
100 F Connectors screw on for	£6.00
10 Philips G11 Lopt for ^ ^	£20.00
Asstd Box of Sony components incl. S.Manuals	£25.00
10 T.V. Stands for	£20.00
20 Asstd. Varicap tuners for	£10.00
50 Slider pots mixed bag for	£5.00
250 Mixed bag resistors .25W/5W/1W/2W	£5.00
150 Thorn 2A Thermal cut out	£15.00
400 3.5mm Jack/2x3.5mm Jack Leads	£60.00
More than 50 asstd. service manuals/sheets	- £25.00
150 Electrolytic caps axial 400MF 40V	£10.00
26 Asstd. Sinclair power supplies	£50.00
150 Boxed, labled, asstd. STYLI	£100.00
Mixed bag of 50 asstd. wire wound resistors	£5.00
Mixed bag of 50 1.25" ASS/QB fuses	£2.50
Box of asstd. we lamps etc	£20.00
150 5 Pin/6 Pin Din Sockets	£15.00
240 Cassette leads 2x3.5 Jack/2x3.5 Jack	£50.00
10 Bell boxes with back plate	£45.00
15 New boxed dynascan tube bases	£60.00
2 3V29 or 3V22 Cassette housing assy	£10.00
75 Spectrum 48K membrane	£75.00
110 Spectrum + membrane	£220.00
142 Spectrum 48K mats	£125.00
300 Asstd. Potentiometers (some dual gang)	£100.00
5 3SSH Video heads	£10.00
1 Periswitch scart switching unit	£25.00

IF WHAT YOU NEED ISN'T LISTED - ASK! RING SHEILA OR EMMA

# Long-distance Television

Terrestrial DX and satellite news and reception, the Hot Bird 3 line up, 1998 meteor shower dates and a Band I notch filter design. Roger Bunney reports

The main event during November was the Leonids Meteor Shower peak on the 17th. When I checked early in the day I found that Band I, particularly ch. E4, was very active, with many signal pings and some more sustained reception. Signals from Scandinavia predominated, with PM5534/44 test patterns alternating and floating with each other. It was not unlike a minor Sporadic E opening, though less intense.

As I had to leave for work I was unable to continue monitoring Band I. Subsequently Cyril Willis (King's Lynn) commented that the Leonids event "wasn't as good as expected". He received an SpE signal in ch. R2 at 1035 that day.

Peter Schubert (Rainham) laments the poor conditions during the month. Apart from his usual ch. E4 reception from Lopik, the Netherlands, he had no tropospheric reception. SpE reception was limited to an unidentified signal on the 8th.

In all, a very poor month for ter-

restrial DX-TV reception.

Down under, on November 7th Robert Copeman (Victoria) logged a ch. C1 signal (49.75MHz vision carrier) during the period 1910-1950 local time. As no other signals were present, this suggests TE (transequatorial skip) rather than multi-hop SpE reception. On the theme of TE and the increasing solar activity, Six News reports several cases of cross-equator signal hops, mainly northwards to the Mediterranean area. As yet, the density of F2 layer ionisation has not been sufficient for signal reflection to the southern UK, but hopefully we'll see traces of ch. E2 signals from Ghana/Nigeria/Zimbabwe during the early evening period sometime this winter.

As solar activity increases with the start of the new cycle, check for flares and other disturbances. On November 6th for example there was the fourth largest flare ever recorded, leading to signal fadeouts and other problems over the following two-three days. It's always worth checking 27 days later, when the sun has rotated, to see whether more solar radiation produces further effects such as an aurora.

Satellite Sightings

Despite the increased use of digital transmission, there has been an upsurge of analogue signals from the satellite belt. You often find anything up to four clear analogue Ku-band feeds via Intelsat K (21.5°W) east-bound to Europe. PAS-3R (43°W) is another favourite for analogue reception. There was a lot of transatlantic activity during late November, thanks in part to spectacular skiing reports from British Columbia. The

snow-clad slopes of the Rockies look fantastic. Sports feeds for Europe were noted via both PAS-3R and K. Identifications indicate that several uplink companies were active at a number of sites. For example on the 20th Sky Sports carried "BC – Park City" (via K) and on the 27th "PSSI NYBC Mammoth CA". I'm uncertain about the significance of the latter.

Did anyone see the "Shell Test" on November 12th at 0730 via Intelsat 803 at 27.5°W (11.680GHz vertical, with sound at 6.6MHz)? I did, but had to leave for work before the transmission came off colour bars.

On November 21st the United Nations "Symposium on TV" from New York was carried in clear analogue form via PAS-3R (at 12-64GHz horizontal). Some of the big guns of the broadcast TV world, including Dan Rather and Rupert Murdoch, presented their views. The programme consisted of recorded highlights from a TV Forum that lasted over a three-day period. Interesting that the 6-2MHz sound carrier was in English and the 6-8MHz one in Spanish.

Cyril Willis saw the Telethon on November 27th via Intelsat K (at 11·62GHz horizontal) – not the UK version but the "Armenian Telethon Fund '97". Various presenters and a scrolling caption at the bottom of the picture provided details of the latest pledges. The carrier ceased abruptly at 2000 hours: little charity from Intelsat!

I hope some of you manage to see the 1997 SatFest, a veritable feast of informal and informative TV on satellites and broadcasting. Line up and rehersals are to be on January 16th, followed by program-

CNCT - Rabat received via Eutelsat. Photo from John Locker.



ming from 0900-2100 during the next two days via the newlylaunched Sirius 2 satellite at 5°E (it's a high-power satellite). SatFest (Satellite Festival) is organised by TESUG (01227 265 222) and is supported by most satellite operators, equipment makers and broadcasters.

Dean Rogers (Abbeywood, London SE2) watched most of the EEFA football cup/champions league during late October via Telecon 2C and Eutelsat II F4. The European Cup Winners game was carried, for Channel 5, by Eutelsat II F3 (16°W), in the clear from a snowy and freezing Norwegian pitch! Dean mentions that Sky Sports often uses the 11.163GHz horizontal transponder aboard this satellite (16°W) for clear analogue feeds.

There has been a little more information on the sighting, mentioned last month, of unmanned surveillance aircraft via Intelsat 803. Roy Carmen comments that the type of aircraft, though slow, is almost impossible to detect and for missile systems to lock on to. They can also downlink information up to five times faster than conventional aircraft. My sightings were of a new type of aircraft however, not the American Bronco unmanned craft. Apparently satellite surveillance can now locate missile launch sites to within 6mm of true grid!

So there's plenty going on in the analogue satellite world, even during quiet months.

# **Terrestrial News**

UK: There have been thirty one applications from across the UK to operate Restricted Service Licence (RSL) TV stations. They range from single-town coverage to larger areas such as the Isle of Wight. Licence periods will be for either 56 days or two years. Decisions from the ITC are due in the spring. Hungary: Two commercial TV stations are now in operation. The first was TV2, Budapest, which came on-air in early October. It was followed a few days later by

Denmark: The plan to sell off TV2 has been shelved for at least four years.

Mexico: TV Azteca plans to expand its network to Costa Rica, Nicaragua, Panama, the Dominican Republic, Honduras and Peru during 1998 and expand farther to Chile, Colombia, Ecquador and Venezuela by the year 2000. It now claims over a third of viewers in Mexico itself and generated profits of nearly \$300m last year.

# **Digital TV**

In the USA the FCC has announced the likely closure of all analogue TV services in the year 2007. The Harris Corporation has just transmitted a live digital outside broadcast, via terrestrial transmitters WHD-TV and WETA-TV in Washington. It's thought to have been a world first.

Sweden's Teracom has installed digital terrestrial broadcast transmitters (DVB-T) at Stockholm, Goteborg and Norrkoping. They should now be on-air with full-time broadcasting. Teracom started DVB-T tests back in 1995.

The European Union is discussing a timetable for the end of analogue TV transmissions across Europe. It seems likely that Brussels rather than individual European countries will decide on the analogue TV switch-off timetable. The idea is to ensure a smooth start to European digital transmissions.

# **Notch Filter**

The fight against interference in Band I is never ending. Robert Copeman recently came across a filter circuit (see Fig. 1) on the

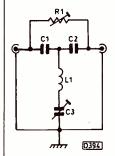


Fig. 1: Bridged-T notch filter design for Band I. noted on the internet by Robert Copeman.

internet. The details provided there relate to US channels: the Video Media page originates in Florida, access being at

http://www.tvfilter.com/videomedia/notch-dir/fkits-info

Otherwise the address is PO Box 93/6025, Margate, FL 33093, USA. Complete filter kits can be purchased at \$20 each one off (\$7 each in quantities of twenty plus).

The kit PCB is designed around F connectors. No component values are given. I suggest 120pF for C1/2,  $100\Omega$  for R1 (miniature carbon preset) and 30pF maximum for C3 (sub-miniature preset). Coil turns listed are 26 for ch. 2, 24 for ch. 3, 20 for ch. 4, 15 for ch. 5 and



14 for ch. 6, wound on a quarterinch coil former. Remember that these are US channels, i.e. ch. 2 is 55.25MHz. But C3 should tune down to ch. E2, or rather the rubbish at 49MHz. The internet details don't include performance figures. Let us know how you get on!

The Dr Dish TV programme which is broadcast on the second Friday of each month via Kopernikus 2 (28.5°E). Photo from John Locker.

MCAN Stares 1

AC/DC 10°

Both above TVs cover the

following systems; all VHF/UHF frequencies and

cables channels, PAL

system 1 (for UK); PAL

systems B/G (for Europe);

SECAM system B/G (for Middle East etc); SECAM

FULLICATALOGUE

Features Sutellite, Multi-system IVs VCR's, Converters Decoders, Amplific and Aerials for

domestic and TV hxing.

AVAILABLE BY ETURN OF POST FOR ONLY E1.

ring with your crodit card

system L (for France)

# Aerial Techniques

■ PAL-SECAM

■ NTSC (via Scart)

■ Fastext Teletext

S-VHS (via Scart)

■ 12-24V DC operation

■ 240V AC operation

**MULTISYSTEM VCR** 

Covers PAL 1 (for UK); PAL B/G

(for Europe); SECAM B/G (for Middle East etc.) SECAM D/K

(for Eastern Bloc); SECAM L

(for France): NTSC 3.58

playback & record

■ Hyperband Tuner

■ NICAM Hi-Fi stered

■ 2 Scart sockets

■ 99 programmes

■ 4·head

■ Long play

£369.00

VideoPlus+

**NEW NICAM** 

■ Infra-red remote control

■ 59 channel memory



■ VHF-UHF Hyperband tuner

- 14" Screen Multi-standard
- PAL-SECAM
- NTSC (via Scart)
- VHF-UHF Hyperband tuner
- S-VHS (via Scart) ■ 59 channel memory
- Fastext Teletext
- Headphone socket
- Infra-red remote control ■ 240V AC operation

# £329.00

#### **CDM-800 MULTISYSTEM DIGITAL CONVERTER**

- Professional quality, full digital processing
- Accommodates input systems of NTSC 3.58, PAL and SECAM (ontional 4.43 available)
- Output systems NTSC 3.58, NTSC 4.43 and PAL
- 4M bit field memory, static resolution 500 lines, dynamic resolution 300 lines ■ Accommodates two inputs and
- two outputs ■ Built-in time Base correction
- (T.B.C.) ■ Line conversion: 525 to 625 lines,
- 625 to 525 lines Field conversion: 60 to 50 and 50
- to 60 fields ■ AC mains powered

# £449.00

NEW 'BRDADCAST QUALITY' MODEL NOW AVAILABLE WITH 8M BIT FIELD MEMORY AND S-VIDED TERMINALS £699 (SAE for details) 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH

■ VideoPlus+ ■ 8 event 1 year timer ■ Infra-red remote control Nicem VCR

£499.00



**Digital Converter** 



(All prices are inclusive of VAT, delivery by courier £10.00)





Unidentified EBU feed via Eutelsat II F4 (7°E). Photo from John Locker.

# Satellite News

Sirius 2 is now in orbit at 5°E. It's a high-power satellite which is operated by GE Americom to provide analogue and digital TV transmissions to Europe. England is within the 50dBW vertical footprint, which extends to the Black Sea in the east and from Germany in the north to Sicily in the south, the frequency coverage being 11.747-12.687GHz. The horizontal footprint, with 55dBW, is centred on Scandinavia, the frequency coverage being 11.727-12.729GHz. The Swedish SVT International channel is one of the first that should be available, with programming that's a combination of material from the terrestrial SVT-1 and SVT-2 channels.

Eutelsat's Hot Bird 3 is now up and running. The transponder line up is shown in the accompanying table. Eutelsat has signed a contract to launch a fourth satellite in the W series: W4 is due to be in operation in early 1999 at 36°E. The Eutelsat TDF2 satellite started TV transmissions from 36°E in November. Its SESAT craft is due to enter service at the same orbital position at the same time as W4.

Intelsat reckons that the 605 craft can continue to be used despite the intermittent/partial loss of telemetry. The fault relates to the pointing accuracy of the solar panels: since the satellite is built to spin upright, the panels receive constant solar illumination and the telemetry information is thus not essential.

Hughes Aircraft has produced a higher efficiency solar panel that's based on a twin-layer, dual-junction gallium arsenide solar cell. Its sun energy conversion efficiency is 21.6 per cent, which compares with the 12.3 per cent efficiency of a standard solar cell. The double-

Hot Bird 3 Transponders				
No.	Frequency (GHz)	Channel	Type*	
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 88	12·13026 12·14944 12·16862 12·18780 12·20698 12·22616 12·24534 12·26452 12·28370 12·30288 12·32206 12·34124 12·36042 12·37960 12·39878 12·41796 TBA	MTV-2 (Hungary) TPS (France) Nethold Hellas (Greece) BT (UK) CME (Central Europe) German digital service MCM (France) German digital service ET1 (Greece) Slovenian/Croatian TV Polish digital service D+ (Italy) Polish digital service French digital service SSR (Switzerland) D+ (Italy) D+ (Italy)		
* A = analogue, D = digital.				

layer cell fabrication can react selectively to long and short wavelengths.

Iridium has now launched 39 low Earth orbiting satellites – the eventual total (66) should be in service this autumn, providing global coverage.

The merger of Kirch and Bertelsmann has been completed: as a result, the DF1 and Premiere TV programme packages now operate as Premiere. Several Italian digital TV packages have merged: RAI, Canal Plus, Fininvest and Ceechi have formed a single digital system called Stream – the Telepiu name has been dropped.

Chinasat 8 is to be launched later this year, with 36 37W C band transponders and 16 125W Ku band transponders.

The digital Canal Plus Polska service is due to start in April/May. Rival Entertainment is expected to start in April.

Armstrong Electronics (Dublin) and Videocom (Boston, USA) have set up a digital TV link to relay Irish news and sports programmes to Celtic Vision's cable systems around Boston and New York five times a week. Israeli company Tadiran Scopus has provided the MPEG-2/DVB equipment.

The Gardiner stand-alone Ku band LNB is apparently to be discontinued: the company will continue to produce the LNBF, an LNB with a feed horn/polariser for an offset dish. The stand-alone LNB for prime-focus dishes required a separate polariser and feed horn.

# Main Meteor Shower Dates - 1998

Our thanks to the British Astronomical Association, Meteor Branch, for the following 1998 MS details. Neil Bone, the director, thinks that 1998/9 could be a "big one" for the Leonids shower in November.

Shower	Overall period	Main peak
Lyrids May Aquarids Cetids Delta Aquarids Perseids	April 19-25th April 24th-May 20th May 7th-June 9th July 15th-August 20th July 20th-August 20th	April 22nd May 4-5th May 14-25th July 29th and August 6th August 12th (late evening)
Giacobinids Orionids Taurids Leonids Geminids Ursids	October 7-10th October 16-27th Oct. 20th-Nov. 30th November 15-20th December 7-16th December 17-25th	October 8th (late evening) October 20-22nd November 3rd November 17th (about 2200) December 13-14th December 22-23rd

ELC EAST LONDON COMPONENTS AUDIO TELEVISION VIDEO COMPONENTS AT VERY KEEN PRICES TEL: 0181-472 4871 FAX: 0181-503 5926

# 4 WAY UNIVERSAL REMOTE

Unique illuminated key (TV, VCR, SAT, CD/H1-F1) indicators Macro function key 24 bit processor Ergonomically designed keypad Replaces up to 4 remote controls Child security feature Fastext/teletext latt. £12.99

# REPLACEMENT REMOTE **CONTROLS FROM £5.99**

**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 £1.50 P/P + 17.5% VAT ALL GOODS DESPATCHED SAME DAY PRICES SUBJECT TO CHANGE WITHOUT NOTICE VISA ACCESS ACCEPTED. MIN ORDER £5.00

#### LINE OUTPUT TRANSFORMERS OVER 100 MODELS AT LOW PRICES

16.99

19.99 19.99

19.99

FINLUX

GOODMAN CTV14R CTV2180 TV20RC GRUNDIG CUC2401 CUC3400 HINARI CT14 CT20R TVA1

TT COMP 60R 16.99 CT3425 16.99 DIGI 3 110 16.99 ST3876 16.99 TX3537 16.99 JVC C21E1E 16.99 LOEWE

ART 1 16.99 CLASSIC M16.99 PROFI S 2816.99

MATSU

20.00 20.00 20.00 TLF15506 TLF15534 PHILIPS 2A/3A CTXE/S CTXE/S GR1AX GR2.2AA CP90 CP110 SAISHO CT14R

SAISHO CT14R 16.99 CT142RX 16.99 CT149TXA 16.99 SAMSUNG CB514F 16.99 CT541ZG 16.99

CT541ZG 18.99 SANYO CBP2146 22.00 CTP6265 22.00 SHARP C1411S 31.00 DV5401S 16.99 SV2887S 20.00

KV2052UB 16.99 KV2096UB 16.99 KV21XRTU 16.99 KV211XRTU16.99

TOSHIBA 140R4W 1400TBT 1433E4WR

1433E4W 145R7BZ 155T9BW 175T9BT 2100TB5 215T8B 221T4B

2812DBT AT2078/25 AT2079/15 AT2079/23

VIDEO HEADS FROM £6.99

OVER 200 MODELS

STR10006 STR41090 STR50020 STR50020 STR50105 STR54041 STR58041 STR58941 STR01706 STRD1706 STRD1816 STRD1816 STRD1816 STRD420 STRD5441 STRD5541 STRD5541 STRD5541 STRD6008X STRD6108 STRD6108 TA8210

PAL003A
PAL0029B
PAL0

TEA2019
TEA2039C
TEA2031A
TEA2164
TEA2165
TEA2260
TEA2261
TEA5101A
TLP621
UC3842
UC3844
UPC1288
UPC1310V
UPC1379C
UPC1379C

**NIKKAI BABY 10** 

REGULATORS £11.00

1.30 1.70 3.50 2.99 2.60 3.25 3.40 4.50 3.99 3 3.99 20.00

**DEGUSSING ROD** £29.99

**VHS ALIGNMENT TAPE** BAND TRACKING, TAPE TRANSPORT, FM PICTU CURVE, AUDIO SYNC HEAD AZIMUTH TRACKING PLAYBACK SWITCHING POINT £39.99

# **PATTERN** GENERATOR

Colour bar, Cross hatch, Staircase COMPACT PORTABLE £84.99 only

Capacitance Meters
Capacitance Meter PG015



An accurate, capacitance meter providing measurements over a very wide range.

OTO 2000UF ACCURACY 0.5% £29.99

Transparent Service/Cassette £6.50



Hitachi/Salora Mains Switch



TDA8178S REPLACEMENT £7.99 REMOTE TESTER £14.99 LOPT TESTER £29.99 FREQUENCY COUNTER £99 SOLDERING STATION £50.00 SATELLITE FINDER KIT £29.89 MICROWAVE LEAK DETECTOR £14.89 DIGITAL MULTIMETER FROM £9.98 DIGITAL MULTIMETER FROM £9.99

# MARAPET ELECTRONIC COMPONENTS Tel: (01452) 53 22 53 Fax: (01452) 549514

QUALITY SPARES for the CONSUMER ELECTRONICS SERVICING TRADE

THIS IS JUST A VERY SMALL SAMPLE OF OUR STOCK. We can supply spares for a vast range of Makes & Models. Please contact us with your requirements, we'll be pleased to offer a 'PRICE & AVAILABILITY'. Many General Components and obsolete Home Computer Spares also available. Telephone or write for a Selected Spares Guide.

MONITOR FLYBACK TRANSFORMERS				
This is just a sample of the types we can:	supply.			
ACORN/DIGITAL/IBM etc	P.O.A.			
AT2090/08 (ESCOM)	£19.95			
CALIBRA AT2090/48	P.O.A.			
COMMODORE 1084SD1 (2 types)	P.O.A.			
COMMODORE 1084P/1084SP	£20.95			
COMMODORE 1084ST	P.O.A.			
ELONEX AT2090/33	P.O.A.			
GOLDSTAR/DELL 154-166A	£27.91			
OLIVETTI TFB200A	€26.95			
OLIVETTI 1172.0018	£26.15			
PHILIPS CM8833 Mk 1 (popular uSlot type)	£20.95			
PHILIPS CM11342 (CM8833 Mk 2)	£23.95			

ľ	REMOTE CONTROLS	
ı	AMSTRAD SRD510/520/600 - Replacement	£7.53
ł	GEC V4001H/V4005 - Genuine	£11.03
l	ITT IFB-13-14-15 - Replacement	£16.45
1	Many other Genuine and alternative types availal	ole P.O.A.
l	TV FLYBACK TRANSFORMERS	
l	FERGUSON TX90 90 (RED SPOT)	£16.50
ı	FERGUSON TX100 51CM FST	£16.80
ı	HITACHI CMD6011 (2435141)	£16.99
ŀ	We can supply many other LOPTx's, for ALBA	S BEKO
ŀ	through to TOSHIBA & ZANUSSI. Please supply	nodel no.
l	and full information from original part.	
l	SELECTED VIDEO HEADS	
l	AMSTRAD TVR1/VCR4500/5200	£13.99
J	FISHER FV HP420/615/720/721/722	£15.99
ı	GOLDSTAR GHV12XX series (Most)	£12.56
ı	SHARP VC381 to VC388	£10.99

SELECTED A	IC's for PHIL	IPS		
AIWA CAW51K	KNOB - Play (R/H DECK	£1.95	MAB8420P C047	26.00
AMSTRAD CDX Midi (Funai) MX200	SPRING - Cassette Door	£1.34	MAB8441P T020	€6.42
AMSTRAD CDX Midi (Funai) MX200	DOOR - Cassette (R/H)	€3.40	MAB8461P W013	£8.10
HITACHI CX-W500EK	KNOB - Operate (On/Off)	£1.85	SAD1009P	€7.20
PIONEER PDX550	MOTOR - Loading	£9.37	TDA1006	£2.59
SANYO M2114L	BELT - Capstan	€2.78	TDA3730	£7.99
SHARP RGF278/291/284/813K/616	BELT - Main Drive	£1.33	XC89507P	£17.96
TOSHIBA ST-U2/U2L	TRANSFORMER - Mains	£9.99	*Limited stock	only"
SONY CDP222/910	CD Pickup - KSS151A	€26.90	Other types P.0	O.Á.

Our range of Video Spares is now much expanded - we can supply parts for over 150 makes. Try us also for a wide range of: Remote Controls, TV On-Off Switches, Posistors, Resistors, Capacitors Fuses, Connectors, Cables, Tools, Domestic Electrical Accessories and much much more...

#### **EQUIPMENT MANUALS**

Large range of Manufacturers Service & User Information available. Original manuals supplied if possible. We only show a few examples here.

AIWA NSX-800	£18.31 £14.53 £10.83
AIWA NSX-800 £9.56 AMSTRAD PC4386X £16.29 AMSTRAD PC5286	£18.31

When ordering, please add \$1.50 P & P and then edd 17.5% VAT. (M.S. VAT is due on P & P — Equipment Manuats are zero-rated). Small payments by Card accepted, however a nominal surcharge may apply — please enquire. Overness orders welcome — minimum P & P is \$2.50, but please check to avoid delays. Validity Dates' required for card orders, atso the issue No. for SWITOL is tack titems despatched as quickly as possible, subject to clearance of payment. All items subject to availability — Prices can change without notice.

y sorry, we are unable to accept callers – Please order by PHONE or POS Ve accept: VISA, ACCESS, MASTERCARD, DELTA, SWITCH, EUROCARD M.E.C. 1 HORNBEAM MEWS, GLOUCESTER GL2 0UE

# **VIDEO PARTS** UNAVAILABLE

7 TOO EXPENSIVE

# SECOND HAND PARTS

TESTED & GUARANTEED

(Complete boards, head motors, loading motors, capstan motors, mechanisms, panels, etc.)

> CALL/FAX 01349 884804 **EASI-SPARES** (at RADCOM UK)

10 Averon Road, Alness IV17 OPT

Overseas customers welcome When calling, please quote any numbers on the part itself, as this will help us locate the right part or any equivalents

Payment by cheque with order (no credit cards) to RADCOM; prices on application plus p&p for all orders. Email on user@wardrop.dial.netmedia.co.uk

# SATELLITE KNOW HOV

✓ INSTALL DIGITAL RECEIVERS!

V GET SATELLITE IN ALL ROOMS! V FIND ALL THE SATELLITES!

✓ DESIGN YOUR OWN SYSTEMS!

THIS BOOK IS SO GOOD THAT WE WILL REFUND ITS FULL COST IF YOU ARE NOT TOTALLY SATISFIED WITH IT IN EVERY WAY!

# Some of the contents of Satellite Know How!

Geostationary Satellites, Footprints and Frequencies

Geostationary orbit, orbital velocity, broadcast satellites, transponder configurations, EIRP footprints, downlinks, transponder plans, launch sequence, geostationary orbit conditions, centripetal force, Universal Gravitational Constant, sub-satellite positions, geo-arc.

Techniques, Knowledge and Skills Downlink, azimuth and elevation, lat/long, site survey, magnetic corrections, polarisation offset, waterproofing, sparklies, dish size, set-ups, tracking geo-arc, polar elevation angle, declination, apex angle, correction modifier, inclined orbit, solar transit, finding true south, angle setting, actuators, actuator triangulation, lateral alignment, offset angle, troubleshooting,

subcarriers, universal LNB, satellite switching, multi-focus dish, DiSEqC switch.

Signals, Dishes, Cables and Connectors C and Ku Band, twin and dual LNBs, noise, OMT, polarisers, polarisation offset, satellite cant angle, parabolic antennas, offset focus,

centre focus, primary and secondary feed dishes, dish beamwidths and gain, cables, cable attenuation, dish fixing systems, types of mounts, wind loading on H-H dish mount.

Installing Digital Receivers, SCART, Distribution and Peripherals

Macrovision copy protection, connectors, UHF loop-through, SCART, digital and analogue receiver, UHF distribution system, IF distribution, extended remote control, two-channel viewing & recording, installation checklist, dB ratio table, glossary of terms, analogue worldwide TV systems, satellites above horizon, link analysis,

beamwidth, noise figure to temperature conversion

tables. And more.. ISBN 1 872567 12 6 Postage:-

UK: £3 Europe: £5 R of W: £10

This PC software (worth Indoor units, IRD receiver, VideoCrypt technique,

£20) calculates the magnetic correction angle required for anywhere on Earth... exactly to the day! It's yours FREE but only when you order it with the Satellite Know How! book @ £22. Subject to availability.

dual feed tables, dish gain. Available by return post! Send stamped envelope for complete list

17 Pittsfield, Cricklade, Wilts, SN6 6AN, England

Tel 44 (0)1793 750620 Fax 44 (0)1793 752399



Know How!



P.O. BOX 142, NOTTINGHAM, NG9 3RX, ENGLAND

Tel: +44 (Ø)115 932 Ø152 Fax: +44 (Ø)115 944 4ØØ4

E-Mail: tony@iche.com WEB SITE: http://www.iche.com

YOUR SOURCE FOR SPECIALIST PARTS FOR COMPUTER & COMPUTER MONITOR REPAIRS

SCHEMATICS

**FLYBACK TRANSFORMERS** 

WELTREND ICs

MYSON ICs

MONITOR VIDEO CABLES

FOR A WIDE RANGE OF MONITORS AT ONE PRICE !!



MONITOR PROCESSOR ICs:

ZILOG: UXØ51B311Z, ZØ86Ø2Ø4PSC etc.

TOSHIBA: UXØ63B219B,etc. MOTOROLA XC86224B, etc.

**IBM PLUTO14/15-A/C** 

"CAPACITOR WIZARD"

**ESR METER** 



"MONITOR WIZARD II" **COMPUTER MONITOR PATTERN GENERATOR** 

"ALWAYS THE FRIENDLY PROFESSIONAL SERVICE"

# Answer to Test Case 422

Before we proceed any further, Sage wishes it to be known that he has some goods for disposal: the three bottles of red wine that remain, a slightly worn but perfectly functional ACE head suitable for a Toshiba V411, and a faulty IC that was the real cause of the trouble with the VCR. Offers to Resident Workshop Sage Esq., Test Case Workshop, c/o Television magazine!

You cannot monitor the control pulses at the ACE head during playback – they are of too low amplitude for a conventional oscilloscope. So Sage checked them at output pin 11 of IT10, the U2561B control-pulse amplifier chip. He found a nasty waveform here. It looked as if mains hum was superimposed on the squarewave control-pulse signal. He decided to check the voltage at the chip's supply pin (Vcc, pin 20) to see whether it was of correct amplitude and smooth. It was. He also checked the decoupling capacitor CT18 in the CTL return line. It was OK, likewise the two resistors associated with the chip's input pin 8.

The obvious conclusion was that IT10 was faulty. This was confirmed by fitting a new U2561B IC, after which the Toshiba V411 worked perfectly. It all goes to show that you should never jump to conclusions, no matter how many times you've known a symptom to be caused by a particular component.

# **NEXT MONTH IN TELEVISION**

# **PC Pitfalls**

Work on PCs can provide a useful source of extra income for the service engineer. One possible line is carrying out PC upgrades. It may be thought that this is simply a matter of fitting parts and installing drives, but there are many pitfalls that can result in wasted time and money and a poorly performing PC. Colin McCormick describes some of the problems he has encountered.

#### Servicing the Toshiba 2505/2805DBT

John Coombes provides a fault-finding guide.

# **VCR/CCTV Trigger Timer**

Closed-circuit TV equipment for basic surveillance is now readily available and cheap. But the ability to record events using a time-lapse VCR is still very expensive. To resolve this problem, Ian Rees has devised a way of using an ordinary domestic VCR to record short bites of scenes. The recording process can be triggered by sensors.

# **The Wessel Circuit**

The idea of the Wessel circuit is to simplify design: a single switching transistor acts as both the chopper and line output device. But the control arrangements can be quite complex. J. LeJeune on the basic circuit and its implementation in the TX805 chassis.

# TELEVISION INDEX/DIRECTORY AND FAULTS DISCS PLUS HARD COPY INDEXES & REPRINTS SERVICE

# INDEX DISC

Version 6 of the computerised index to TELEVISION magazine covers Volumes 38 to 47 (1988 – 1997). It has thousands of references to TV/VCR fault reports and articles, with synopses. A TV/VCR spares guide, an advertisers list and a directory of trade and professional organisations are included. The software is easy to use and very quick. It runs on any IBM or compatible PC with 640K RAM and a hard disc. Price £35 (3.5"HD, alternatively 3.5DD") Those with previous versions can obtain an upgraded version for £15. Please quote the serial number of the original disc.

#### **FAULT REPORT DISCS**

Each disc contains the full text for Television VCR, monitor, 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 38 (November 1987 – October 1988); Volume 39 (November 1988 – October 1989); Volume 40 (November 1989 – October 1990); Volume 41 (November 1990 – October 1991); Volume 42 (November 1991 – October 1992); Volume 43 (November 1992 – October 1993); Volume 44 (November 1993 – October 1994); Volume 45 (November 1994 – October 1995); Volume 46 (November 1995 – October 1996); Volume 47 (November 1996 – October 1997).

Price £15 each (3.5"HD, alternatively 3.5"DD if required).

# **NEW - FAULT FINDING GUIDE DISC**

This disc is packed with the text of the TELEVISION Test Cases, What a Life!, Service Briefs and other vital fault finding information. It is accessed via the Index disc. Price £15 each (3.5"HD, alternatively 3.5"DD if required).

# REPRINTS & HARD COPY INDEXES

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 47 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 SoftCopy Ltd. Access, Visa or MasterCard Credit Cards are accepted. Allow 28 days for delivery (UK).

SoftCopy Limited, 1 Vineries Close, Cheltenham, GL53 ONU, UK. Telephone 01242 241 455

Published on the third Wednesday of each month by Reed Business Information Ltd., Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Filmsetting by Marlin Imaging Ltd., 2-4 Powerscroft Road, Sidcup, Kent DA14 5DT. Printed in England by BPC Magazines (Carlisle) Ltd., Newtown Trading Estate, Carlisle, Cumbria CA2 7NR. Distributed by MarketForce (UK) Ltd., 247 Tottenham Court Road, London W1P 0AU (0171 261 7704). Sole Agents for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. Television is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.

# I.C.H.E.

# P.O. BOX 142, NOTTINGHAM, NG9 3RX, ENGLAND TEL: +44 (0)115 932 0152 FAX: +44 (0)115 944 4004

E-MAIL tony@iche.com http://www.iche.com

Pat Bunce
"TELEVISION"
Reed Business Information
Quadrant House,
The Quadrant,
Sutton,
Surrey
SM2 5AS 09/12/97

Dear Pat.

Just a short note to express my thanks for the coverage that "Television" magazine has given my products.

I have had more responses from my advertisements in your magazine than any other. With those responses my sales of the "Monitor Wizard" pattern generator and "Capacitor Wizard" ESR meter have increased by leaps and bounds as well as the monitor schematics, flyback transformers, Weltrend IC's etc. etc.!

It reaches the engineers and technicians other magazines don't and not just from the UK, but from Southern Ireland, Europe, Scandinavia and as far away as Borneo, Australia and New Zealand!

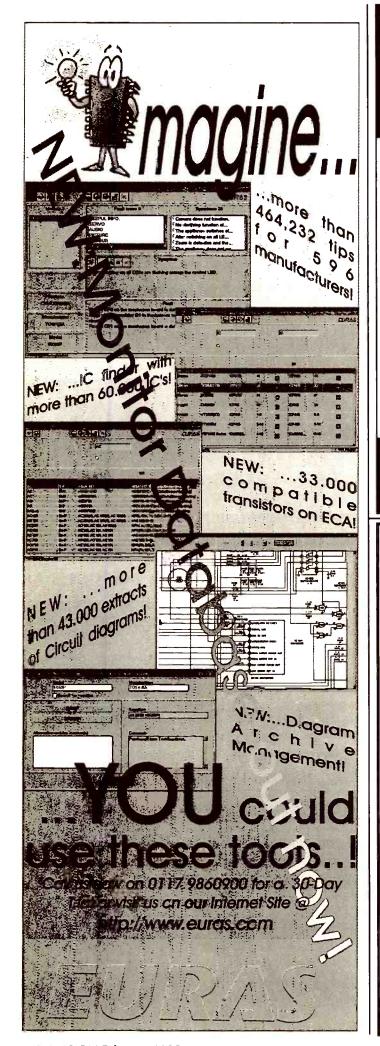
Your magazine is the most cost effective advertising medium that I use, bringing in more sales per pound outlay than any other.

Again many thanks and kind regards

Tony

Tony Bailey.





# C.T.V.

UNIT 5, THE PHOENIX BUILDING, RUSHOCK TRADING ESTATE, DROITWICH ROAD, DROITWICH WR9 0NR TELEPHONE: 01299-251522 0589-888021/0850 486147 (24HR)

SUPPLIERS OF HIGH QUALITY
GRANADA AND THORN

EX-RENTAL TELEVISIONS AND VIDEOS
LARGE STOCKS ALWAYS AVAILABLE
ALL AT COMPETITIVE PRICES
Satellite Receivers
Complete Range of Hand Sets
EXPORT ENQUIRIES WELCOME
OPEN: MON-FRI - 9.30-5.30

TEL: 01299-251522

Fax: 01299-251543

# IS YOUR RENTAL BUSINESS EXPANDING?

**Broughfame Ltd.** 

can help to expand your television/video rental business and increase your profitability.

Our rental Finance Plan offers you financial facilities from £1,500 upwards.

Block Discounting finance also available.

For further details ring or write to:

Broughfame Ltd. 115A St John's Hill, Sevenoaks, Kent TN13 3PE

Tel: (01732) 743400 Fax: (01732) 743335

E-Mail: R@Broughfame.Tel Me.com



# vista electronics LTD

Manufacturers of television tube and video heads



# COMPONENTS CATALOGUE

TV/VCR COMPUTER
SPARES AND ACCESSORIES



FREE
CARRIAGE
FOR ORDERS

**ABOVE £10** 



FOR PERSONAL SERVICE RING THE 'SAS'

SUSAN ANN SANDRA

**WE DARE TO PLEASE** 

# TUBES

THOUSANDS OF NEW, B GRADE, AND REGUNS IN STOCK

# SPECIAL OFFERS

WHILE STOCKS LAST

A59-JJZ	£60.00
A51-EFS	£50.00
A59-EAK	£69.50
A66-EAK	£72.00
A51-EAL	£55.00
A51-JAR	£55.00
A51-AEZ	£45.00
A68-EGD	£78.00
A66-EGW	£72.00
A34-EFU	£24.50
A33-LPE	£24.50
A34-FAC	£24 50

# ALL NEW TUBES Carriage Extra

12 MONTHS GUARANTEE Enquire for types not listed

TUBES 01429 838057

FAX

01429 837100 01429 837101

VISTA ELECTRONICS LTD, UNIT 1B, WINGATE GRANGE IND EST WINGATE, CO DURHAM TS28 5AH







#### WHOLESALE DISTRIBUTION LTD

# AIWA PRODUCTS

# AUDIO

NSX-VHS...PRO-LOGIC MINI HIFI REMOTE NSXV70.MINI HIFI 3 CD SURROUND SOUND Z2300 ......PRO-LOGIC MIDI HIFI REMOTE L/CX100 ......CD MICRO SYSTEM NSXV750 .....MINI HIFI CD PLAYER NSX640..MINI HIFI 3CD SURROUND SOUND

**EX-RENTAL TVS & VIDEOS ALWAYS AVAILABLE** PHONE NOW FOR BEST PRICES

PHILIPS, PANASONIC, SHARP, SANYO, FINLANDIA ETC...

AMSTRAD SRX 100 AT ONLY £2.00 A PIECE AMSTRAD SRX 200 AT ONLY £10.00 A PIECE BT 250 AT ONLY £7.00 A PIECE (QUANTITIES OF 10 + ONLY) PLUS VIDEO CRYPT DECODERS NOW AVAILABLE

# WALKMANS

HSTA153 HSTA223 HSTA253 HSTA353 HSTA423 HSTX356

HSTX446 HSTX646

HSGS242 HSGS252 HSGS352 HSPX257 HSPX347 HSPX357 HSPX447 HSPX547 HSPX747

PHONE FOR BEST PRICE ON THESE 'A' GRADED STOCK

PLUS MANY MORE MODELS AVAILABLE

SANYO GRADER 28", 25", 21" F.S.T. SP/LP VIDEO + (NOW IN STOCK)

**FOR ALL EXPORT ENQUIRIES ON TVS** AND VIDEOS CALL OUR **BIRMINGHAM OFFICE** NOW

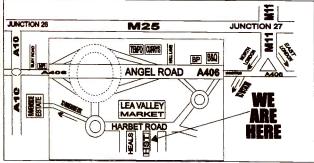
LONDON CONTACT: JOSHI/SALEEM ELEY ESTATE, NOBEL ROAD, **EDMONTON N18** TEL: 0181 807 4090 FAX: 0181 884 1314

BIRMINGHAM CONTACT: ASH/MICK 369 STRATFORD ROAD, SPARKHILL, **BIRMINGHAM B11 4JY** TEL: 0121 772 1591 FAX: 0121 766 6383

# APPROVED TELEPRICE DISTRIBUTOR R

Suppliers of high quality EX-RENTAL & GRADED TV'S AND VIDEN'S Direct From Source

**PHONE FOR DELIVERY DAYS ON** 0181 - 803



UNIT E2/3, HARBET ROAD, (off Angel Road), STONEHILL BUSINESS PARK, LEA VALLEY TRADING ESTATE, LONDON, N18 3LD DELIVERY SERVICE AVAILABLE

# 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** 

Satellite Receivers and Export Enquiries Welcome ½ Mile off Junction 10 M6. Easy Parking Facilities

**UNIT 3, BENTLEY LANE BUSINESS PARK** BENTLEY LANE, WALSALL WS2 8TL

Tel: 01922-724542. Fax: 01922-722208 Mobile: 0831-246622 (24 hours)

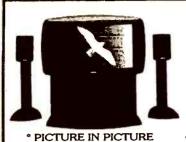
Visit our website: WWW.WMTV.MIDWEB.CO.UK

OPEN: MON-SAT, 9-6pm **SUNDAY BY** APPOINTMENT **DELIVERY SERVICE** THROUGHOUT THE COUNTRY



28-29 RIVER STREET, DIGBETH, BIRMINGHAM B5 5SA

FAX: 01 21 ~766~6100 TEL: 0121~772~27



NICAM STEREO

FASTEXT

 2 SCART SOCKETS FRONT AV CONNECTORS

· UHF/VHF

\* A.I.P. SYSTEM (COMPLETE WITH HANDSET & INSTRUCTION BOOK)

**BRAND NEW** & BOXED

PALPLUS WIDESCREEN 16:9

WITH DOLBY PRO-LOGIC 77CM (32")

PIANO BLACK FINISH

NOW WAS £899

R.R.P £2099.99

# BRAND NEW

# MODELSFN7296PP

\* NICAM STEREO

- \* 28in Widescreen
- \* PaiPlus
- \* Pict. in Pict.
- \* Zoom & More..



£599-99

# EX-RENTAL CTV's

20 Mixed CTV, 6 Basic,

6 Remote, 6 Text &

2 Portables C = 2 with

handsets

**BRAND NEW** 

Quantity Price £99.99

£95.99 5-10 10+ £89.99

\* Teletext 40 Channels

OSD Remote Contro

\* Sleep Timer \* Mains Operated \*Scart Socket \*UHF/VHI

HITACHI **WIDESCREEN** C28300TI

DOLBY PRO-LOGIC NICAM DIGITAL STEREO 28" FST FASTEYT

2 SCART SOCKETS COMPLETE WITH CABINET STAND COMES COMPLETE IN BOX

Graded Stock

ONLY

10 for 3



FERGUSON Grade 'B' Stock

T10R Colour Television

OPERATES ON EITHER MAINS OR BATTERIES







GRADED STOCK Video Camera VPH-65 OUR PRICE (M) 12Y ZOOM Soom HI-RRAND

6 MODE PROGRAM AS



£4.95

# acemen

FERGUSON 3V55 £4.95 £4.95 FERGUSON FV11R £4.95 THORN 8948 £5.95 FERGUSON FV31R £5.95 FERGUSON FV32L £5.95 FERGUSON FV42L £5.95 FERGUSON FV41R £5.95 FERGUSON FV31R FERGUSON 20E2 £4.95 FERGUSON 37141 £4.95 FERGUSON 37371 £4.95 FERGUSON 57971 £4.95 FERGUSON 57981 £4.95 £4.95 FEGUSON 14C2 £4.95 14D2,4J2,14L2,16A2 £4.95 16C2,20A2,20C2 £4.95 2000,22B2,36141 £4.95 **THORN 6171** THORN 67971 £4.95 **THORN 7971** £4.95 **THORN 9500** £4.95 THORN 9600 £4.95 £4.95 **THORN 2251** THORN 2256 £4.95 THORN 2261 £4.95 £4.95 **THORN 2282** THORN 4094 £4.95 £4.95 THORN 4290 TEL-FUNK SP141 £4.95 £4.95 LOGIK 4094 BUSH 1511RD £4.95 £4.95 APOLLO SR1900 BEKO IRD2000 £4.95 FERGUSON SAP4S £4.95 FERGUSON SAP5S £4.95 FERGUSON SAP6S £4.95 £4.95 FERGUSON SAP7S FERGUSON SRD16 £4.95 £4.95 FERGUSON SRD5 FERGUSON ASTRA SR\$24.95

HITACHI 1010D £4.95 MANHATTAN 850 £4.95 £4.95 MANHATTAN 950 £4.95 MASPRO SRE250S MASPRO SRE350S £4.95 NOKIA SAT1600 £4.95 NOKIA SAT1602 £4.95 NORMENDE SRD1000 £4.95 PACE PRD800 £4.95 £4.95 PACE PRO900 PACE PSR800 £4.95 £4.95 PACE PSR900 £4.95 PACE SS9000IRD £4.95 PACE SS9090XT PANSONIC TUSD200 £4.95 PHILIPS 05G £4.95 PHILIPS 05M £4.95 SABA SSR850 £4.95 TEL-FUNK SR1000Z £4.95 £4.95 THOMSON SRD11

PACE MSS100 £3,35 HITACHI SR2070D £5.75 £5.75 PACE MSS500 £5.75 PACE MSS1000 £5.75 PACE MSS SERIES APOLLO 120 £5.75 £5.75 PACE MSS100IP PACE MSS1008 £5.75 £5.75 PACE MSS1038 £5.75 PACE MSS138 PACE MSS238 £5.75 PACE MSS290 £5.75 PACE MSS300 £5.75 PACE MSS348 £5.75 £5.75 PACE MSS508 PACE MSS538 £5.75 FERGUSON 22B5 £4.95 **THORN 2423** £4.95 £4.95 **THORN 2453** 

**THORN 2463** 

TRADE ONLY ALL STOCK SUBJECT TO AVAILABILITY, CARRIAGE & V.A.T

 $\mathsf{ORDER}$ 

# Universal

The Amstrad Service Centre

Audio Television Video Telecommunication

The 'Amstrad Service Centre' is the exclusive returns centre for all standard customer returns on behalf of Amstrad and Betacom. For the first time we are offering to supply genuine Standard Customer Returns direct at market competitive prices. All of the products we offer for sale are supplied in original manufacturer cartons, both picture print and full colour gift type. All product is 'virgin' and has not been serviced by the Amstrad Service Centre or any other outside service agent. If you would like to receive a colour product catalogue and an up to date stock and price list please fax your full company details through to the facsimile number listed below.

Currently we have over 90 lines throughout the consumer electronics range starting with walkmans, clock radios, portable stereos, portable CD stereos, personal CD players, micro systems, CD micro systems, mini hi-fi, midi hi-fi, 14" television, 20" television, 28" television, non videoplus VCR, videoplus VCR and fans and, approximately 40 different telecom products.

There are no restrictions on the sale of these products but if any are exported it is your legal responsibility to check the goods meet all electrical requirements and relevant regulations for the country of export. Export enquiries welcome.

Please mark all references from this advertisement for the attention of Mr T James, Operations Manager.

Switchboard 01630 655 797 Facsimile 01630 655 683

Amstrad Service Centre. Universal Consumer Products, Universal House, Tern Valley Business Park,
Market Drayton, Shropshire TF9 3SQ.

ALL MAJOR CREDIT CARDS ACCEPTED

# TECINO

(U.K.) Ltd

UNBEATABLE PRICES
NEW COLOUR TVs FROM £99
FASTEXT TVs FROM £119
VIDEO PLUS L/P FROM £119
NICAM VIDEO £159

Happy New Year to everybody

DIRECT PRICES TO THE TRADE TV, Video, Hi-Fi, Camcorder Brand new 'B' grade available

Excellent Mail Order Service available. Next day delivery on most items

We also require a fully qualified TV, video and hi-fi engineer to work in the Oxford area. Send your cv to:

TECHNOVISION
216 Cowley Road,
Oxford OX4 1UQ
Tel: 01865 202627
Fax: 01865 202655
Opening Times:
Monday to Saturday,
9.00am to 6.00pm
Sundays,
by appointment only

Sole UK
Agents for





Built-in loudspeaker for AM and FM reception

■ Frequency Indication with 4 digit LCD Display

# TC-402D

Due to its weight and size, the TC-402D is the ideal instrument for the installation of FM and Terrestrial TV antenna, as well as CATV systems.

■ Multi-turn potentiometer to enable tuning ■ Weight including batteries: 1.9 Kg

rc 00

**CALL 01865** 

202627

Portable equipment, with many applications, designed to carry out any type of Terrestrial TV, FM Radio, CATV and Satellite TV. installations.

- Frequency Sweep on Satellite
- Peak Detection
- Measurement of terrestrial TV from 20u V to 3V without the need of external attenuators.



Rechargeable 12V / 2.6 Ah BatteryWeight including batteries: 3.5 Kg



- Full Band Frequency Sweep
  Switchable 14V or 18V LNC Power Supply
- The TC-80 has been designed for the recention of TV Satellite systems, the

reception of TV Satellite systems, the installation and testing of domestic and SMATV systems.

Rechargeable 12V / 2.6 Ah Battery
 Weight including batteries: 3.3 Kg.

Available from most wholesale distributors across the UK or direct from

# COASTAL AERIAL SUPPLIES

Unit X2, Rudford Industrial Estate, Ford, Arundel BN18 0BD Telephone: 01903 723726 Fax: 01903 725322 Mobile: 0976 241505



Wholesale Distributors & Export Agents of Domestic Electronics & Appliances

# We have moved to bigger premises

# **NEW 'B' GRADE**

Major Brands ONLY. TV's - Video - Audio. Microwaves. Satellite Receivers, Decoders. Camcorders - Phones/Fax **COMPLETE BOXED - WITH STAND - HANDSET - BOOK ETC** MINT LATEST NICAM FASTEXT F.S.T.

**EXPORT AGENTS FOR THE FOLLOWING** TV, VIDEO, HI-FI, CAMCORDERS, SATELLITE WHITE GOODS, HEATING EQPT., VACUUM CLEANERS, KITCHEN APPLIANCES, GARDEN EQUIPMENT, POWER TOOLS

FERGUSON - DECCA - TATUNG - AMSTRAD

FULL RANGE - ALL CURRENT MODELS OF TV-VIDEO IN STOCK No minimum quantity

A38(M)

NATION-WIDE NEXT DAY DELIVERY SERVICE - VISITORS BY APPOINTMENT

# hone 0121-359 70 FAX 0121-359 6344





PHOENIX HOUSE, 190 BRIDGE ST. WEST. **BIRMINGHAM B19 2YT** 



SUMMER LANE S



YOUR PREMIER SUPPLIER FOR OVER 30 YEARS NEW STOCKS ARRIVING DAILY

#### HI FI HI FI HI FI

# 100s OF UNITS IN STOCK!!

# Large stocks available A and B grade:

makes include: Kenwood, Aiwa, JVC, Sanyo, Akai, Pioneer, Panasonic, Goodmans, Alba etc. Alba/Bush Ghetto Blasters, CD, Radio, Tape boxed £25 Alba/Bush CD Micro Systems boxed £35 • Alba/Bush CD Midi Systems boxed £40 most goods under half price

# VIDEOS/TV's: A and B Grade

Bush/Alba long play boxed £60 . Roadstar long play boxed £50 Akai, Sanyo, JVC, Toshiba, Aiwa less than half price 21" Remote Control Crown/Bush, Alba boxed £60

# EX-RENTAL TV/VIDEO ALL TESTED, SEEN WORKING

Philips complete with remote £45 Salora all models with remote £65, Grundig from £65 many other makes/models in stock Cheaper Video/front loading from £25

# **ALL MAKES, MODELS & SIZES OF TV IN STOCK**

Brown cabinet working TVs from £12 . Videos off the pile from £10 We stock Camcorders, Car Stereo, portable radio/CD, kettles, irons, toasters etc, etc.

# ALL PRICES INCL. VAT. TERMS - CASH ONLY \* DISCOUNT ON BULK PURCHASES \*

Send S/A Envelope for price list or call 01274 308186

Walker House, 16 Bottomley Street, Manchester Road, Bradford BD5 7LJ Tel: (01274) 308186 Fax: (01274) 722229

# TV WHOLESALE

# **STARVISION**

SUPPLIERS OF HIGH QUALITY **EX RENTAL - EX DISPLAY TV & VIDEO** 

ALL SETS ARE FULLY SERVICED WITH REMOTE CONTROLS AND ARE READY FOR RETAIL SALE

MOST POPULAR MAKES ALWAYS IN STOCK AT PRICES THAT WON'T SHOCK

> **ALL PRICES INCLUDE V.A.T.** NO MINIMUM QUANTITY

RING TODAY FOR LATEST PRICES **TELEPHONE** 0121 502 3016 - 0121 505 1033

**STARVISION UNIT A, BRUNSWICK PARK ROAD WEDNESBURY, WEST MIDLANDS WS10 9QR** 

# **NOW OPEN**

IN NORTH EAST - W.TREE TRADE WAREHOUSE UNIT 9A/9B CARRMERE RD, LEACHMERE IND ESTATE, SUNDERLAND SR2 NTE TEL 0191 521 1500
GRADED STOCK ALL BOXED TESTED + WORKING

# **B GRADE TV/S BOXED WORKING NOW**

	WAS	NOW
14" R/C	£79	£75
14" Text	£89	£85
14" Tele Video Combinations	£175	£159
20" Tele Video Combinations	£235	£200
20" R/C T/V	£99	£95
20" Nicam Fastext	£139	£129
28" Widescreen Nicam	£450	£375
32" Widescreen Nicam	£700	£650

# JOB LOTS OF CAMCORDERS

Sony, Panasonic, Cannon etc...(In lots of 20) £50.00

# **EX DEMO CURRENT MODELS**

29" Sony Nicam		£270
29" Hitachi Prologic		£350

SPECIAL OFFER	- <i>'B</i>	' GRADE	
Boxed & Fully Tested L/P			680

with instructions Nicam

Video Plus £79 £129

# W.TREE TRADE WAREHOUSE

Unit 1, Sunshine Mills, Wortley Rd, Leeds Tel: (0113) 2638804 Fax: 2310275

# UBE

Stock clearance of tubes for current models

14" narrow neck

£49

48ECR..... 48EEV..... 51EAL..... 51EBV.. 51EFS.. 510UFB.....

£69

**66ECY.....** 66EAS.....

LOTS, LOTS MORE **RING Irene or Jane** 



Carriage and VAT extra



# PRESS TV

The Mill, Mill Lane, RUGELEY, Staffs WS15 2JW

Tel: 01889-577600 Fax: 01889-575600

# **OPENING SHORTLY IN**

# COLLAND

# LONG PLAY VIDEO 21" FLAT SCREEN:

Traders . . . You must register with me NOW to qualify for these prices. Fill in the coupon below and post it with your letterhead or business card.

Dear Mike, I am interested in buying good, reliable cheaply. Please register my name and keep me informed of your opening in Scotland. I enclose my letterhead/business card.

# **SUPERSCREEN**

12 Cannon Park Rd Cannon Park Ind Estate

MIDDLESBROUGH TS1 5JP

**CLEVELAND** 



**COMPLETE RANGE OF TVs** VIDEOS AND SATELLITES

Most makes and models available TVs from £3.00 • Satellites from £8.00 Videos from £15.00 Prices Ex-VAT

Free Delivery Service to most areas of the UK

**U.K.s Largest Export Wholesaler** Specialists in conversions to most countries systems

**UNIT 75, BARRACKS ROAD,** SANDY LANE INDUSTRIAL ESTATE. STOURPORT-ON-SEVERN, **WORCESTERSHIRE DY13 9QB** Just 10 Mins from M5 Junct, 6 Worcs North

01299-879642 (3 lines) FAX: 01299 827984

# ELECTRONICS

8 Heather Park Drive, Alperton. Wembley, Middlesex HA0 1SL Tel: 0181 795 1735 Fax: 0181 795 1736

SUPPLIERS OF HIGH QUALITY AUDIO VIDEO/TV EQUIPMENT - GRADE A STOCK WITH WARRANTY

Popular brand names at competitive prices, eg: Video Recorder, LP/SP, from.....£85.00 Video Recorder, LP/SP, VideoPlus from £95.00 Twin Deck Video Recorders.....£145.00 20in TV/Video Combi .....£235.00 14in TV/Video Combi .....£180.00 Microwaves, Digitouch, from .....£47.00 Camcorders, from.....£165.00 Triple Disc HiFi Systems from .....£120.00

Televisions, all sizes including Prologics, Nicam, VCRs etc

# PHONE OR FAX FOR FULL LIST

WE ARE NOT EX-RENTAL DEALERS **ALL PRODUCTS SUPPLIED ARE CURRENT LINES** 

ALL PRICES SUBJECT TO VAT PLUS CARRIAGE AND AVAILABILITY

ASSIFIED TEL:0181 652

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

# LASSIFIED

PHONE 0181-652 8339

FAX 0181-652 8931

The prepaid rate for semi display setting is £14.50 per single column centimetre (minimum 4 cm). Classified advertisements £2.15 per word (minimum 20 words), box number £22.00 extra. All prices plus 171/2% VAT. All cheques, postal orders etc., to be made payable to Reed Business Information. Advertisements, together with remittance, should be sent to Television Classified, 11th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS

# TEST EQUIPMENT

# **SPARES & COMPONENTS**



# **TRANSFORMERS**

# 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

Mon-Fri 9 am to 12.30 pm & 1.30-4.30 pm

TIDMAN MAIL ORDER LTD · 236 SANDYCOMBE ROAD · RICHMOND · SURREY · TW9 2EQ Approx. 1 mile from Kew Bridge

# LINAGE

**DECODER TO COMPUTER** interface card with smart card connectors and diagram: £9. E.M.O., 62 Bridge Street, Ramsbottom. Lancs BL0 9AG. Tel: 01706 823036.

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel: 01494 814317.

AVO MULTIMETER Model 8: £45.00. 500 volt megers: £30.00. Prices plus VAT and p&p. Send SAE for lists of Surplus Instruments and Scopes, etc. A. C. Electronics, 17 Appleton Grove, Leeds LS9 9EN. Tel: 0113 249 6048.

OCHRE MILL Technical Services, Grundia TV spares for most models to 1985. Fast, friendly, helpful, sensible prices. Gt Lype Farm, Charlton, near Malmesbury, Wilts SN16 9DR, Tel: 01666 823228.

Unit B3. Citadel Trading Park, Garrison Road, Hull HU9 1TQ Tel: 01482 222295/Fax: 222213

SCART/SCART

FROM 1-99

CABLE FROM

CABLE FROM

8-95

**RG6 SAT** 

11-95

21 PIN LEADS 89p **AERIALS** 

**2M FLY LEADS** 35p

**CABLE CLIPS** 

**YE**/ **CONNECTORS COAX PLUGS** 

**POLES BRACKETS** 

**LASHING KITS BOLTS** 

**SADELTA** TV/SATELLITE

**METERS NOW IN STOCK** 

**SAT SYSTEMS** ALL PACE **RECEIVERS POA** 

LNB'S FROM £16.95

STOCKISTS FOR: ANTIFERENCE COASTAL LABGEAR

**LENSON HEATH MERCURY TELEVES** 

TRIAX **TOWER BLAKES** 

PACE WOLSEY UNIFIX

**PHILEX** & MANY MORE

CALL FOR CATALOGUE OF FULL RANGE ALL PRICES + VAT + CARRIAGE + CREDIT CHARGE IF APPLICABLE

# SPARES & COMPONENTS

# SERVICE INFORMATION

CIRCUITS and SERVICE MANUALS from 1930s - 1990s:
Radios, amps. radiograms, tuners. CDs. TVs. videos. casette radios. ICE etc.
LARGE QUANTITY USED TV and VIDEO PANELS BACK COPIES PW and TV MAG.

# DAVE WILLIAMS 16 Church Street, Owston Ferry, Doncaster, S. Yorks DN9 1RG Tel and Fax: 01427 728046

# **SURPLUS / REDUNDANT ELECTRONIC COMPONENTS**

WANTED ICs - Tuners - Transistors -

Valves - Diodes Etc Any quantity considered

**NJM** General Trading

Tel: 01902 429022 Fax: 01902 429052

# Service Manuals Less than £1 each

MTS

We now have 3 CD-ROM's covering a vast range of Colour Televisions. The full set contains between them over 3600 models from 133 makes and over 80 full workshop service manuals. Each CD is normally £24.95 + VAT (total £29.31) making the set of 3 £90.89 inclusive of VAT & p/p. As a special introductory offer the full set of 3 can be purchased for just £75.00 fully inclusive. Order your set TODAY. Order code MP-380.

Monitor alignment disc with all orders for **MP-380** 

when purchased on CD-ROM

Order Form Please supply (circle items required)
MP-380 TV CD-ROM set of 3 @ £75.00 inclusive plus FREE monitor alignment disc.
MP-285 Index of Manuals available on PC Disc @ £5.00 inclusive
FD-35 Catalogue of Books & CD-ROM's available for 4 x 1st class stamps.
Name
Address
Postcode
Card No.
Expiry Date Signed
Mauritron Technical Services 8 Cherry Tree Road, Chinnor, Oxfordshire, OX9 4QY

Tel: 01844-351694. Fax: 01844-352554. email: sales@mauritron.co.uk

Web Site at: http://dialspace.dial.pipex.com/mauritron/

# REPAIR DATABASES & INDEXES

NEW FAULT GUIDES NOW AVAILABLE FOR 98 NEW! Kwik tips on disk V1.0

First time release: KWIK TIPS on DISK now available. Based on the forthcoming 2nd Edition Kwik Tips publications the program also includes current 1st edition repair information. Altogether a vast fault & remedy database of TV & VIDEO repair information for an extensive range of makes & models.

Kwik Tips V1.0 Excellent value at only \$27.95

New Editions Fault Indexes in book format

Just released - Edition 19 of the Television Magazine Index, Covers over 14,000 Television, Video, Satellite, Camcorder & Compact Disc faults, Large easy to read A4 format, The newest addition to a highly acclaimed series. In daily use in workshops across the UK (And beyond).

ISBN 1 898394 22 9 Edition 19: Complete set £14.75

<u>New version Fault indexes on disk - V1.5</u>

Our largest ever fault index database on disk, Covering a massive 18,300 !! Television, Video, Camcorder, Satellite, CD & Monitor faults listed in 17 years of Television.

Version 1.5: Indexes on Disk (price held) \$17.50 Low cost updates are available for all fault indexes

LATEST RELEASE - Equivalents guides - 2nd Edition.

The long awaited 2nd Edition of our equivalents guides now available, Over 6,300 entries - Equivalents covering Video, TV, Camcorder & satellites plus TV model-chassis guide. This single comprehensive book contains all FIVE guides. Edition 2: Equivalents guides \$5.95

All disks require PC or compatible (Supplied on 3<sup>1</sup>/<sub>2</sub>" HDs)

Technical Publishing

316, Upton Road, Noctorum, Wirral, Merseyside. L43 9RW. Tel / Fax 0151 522 0053

Please add £1.75 P & P to total (Europe £2.75, r.o.w please enquire).

# **Technical Information Services**

76 Church St, Larkhall, Lanark ML9 1HE N.B.: There is a £2.50 Post/Handling Charge on all orders Send an SAE For Your *Free* Quote & Catalogue

We have the world's Largest Selection of



VCR CIRCUITS £8.00 CTV CIRCUITS £6.00

# CTV CIRCUIT COLLECTIONS

Ferguson from 1980's till present @ £45.00 • Bush £22 Hitachi £45 • Mitsubishi £38 • Panasonic £30...etc...

Call for full list & prices of all 27 collections

Tel: 01698 883334/884585 
Fax: 01698 884825

# TOP SELLING BOOKS

PRACT' VCR or TV REPAIRS £16.95 each (or £30 for Both) MICROWAVES: ENERGY & OVENS

Data Reference Guide (Chassis/X-Ref) £9.95

KUXO' SCRAMB' SYS' (New 5th Edn.) £35.00 Buy, Sell & Service Used CTV/VCR/CD

£9.95 each IC DATA BOOKS - Various Titles

£12.95 cach With 100's of Titles, send SAE for Full List

# SERVICE MANUAL LIBRARY

BUY ANY MANUAL FOR £10.00 or Swap at £5.00 Each (plus p&p) Initial Joining Fee £65.00 (£,20/annum, thereafter)

.....000...... NEW RELEASES:

3.5" Disk Drives (Installation & Circs): £9.50 Data Ref' on 3.5" Disk: £5.00

# Servicing Books from

February Special Offers

**Television Servicing Books** 

1989/90 .... Now £69

Satellite Servicing Books

1991/92 & 1993/94 .... £39 each

Video Servicing Books

1989/90 (to clear) .... Now £49

1991/92 £185 .. Now £97.50 1993/94 £220 .. Now £150

\*NEW EDITION\*

Satellite Servicing Book Four ....£79

Contains New Satellite Cross Reference Guide



Satellite Servicing 1991-92 ISBN: 0 9513897 8 5 £39.00 Covers 251 Models. Satellite Servicing 1993-94 £39.00 Covers 316 Models. ISBN: 0 898 598 05 3 Satellite Servicing Book 4 £79.00 Covers 320 Models. ISBN: 1 898 598 12 6 Television Servicing 1989-90 669 00 Covers 307 Models ISBN: 0 9513897 1 8 Television Servicing 1991-92 £95.00 Covers 307 Models. ISBN: 0 9513897 7 7 Television Servicing 1993-94 £95.00 Covers 629 Models. ISBN: 1 898598 03 7 Television Servicing 1995-96 299.00 Covers 400 Models. ISBN: 1 898598 11 8 ISBN: 0.898598.04.5 Video Servicing 1989-90 £49.00 Covers 247 Models Video Servicing 1991-92 £97.50 Three Volume Set. ISBN: 0 9513897 9 3 Video Servicing 1993-94 £150.00 Three Volume Set. ISBN: 0 898598 07 X

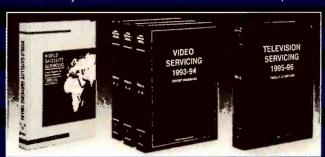
All prices include UK postage, packing & insurance Interest Free Credit Available - Phone for Details





Professionally Produced with the Manufacturers Full Co-operation

Technical Publishers



To qualify for this offer please quote T0298 when ordering. Offer is limited to one book per customer. Offer ends 28 2 98

> All Books Contain: Circuit Diagrams, Scope Readings, Voltage Tables, Part No's, Alignments & Adjustments, Trouble Shooting Guides. Send for brochure with full model list.

U-View Technical Publishers. 4 South Parade, Bawtry, Doncaster. Yorkshire. DN10 6JH. Tel: 01302 719997 Fax: 01302 719995

# SERVICE MANUALS

AND CIRCUIT DIAGRAMS

Thousands of different models available For most U.K. European, Far East & USA makes

	Service Manual	Circuits
B/W TV	£ 6.00	£3.00
CTV/VCP	£10.00	£5.00
VCR	£14.00	£7.00

Audio/Satellite/Microwave also available - P.O.A. Cheque/PO with order only please.

Add £2.00 P/P etc. to order total. Do not add any VAT

**D-TEC** 

PO BOX 1171, FERNDOWN, DORSET BH22 9YG

Tel: 01202 870656

# **Fryerns**

Service



Circuit

TV's, VCR's

SATELLITE

AUDIO & HI-FI

Most models/makes old & new covered Also fault guidance service available Prices are from £3.75 + £2.50P/P

i.e. I item - total £6.25 inc

2 items - total £10.00 inc

3 items - total £13.75 inc

4 items - total f 17 50 inc.

Payment by credit card or Postal Order

for next day delivery. Cheques to clear,

Tel/Fax: 01268 470899 Answerphone outside office hours

P.O. Box 5830 Basildon, Essex



# **REPAIRS**

# accént

# TECHNIC

CAMCORDER REPAIRS

Collection and delivery anywhere in the UK. All makes, fast service. Phone free for details.

Fax: 01905 796385 (0800) 281009



# Pace Remotes

SS9000/9200 Pro 800/900 MSS Series Pace Prima All one price £7.50 + VAT

(cheque with order) PRD 800 Tuners New catalogues available

Suppliers of Electronic Components To The TV Trade

# FOR SALE

# Trade Only

Televisions from £5.00 from £20.00 Teletext Videos from £20.00

Twin Speed Stereo from £25.00 Minimum quantity - 10 units

> **BOURNEMOUTH** WHOLESALERS 01202 470443

# WANTED

Faxback and Postal 'Repair Information Services

Whether you are a hobbyist or a professional engineer

You will save time and money by joining this service

To find out more, send a SAE to

> Translink Int. Box 17505 London SE18 7ZJ



Billingshurst, West Sussex RH14 9EZ

### **VALVES WANTED FOR CASH**

(KT88 PX4 PX25 DA100 EL34, EL37, CV4004, ECC83)

Valves must be Mullard/GEC/West Europear to achieve top prices

Ask for our free Wanted List

# WE SUPPLY VALVES, C.R.T., VIDICONS ETC

Visitors, please phone for an appointment, we're a very busy export warehouse.

Tel: (01403) 784 961 Fax: (01403) 783 519

BROADCAST & COMMUNICATIONS PROFESSIONALS

# **ASSIFIED TEL:0181 652**

# SONY

# TUNE IN TO THE LATEST

# **BROADCAST EQUIPMENT**

(IT'S A WHOLE NEW CHANNEL FOR YOUR SKILLS)

#### BASINGSTOKE

Experienced Service Engineer? Interested in the latest technology? Looking for a challenging new outlet for your skills? Then look no further!

Sony Broadcast and Professional supplies sophisticated systems and equipment to many of the world's top

broadcasters - and now we're looking for talented engineers like you to provide our customers with first-rate technical support.

Much of your work will be undertaking fast, effective repairs, although you'll also be providing fault diagnosis and technical advice by phone.

Qualified to C&G level (224), you'll need to be a confident communicator, with an adaptable, friendly approach, a good knowledge of TV and electronic circuit theory and at least a year's experience of servicing video recorders or monitors and TVs.

We'll offer you thorough technical training in all aspects of our Broadcast and Professional range, as well as good prospects and the sort of salary package you'd expect from a global leader.

Reaching a wider audience

INTERESTED? THEN WRITE WITH CV AND CURRENT SALARY DETAILS TO VANESSA CONNOLLY BCP SEARCH & SELECTION 9B INTEC 2 INTEC BUSINESS PARK WADE ROAD BASINGSTOKE

HAMPSHIRE RG24 8NE TEL: 01256 470704 FAX: 01256 844054 F-MAR:

mail@bcprecruitment.

SEARCH & SELECTION **Communications** & Multimedia

We are looking to add two more experienced TV engineers to our existing team, working in our recently extended workshop you will be given maximum support, we see our engineering team as an asset not an expense and we expect all staff to smile three times a day in addition to outbursts of laughter which we expect twice daily. You will be well paid and treated with respect. In return we ask you to fix things like TV's or microwaves etc. So if you want to join a winning team and enjoy your work please write, fax or Email to the below and we'll be in touch.

# PRO VISION

# **Electronics Ltd**

Unit 94, Pinnacle Storage Depot. Cat & Fiddle Lane, West Hallam, Derbys DE7 6HE

Tel: 0115 944 7134 Fax: 0115 944 4646 E-Mail: Provision@Enterprise.Net

# Visual FX TV VIDEO HI FI Service Centre

require

# Field Service Engineer

Based in Romford we require suitable candidate to be located in the Chelmsford area.

Relevant trade qualifications and multi brand experience preferred. Full clean driving licence

Company Car plus benefits

# **Bench Service Engineer**

Audio/Video Romford Based Excellent Salary on both positions

For further information contact: Gary Hall on

01708 381896

# **AUDIO AND/OR VIDEO ENGS**

TV, Radio, VCR Video, Type CD

Test/Repair component level & SMT

> Long Term contract RERKS

Contact Francesca Palmer (0181) 569 6199

# FOR SALE

# T.Vs, VCRs HI FIs **COMPUTERS**

MAJOR RETAILER **RETURNS** 

DISCOUNT FOR QUANTITY TEL: 01384 411414

# DUE TO FURTHER EXPANSION

SERVICESPEED SLOUGH

Require

# FIELD/BENCH **TECHNICIAN**

AND TECHNICAL INSTALLERS

For the repair and installation of CTV/VCR/Audio and Camcorder products

Top rates of pay

Tel: 01753 692408

For further details

# **PROPERTY**

# JOLLEY & CO~ Est 1947

T.V./SATELLITE REPAIRS/SALES.

WIRRAL. Net profit £45,608. Including rental income. Smart main road property. Freehold £120,000 sav or Leasehold £60,000 sav. V.2439

TEL: 0151 604 0265

# IF YOUR COMPANY HAS A VACANCY

For Experienced TECHNICIANS or **ENGINEERS** etc

Why not let TELEVISION help you find the right person by placing your recruitment advertising with us

> For Further Information Call: PAT BUNCE on Tel: 0181 652 8339 Fax: 0181 652 8931

> > **TELEVISION February 1998**

SENDZ COMPONENTS 01702 332992 & 338894			
FERGUSON BATTERY CONVERTER TÅ606 24V DC/240V AC	FARNELL POWER SUPPLY – SWITCH MODE, IN CASE 5V 6A, 12V 3A, 12V 1A X 2, SMALL £10.00	HOSIDEN TUBE BASE – 8 PIN – EK0353 50p	HANDSETS  CPT1408T, CPT2176, CPT2178  CPT2476, CPT2478  EACH £5.00  EACH £5.00
ADAPTOR-KEYBOARD MAINS 12V 800MA £5.00 BENCH LAMP-FLUORESCENT WITH MAGNIFIER P/P £5.00ea £50.00 BENCH POWER SUPPLY VARIABLE 0-30V 3A-TWIN METERS P/P £5.00ea £50.00 BRIDGE RECTIFIERS 10 FOR £1.00 BURGLAR ALARM KIT full description £7.00 BURGLAR ALARM KIT send for data MAIN CONTROL PANEL £12.50 BURGLAR ALARM SIREN 12 VOLT 50 CAMCORDER-UNIVERSAL BATTERY 9.6V – 1400MA FOR JVC-PANASONIC-PHILLIPS £9.50 CAMCORDER-TRIPOD SHOULDER POD £5.00	FERGUSON  ADAPTOR - VPT - TEXT - VA354  ADAPTOR - VPT - TEXT - VA354  £5.00  ADAPTOR - VPT - TEXT - VA354  £6.00  £20.00  £20.00  £20.00  £20.00  £8.00	I.T.T.  IF MODULES:- 5827-01-51, 5827-03-51 EACH £8.00 5828-04-10, 5829-02-58 EACH £8.00 5929-03-41 EACH £8.00 ANNEL-TIT FRONT-CMC115 £6.00 PANEL-TIT FRONT-SEL IBF 300 £10.00 PANEL-TIT FRONT-SEL IBF 150 U.K. 210.00 PANEL-TIT FRONT-SEL IBF 194P £6.00 PANEL-TIT FRONT-SEL IBF 194P £6.00 PANEL-TIT FRONT-SEL IBF 194P £6.00 TELETEX CONVERSION KIT £8.00 CORE 2.90° ITI TEXT PANEL £13.00	TEXT, REPLACES PHILIPS KT3, K30, K4 ETC. UNIVERSAL, REMOTE TV1, TV2, VCR - SAT, AUX, LCD, VIDEO, TV - ALL, NEW 10 MIXED FOR ONLY £15.00 AMSTRAD EXPORT £3.00 4600 £3.00 4700 £5.00 6800 £15.00 6800 £4.00 UNIVERSAL £3.00
CAMCORDER-TRIPOD SHOULDER POD 25.50 CAPACITORS: INVZKV, 2NZZKV, 4NZZKV EACH 15p 35V-22UF, 50V-4, 7UF, 50V-100UF EACH 25p COMPONENTS (MIXED) – BUY 8F WEIGHT	CARDIOID CAMBERA MICROPHONE-VAS DEER 12.50 CHASSIS-TX80-NEW-NO TUNER P/P.£5.00ca £15.00 CHASSIS-TX10 O VHF/UHF YELLOW SPOT AND SECAM P/P.£5.00ca £20.00 CHOKENAINS INPUTTX9-TX10 D	LOOP A ERIEL WITH SPIGOT DECKS WITH HEADS - 3000/ORION P/P £ 5.00ca £16.00	NICAM LCD £4.00 FERGUSON £1.50 FV41R/IV59 £1.50 FV41R/FV42 – FV51-52 ICCS £5.00
11b for £1 1b for £1   £1.00 per lb	CHROME BOARD-ICCS  UCS U4647TKF OR HAI 1498	MATSUI  DECK AND HEAD-VP9501 P/P £5.00ea £20.00  DECKS WITH HEADS — 3000/ORION P/P £5.00ea £16.00  HEAD-VCR-VX3000 £10.00  HEAD-VSR 1500 = ORION D2096  PANEL-MAIN-VSR 1500 P/P £5.00ea £5.00  POWER SUPPLY-VSR 1500 P/P £5.00ea £5.00  TYPE STK 5343-VP9501 £8.00  POWER SUPPLY-SWITCH MODE-1500 £3.50	IKZ000. IK7000 EACH £5.00 SRD2. SRD3, SRD4 EACH £5.00 SRD2. SRD3, SRD4 £1.00 T780 £2.00 TV/SATELLITE WITH FST £3.00 HITACHI CPT2158 (NO REPLACEMENT) £5.00 VIDEO RM933E VIDEO PLUS £3.00 CLE874B £5.00 CLE874B £5.00 CLE883A = IRR512, CPT2196, CPT2578 £8.00 TV MODEL C2558 (IR 1820)-CLE883A £10.00 MATSUI 1500 £5.00 VSR 1500 VX3000 £4.00 VX3000 £5.00 0X3000 £5.00 0X3000 £5.00
GAS SOLDER IRON-PORTASOL HOBBY £10.00 HANDSETS-SEE SEPAR ATE LISTING INFRA RED DETECTOR WIDE/SHORT ANGLE WITH RELAY £8.00 INFRA RED RECEIVER-MATSUMI MINIATURE £1.00 LOPTS – SEE SEPAR ATE LISTING MAGNIFIER – 2X AND 4X £3.50	HEAD-FV3IR	SERVICE MANUALS           WE HAVE 20,000 DIFFERENT MODELS,           10 OF MIXED         £4.50           £3 POST – TV-VIDEO-AUDIO           PHILIPS           DECODER-TEXT-K40-KT3         £10.00	3000/00/10/10   1
MILLI VOLTMETER-ELECTRONIC-LEADER LMV-181A 40V A/C IN-IMV F/S IMV-300V CALIBRATED - COST £225.00 COLOUR TV BATTERY CONVERTER IN 24VDC TO 240VAC OUT MODULATOR-TUNABLE SATELLITE-TV MODULATOR KIT. 5V TO 12V - FOR ALL CAMERAS £5.00	PANEL-FRONT-TX98 T1333E W/INFRA-RED RECEIVER PANEL-FRONT-TX100 PANEL-IF-TX9, TX10 PANEL-REMOTE AND POWER SUPPLY FV31R DISPLAY PANEL-REMOTE-TX9, TX10 PANEL-REMOTE-TX9, TX10 PANEL-REMOTE-TX10-540011 55.00	IF PANEL FOR CCP90-CP110	TY AND VIDEO £2.00 VIDEO WITH LCD - 1992/93 MODELS £5.00 PANASONIC EUR\$1142 TC1632. TC1642. TC2232 EACH £8.00 TX2034, TX2044, TX2200. TX2234 EACH £8.00 TX2244, TX2300. TX2636, TX3300 EACH £8.00 EACH £8.00 EACH £8.00
MOTORS - SEE SEPARATE LISTING   PANEL CM201   £10.00   PANEL CM201   STEREO   £5.00   PANEL CVC80-POWER   £5.00   POSITOR. 2322 662 98009   SOPPOSITOR. 2322 662 98012   SOPPOSITOR. 3122 662 98012   SOPPOSITOR. 3121 POSITOR. 3101 POSITOR.	PANEL-REMOTIE-TX10, WITH BATTERY AND 4 1/5c – 1544-033C  PANEL-REMOTIE TX90 – 139.001 1/Cs M293B1 AND MS1000  1/C M293B1-SAA5012  PANEL-REMOTIE TX100 11/C M293B1-SAA5012  1/C M293B1-SAA5012  1/C M293B1-SAA5012	NICAM BOARDS MK II   £6.00   TUNERS     FTERCS-022A TBJZ4-00ZA-ALPS   £7.00   SATELLITE SXT2302180968   £3.00   SATELLITE WITH BASE BAND MIN SXT2302234   £4.00	RC201 - TV - REPLACES TNQ1411/2
POWER SUPPLY - 12Y DC & 24Y DC-REGULATED	WITH STAND-BY BATTERY AND I/CS \$10.00 PANEL-T1228B TEXT FOR TX89, TX99, TX100 £15.00 PANEL-TX90 THORN FRONT— - 8 BUTTONS 01M4-515-002 £10.00 PANEL-TUBE BASE-I/CC5 £5.00 PANEL-TUBE BASE-I/CS £5.00 PANEL-TUBE BOSE-TX89, TX98, TX99 PANIEL-TUBING 15/90G-TX9,TX10 £5.00	SMALL UHF/YHF     £3.50       VHF/UHF - TEKE4-112A     £4.00       4944     £3.00       U321, U341, U342, U343     EACH     £5.00       U344, U411, U412, U944     EACH     £5.00       U743, U744     EACH     £3.00	SANYO UNIVERSAL VIDEO £3.00 SIEMENS TV/VIDEO - 1994 MODEL THORN 900, 9600, TX9, TX10, TX100 TEXT AND NON-TEXT EACH £10.00
RELAYS-SUB MINIATURE   25p   SATELLITE TUNER UNIT - 2427611   BASE BAND/VIDEO OUT   £6.00   SCART TO 4 PHONO LEADS 1.5M   £4.00   SCART TO 6 PHONO LEADS   £6.00   SCART TO "D" PLUG   £1.00   SCART TO "D" PLUG   £1.00   SCART TO SCART LEADS - ALL PINS CONNECTED - 1.5 METRES   £2.00	POWER SUPPLY 12V-3A FOR VIDEOSTAR CAMERA PP3 \$4.00 PUSH BUTTON UNIT-TX85, TX86 - 8 BUTTONS \$5.00 RECEIVER - INFRA - RED - ICSL486-TX100 50p TRANSFORMERS-SWITCH MODE: TX85, TX86, TX89 EACH \$4.00 TX100 \$5.00 47319040, 40153000 EACH \$5.00	AMSTRAI)  LE33-BOI £3.00  FERGUSON  IF2105-RE £5.00  MTP2011-AP00 £5.00  UHF - ICC5 £5.00  VHF - ICC5 £5.00  VHF - ICC5 £5.00	L.O.P.T. 36061, 36162, 36362, 36383, 36481 36482, 36761, 36831, 36832, 36922 2432211, 2432351, 2432491, 2432851 2432871, 2432981, 2432984, 2433752 2433952, 2434002, 2434141, 2434393 EACH £10.00 2434361, 243492, 2434491
SOUND 5.5MHZ MPM 1000T   £1.00	ICCS 3112-338-326842 £4.00  GRUNDIG  TRIPLERS BG2032-642-3002 £9.00  TRIPLERS BG2087-642-1005 £9.00  TRIPLER WITH FOCUS POT £7.00  UNIVERSAL TRIPLER - UPRIGHT  PRINTED CIRCUIT TYPE £9.00	TX98, T99, TX100 EACH £4.00 ORION 1500 - UE33 BO9 £4.00 PANASONIC SMALL UHF/VHF SANYO UHF/VHF TDO 124EB £4.00	2435016, 2435062 EACH £10.00 243504, 2435082, 2435121 EACH £10.00 2435372, 2435701, 2436773 EACH £10.00 2435372, 2436795, 2436797, 3216001 EACH £10.00 23220029, 3714016, 47003481 EACH £10.00 AT2076/78, AT2076/88, AT2078/25 DST81N243/472593-00 DST81N243/472593-00 EST858235/47328700 & /40153200 EACH £10.00
TUNERS - SEE SEPARATE LISTING TUNING POTS - 8 WAY 50p  AMSTRAD DISPLAY PANEL - LONG CHASSIS - 1992/93 54.00 FRONT PANEL FOR ALL. 1992 MODELS 64.00 HEAD AND DRUM - 6000 512.00 HEAD AND DRUM - NICAM 512.00	HITACH1	SHARP TUNER AND IF 1810587 PAI UK TATUNG UNIVERSAL 205 OR EQUIVALENT WITH AERIAL SOCKET  MOTORS  SA.00	DST8RN234/4000R6AI), & 1/3R05200L   EACH   £10.06   DST8RN234/47302001, & 1/37137590   EACH   £10.06   DST1R6N243/4730S8-00   TFB3036D, TFB4065AD   EACH   £10.00   TFB3035D, TFB4066AD   EACH   £10.00   TX10   £4.00   £4.00   EACH   £4.00   EACH   £6.00   EACH
PANEL-CLOCK DISPLAY - 8,900	PANEL-TELETEXT GBP - ISSUE 6	HITACHI CAPSTAN - ACE G4-B to ACE G40-B MICROWAVE TURNTABLE MOTOR  MATSUI CAPSTAN VSR 1500 I/C NO. M56730 ASP 2 TYPES 1995 TO 1997 MODBLES MATSUI VIDEO DECKS WITH CAPSTAN MOTOR AND HEAD £20.00	TX85, TX86 EACH \$8.00 TX89, TX98, TX99 EACH \$12.00 Y260781 \$8.00 FSTY260482 \$110.00 LOPT BLUE SPOT \$110.00 LOPT RED SPOT \$6.00 LOPT WHITE SPOT & YELLOW SPOT EACH \$8.00 PANASUNIC
20 OFF MIXED NOKIA ITT. SALORA FINLEX SERVICE MANUAL MAINS ADAPTOR 12V AT 500 M/A NEGATIVE CENTRE  \$10.00	THICK FILM-HM9204A \$2.50 THICK FILM-FRAME OUTPUT & GEC-6251 \$9.00 TRANSFORMER-SWITCH MODE-470036-70 \$5.00 TRANSFORMER-SWITCH MODE-473187-01 \$5.00 TRANSFORMER-SWITCH MODE-473332-00 \$5.00	MITSUMI	TC2203, TLF 14568 EACH £15.00 TLF14578, TLF701/6 EACH £15.00 TOSHIBA TFB 3035D, TFB 4023AD, TFB 4032BD EACH £10.00 TFB 3038AD, TFB 4110AD EACH £10.00 TFB 3089D, TFB 4088AD EACH £3.00
7805   20p   25D1412   £1.00   BUJORA   7806   20p   25D1433   £1.00   RUJORD   RU	1.00   BYV95R   10p   HA118041NT   1.50	HGAI124A   S0p   HdG254   AI.P-15   53.50   K7ST   G39! B1   51.50   K7ST   G39! B1   51.50   K7ST   G39! B1   51.50   K7ST   51.50   K7ST	
PLEASE ADD 17.5% VAT TO BOTH THE GOODS TOTAL AND P/P CHARGE			
THE PROPERTY OF THE PROPERTY O			

# MENSUREMENT

Test
Equipment
Catalogue Available
Please call for your
FREE COPY
TODAY

# SULUTIONS

Meter
Repair Service
In or out of warranty
Free Collection &
Free Delivery Available
0800-801978

RSIG ELITERIA REIG ELITERIA



THESTARITY IN THE TAIL TO BUT TAILED



ETLLETAS & VT



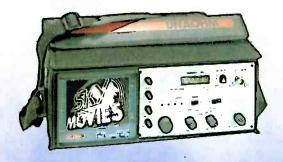
DIGITAL SATELLITE & DIGITAL TERRESTRIAL



אבובות בתיבותות פובלי דליוציבלי הב



YAYYUK SYLETTLE SYLETTLE



TEL - 01604 787 888

Fax - 01604 787 999

E-mail - sales@satsol.co.uk

E-mail - support@satsol.co.uk

Internet Site - www.satsol.co.uk

Stocking over 2,500 different
TV is Satellite items in depots located
throughout the UK. We don't just offer a Solution.
WE ARE THE SOLUTION - SATELLITE SOLUTIONS.

