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Competition

It seems incredible that a market as open and competitive as the UK brown goods trade should have been receiving the detailed attention of the Monopolies and Mergers Commission. But the Commission has been at it for two years – its investigation has been extended twice. The Commission's report is due to be published in late summer. It was sent to the Department of Trade and Industry at the end of April, but details of a draft have been leaked and appeared recently in *The Economist*. After this they received wide publicity.

The Commission appears to have convinced itself that a "complex monopoly" exists, because manufacturers with a combined market share of over 25 per cent recommend retail prices. On this basis it seems to have decided that recommended retail prices should be made illegal, and that manufacturers should be forced to give undertakings that they will not refuse to supply discount retailers. "Consumers will be lucky if they can tell the difference", the *Financial Times* concludes.

Apart from the fact that the prices quoted for brown goods are "similar" wherever one goes, there is little or no evidence that manufacturers have been trying to impede a free market. This price similarity could as well be the result of intense competition in the retail trade, as a result of which prices have been forced down. While the price of all consumer durables has risen by 43 per cent in real terms over the past decade, the price of electrical goods has fallen by 23 per cent.

The great flaw in the Commission's report seems to be its emphasis on manufacturers rather than the retail trade. This ignores the great changes that have taken place in the supply of brown goods over the last decade or so.

It's the great clout of the major retailers, Dixons in particular, that does more than anything to set price levels today. Does the Commission think that the likes of Dixons quake at the thought of a manufacturer (or even several) refusing to supply it with goods for sale? Any manufacturer who was foolhardy enough to do so would simply be doing himself a misfavour. Dixons and Comet can go elsewhere if they are not happy with a supplier – so for that matter can Euronics, which supplies much of the independent trade. And elsewhere can mean anywhere – China, Korea, Malaysia and points east and west. Large retailers can and do get their own products made to their own specifications, and can make a larger profit from this than from selling leading brands.

If Dixons and the others were trying to keep prices high, there might be cause for complaint. If anything however the Dixons effect has made it extremely difficult for anyone, manufacturer or retailer, to make any significant profit out of selling brown goods. It has often enough been said that credit supply and the sale of insurance and service arrangements are the main source of profitability for many large brown goods retailers.

What of the argument that prices are cheaper in the USA? This seems to reflect rather different trading conditions there. People are prepared to travel considerable distances to visit vast discount outlets that operate under extremely low-cost conditions. It's hard to imagine that this approach could be applied in the UK – planning laws would be one problem. Nearer home, it's a fact that prices in the UK are lower than in the rest of Europe.

Another thing that the Commission seems to have overlooked is the nature of the product. The trade is dealing with increasingly sophisticated electronic products, not bars of soap or bags of chips. Such products require knowledgeable retail staff who can understand them and give customers the guidance they require. Indeed a common complaint against the trade is that there is a lack of such expertise. It can't be provided, nor can proper service back-up, without adequate profitability. But on all sides of the industry profitability has been woeful in recent years. The Commission chooses to ignore this.

Most people want and appreciate good service. They want to buy decent products that will have a good lifespan and can be repaired. But they are not going to get good service from a trade that is denied the chance to earn a reasonable profit. One has to conclude that the Commission has learnt curiously little from its two-year stint.

An Apology

We regret that because of a print production problem last month the advertisement that appeared on page 586 was incorrect. Our apologies to Grandata and our readers for the inconvenience caused, particularly with respect to special offers.

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.

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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	0.16	LA4445	3.45	STK5481	8.12	TDA2593	1.12	TMP47C432AP8189	
2SC124	0.48	2SD669A	0.64	BC337	0.14	BF471	0.37	BYD33M	0.26	LA4460	2.50	STK7253	7.69	TDA2600	7.69		15.19
2SC1318	0.19	2SD718	1.90	BC338	0.06	BF487	0.57	BYV10-40	2.55	LA4700	4.27	STK7308	6.41	TDA2611A	0.64	TMP47C434N3537	
2SC1473	0.21	2SD756	0.47	BC368	0.18	BF491	0.41	BYV95B	0.21	LA6324	2.05	STK7348	5.74	TDA2611AQ	1.32		15.22
2SC1573	0.52	2SD837B	1.12	BC369	0.18	BF494	0.12	BYV95C	0.28	LA6510	2.94	STR11006	7.37	TDA2653A	4.70	TMP47C434N3555	
2SC1675	0.14	2SD856	0.79	BC372	0.53	BF759	0.38	BYV96D	0.27	LA7830	1.88	STR4211	9.40	TDA3190	2.05		16.63
2SC1685	0.21	2SD882	0.43	BC546A	0.11	BF869	0.38	BYV96E	0.53	LA7832	2.40	STR50020	9.38	TDA3330	14.21	TPU2732	10.05
2SC1740	0.16	2SD898B	6.41	BC546B	0.12	BF871	0.41	BYW56	0.31	LA7835	2.99	STR50103	4.48	TDA3505	2.40	U28298	3.40
2SC1815Y	0.11	2SD965	0.67	BC547	0.11	BF959	0.18	BYW95C	0.21	LA7837	4.19	STR50103A	5.56	TDA3560	6.13	UC3842	1.46
2SC2001	0.23	2SD965R	1.05	BC547A	0.04	BF960	0.30	BYW96E	0.50	LC7132	4.70	STR54041	5.15	TDA3561A	3.85	UC3844	1.20
2SC2023	3.18	2SK1117	3.40	BC547B	0.11	BF970	0.43	BYX55600	0.23	LED3G	0.10	STR5412	4.02	TDA3562A	4.62	UC3844N	1.91
2SC2073	1.03	2SK1118	3.40	BC548	0.11	BFR90A	0.68	BZV10	1.34	LED3R	0.10	STR58041	3.42	TDA3565	2.74	UPC1318AV	3.85
2SC2078	1.00	2SK30A	0.35	BC548A	0.11	BFY51	0.39	BZV85C5V1	0.15	LED3Y	0.10	STR59041	8.11	TDA3566	6.41	UPC1365C	1.70
2SC2120	0.23	7407	0.69	BC548B	0.06	BR100	0.18	BZX6110	0.16	LM317T	1.29	STR6020	6.07	TDA3576B	10.31	UPC1378H	1.71
2SC2229	0.31	74HC04	0.88	BC548C	0.14	BR103	0.62	BZX6111	0.10	LM324N	1.48	STRD1816	7.69	TDA3592A	4.60	UPC1394C	1.92
2SC2230	0.55	7805	0.78	BC549B	0.11	BRX44	1.02	BZX6112	0.13	LM339N	0.50	STRD4420	10.64	TDA3640	5.98	UPC1498H	2.99
2SC2235	0.36	7806	0.60	BC550B	0.16	BRX49	0.43	BZX61120	0.28	M4948I	11.85	T9053V	1.35	TDA3650	11.04	UPC1498H	2.31
2SC2236	0.36	7809	0.69	BC550C	0.09	BRY55	0.28	BZX6113	0.11	M5218L	0.69	T9064V	1.87	TDA3653B	1.54	UPC574J	0.86
2SC2240	0.21	7812	0.52	BC556A	0.11	BSX20	0.35	BZX6116	0.19	M54544L	2.04	TA7120P	0.66	TDA3653C	2.82	X2402P	5.78
2SC2271	0.67	78L05	0.35	BC556B	0.14	BT139600	1.29	BZX6120	0.19	M58655P	4.96	TA7280P	2.74	TDA3654	1.44	ZTX650	0.51

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NEW HIGH POWER MINI BUG With a range of up to 800 metres and a 3 days use from a PP3 this is our top selling bug! less than 1" square and a 10m voice pickup range. **£28** Ref LOT102.

BUILD YOU OWN WINDFARM FROM SCRAP New publication gives step by step guide to building wind generators and propellors. Armed with this publication and a good local scrap yard could make you self sufficient in electricity! £12 ref LOT81

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CCTV PAN AND TILT KIT Motorize your CCTV camera with this simple 12vdc kit. 2 hermentically sealed DC linear servo motors 5mm threaded output 5 secs stop to stop, can be stopped anywhere, 10mm travel, powerful. £12 ref LOT125

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CCTV CAMERA MODULES 46X70X29mm, 30 grams, 12v 100mA. auto electronic shutter, 3.6mm F2 lens, CCIR, 512x492 pixels, video output is 1v p-p (75 ohm). Works directly into a scart or video input on a tv or video. IR sensitive. £79.95 ref EF137.

IR LAMP KIT Suitable for the above camera, enables the camera to be used in total darkness! £6 ref EF138

INFRA RED POWERBEAM Handheld battery powered lamp, 4 inch reflector, gives out powerful pure infrared light! perfect for CCTV use, nightsights etc. £29 ref PB1.

SUPER WIDEBAND RADAR DETECTOR Detects both radar and laser , X K and KA bands, speed cameras, and all known speed detection systems. 360 degree coverage, front &earwaveguides.

1.1"x2.7"x4.6" fits on sun visor or dash £149 ref

CHIEFTAN TANK DOUBLE LASERS 9 WATT+3 WATT+LASER OPTICS

Could be adapted for laser listener, long range communicastions etc Double beam units designed to fit in the gun barrel of a tank, each unit has two semi conductor lasers and motor drive units for alignement. 7 mile range, no circuit diagrams due to MOD, new price £50,000? us? £199. Each unit has two gallium Arsenide injection lasers, 1 x 9 watt, 1 x 3 watt. 900nm wavelength. 28vdc, 600hz pulse frequency. The units also contain an electronic receiver to detect reflected signals from targets. £199 for one. Ref LOT4.

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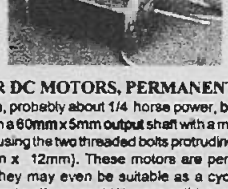
MAGNETIC CREDIT CARD READERS AND ENCODING MANUAL £9.95 Cased with flyleads, designed to read standard credit cards! complete with control elctronics PCB and manual covering everything you could want to know about whats hidden in that magnetic strip on your card! just £9.95 ref BAR31



HIGH POWER DC MOTORS, PERMANENT MAGNET 12 - 24v operation, probably about 1/4 horse power, body measures 100mx75mm with a 60mm x 5mm output shaft with a machined flat on it. Fixing is simple using the two threaded bolts protruding from the front of the motor 4mm x 12mm). These motors are perfect for model engineering etc they may even be suitable as a cycle motor? We expect high demand so if you would like one or think you may require one in the future place your order today! £22 ref MOT4 10 pack £185

WANT TO MAKE SOME MONEY? STUCK FOR AN IDEA? We have collated 140 business manuals that give you information on setting up different businesses, you peruse these at your leisure using the text editor on your PC. Also included is the certificate enabling you to reproduce (and sell) the manuals as much as you like! £14 ref EP74

RUSSIAN 900X MAGNIFICATION ZOOM MICROSCOPE metal construction. built in light, mirror etc. Russian shrimp farm!, group viewing screen, lots of accessories. £29 ref ANAYLT.

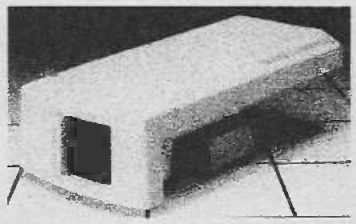
AA NICAD PACK Pack of 4 tagged AA nicads £2.99 ref BAR34

RUSSIAN NIGHTSIGHTS Model TZS4 with infra red illuminator, views up to 75 metres in full darkness in infrared mode, 150m range, 45mm lens, 13 deg angle of view, focussing range 1.5m to infinity, 2 AA batteries required. 950g weight. £199 ref BAR61. 1 years warranty

LIQUID CRYSTAL DISPLAYS Bargain prices,
16 character 2 line, 99x24mm £2.99 ref SM1623A
20 character 2 line, 83x19mm £3.99 ref SM2024A
16 character 4 line, 62x25mm £5.99 ref SMC1640A

TAL-1, 110MM NEWTONIAN REFLECTOR TELESCOPE Russian. Superb astronomical 'scope, everything you need for some serious star gazing! up to 169x magnification. Send or fax for further information. 20kg. 885x800x1650mm ref TAL-1. £249

YOUR HOME COULD BE SELF SUFFICENT IN ELECTRICITY Comprehensive plans with loads of info on designing systems, panels, control electronics etc £7 ref PV1



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MICRO RADIO It's tiny, just 3/8" thick, auto tunning, complete with headphones. FM £9.99 ref EP35

25 SQUARE FOOT SOLAR ENERGY BANK KIT 100 6"x6" 6v Amorphous 100mA panels, 100 diodes, connection details etc to build a 25 square foot solar cell for just £99 ref EF112.

CONVERT YOUR TV INTO A VGA MONITOR FOR £25! Converts a colour TV into a basic VGA screen. Complete with built in psu, lead and s/ware. Ideal for laptops or a cheap upgrade. Supplied in kit form for home assembly. **SALE PRICE £25** REF SA34

***15 WATT FM TRANSMITTER** Already assembled but some RF knowledge will be useful for setting up. Preamp req'd, 4 stage 80-108mhz, 12-18vdc. can use ground plane, yagi or dipole £69 ref 1021

***4 WATT FM TRANSMITTER KIT** Small but powerful FM transmitter kit. 3 RF stages, mic & audio preamp included £24 ref 1028

YUASHA SEALED LEAD ACID BATTERIES 12v 15AH at £18 ref LOT8 and below spec 6v 10AH at £5 a pair

ELECTRIC CAR WINDOW DE-ICERS Complete with cable, plug etc **SALE PRICE JUST £4.99** REF SA28

AUTO SUNCHARGER 155x300mm solar panel with diode and 3 metre lead fitted with a cigar plug. 12v 2watt. **£12.99** REF AUG10P3.

SOLAR POWER LAB SPECIAL You get 2 6"x6" 6v 130mA cells, 4 LED's, wire, buzzer, switch + 1 relay or motor. **£7.99** REF SA27

12V DC MOTOR SPEED CONTROL KIT Complete with PCB etc. Up to 30A. A heat sink may be required. **£19.00 REF: MAG17**

SOLAR NICAD CHARGERS 4 x AA size £9.99 ref 6P476. 2 x C size £9.99 ref 6P477

MEGA POWER BINOCULARS Made by Helios, 20 x magnification, precision ground fully coated optics, 60mm objectives, shock resistant caged prisms, case and neck strap. £89 ref HPH1

GIANT HOT AIR BALLOON KIT Build a 4.5m circumfrence, fully functioning balloon, can be launched with home made burner etc. Reusable (until you loose it!) £12.50 ref HA1

AIR RIFLES .22 As used by the Chinese army for training puposes. so there is a lot about! £39.95 Ref EF78. 500 pellets £4.50 ref EF80.

***NEW MEGA POWER VIDEO AND AUDIO SENDER UNIT.** Transmits both audio and video signals from either a video camera, video recorder, TV or Computer etc to any standard TV set in a 500m range! (tune TV to channel 31) 12v DC
op. Price is £85 **REF: MAG15** 12v psu is £5 extra **REF: MAG5P2**

***MINATURE RADIO TRANSCEIVERS** A pair of walkie talkies with a range up to 2 km in open country. Units measure 22x52x155mm. Including cases and earp'ces. 2xPP3 req'd. £37.00 pr **REF: MAG30**

***FM TRANSMITTER KIT** housed in a standard working 13A adapter!! the bug runs directly off the mains so lasts forever! why pay £700? or price is £18 REF: EF82 (kit) Transmits to any FM radio. Built and tested version now available of the above unit at £45 ref EXM34

***FM BUG BUILT AND TESTED** superior design to kit. Supplied to detective agencies. 9v battery req'd. £14 REF: MAG14

GAT AIR PISTOL PACK Complete with pistol, darts and pellets £14.95 Ref EF82B extra pellets (500) £4.50 ref EF80.

HEAT PUMPS These are mains operated air to air units that consist of a aluminium plate (cooling side) and a radiator (warming side) connected together with a compressor. The plate if inserted into water will freeze it. Probably about 3-400 watts so could produce 1kw in ideal conditions. £30 ref HP1

3 FOOT SOLAR PANEL Amorphous silicon, 3' x 1' housed in an aluminium frame. 13v 700mA ouput. £65 ref MAG45

SOLAR/WIND REGULATOR Prevents batteries from over charging. On reaching capacity the regulator diverts excess power into heat avoiding damage. Max power is 60 watts. £27.99 ref S/CA11-/05

FANCY A FLUTTER? SEEN OUR NEW PUBLICATION? Covers all aspects of horse and dog betting, systems etc and gives you a betting system that should make your betting far more profitable! £6 a copy ref BET1

FIBRE OPTIC CABLE BUMPER PACK 10 metres for £4.99 ref MAG5P13 ideal for experimenters! 30 m for £12.99 ref MAG13P1

4X28 TELESCOPIC SIGHTS Suitable for all air rifles, ground lenses, good light gathering properties. £24.95 ref R/7.

GYROSCOPES Remember these? well we have found a company that still manufactures these popular scientific toys, perfect gift or for educational use etc. £6 ref EP70

NICAD CHARGERS AND BATTERIES Standard universal mains operated charger, takes 4 batts + 1 PP3, £10 ref PO11D. Nicads- AA size (4 pack) £4 ref 4P44, C size (2 pack) £4 ref 4P73, D size (4 pack) £9 ref 9P12.

RECHARGE ORDINARY BATTERIES UP TO 10 TIMES! With the Battery Wizard! Uses the latest pulse wave charge system to charge all popular brands of ordinary batteries AAA, AA, C, D, four at a time! Led system shows when batteries are charged, automatically rejects unsuitable cells, complete with mains adaptor. BS approved. Price is £21.95 ref EP31.

PHOTOGRAPHIC RADAR TRAPS CAN COST YOU YOUR LICENCE! The new multiband 2000 radar detector can prevent even the most responsible of drivers from losing their licence! Adjustable audible alarm with 8 flashing leds gives instant warning of radar zones. Detects X, K, and Ka bands, 3 mile range, 'over the hill' 'around bends' and 'rear trap facilities, micro size just 4.25"x2.5"x.75". Can pay for itself in just one day! £89 ref EP3.

3" DISCS As used on older Amstrad machines, Spectrum plus3's etc £3 each ref BAR400.

STEREO MICROSOPES BACK IN STOCK Russian, 200x complete with lenses, lights, filters etc etc very comprehensive microscope that would normally be around the £700 mark. our price is just £299 (full money back guarantee) full details in catalogue.

SECOND GENERATION NIGHT SIGHTS FROM £748

RETRON Russian night sight, 1.8x, infra red lamp, 10m-inf, standard M42 lens, 1.1kg. £349 ref RET1

LOW COST CORDLESS MIC 500' range, 90 - 105mhz, 115g, 193 x 28 x 39mm, 9v PP3 battery required. £17 ref MAG15P1

HI POWER SURVEILLANCE TELESCOPE Continuous zoom control from 20 times to an amazing 80 times magnification. 60mm fully coated objective lens for maximum light transmission, complete with tripod featuring micro elevation control. £75 ref ZT1

JUMBO LED PACK 15 10mm bicolour leds, plus 5 giant (55mm) seven segment displays all on a pcb £8 ref JUM1. Pack of 30 55mm seven seg displays on pcbs is £19 ref LED4, pack of 50 £31 ref LED50

12VDC 40MM FANS MADE BY PANAFLO, NEW. £4. REF FAN12

WIND GENERATORS 380 WATT

1.14 dia blades, carbon matrix blades, 3 year warranty, 12vdc output, control electronics, 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

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Television – reader offer

Temperature-controlled soldering stations – over 15% discount

Television readers are eligible for an exclusive discount on both the SL20 and SL30 soldering stations from Vann Draper Electronics.

Normally, the SL20 with bar-graph temperature indicator costs £59 while the SL30 with digital read-out costs £69 excluding VAT and delivery. *Television* readers using the coupon alongside can obtain either of these stations for the prices above – but without adding delivery charges and 17.5% VAT.

Designed for servicing and manufacture, these irons feature 24V/48W heating elements and an iron-coated bit for long life. The SL20 has a control range of 150 to 420°C while the 30 spans 160 to 480°C. As standard, an 0.8mm diameter bit is fitted, but 1.6 and 3.2mm alternatives can be obtained by adding £1.65 inclusive to your order for each extra bit required. Please make enquiries to Vann Draper on 0116 2771400, fax 2773945.

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Or, please debit my Master, Visa or Access card

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Expiry date

Please mail this coupon to Vann Draper Electronics, together with payment. Alternatively fax credit card details with order on 0116 2773945 or telephone 0116 2771400. Address orders and all correspondence relating to this order to Vann Draper Electronics at Unit 5, Premier Works, Canal Street, South Wigston, Leicester, LE18 2PL. Overseas readers can also obtain this discount but details vary according to country. Please ring, write or fax to Vann Draper Electronics

TELETOPICS

Latest on Discs

Sony has developed a technology that could be used for a new generation of high-density, optically-scanned discs. It uses a high-power blue-green laser, two-element objective lens and a disc with similar dimensions to the CD and DVD – 12cm diameter, 1·2mm thickness. The discs could store up to 12Gbytes of data on a single side, twenty times more than today's CD-ROMs.

The blue-green zinc-selenium laser has a wavelength of 515nm. This compares with the 780nm red laser used with the CD format and the 650/600nm laser used with DVDs. The blue-green laser produces a beam spot with a diameter of about 0·7 microns, making it possible to store 9·5Gbits of data per square inch (the CD has a recording density of 730Mbits per square inch and the DVD a storage capacity of 3·2Gbits per square inch). The numerical aperture of the blue-green laser is about 0·85, the power output 20mW. Sony adds that recordable discs could be developed using either phase-change or magneto-optical technology.

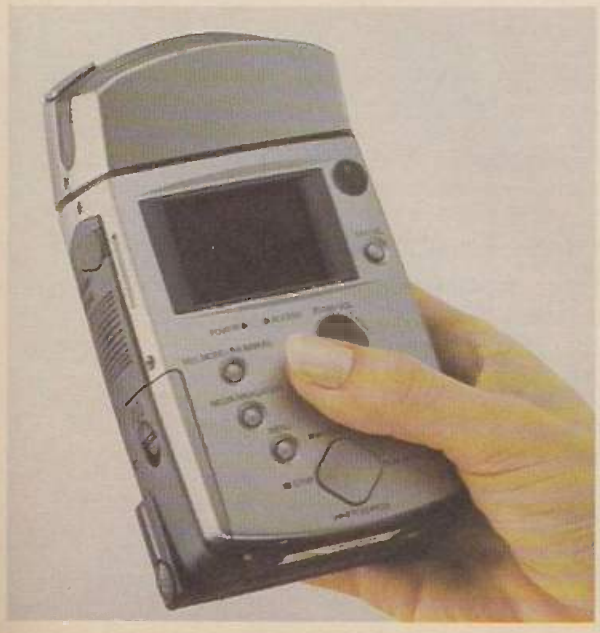
Sony is now working on blue lasers with a wavelength of around 410nm. In theory this could be used to create discs with a storage capacity of 18Gbytes per side.

Philips has launched its first DVD video player in the USA. The suggested retail price is around $549. The company now has a fully operational authoring, mastering and replication line for MPEG-2 audio and video.

Ricoh has launched the first consumer CD-rewritable (CD-RW) drive in the UK. The MP6200 has a suggested price of around £590 and can play CD-ROM, CD-Recordable and CD-RW discs – the latter have a recording layer that consists of silver, indium, antimony and terbium and can be used up to 1,000 times. They cost about £25 each.

Video News

Hitachi's MPEG camera (see photo) can record up to twenty minutes of full-motion video with sound. Alternatively it can take and store up to 3,000 JPEG still pictures, or 1,000 such pictures each with ten seconds of sound. In the video mode, MPEG-1 encoded data is stored on a 260Mbyte type III PC card. The data can then be transferred to a PC. Price is expected to be around £2,000.



Sharp has launched two VCRs that incorporate its Post Code Security system. This works by enabling the owner to store his/her post code in an EPROM. Should the VCR be stolen and recovered by the police, the post code will be displayed on the screen automatically during power-on. Should the owner move, he/she can use a secret ID code to change the data. Models VCMH67HM and VCMH68HM have suggested prices of £180 and £280 respectively.

Sharp is also planning to launch its MDPS1 MiniDisc camcorder in the UK later this year or early next. The camera was launched in Japan last February and can store 2,000 still images on a single MiniDisc. It can also record text and data. Sharp expects two million digital still cameras to be sold in Japan this year, twice last year's number. No other UK launch details have been released.

Toshiba's new Model V727B VCR is a four-head Nicam machine with a suggested price tag of around £360. Its auto set-up system tunes in all channels automatically, storing them in the correct order. The system also has an auto-seeking UHF output that finds a free channel with no interference, overcoming the Ch. 5 problem.

A multimedia home computer that can be connected to a TV set, a computer monitor and an audio system has been launched by Toshiba in Japan. It runs PC software, plays DVD and CD discs and provides access to the Internet. Other features include a wireless keyboard, a remote control handset, and both S-video and composite video outputs. The machine is designed to be portable. Price in Japan is the equivalent of around £1,250.

Clever Chip

Sharp has developed a media processor chip for intelligent TV and similar applications. Referred to as a data-driven media processor (DDMP), it uses novel processing technology. The main aspect of this is the fact that the eight computing cores are data instead of clock controlled. Thus current consumption falls to a negligible level when there's no data. Maximum power consumption is 0·8W. The chip is capable of 3·8bn operations/sec.

Possible applications include videophone, 3D graphics and digital satellite or cable broadcast signal processing, also HD-TV decoding. The device could be used for MPEG-2 decoding in a PC.

Business News

Matsushita intends to increase capital spending significantly during the current financial year. The bulk of the 13 per cent increase, to $4bn, will be invested in LCD production. Sales during the year just ended reached a record $67·19bn, with net profits more than doubling. All divisions reported improved results.

Sony also saw doubled profits last year, helped by strong sales of the PlayStation video games system. Video equipment sales rose by 11 per cent, camcorder sales by 14 per cent. The TV division increased sales by 30 per cent, helped by the demand for computer monitors.

The performance of Japanese consumer electronics manufacturers during the last financial year was helped by a favourable exchange rate.

Taiwanese computer manufacturer Acer plans to increase the share of its income derived from consumer electronics products from five to twenty per cent by the year 2000. It intends to launch new products including digital mobile phones, digital set-top boxes, widescreen TV sets, and an "Internet appliance device" which will connect with a standard TV set and telephone line to provide Internet access.

Amstrad plans to withdraw from direct involvement in the consumer electronics field by selling this side of its business, including the expanding satellite section, to Betacom, in which it holds a 65·4 per cent stake.

Matsushita (Panasonic, Quasar, Technics, etc.) has established a regional headquarters in London, to integrate its sixteen European sales and financial operations. A new holding company has been set up, capitalised at £153m, with 100 employees. Europe accounts for ten per cent of Matsushita's sales.

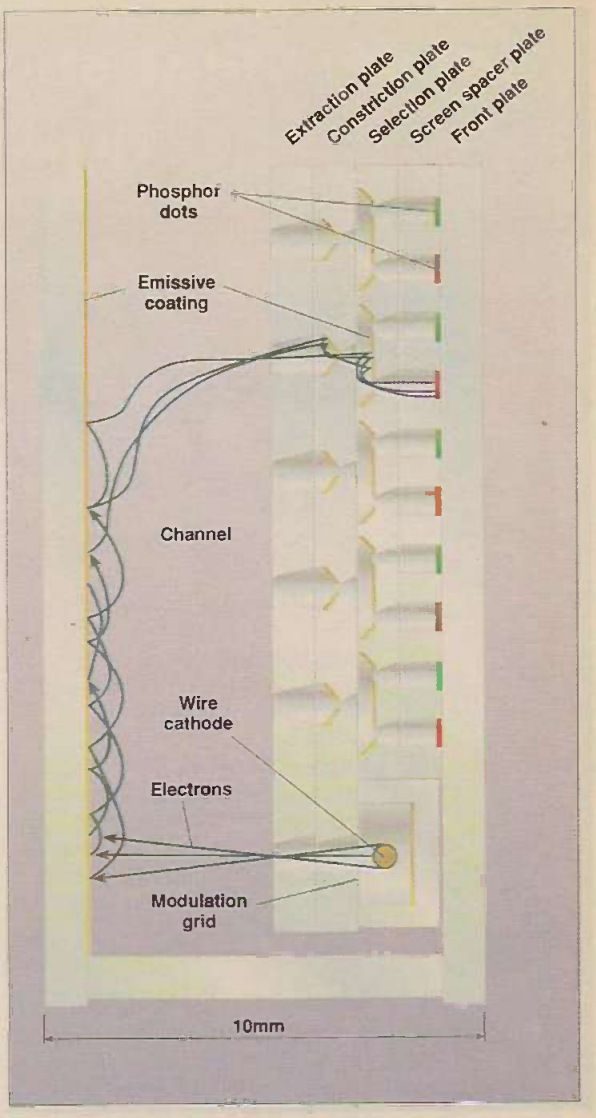
At a recent presentation Doug Dunn, chairman and chief executive officer of Philips Sound and Vision, announced that in view of the stable consumer electronics market, with only ten per cent annual growth, Philips has decided to change its role from a manufacturing company to an integrated system solutions provider. To remain a market leader, he continued, product development times will be cut to six months, flexibility will be increased through the use of common building blocks, and market responsiveness increased. One of the most difficult tasks is "to find out in advance what the consumer will want". Subsequently Cor Boonstra, Philips' President, told the annual general meeting that the company intends to limit the extent to which it stakes its future on product breakthroughs, aiming for "predictability in growth rather than seeking rewards in expensive and risky innovations". He pointed out that Philips came close to bankruptcy in 1991, achieved record net profits (Fl2.52bn) four years later then slid back to a Fl290m loss last year. The aim in future will be to reduce vulnerability to market fluctuations, the trade cycle and success or lack of it with a particular product.

Thomson Multimedia is to close two more non-European factories in addition to the six planned in Malaysia, Germany, Canada and the USA. Under the restructuring, the company will lose a fifth of its global workforce. Despite a sales increase of 3·6 per cent last year, there was an increased loss of FFr3.13bn, up from FFr1.09 in the previous year. Restructuring and financial costs contributed to the increased loss.

Exhibitions/conferences

The Confederation of Aerial Industries' 1997 Trade Fair will be held at the Heathrow Park Hotel over June 24-26th. Digital TV technology will be the main theme. A comprehensive programme of training and seminars will be run alongside the main exhibition. For further information contact the CAI office on 0181 902 8998 or fax 0181 903 8719.

The annual RETRA service conference will be held on July 2nd at the Swallow Hotel, Solihull. Key questions on the future of servicing, in particular the impact of digital technology, will be addressed. For further details contact RETRA at 1 Ampthill Street, Bedford MK42 9EY (01234 269 110, fax 01234 269 609).



Flat CRT?

Philips Research Laboratories in Eindhoven have developed a cathode-ray flat display panel (CRP) with a depth of just 10mm. The accompanying illustration shows a vertical cross-section of one of the cathode-ray panel's channels (columns). Electrons emitted from a wire cathode at the bottom travel across the channel to the rear plate, which has an emissive coating. Because of this further electrons are released by secondary emission. Electrons close to the channel's rear plate can be attracted across the channel as required to activate the display's phosphor dots. Further secondary emission occurs at the front plate section. To generate sufficient light output, the electrons are accelerated prior to reaching the phosphor dots by applying 5kV to the screen spacer plate.

The modulation grid controls the beam from the cathode, providing column activation. When a modulation grid has been switched on, the associated channel receives a charge. A 'transport field' encourages the electrons that form the charge to travel up the channel. The extraction plate controls row activation. Thus scanning is achieved by activating a single row electrode then activating each column (channel) in turn. The constriction plate equalises the electron energy levels. Switching between the RGB phosphors is controlled by the selection plate.

Philips has no plans at present to put the CRP into production. For this, the company would require business partners.

Camcorner

Reports from
David C. Woodnott

Sony CCDTRV30E

This model has an LCD screen as well as a standard viewfinder. The viewfinder picture and all the camera and playback functions were OK, the only inoperative feature being the LCD display.

Various checks in the relevant circuitry revealed little except that something odd had possibly occurred. As no circuit fault could be found, we decided to use the EVR to check the relevant data at page D. This was found to be reasonably correct (near to standard values) in all but one address location – address BB, which read 00. The manual shows this location as data 92. When it was set to this figure the LCD picture appeared! We then switched the unit off, and were pleased to find that the LCD still operated at switch on.

We finally set up the LCD adjustments as per the manual. All was now well. It seems that the data had become corrupted, but no reason for this could be found. An interesting point is that the function of the offending address, BB, is not listed in the manual. **D.C.W.**

Sharp VLM4H

The iris behaved erratically when the camera was pointed at a strong light source – all other functions worked correctly. The cause was a dry-joint at connector P8 on the main PCB. **D.C.W.**

Sony CCDTR75E

The complaint with this camcorder was failure to eject the cassette. When the eject button was pressed, all that happened was that the caution LED flashed. The E-E pictures were OK.

Once the cassette had been removed we found that the capstan motor wasn't working. The motor does sometimes fail, but not this time. Another quite common problem is poor joints at the capstan motor edge connector (this is also a problem with other connectors, i.e. the drum motor, deck sensors, etc.). In fact however the culprit was the CXA1127AM capstan motor drive chip. A replacement restored the unit to its former happy state. **D.C.W.**

Ferguson Pro 8/220

This one is a bit of an oddity! It bears the Thomson as well as the Ferguson name and is a clone (or very much like) the Samsung VPE807, a model for which certain spares are no longer available.

This one required a replacement head drum assembly, which is available from Ferguson only as a complete unit. The replacement restored the machine to working order, though its price is rather high for a 'low-end' camcorder. The drum is not available from Samsung, but you may find that Ferguson still have some stock. **D.C.W.**

Sharp VLC690H

No operation was the complaint with one of these popular camcorders. As with many of its contemporaries, leaky capacitors are a problem. This time C946 was the culprit.

It's probably wise to inspect and/or replace all the electrolytics used in this and similar models, as a preventative measure – leakage has become the number one common fault in recent times. PCB cleaning is also required of course. **D.C.W.**

Hitachi VM2300E

This full-sized camcorder produced good playback pictures and sound, but the camera mode E-E pictures were covered with horizontal lines. These disappeared (almost) when the unit had been left running for some time. A replacement camera DC-DC converter cured the fault. **D.C.W.**

Canon E400E

There were lines on the playback picture. Replacement of the BT string assembly cleared the fault. This model uses the Sony A mechanism, and can suffer from similar fault symptoms to Sony models. Generally the unit is very reliable. **D.C.W.**

Sharp VLC690H

There were severe striations on the camera E-E pictures. Playback of a known good tape was OK. The cause of the trouble was C210 (33µF, 16V) on the YC PCB (Y DET). It's becoming a common fault with this model. **D.C.W.**

Canon E110E

This model, being based on the E60E, suffers from the same leaky capacitor problem. As little else seems to fail, these camcorders are generally worth repairing. They do however have a considerable number of extra electrolytics on the enlarged audio-video panel CBA. To overcome audio problems, seventeen or so electrolytics on this PCB should be replaced. The symptoms can be no E-E record sound, no playback sound or a mixture of both. The symptoms can also change with use – as can most problems due to this cause.

To ensure a long working life with no returns under your guarantee a total of around 48 components should be replaced. **D.C.W.**

Ferguson FC28

This full-sized, ex-rental camcorder was brought in because it was dead. We'd seen several of them when they were new (around nine years ago) but few recently. The cause of the trouble had not been common at that earlier stage. Circuit protectors CP3 on the main PCB and CP601 on the camera operation PCB had both failed. (CP601 is not shown in some circuit diagrams!) No cause of the CP failures could be found. **D.C.W.**

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Philips VR757

There was no E-E or record sound – the playback sound was normal. The scart sockets produced no sound output, and if an external input was tried the vision came through but not the sound.

Audio went into IC7010 at pins 1, 2 and 3 but wasn't seen again. Internal signal switching is controlled via the I2C bus, so a half hour was spent with the instruction book and remote control unit checking whether there were any options or modes that could account for the problem. Then a RAM clear was tried. This erased all the channels, the time etc. When they were set up again the fault was still present. Incidentally when setting up the RAM I found that if you set the REC TV option to ON (so that the machine records from the TV set only via the scart connector) the station cannot be stored when you tune in using the manual method.

When checked, the voltages at all 64 pins of the TDA9614 chip were found to be correct. A replacement chip was then tried but made no difference.

It seemed that the TDA9614 chip was being muted via the I2C bus. According to the circuit description this chip is muted when there is a servo fault and during all operations other than record, playback and E-E. Checks on the record and playback control lines didn't reveal any problems, neither did a check on the AFC signals in case there was a tuning fault. Maybe the deck controller chip (IC7100) was muting the sound, but why should it do so in the E-E mode?

Scope checks around IC7100 showed that the field sync pulses were missing at pin 6. When I traced back to the sync separator (transistor Tr7810 etc.) I found that there was no pulse output here. The sync separator itself was OK, but the pulses fed to it from the OSD board were of low amplitude – 1V instead of 3V peak-to-peak. The cause of the trouble was transistor Tr7918 on the OSD board.

The machine was an early production model whose OSD board had a BA7046 chip on it. A replacement OSD board restored the sound. Why had the transistor failed? The screened cable that connects the video signal from the OSD board to the motherboard hadn't been trimmed properly. A stray piece of wire stood proud of the board and had shorted to the earthed metal case. **P.B.**

Akai VS650

The owner of this top-of-the-range Dolby Surround sound machine brought it in to us when one of the local cowboys had failed to cure a tracking fault. When we removed the top we were horrified to see the trail of destruction that had been left behind. Every single potentiometer in the machine had been twiddled – even the L-R hi-fi level meter adjustments. Could it be that this person hadn't a clue about what he was doing?

After replacing the AC head and the base, because all the screws had been churned up and the base bent, we had to reset the deck and guides, replace the worn video head (the original cause of the tracking problem), and reset all the potentiometers in accordance with the instructions in the service manual.

When this had been done we had one remaining problem, severe chroma patterning. It was worse with SP than LP recordings. We worked on the problem for weeks on and off. Finally, drawing a blank, we decided to phone Akai's Technical Department. The man on the end of the phone diagnosed the cause of the trouble immediately. "With the top off, turn the machine upside down and see what drops out" he said. Nothing, I replied. "Go back to the person who looked at the machine last and ask for the plastic-coated tinfoil shield that should be between the head amplifier and the power supply" he continued, "because it's not available as a separate item from Akai. To prove the point, lift out the power supply and position it 90° to the head amplifier."

As this cured the fault, we made up a shield from some material from the base of a scrap Video-Crypt decoder. The power supply, which is partly a switching regulator, uses large inductors that radiate. Hence the importance of good shielding.

Although the customer was not too happy with the charge of £150, he was glad to get his machine back in working order. **M.Dr.**

Ferguson FV74

The power supply was tripping and a clonking noise came from the capstan motor. The cause of the trouble was eventually traced to CP71 (10µF, 50V) which is mounted on the print side of the power supply. It was slightly low in value, and must have become resistive as the power supply fired up when it was disconnected. It's in circuit between the 12V and 33V rails. **M.Dr.**

Panasonic NVJ35

This machine was OK when used with the AV connectors, but provided no RF output. The +B voltage for the RF converter comes from Q1102 in the power supply, via the demodulator pack. This is the N.SW12V supply. We found that Q1102 (type 2SD1330) was open-circuit. **D.C.**

JVC HRD860EK

There were no functions at all and the display consisted of an occasional random flashing of various segments. I checked the power supply and found that its outputs were all correct. When I moved over to the microcontroller chip IC601 I found that pin 28 (reset) was at 12-15V, which was obviously high. The cause of the trouble was a leaky 7·5V zener diode, D601, which is connected to the unswitched 12V supply. A replacement restored normal operation. **M.L.**

Panasonic NVL28

No rewind was the problem with this machine. We eventually traced the cause to the mode switch. **S.H.**

Panasonic NVSD400

There was no playback or E-E sound. We were surprised to find that instead of being in the audio circuitry the cause of the problem was on the timer PCB, where pin 30 of IC7501 was not properly connected to the PCB. **S.H.**

Ferguson 3V45/JVC HRD150

This VCR couldn't be tuned. I found that the 30V supply was missing at pin 5 of CN1, though 45V was present at pin 3 of CN2. Nor was there 13V at the collector of Q13. Lifting the tuner panel revealed all. Water had come down the aerial lead into the RF converter/booster and flooded under the nearby tuner/IF panel, corroding away the link between the emitter of Q12 and the collector of Q13. Hence the fault – the booster was undamaged. **J.P-F.**

Mitsubishi HS421B

The customer complained that rewind/fast forward hadn't worked for some time – he had to use review to wind his tapes back! After explaining to him that this would double the head wear, I started to look for the cause of the trouble. It didn't lie with the idler or its surrounding mechanics. When link C (item 94) was pulled – it's towards the back of the deck, see Fig. 1 – the idler gripped properly and there was normal rewind.

After removing the loading motor assembly I found that the spring (item 45) beneath the trigger lever (item 44) was dislocated. It was also upside down. Once you've got it the right way up, a parking post on the underside of the lever enables the lever and spring to be put in position. The spring is then released for normal operation by pushing downwards as the loading assembly is replaced. Magic! I've explained this in some detail as I had to learn it the hard way. I wonder who turned the spring round? **J.P-F.**

Panasonic NVHD610B

In the E-E mode the left-hand channel produced no sound, just a roaring noise. Playback of a prerecorded tape was OK. After I'd spent some time carrying out voltage checks, another machine came in with the same fault. So it seemed that a quick phone call to Panasonic might prove helpful. I was told to check the 5V supply (at Q7301) and the 8V supply (at Q7302) in the Nicam section and, if these were OK (they were), to replace the MSP3410-15 chip IC7301.

I persuaded Rob, a fellow technician who can see the connections around this 68-pin flat-pack device, to fit replacements using the pyro pen. Both machines then worked all right. **M.C.**

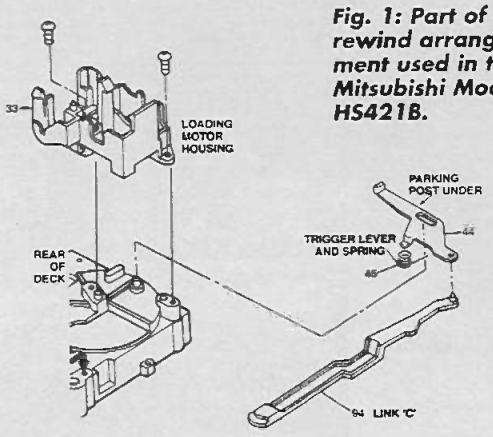

Fig. 1: Part of the rewind arrangement used in the Mitsubishi Model HS421B.

GoldStar GSEQ121

A loud scraping noise accompanied all tape functions. It was caused by the fact that all three capstan motor securing screws had become loose. The cure was simply to tighten the screws and then apply locking paint. **J.E.**

Panasonic K Deck

As with many modern mechanisms that are otherwise reliable, the K deck can suffer when a faulty tape or the brakes within a cassette jam and the customer tries to remove it himself. You realign the deck and return the machine to the customer in good working condition. It then jams again for no apparent reason. In this event it's worth checking the following items:

(1) The side plate (right-hand side). It can cause problems, but check that the spring which gives tension to a lever has not fallen off (difficult to describe, but easy to see if it has come off).

(2) The main shaft drive arm (VXP1339) that drives the cassette lift. It tends to sprain outwards and slip. If you look down the right-hand side of the carriage you will see that it is driving the lever down on its edge, not the whole cam.

(3) The loading motor drive cog. It can be replaced without upsetting the alignment of the mechanism. You may find that the small, underside cog has some stripped teeth. The part supplied by Panasonic (VDG0868) seems to have been made stronger.

(4) The P5 arm unit (sub-loading arm VXL2306) can get bent when the tape is ejected. It can sometimes be bent back, but it's well worth keeping some in stock.

For odd operation, check the tape sensors and IR sender. To do this you have to lift the deck off the mother board then lift the board out. This is a quick operation with later models that have fewer screws. If care is taken, the mode switch (VSS0365) is easy to replace and align.

The loading motor's supply comes via a plug which is connected to the mother board. It can produce odd problems and is worth replacement if you are in any doubt.

Some odd faults I've had have been as follows. A broken take-up arm unit (VXZ0313). The metal arm on the loading post had fallen out, jamming the mechanism. The pressure roller has a nylon peg that engages with a drive cam: it has been known to snap off.

Those who have not worked on this deck before should note that the cassette lift loading drive relies on the lift assembly to tension the drive cog. The operation of this is not very easy to see. You'll find that a service manual or the K deck video tape is a great help. **M.C.**

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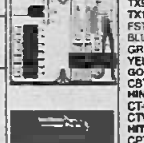

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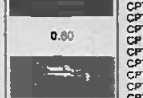

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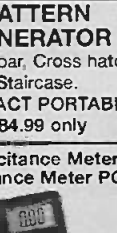

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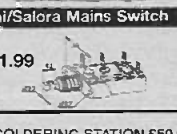

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Digital TV Plans

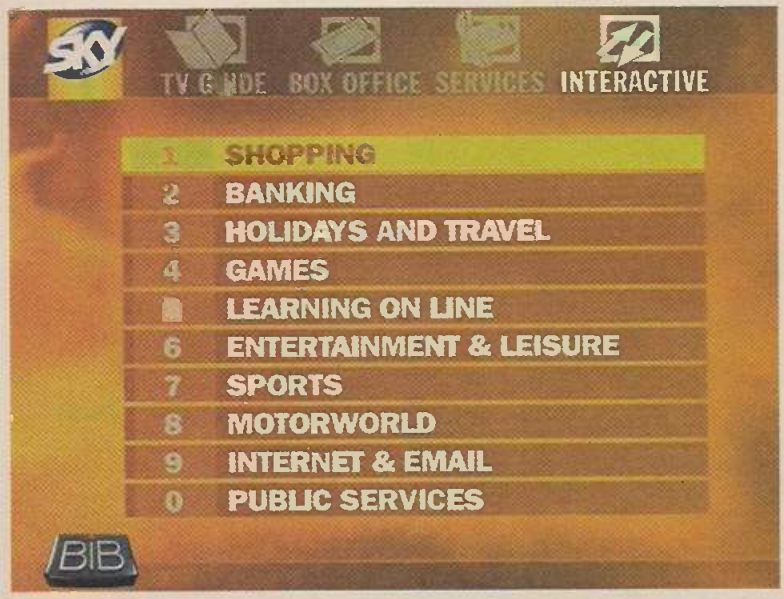
BSkyB has announced that its multi-channel digital satellite TV services for UK viewers will start next spring, not this autumn as originally hoped. Satellite launch delays (see last month) are the main reason for this. But it means that the system is likely to offer a greater range of services from the start.

To this end BSkyB has joined with BT, the Midland Bank and Matsushita to form British Interactive Broadcasting (BIB). BSkyB and BT both have 32·5 per cent stakes in BIB, with the Midland Bank and Matsushita having 20 per cent and 15 per cent stakes respectively. The companies will invest £265m in BIB, to establish the infrastructure for interactive services and to subsidise the set-top boxes viewers will require. The aim is to make these available at about £200 rather than the estimated economic cost of around £500.

Subscribers will be able to use interactive services such as home shopping (agreement has already been reached with J. Sainsbury, GUS and HMV amongst others) and banking, and will also have access to the Internet. BIB will earn profits by charging a percentage on the revenues generated by interactive services. The founders expect the company to be profitable within five years, and might then float it on the stock exchange.

BSkyB has announced that the initial set-top box order will be for a million units. There will be four suppliers, Pace Micro Technology, Amstrad, Matsushita (Panasonic) and an alliance between Grundig and the Korean firm Hyundai. The decoders will be supplied with a new, smaller dish and will have an integrated 28·8kbits/sec modem and a Mondex slot for digital cash payments (this type of payment will be in addition to a debit/credit card option). A remote control handset will be used for access to the interactive services, with menu selection: an optional remote keyboard will be available for e-mail use.

BSkyB is also to bring BIB into the British Digital Broadcasting consortium, which is the leading applicant for the franchise to provide digital terrestrial TV (DTT) services in the UK. BSkyB, Carlton and Granada each have a one third stake in BDB.



An interactive service selection menu designed for BIB.

Specifications

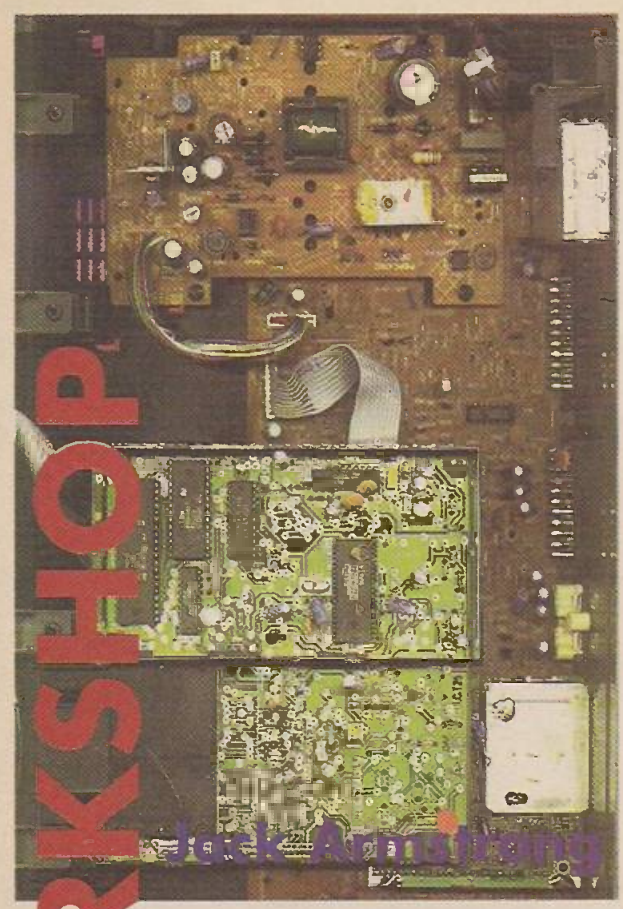
The British Radio and Electronic Equipment Manufacturers' Association has announced that agreement has been reached by the major TV manufacturers on the basic features of the receivers required for the DTT services, which are due to begin in the summer of 1998. Digital TV sets will automatically receive free-to-air broadcasts – these will consist of the existing four services plus new channels planned by the BBC, the ITV companies and Channel 4. Those who wish to watch the digital pay-TV channels will need to add extra accessories – as will those wishing to receive digital satellite and/or cable services. So that the sets are "future-proof", they will not contain any exclusive proprietary technology, and will employ a common interface. The move will also enable manufacturers to export digital TV sets to other European markets.

The Digital Video Broadcasting Project, which includes 207 members from the broadcasting, electronics and semiconductor industries, has approved a data broadcasting specification. This paves the way to downloading software via satellite, cable or terrestrial links, providing Internet services over broadcast channels and interactive TV.

Cable Units

Many of the largest Continental European cable TV operators have reached agreement on a standard digital decoder for cable systems. More than a million units are expected to be supplied over the next eighteen months, giving subscribers access to more than 100 TV channels. Deutsche Telekom, the largest Continental cable TV operator, plans to launch a digital service by the end of the year. The standard has been drawn up by the European Cable Communications Association. It will use the Viaccess conditional access system developed by France Télécom. UK cable companies are not involved – they had previously chosen a different access system from General Instrument of the USA. The first orders for some 10,000 GI decoders have already been placed.

Satellite WORKSHOP



Amstrad SRD650

Archie is a Scot – or so he tells everyone. He has a London accent however, and my opinion is that his claim is just an excuse to wear a skirt! Mind you, he does like to watch those questionable films after midnight.

It was for this reason that he paid me a visit with his Amstrad SRD650 receiver. Its internal D-MAC decoder was, he said, "playing up". Apparently it had requested "check the card" for a few days before it expired completely.

A quick check in the power supply revealed that the large electrolytic reservoir capacitor C609 was still charged at 300V. I discharged it with a 10Ω resistor – believe me, this is preferable to doing it with the palm of your hand!

The power supply is similar to the one used in the SRD510 series, with some important differences. C609 is 150µF, and the two high-voltage resistors R602 and R603 are 100kΩ. Amstrad never did catch on to the fact that they break down because of arcing rather than excessive dissipation. I always use replacements rated at 350V, 0·75W. After fitting thousands of these in the SRD510, I've never had one fail (a shame – I could have made a fortune out of repeat business!). The correct type is supplied in the SRD650 kit which is available from several suppliers, for example Economic Devices and SatCure.

With new resistors fitted, the receiver appeared to work perfectly. But it still asked you to "check the card" after inserting a valid card in the slot. A voltmeter check showed that the 5V Vcc supply wasn't present at the card contacts. This was because of an open-circuit 10Ω resistor at the front left corner of the main PCB. It's a current-limiting resistor, and seems to fail when a non-approved smartcard is used.

Sauerkraut

Being on the main caravan route to Scarborough, we seem to see a lot of foreigners. A tiny lady towed a huge fellow with a number one haircut into the shop. I would have described it as a 'crewcut', but my daughter tells me that this isn't 'cool'. During the war it was very cool, but things must have hotted up since then. I blame it on the global warming and Mrs Heckmondwyke's greenhouse next door. But I digress.

The tiny lady handed over a Pace D150 and twittered "tell the man what's wrong with it Yoorgen".

"Lauft nicht" rumbled the monster in a gutteral voice.

"Yes Yoorgen" she said, "we know it won't work. Couldn't you be a bit more specific?"

"Keine Mitteilungen auf dem Bildschirm. Dekodiert nicht."

Now I understood the last bit, but the tiny person peered over the counter and translated. "No information on the screen. Won't decode."

This was all very strange, because the stout fellow clearly understood every word she said in English! Anyway, I booked it in as 'Kaputt', which seemed to please the hulk so much that his monacle fell out.

On test the D2-MAC decoder seemed to work all right until I pointed the dish at 1°W. The CTV package then announced "no access", even with a valid smart card. A quick call to Pace established that these programmes are now broadcast in Simulcrypt, which means both D2-MAC and D-MAC. A new EPROM (part no. 807 2301009) arrived the following day. Fitting it in the socket in place of the existing EPROM was simple and cured the problem. It's a real pleasure to deal with a company that can answer technical questions and supply the parts required for product updates straight away.

The little woman and large gentleman were staying at the Bull and Bushel. A quick phone call brought them back. I refused the offer of a 500 Deutschmark note and settled for an English tenner instead. You can't fool an old soldier! I've been fooled once with a 500 Peseta note. The big gent patted me on the shoulder and called me "Dumkopf". I think he liked me.

Philips BBD901

It's been a D2-MAC month. There were rumours that certain channels were going to disappear to the Thor satellite at 0·8°W, while others were to vanish altogether. I'm told that in the UK you would need a 3m dish to watch programmes from Thor, though a 1·5m dish might be just about large enough in London provided a good receiver is used.

The BBD901 D2-MAC decoder was imported into the UK under the FilmNet badge. It has special programme firmware built into the EPROM. This requires that a FilmNet channel is viewed at least once a week. As a result, with the loss of this service from Astra many decoder owners have been left with equipment that refuses to decode any channel.

As the decoder simply needs to see a certain code in its memory chip to make it work happily again, the solution is quite simple. I can't publish the code however, because it is undoubtedly copyright. But most repairers are aware of it by now.

A user instruction book for this decoder is available for £9.95 inclusive from SatCure. PO Box 12, Sandbach, CW11 1XA. It contains lots of useful information, including notes on the service menus and suitable handsets. The handset I use is a Philips RC6932/01, which is available from Willow Vale under order code 4822-218-21137. Although it's rather expensive for something you might use just twice a year in the workshop, it has the bonus of also operating the STU824 receiver.

Amstrad SRD950

Jerry runs the TV and video repair

shop in town. I pass all the TVs to him, and he usually reciprocates with satellite equipment. On this occasion however his problem was so simple that I told him how to do it himself.

His customer had acquired a secondhand Amstrad SRD950 from an elderly relative who, having paid £350 to have it installed, then found it too complicated to use. Unfortunately he'd already pressed every button combination on the remote control unit. The problem was that there were no decoder messages and, because the new owner was using a standard 10GHz LNB, half the channels were missing.

This model comes programmed for use with an enhanced, 9·75GHz LNB. Unlike the similar SRD700, the SRD950 has no menu option for any other LNB local oscillator frequency. The only way to use it with a standard 10GHz LNB is to use the 'autotune' facility. It's simple to do this.

You press Setup ‰ ‰ ‰ then, quickly (within five seconds), Setup followed by Mute. The receiver then supplies 18V to the LNB and searches the entire band from the lowest to the highest frequency, storing each programme on successively higher odd-numbered channels as it does so. This process is then repeated for the even-numbered channels, with 13V fed to the LNB. It takes several minutes for the automatic process to take place: once it has been completed you will see OK on the screen. Press Cancel and the job is done.

As the programmes have been stored in transponder order however you need to reprogramme the 'favourites'. Press button 1 then, to select the favourites mode, press the button with the smiling face. Now press s or † to find Sky One or whichever programme is wanted as favourite one. Press Store and this will be fixed as favourite channel 1. The number will increment automatically to favourite two ready for the next selection. Press the up/down buttons to find the next programme, then press Store. The process really is simple, and is best done without a card inserted – so that you can read the scrambled channel names, which appear after the "Please Insert Card" message.

Unfortunately nothing in Jerry's life is ever simple. He followed my instructions, but nothing seemed to work. In desperation he brought the SRD950 to my workshop, and I connected it to my monitor TV via the scart connector. There were no messages, because the video bandwidth had been set to wide instead of narrow. Wide is indicated by [...] in the Setup mode, narrow being indicated by a single dot within square brackets – [.].

I corrected this but autotune failed to find any stations at all, even though I could see pictures! Changing the AFC value from –32 to 0 cured this. My LNB is a universal type however, so there was no point in continuing. Jerry returned to his shop, where he uses a standard 10GHz LNB. Within minutes he was on the phone again.

"It's reset itself to 'wide', and every time I press a button in the setup mode it goes to standby!"

After several trips back and forth we realised that he was using a fully-wired scart connector while I was using a partly-wired one. According to the user instructions, his was correct. On looking at the scart connection list however I found that pins 10 and 12 are labelled Data and Clock. It seems that his Sony TV set was interfering with these lines. Cutting off the two offending wires restored correct operation.

Please note change of e-mail address for Jack Armstrong. He can be reached on:

jack@netcentral.co.uk

Test Case 415

There was a time when many TV faults were related to temperature, and the warm summer days and nights resulted in lots of callouts. It's quite different now. In fact the early summer period is a relatively slack time for the Test Case workshop, which is just as well when one job takes as long as this big telly did . . .

When Colin paid a field call he was confronted with a large, modern-looking (six years old, actually!) Toshiba TV set, Model 2805DBT. No go was the customer's complaint, but in fact there was a short burst of energy at switch on from standby, followed by immediate reversion to the standby mode. Colin tried a mains reset. As this had no effect, he staggered out to the van with the beast, leaving the dismayed customer with a 14in. portable by way of a loan set.

Back in the workshop the set was assigned to Cathode Ray. It didn't take him long to discover that the power supply section came to life briefly at switch on, only to shut down less than a second later. A bit of probing and scoping revealed why: the on command at pin 26 of P820A would go low briefly then revert to high, switching the set to standby. So it was a control fault rather than a power supply problem. Ray turned from the power panel to the microcontroller chip on the main board. It's a 64-legged device that carries out many functions in this bus-controlled, multi-featured receiver.

The microcontroller chip's key pins were identified and checked in turn. The 5V supply was present at pin 64, the chassis connection at pin 32 was good, the 4MHz crystal oscillator was active at pins 34 and 35, and at power-up there was a suitably delayed reset pulse at pin 36. Thus the four main requirements were being met. Time, then, to check out the secondary ones.

The I2C bus lines at pins 53 and 55 were neither stuck nor shorted – they would pulse down from their quiescent 5V level when a remote control command was received. There was nothing wrong at the key-pulse strobing lines: short-circuit, stuck in or leaky control-key switches can immobilise a microcontroller chip. Clean, square command pulses were present at the IR control pin 26. So several possible nasties had been eliminated.

Casting his eye over the chip's other pins, Ray could see nothing else that could possibly inhibit switch on. He gave some thought to forcing the power supply to operate by linking the on/off control line to chassis. But, with previous bad experience in mind, he decided against doing this. There seemed little doubt that the power supply would work if the on command was sustained. Could the microcontroller chip be faulty? It was not in stock. A replacement would probably be expensive, and might not solve the problem. With a VCR, this sort of symptom generally means that there is an incorrect input at one of the microcontroller chip's monitoring or feedback pins. But with a TV set there are no mechanics to jam, no mode switch to play up and no motors to pulse. So Ray decided to order a CX80424-107S chip. When it arrived, he strapped himself to earth and fitted it carefully, still full of doubt as to whether he was doing the right thing. He preserved the old chip in case it should prove to be innocent.

When Ray switched the set on he found that his doubts were vindicated. The new chip failed to cure the fault, and the old one was subsequently found to be perfectly all right. With some help from a friend, he finally got to the bottom of the problem. But many hours had been spent by then. Have you any ideas as to what was the cause of the fault? Turn to page 679 for the solution.

Astra 1D Reception with the Amstrad SRD500/SRD510/SRD520

Martin Pickering, B.Eng., describes a simple modification that gives automatic channel-expander unit control

The Amstrad SRD500 satellite receiver can be modified to produce a 12V output on certain channels. This output can be used to control the Global Communications ADX-plus channel expander, providing automatic selection of the channels from the Astra 1D satellite. The ADX unit moves the entire frequency band 500MHz higher and, with the modification described here, will do so automatically for channels 40 through to 48. This is a distinct improvement on manual operation of the ADX unit. Alternatively, the 12V output could be used to control a Global Communications 22kHz tone inserter to select the 'high band' with a universal LNB.

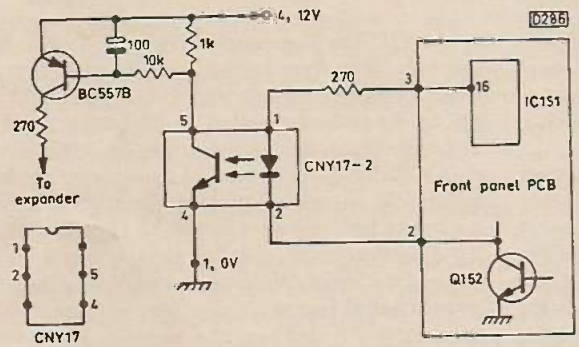


Fig. 1: Modification circuit.

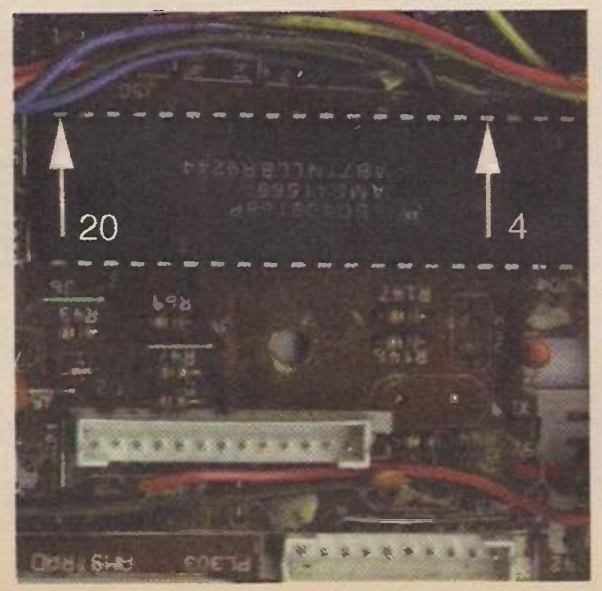


Fig. 2: The microcontroller in the SRD510, showing the pins to link.

If you want to watch programmes from two satellite positions, for example Astra and Eutelsat, the 12V output could be connected to a Global Communications VH1-DC switching unit.

Channels 40 to 48 were chosen for the reason explained in my previous article on modifying the Amstrad SRD400 (see April 1997, page 408). As with the SRD400, the only switching function that can be readily used with the SRD500 is the TV/SAT button. This selection cannot be stored on a per-channel basis however. So use of channels 40-48 for the 12V output is ideal.

The modification (see Fig. 1) is identical to that previously described for the SRD400. The only difference is that the 12V supply (lead 4) is obtained from link J164 at the front of the main board. As before, lead 2 is connected to the the centre leg of Q152, lead 3 is connected to pin 16 of IC151 and lead 1 is connected to chassis. The few components required cost very little and can easily be assembled on a piece of Vero or similar stripboard. For a more detailed description, refer to the SRD400 article.

A minor drawback of the system is that the ADX unit can switch on and off while you are tuning the receiver. To avoid this nuisance, disconnect the wire and move the ADX toggle switch to on whilst tuning. Once the channels have been tuned in and stored, switch off the ADX unit and reconnect the control wire. It will then be switched on automatically for channels 40-48 only.

If you want a ready-made board with instructions, for just £4.95, phone 01270 753 311 or contact me by e-mail at

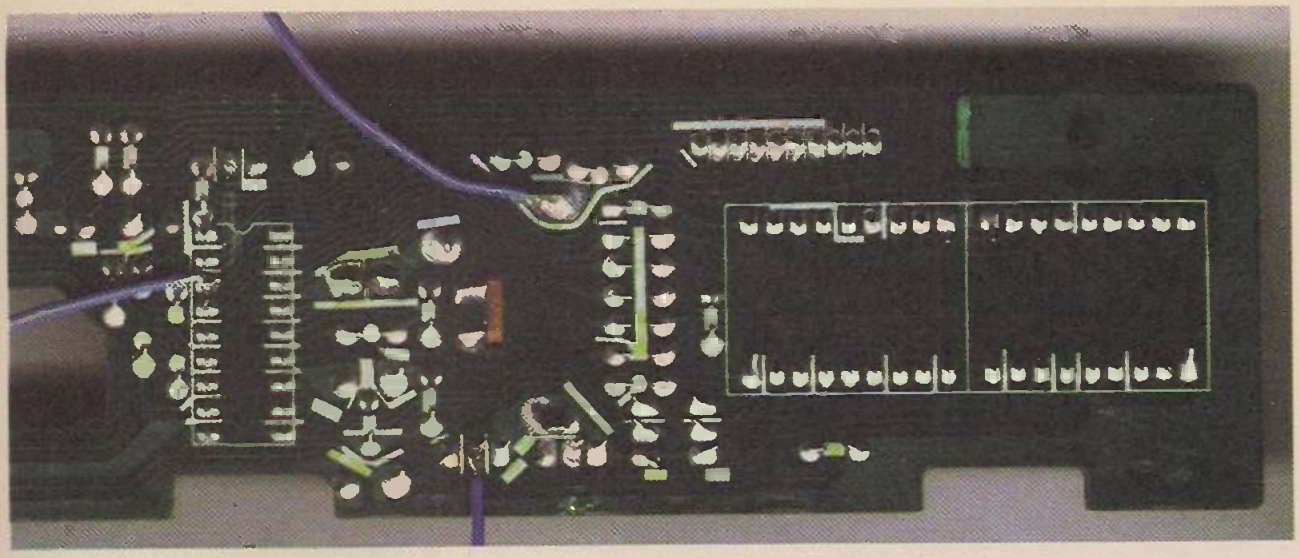
repairman@netcentral.co.uk

Models SRD510/SRD520

These later satellite receivers have a built-in control that gives selection of dish A or dish B with each channel menu. Selection of dish B places a voltage, which is sufficient to activate the ADX-plus unit, at pin 14 of the decoder scart socket.

It's a simple matter to retune a few channels for reception of the Astra 1D services. With dish B selected and stored for each 1D channel, you can then use the timer function to record programmes without worrying about whether the channel expander will operate correctly.

The dish A/B selection appears in the SRD520's menu, but with the SRD510 you will have to add an internal



Front panel, Model SRD500.

link to enable this option. This link is in position LK1, next to the microcontroller chip. To avoid the need for a complete dismantling operation, it's simpler to solder a thin, insulated wire from pin 4 to pin 20 of the chip (see Fig. 2). As an added bonus, you will find that the SIS (Special Index System) button provides on-screen channel selection with cursor control. This feature is normally available with Model SRD520 only.

The above information also applies to the export Models SRD310/SRD320, which have no internal decoder.

While you have the receiver in pieces, you might as well fit a reliability upgrade kit. This will extend the life of the receiver and get rid of the nasty streaks and interference that mar the picture as the receiver ages.

Kits

The ready-made ADX control board for all Amstrad 48-channel models is available at £4.95; the SRD600 ADX control board is available at £6.95; the ADX control kit for the Pace SS9000/9200, Ferguson SRV1 and Grundig GIRD2000/3000 is available at £4.95. Reliability upgrade kits for all these models are available at £6.95. All kits are supplied with comprehensive instructions. Phone 01270 753 311 or contact me at the e-mail address given earlier in this article.

BACK NUMBERS

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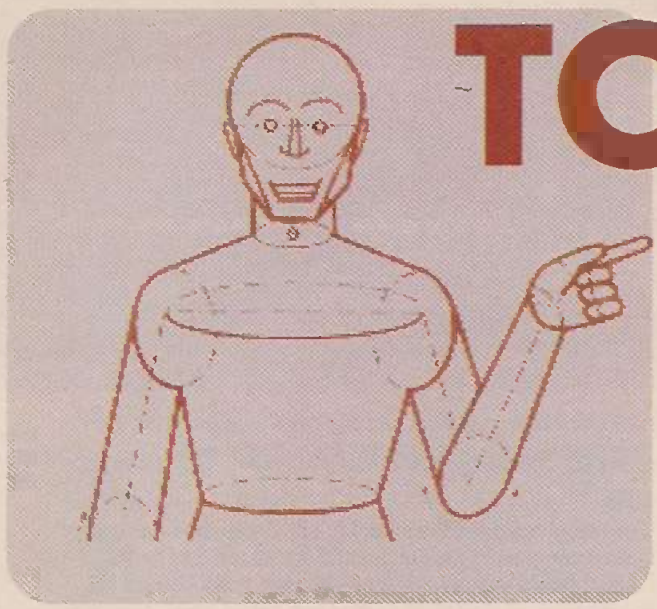


TOSHIBA Service Briefs

Know-how from Toshiba Technical, based on Bulletins AH64 and CDH65

Television Sets

Models 1440, 1722, 2140, 2141 and 2151 (RB and TB versions)

HT and width variations, with the STR58041 chopper chip IC801 running very hot and eventually going short-circuit: Replace C815 (1,800pF) which couples pulses to the base of transistor Q803 in the switch-on delay circuit.

Model 2112DB

Field linearity stretched at the top of the screen: Replace the 1µF electrolytic capacitor C331 which is connected to pin 6 of the LA7837 field output chip IC330. The capacitor goes open-circuit. Its correct voltage rating is 50V.

Models 2132DB, 2145DB, 2535DB, 2545DB and 2835DB

Faint hum bar across the screen. Moves up or down: Replace the 470µF, 16V electrolytic capacitor C450 which smooths the line output stage derived 12V supply. It goes low in value.

VCRs

Models V204B, V205B, V215B, V254B, V255B, V404B, V425B and V454B

Sound varies (wow) with the machine's own recordings in the LP mode – this may happen only with certain tapes: Cause is wear on the supply and take-up reel spools. Replace them both. The supply reel assembly is part no. 70031328, the take-up reel assembly is part no. 70031335.

The fault could also arise with Hi-Fi models V804B, V825B, V854B and V855B but will not be noticed as the customer will be listening to the Hi-Fi sound track.

Models V703B and V813B

Very intermittent lock-out at start of play mode: Replace the TA8789AF chip IC503, part no. B0384053. In the fault condition the outputs at pins 15 and 16 are missing. Look for a small loop of tape that spills out at the end of the initial cue forward function – the capstan appears to overrun slightly. There is no tape damage because the immediate review operation takes up the slack.

No display: Check circuit protector ZX10 (ICP-N5, part no. 23118122).

Dead machine with F801 blown and IC803 short-circuit: See notes on this condition on page 873 of our October 1996 issue. Bridge rectifier D804 (S1WBA60) should also be checked for shorts in this situation.

Models V705B, V726B and V856B

Reverts to standby within five seconds from power on. Won't accept a tape: The 2SC2236-Y 12V regulator transistor TW003 on the main PCB is open-circuit. Replace it – part no. A6325549. Note that incorrect TW003 voltage readings are shown on the circuit diagram. Correct voltages are 12·2V collector, 12·8V base, 12·1V emitter.

Tape loads and goes to cue forward (for tape count) then stops and is ejected instead of review: Replace faulty start sensor GT006. Type PT493F, part no. 70010181.

Models V804B, V825B, V854B and V855B

Herringbone patterning: The 1,000µF, 10V ever-6V supply's reservoir capacitor C823 is open-circuit. Replace – it part no. 70041508.

Cassette goes in an down but the tape will not load or attempt to load around the drum. Drum does not rotate. Cassette is immediately ejected and the machine goes to standby: Replace the loading drive assembly, part no. 70031394. The loading motor has enough torque to manage slot in/out but will not load tape (there is only 2V instead of 12V across the motor).

Auto clock setting models

An auto clock setting problem, with the clock set incorrectly by exactly half an hour under poor signal reception conditions, was reported in our March issue (page 359). The solution is to replace the main microcontroller chip with a version that has different software. These chips are available from Toshiba's Spare Parts Dept., the part no. varying with different models as follows:

Models V226B and V426B: Part no. 70012716.
Models V255B and V425B: Part no. 70012714.
Model V726B: Part no. 70012718.
Models V825B and V855B: Part no. 70012713.
Model V856B: Part no. 70012717.

Projection TV

Models 48PJ6DB and 55PJ6DB

Large red, green and blue convergence errors, bowing in at the sides, top and bottom: The digital convergence is not working because fuse F803 (2A, 250V, part no. 23144870) is open-circuit, removing the –18V supply to the output stages (on Power 2 PCB). It's unlikely that there will be any other faulty components. User may have reported that the set went to standby with the green LED blinking (protection mode), was then switched off and when switched on again the convergence was wrong.

Set dead, power LED on (like standby mode): Fuse F802 (2A, 250V, part no. 23144870) on the Power 2 PCB is open-circuit. As a result relay SR80 has no 18V supply and there is no AC input on the Power 1 PCB. It's unlikely that there will be any other faulty components.

Very intermittent blue content: Plug 915 on the green CRT drive PCB is poorly fitted (at pin 9 end). Refit the plug. Note that the R, G and B drive signals go to the green CRT drive PCB via plug P915: the R and B signals are then fed to their respective CRTs.

No colour at scart socket 1, other scart sockets and channel positions OK: These are multistandard receivers with the option to set the input sockets or channel positions individually to a different colour system. The scart 1 socket had inadvertedly been set to NTSC.

Parts list: Add anode cap assembly (lead and cap) part no. 23192917 (location T461A). Seal the cap to the CRT glass with silicone glue, which is available as part no. 23960136.

PC Pattern Generator

Philip Blundell, AMIEEIE, puts Ozan's latest test pattern generator through its paces

PC monitor repairs are nowadays providing a useful addition to the work load in many service departments, making a worthwhile contribution to the cash flow. They also provide a welcome change from the usual TV sets and VCRs. The only snag is that to test a monitor you need a signal source. On the first few occasions you may be able to borrow the office or home PC to provide a source of signals. But sooner or later this will lead to moans, and you will thus need to obtain your own workshop signal source.

PC Signal Source

The Ozan Teletest PC pattern generator is well worth considering. It's a hand-held, battery/mains powered generator, designed to provide outputs for VGA and SVGA monitors – the ones you are most likely to encounter. Being battery-powered and pocket-sized, the Teletest PC is ideal for field calls: it will enable you to check whether the monitor or the PC is the cause of the fault without having to clear everything off the desk – or search for an elusive empty 13A mains socket! A padded carrying case is available as an optional extra for £9.95 plus VAT.

For workshop soak testing a mains adaptor power unit is available as an optional extra, also at £9.95 plus VAT. The unit's small size is a bonus for general bench use, since it leaves more space available for circuit diagrams, meters, scopes and other equipment.

Features

The Teletest PC provides eight patterns that are essential for aligning and testing monitors. They are more than you will need in the normal course of servicing, but cater for almost every possible eventuality. The patterns are as follows:

(1) Colour bars (100 per cent).

(2) Black to white grey scale in eight steps.

(3) Crosshatch, with an 8 x 11 grid for VGA screens and a 10 x 14 grid for SVGA screens.

(4) Dot pattern. This is useful for focus and convergence adjustments, particularly with overhead projector units for PC displays.

(5) Red screen, to check for colour purity.

(6) White screen. This provides a peak white reference.

(7) A 7MHz burst. This enables the frequency response to be assessed.

(8) A black screen with syncs. This provides a black reference and enables the flyback blanking to be checked.

The front panel has a label with the eight test patterns and a LED by each one. When a pattern is selected, the relevant LED lights. To change pattern you simply press the select button. The display then moves to the next pattern, in sequence. There is no direct access to the individual patterns: you have to step through the sequence.

The other controls are a slide switch to change from the VGA to the SVGA standard, and another to invert the sync pulse polarity. This may be necessary with some older monitors. You may not come across these models very often, but the feature is helpful when you do.

There are two clearly marked sockets, a DC input for an external 9V-12V power supply (regulated), and a 15-pin high-density D-type socket to suit VGA and SVGA monitors.

It's by concentrating on VGA and SVGA monitors only, the ones you are most likely to be called upon to repair, that Ozan has been able produce the Teletest PC for only £149.99 plus VAT.

Use

In use the Teletest PC is fiddle-free. Even when it's used for some hours during a soak test the display remains rock solid and the case is cold.

The mains power unit is preferable for workshop use, as the unit consumes 180mA. Alkaline batteries would last for about two hours with continuous operation. They should obviously be saved for the field calls.

The Teletest PC pattern generator really scores in its role as a piece of field test equipment. Portable, pocket-sized and self-contained, it provides all the patterns you are likely to need when making outside calls to ailing PCs/monitors.

Availability

The Ozan Teletest PC pattern generator is available with a 60-day money-back guarantee from Ozan, Freepost, Wimborne, BH21 7BR. Or telephone (free) 0500 009 070, fax 01202 877 271 or access Web site
http://www.ozan.co.uk
and a free info pack will be sent. Alternatively contact CPC, SEME or Willow Vale. The Teletest PC comes with a one-year parts and labour guarantee.

Grundig Satellite Receivers

In this concluding instalment Steve Beeching describes the audio and microcontroller arrangements, VideoCrypt decoder interfacing, the LNB supply and chassis differences

In Part 1 last month we followed the video signal path as far as the outputs to the VideoCrypt decoder and the scart sockets. This time we'll start off with the audio signal processing arrangements.

Note that the signal processing chip IC1 is type STV0020 in the E1 chassis, type STV0030 in the E2 and Omnisat chassis. The STV0030 is a later version of the STV0020, but as some of the pin functions differ the two types are not interchangeable. As last month, the description below is based on the E1 chassis.

Audio Path

Emitter-follower transistor Q2 (see Figs. 4 and 5 last month) acts as a buffer for the de-emphasised signals. A feed from Q2's emitter is taken via a high-pass filter (to remove the video signal) to pin 24 of the STV0020 signal processing chip IC1, see Fig. 6. Within the chip there are feeds to two separate gain-controlled amplifiers. Thus constant-amplitude FM signals are available for the following demodulators. These select and demodulate separate FM carriers, typically 7·02MHz and 7·2MHz, by means of programmable phase-locked loops. The operation of these is similar to that of the tuner, described last month. The microcontroller chip sets this frequency selection via the serial data and clock I2C bus lines.

After demodulation the audio signals can be passed

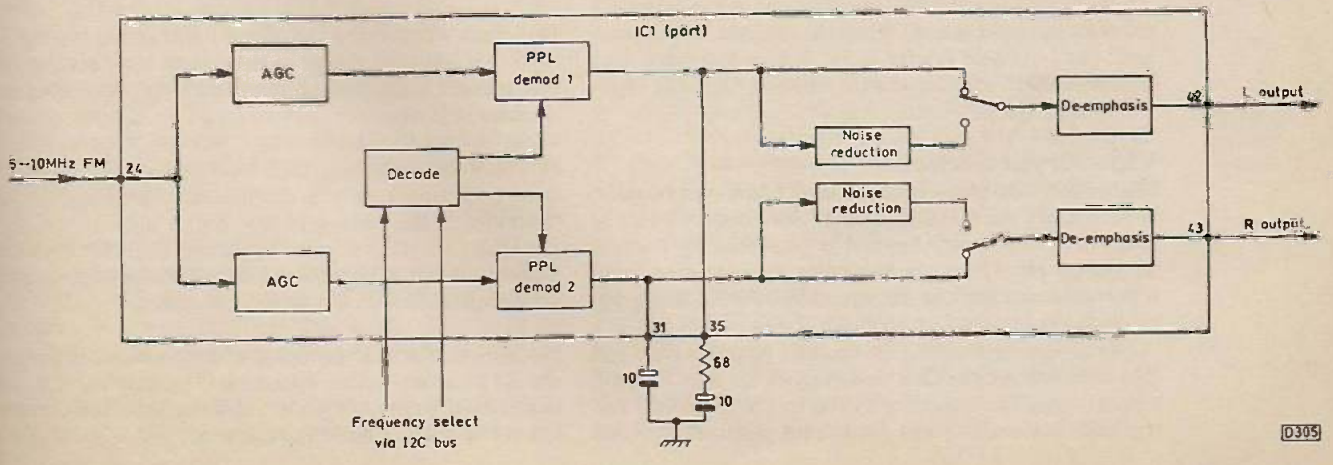


Fig. 6: Block diagram of the audio demodulation/processing section of the chassis.

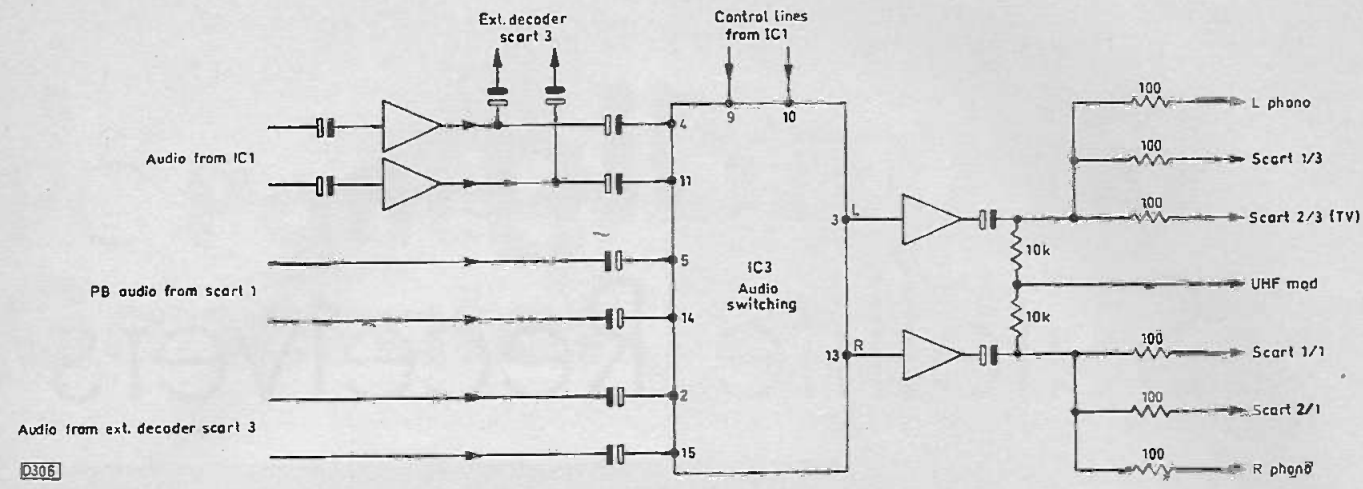


Fig. 7: The audio switching system.

through noise-reduction systems. Audio de-emphasis is then applied, either J17 or 50µS (menu selected). All this is again controlled via the I2C bus.

Left and right audio outputs appear at pins 42 and 43 respectively of IC1. From here they are passed to the external decoder scart socket and to an audio switching matrix in the MC74HC4052 analogue multiplexer chip IC3. This matrix enables the demodulated signals or inputs from the scart 1 or scart 2 connectors to be selected. See Fig. 7. This time the logic from the microcontroller chip is first decoded by IC1 to two-bit binary form. IC3's switching is controlled at pins 9 and 10. The outputs at pins 3 and 13 of IC3 (left and right respectively) are buffered and then fed to the phono sockets, scart connectors 1 and 2 and, after mixing, to the UHF modulator as a mono signal.

Scart Switching

We have already covered many of the operations of the signal processor chip IC1. Pins 2, 3 and 4 provide scart switching outputs (they go to pin 8 of the relevant socket). Thus the linked TV set, VCR or external decoder can be enabled. The most obvious use for this feature is to switch the TV set from off-air to scart operation when the satellite receiver is switched on from standby.

The Microcontroller Chip

The microcontroller chip IC4 varies with different versions of the chassis. It controls and organises the operation of the receiver. In early production versions an emulator PCB was present to accommodate an external ROM. In later versions IC4 incorporates a mask-programmed ROM. Upgrading is simple. You replace IC4 and add X2 (8MHz crystal), C63 and C64.

A charging capacitor (C61) connected to pin 14 of IC4 provides the reset action. When the receiver is first powered, pin 14 is held briefly at 5V. It goes low when C61 has charged. In early production models C61 was 10µF: it was subsequently changed to 47µF.

VideoCrypt Section

Fig. 8 shows the connections to the VideoCrypt decoder, at PL2. Only the conditions up to this connector can be checked: the circuitry beyond is protected by licence. TP3 (PL2 pin 12) is the test point for the video input (encrypted or clear) to the decoder, TP4 (PL2 pin 10) being the point at which to check for an output.

A sync separator within the decoder provides field and line sync outputs (VCFS and VCLS) at pins 7 and 8 respectively. The signals are used by the STV0020 and the microcontroller chips for timing purposes. Q9 and Q10 convert the 12V field sync pulses to 5V. Q27 inverts the line sync pulses and converts them to 5V for feeding to IC4. After inversion again by Q26 (shown as Q28 in error in Fig. 8) the line sync pulses are added to the field sync pulses by Q8 to provide a composite sync pulse output for IC1. IC1 and IC4 use the sync pulses for menu synchronisation.

In non-crypt versions of these receivers an additional chip, IC7 (TEA2130), is used to supply sync pulses to the same circuitry, i.e. Q8/9/10/26/27. As it uses a phase-locked loop to produce the line sync pulses, a signal to mute the audio channel when no signal is being received is produced at pin 7. It seems that PTV111 on the VideoCrypt board serves the same purpose – the mute signal appears at pin 6 of PL2.

The VideoCrypt decoder has to be obtained as a replacement unit. The following checks can be carried out at PL2 to determine whether to order a replacement:

(1) Check for 29V at pin 1, 12V at pin 2 and 5V at pin 3. Pin 1 is the one at the centre of the PCB, pin 14 being nearest the side edge of the PCB.

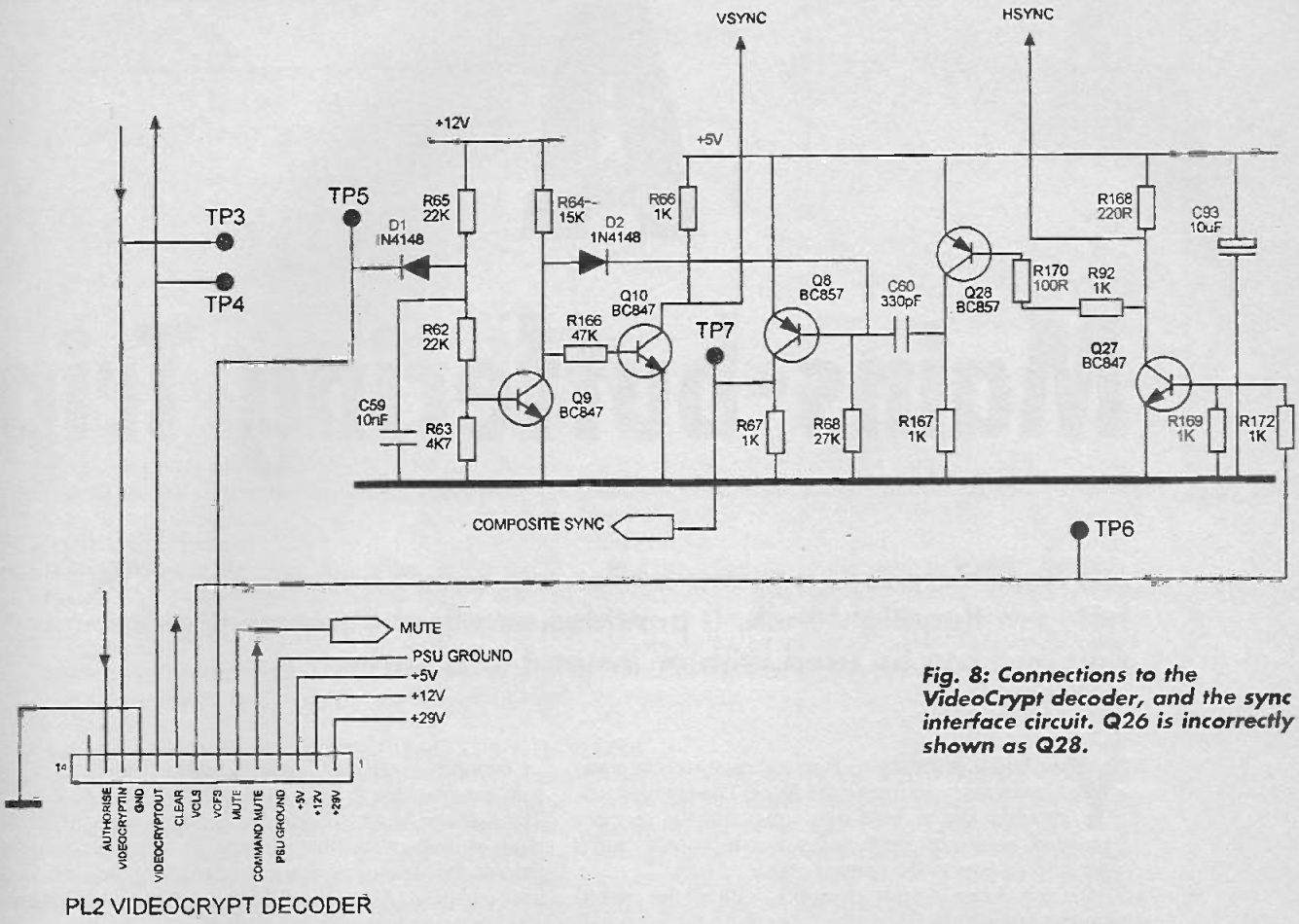
(2) Check that a 2V peak-to-peak video input, with the sync tip level at 1·5V DC, is present at pin 12. If the video output at pin 10 is less than 1V peak-to-peak, or is distorted, check for main board loading by disconnecting L11. A clear channel can be used for this check.

(3) Check for field and line sync outputs at pins 7 and 8 respectively. If neither is present the decoder is probably faulty. If one is missing, disconnect either link J21 (field) or J90 (line). If the missing signal is still absent, the decoder is faulty.

(4) Check whether the 'command mute' signal at pin 5 is high (5V). If the voltage at this pin is low, disconnect the decoder module. If the voltage then goes high, the decoder is faulty.

(5) Pin 9 should be high with a clear signal, low with an encrypted signal. It will change state when switching channels. If the voltage is low with a clear signal and goes high when the decoder is disconnected, the decoder is faulty. With a VideoCrypt signal the voltage should go low. If it doesn't, the decoder is faulty.

(6) With a VideoCrypt signal and no smart card, there should be an on-screen "insert card" message. If not, the decoder is faulty. With a valid card inserted, there should be a descrambled signal at pin 10.



PL2 VIDEOCRYPT DECODER

Fig. 8: Connections to the VideoCrypt decoder, and the sync interface circuit. Q26 is incorrectly shown as Q28.

LNB Supply

Some receivers have only one LNB power supply, see Fig. 9. The supply to the LNB comes from the LM317 programmable voltage regulator IC5. Its output is set at 18V (for horizontal polarisation) by the resistor chain R77, R100, R86, R191. If transistor Q11 is switched on, IC5's output falls to 0V and the LNB is thus without a supply. If Q13 is switched on, via Q38, IC5's output falls to 13V giving reception of the vertically polarised channels.

If the LNB is a universal type, a 555 timer chip (IC13) can be used to generate a 22kHz tone to switch the LNB's local oscillator frequency. IC1 provides an enable output to bring IC13 into operation. Its 22kHz output is fed to the base of Q32 and thus modulates the output to the LNB. The universal LNB filters out the tone, smooths it and uses it to switch the local oscillator frequency from 9·75GHz (low band) to 10·6GHz (high band).

Later models that can supply two LNBs have an extra LM317 programmable voltage regulator and duplicate the Q13/Q32/Q11 circuitry.

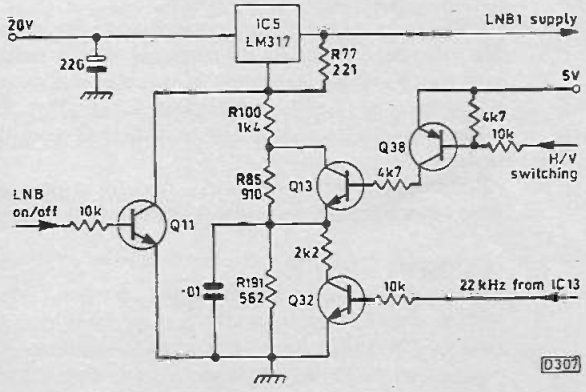


Fig. 9: The basic LNB power supply circuit.

The Omnisat Chassis

This is a later version of the E (European) chassis. The main PCB is double-sided, and the VideoCrypt decoder circuitry is incorporated on this board. Thus when a decoder fault is present the receiver must be returned to the manufacturer.

Most of the components and the circuitry are similar to the E chassis, but the components were renumbered and some component value changes were made. As mentioned above, IC1 is type STV0030. The microcontroller chip is an SDA20562, as in the E1 chassis (in the E2 chassis an ST9293 is used). Note however that the SDA20562 is mask-programmed for either the E1 or the Omnisat chassis, so care must be taken not to interchange chips between chassis.

Service Manual

For any further servicing information on these satellite receiver chassis, refer to the manual available from Grove Farm Publications, Long Lane, Barnby in The Willows, Newark, Notts NG24 2SG (01636 626 327, fax 01636 626 767).

A Mains-buffering Trip

Ian Rees describes a mains buffer/trip circuit based on a 500W halogen floodlight bulb. It provides excellent equipment protection and can be used with or instead of a variac

You find that the mains fuse has ruptured big time, blackening or bursting the glass. The bridge rectifier has lost at least two arms, and the chopper transistor reads short-circuit all ways. It probably fed a wrecking voltage to the control chip.

After rebuilding the power supply, with all the critical components replaced, you check carefully for the possible cause of the original destruction. Not finding anything amiss, you conclude that the cause lies amongst the charred remains on the bench.

This time you make the connection to the mains supply via your variac. As its output is slowly wound up, you watch out for any signs of trouble. If it comes, it's likely to come quickly: a whistle or a buzz, then the fuse takes away the picture and in an instant all your work is undone.

Sometimes everything works fine for a considerable time before failure occurs without warning.

Halogen Bulb

I found a way of avoiding this situation when I was faced with an errant Hotpoint washing machine during an outside call. It would blow the mains fuse during random parts of its operating cycle. When all standard Megger and component checks had been exhausted, it was obvious that another approach was needed. The brown goods method of using a light bulb to buffer the mains supply was adopted and beefed up.

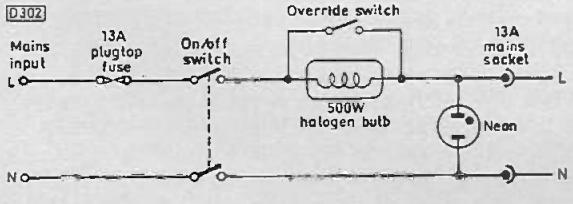


Fig. 1: Mains buffer for use with white goods.

I connected a 500W halogen bulb in series with the washing machine to limit the current to 2A (see Fig. 1). The machine worked normally, though slowly, with the lamp glowing at different intensities depending on the current drawn by the motor, heater etc. When the fault next occurred, the halogen bulb went to full brightness and the cause was easy to localise.

Back in the workshop I tried the same circuit, with the mains fuse reduced to 5A, in series with my 600VA isolated bench power supply. TV sets, VCRs etc. that had newly come in for repair were initially connected via this buffered supply. The switch across the lamp (see Fig. 1) enables the buffering to be brought into or switched out of circuit.

Advantages

One of the many advantages of this approach is that faulty degaussing circuits can be spotted. I have a 5A AC ammeter in series with my isolated power supply, but the needle tends to just flick when the set is switched on. With the halogen lamp in circuit, the glow lingers longer should the posistor be faulty. Lazy or arcing posistors are a common cause of intermittent fuse blowing, channel changing etc.

I always power a microwave oven via the buffer initially, especially when fuse blowing is the problem. (Slamming the door often shows up intermittent safety switches.) For all field work on white and brown goods, I continue to use this simple circuit.

Most brown goods do not make the lamp glow whilst running, except for the current surge at switch on. If a set fails, the lamp's current limiting reduces the likelihood of major component damage.

Automatic Cut-off

An automatic supply cut-off will provide better protection. I have devised the circuit described in this article using additional circuitry, with the halogen lamp as one end of what is, in effect, an optoisolator (see Fig. 2). Short lamp flashes of less than three seconds are

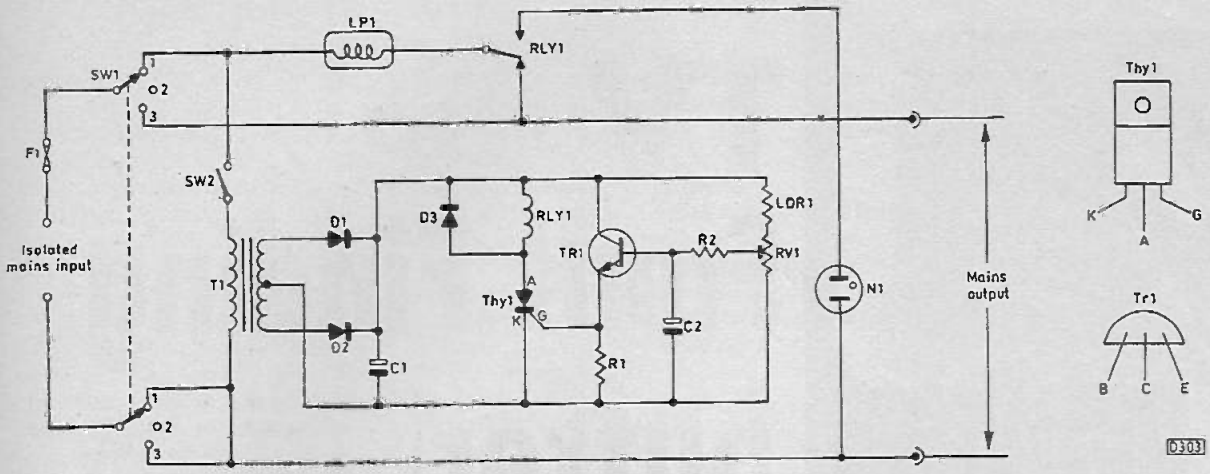


Fig. 2: The mains-buffering trip circuit.

ignored. Longer overloads will operate the trip, disconnecting the mains feed to the equipment under test.

Circuit Description

Switch SW1 provides the following options: (1) Buffering trip in operation, (2) mains supply disconnected. (3) trip disconnected, i.e. direct mains input to the equipment.

Transformer T with rectifier diodes D1 and D2 and their reservoir capacitor C1 provide a DC supply for the trip circuit.

The light-dependent resistor (LDR1) has a high resistance value until the halogen lamp (LP1) glows, when its value falls to a few hundred ohms. LDR1 forms a potential divider with the preset control RV1, determining the voltage at the base of transistor Tr1. RV1 is included to set the threshold at which the LDR operates the trip. If required, the threshold can be set so that the trip ignores a dull glow from the halogen bulb but operates at an increased brightness level. R2 and C2 introduce a time-constant at the base of Tr1, to avoid spurious operation.

When Tr1 conducts, it fires the thyristor Thy1 which latches on and actuates the relay RLY1. The relay's contacts open, disconnecting the supply to the equipment under test. The trip will remain latched by Thy1 until SW1 is set to position 2 or SW2 is opened. A mains neon indicates the tripped condition.

If you don't want the trip to operate, using just the lamp for current limiting, SW2 can be left open-circuit. If required, the trip circuit can be activated after a large surge has passed.

Unprotected mains connection is provided with SW1 in position 3. This is when neither the lamp nor the trip is required.

Construction and Setting Up

Construction is not critical, but observe safety requirements – enclose all live parts, and mount the halogen lamp where its considerable heat output will not melt or burn the wiring or case. CPC can supply a suitable holder for the lamp, which comes complete with tagged, heat-resistant leadouts. In the prototype the LDR was mounted on a piece of matrix board along with the rest of the circuit.

The case I use has ventilation holes on all sides, and I was concerned that external lighting might operate the trip. So the LDR was enclosed in a short length of half-inch plastic water pipe. Its open end faces the lamp. I have not had any problems with false triggering, even when the bench light is shone on the case.

To adjust RV1, use a cloth to shade the LDR then set it for reliable relay operation when the LDR is uncovered under normal ambient light conditions. With the prototype, this occurs with RV1's slider at the approximate mid-position on its track.

The trip delay can be increased or reduced by altering the value of C2. The time is about three seconds with the prototype. I have considered making the delay variable by using a switch to select different capacitor values. This would provide a range of delays for different types of equipment.

Use

After two years' use I have still to find a set that won't work via the buffer. My confidence in this trip has grown to the extent that I now rarely use my variac. When I do use it, the buffer adds an extra degree of protection with tricky repairs.

The final tests on any repaired equipment are carried out with the trip out-of-circuit, to ensure that the buffering effect does not hide surge faults.

The saving on high-cost anti-surge fuses and expensive blow-ups has well and truly covered the time and energy spent on developing and building this circuit.

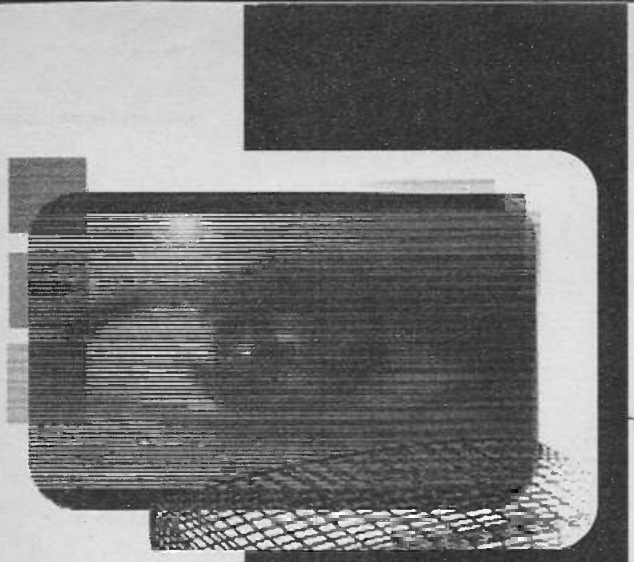
Help

If advice is required on this article or any of my past ones in *Television*, I can be contacted via e-mail at:

Solatair@aol.com

Components required

R1, R2	1kΩ, 0·25W carbon	C1	470µF, 25V
RV1	220Ω preset	C2	470µF, 12V
D1, D2	BY127	D3	1N4148
LDR1	ORP12 (Maplin HB10L)		
Thy1	TIC106D (Maplin QH30)		
Tr1	BC639		
F1	5A quick blow		
LP1	500W halogen bulb (CPC LA0008)		
N1	250V mains neon		
RLY1	SPDT 10A relay with 12V coil (Maplin DC55)		
T1	100mA mains transformer with 12-0-12V secondary		
SW1	DPDT/F 10A centre-off switch (Maplin JK30)		
SW2	SPST toggle switch		
Holder for LP1 (CPC PL00211)			



TV Fault Finding

Reports from
Mike Leach
Brian Storm
Michael Dranfield
Terry Lamoon
Paul Hardy
Edward Branch
Chris Watton
Glyn Dickinson and
David Smith

Samsung CI5337AN (US60A Chassis)

The symptoms were partial field collapse and reduced brightness after a couple of minutes' use. When freezer was applied to the two 7812 type 12V regulators IC801 and IC802 the fault cleared, only to return a few minutes later. We replaced the two regulators but this made no difference. Voltage checks showed that in the fault condition the input at IC802 was only 9V instead of 15V. It comes from the 1N4003 diode D801. When this diode was replaced the 15V remained stable and the field and brightness were steady. **M.L.**

Sony KVX2972U

One of these sets displayed some strange symptoms. There was no colour when it was switched on from cold. If you were lucky, the colour might appear after a few minutes. On most occasions however the grey scale would start to vary and the picture would turn a very bright magenta or sometimes green. Eventually the grey scale would return to normal and the colour would probably also return.

We got busy with our trusty hairdryer and freezer, but this only complicated matters – heating the underside of the decoder area speeded up the magenta/green, grey scale, chroma variations. After much testing we discovered that the chroma delay line chip IC302 had no 12V supply. This caused instability in the colour decoder section of the receiver. The cause of the loss of the 12V supply was that jumper wire FS053, which is adjacent to plug CN0103, had never been soldered. Normal colour and grey scale were restored once it had been resoldered. **M.L.**

Hitachi C1410R

Tuning drift was the problem with this 14in. portable, which is fitted with a Nokia chassis. The drift would occur after about five minutes and was only slight – the station would seem to be just off tune. There was no further drift.

The obvious thing to do was to replace the 33V tuning voltage regulator (VF07), but this made no difference. The cause of the problem was eventually traced to the BF840 transistor VF06, which is a surface-mounted device in the tuning circuit. Replacing it restored normal operation. **M.L.**

Panasonic Euro 2 Chassis

This second-generation digital TV set would work happily for many hours before lapsing into standby. The fault could be instigated sooner by covering the ventilation slots in the back cover. Unfortunately any of the processor chips in a digital TV chassis can cause this sort of problem. So we set out on a course of elimination.

The digital video processor IC was replaced first. Later that day the heavily-insulated set cut out. The multi-sound processor chip was tried next, with the same result. The teletext processor chip (TPU3040-18) was eventually found to be the culprit. **B.S.**

Panasonic Z5 Chassis

The HT voltage was low and the set constantly tripped. When the feed to the line output stage was disconnected the symptoms remained exactly the same. C823 (10nF, 500V) in the snubber circuit was eventually found to be the culprit. It was leaky. **B.S.**

Panasonic Euro 2 Chassis

Despite every attempt to activate it this set was permanently stuck in standby. Checks around the main microcontroller chip showed that there were some signs of life here, but although most conditions around the digital chips were OK the set couldn't be lured into life.

The set was eventually made to work by disconnecting the serial data and clock lines to the EAROM chip IC1203, though the picture geometry and the customer set-ups were poor. A new EAROM chip (X24C016P-P1) cured the fault. **B.S.**

Panasonic Euro 2 Chassis

The set would cut out when hot. Fortunately on this occasion there were some clues. Just before the set lapsed into standby, its picture would break up into lines – as if the AD converter's frequency was varying. The cause of this can be crystal X601 or the digital video processor chip IC601. Although we opted for X601 first, the culprit was IC601 (type VDP3108-30). **B.S.**

Sanyo CBP2180A and Clones (A5 Chassis)

Field foldover at the top with bent verticals and hum on the sound were the symptoms with this set. We suspected the mains bridge rectifier's reservoir capacitor but it was OK. The cause of the trouble turned out to be a dry-joint at the centre, earth connection of the AN78M12LB (or equivalent) 12V regulator IC552.

We have had the same problem

with an Akai model fitted with this chassis. **M.Dr.**

Philips GR1-AX Chassis

One of these sets came in because of a purity fault. This was caused by the fact that the degaussing plug was not pushed fully home into its socket.

When we had put this right we noticed that the protection thyristor Thy6641 had been removed, and soon found out why when we fitted one from a scrap chassis – the set tripped at switch on. The usual cause of this is the overvoltage sensing zener diodes D6638, D6639 and D6640, but they tested OK. The other input at Thy6641's gate comes from Tr7100 (BC558) in the excess-current sensing circuit associated with the 9V supply (sets with serial no. SV01 onwards). We found that the value of the smoothing/current sensing safety resistor R3100 (1Ω) had risen to 4Ω. **M.Dr.**

Matsui 1435B

This set led us a right dance. It came in because there was no sound or picture, but EHT was present. When the first anode preset was turned up all we got was a white screen. Hours were wasted checking various things before we discovered that all the user settings – brightness, contrast, colour and volume – had gone to zero, perhaps as a result of a CRT flashover. After rememorising, the set was fine. But we gave it a three-day soak test to be sure. **M.Dr.**

Akura CX25, CX26

Back in March 1997 Steve Leatherbarrow commented on the many faults that the NVM3060 EEPROM can cause in these sets. But you don't have to spend £18 on a replacement – you can reprogram the original one. For this you need the service manual and the remote control unit.

Next time you get a set in and have completed the repair, enter the service mode, scroll down to NVM address and read out the memory. Each memory location has a number in hexidecimal form, from 00 to FF or 0-256, and a setting value, again in hex form. Write the data down and next time you can reprogram the EEPROM yourself. As some locations relate to tuning, picture geometry etc. you will have to make slight adjustments after reprogramming.

To get you started, if you have a sound problem with the Nicam Model CX26 scroll down to locations D7, D6 and D5 and enter the following data: location D7, data 3E; location D6, data 09; location D5, data 1F. Location D7 seems to relate to the maximum volume setting. Empty locations are all filled with FF. If you change the data at location D7 to FF the sound is muted – the microcontroller chip sends the sound mute command to the Nicam panel. **M.Dr.**

Mitsubishi CT21ASTX (Euro 12 Chassis)

Field collapse was the fault with one of these sets. We suspected the SGS-Thomson TDA8178S field output chip IC451 but didn't have one in stock. So we tried a TDA8178FS as used in some Ferguson chassis. This restored the field scanning, but with foldover. Obviously the correct S version was required.

All our suppliers were out of stock. After six weeks on back order with one company we spoke to our helpful SEME rep who said he might be able to help. A couple of days later the chip arrived. Imagine our horror when we opened the bill and found that it costs some £32 plus VAT – the TDA8178FS costs about £3. Luckily the set features Nicam and Fastext, so the estimate was accepted. Any comments, Mitsubishi? **M.Dr.**

Sony KVX2132U (AE-1B Chassis)

When I switched this set on there was poor field scan with reduced width. As I'd had the problem before, I went straight to the 680µF, 25V field scan coupling capacitor C531 which was looking pretty stressed. After replacing it and resoldering all the connections to the TDA8170 field output chip IC501 I was rewarded with a perfect picture. **T.L.**

Grundig GT2105

When this set was switched on the sound and picture were very unstable. The outside engineer had tried a new tuner without success. When I checked the tuner voltages I found that the 33V supply was fluttering at 25V. After fitting another tuner everything was OK. **T.L.**

Sharp VT3700

This TV/VCR combination would not come out of standby. On investigation I found that L752 was burnt up. When I checked with Sharp Techical I was advised to replace all the semiconductor devices in the line concerned. This did the trick. **T.L.**

Matsui 1492

Intermittent drifting was the complaint with this set. A light tap on the tuner made things go haywire. So I removed the tuner and carefully resoldered every connection on it. When it was replaced everything was nice and stable. **T.L.**

Grundig GT2105

If the trouble with one of these sets is no green in the display, check R908 on the CRT base panel and R802 near the RGB chip. **T.L.**

Matsui 1436XA

This set was dead with no illumination from the standby light. The small 160mAT fuse FU211 in the standby supply was open-circuit. A nice, easy one for a change. **T.L.**

Panasonic Z3 Chassis

The customer complained that this set was noisy. Sure enough it would fizz every now and then. The HT was going high, and the STR50103A chopper chip was sensitive to freezer. A replacement restored normal operation. **P.H.**

Ssangyong STV9214R

I'd never seen one of these sets before and had no circuit diagram. There was no picture, the basic fault being field collapse. ZD401 and R414 had both failed, and failed again immediately after being replaced. The cause of the trouble was high voltage from the line output stage because the HT was excessive. Eventually capacitors C909 and C910 in the power supply were found to be significantly low in value when checked with a bridge – they appeared to be OK when checked with an Avo meter. Replacements restored correct operation. **P.H.**

Ferguson TX89 Chassis

There was no sound or vision with a distinct lack of snow. I eventually found that C13 (220nF) was short-circuit. It's connected to pin 9, one of the IF input pins, of the TDA4501 multifunction chip. **P.H.**

Philips G11 Chassis

Field roll when warm was the complaint with this elderly set. I'd seen it about six months previous-

ly, and had reset the field hold control. Obviously something else was amiss. This turned out to be C2049 (15µF) on the timebase panel. It smooths the LT3 supply and had gone low in value. **P.H.**

Philips CP110 Chassis

This set had originally come in for a new mains switch, as the original one wouldn't latch. After replacing it I switched on confidently but the mains fuse shattered. As I couldn't find any sign of a short-circuit I next tried running the set up via a variac. At about 160V the fuse went spectacularly and smoke came from a small subpanel in the power supply. As this panel is not mentioned in my service manual, I was on my own.

Tr7691 (BC368) and D6691 (18V zener diode) had both failed, and C2656 (150µF, 385V) was short-circuit. Someone had been playing here, because C2656 was fitted back-to-front! When these items had been replaced the set still wouldn't work. A new TEA1039 chopper control chip finally restored normal operation. **P.H.**

Salora H Chassis (Ipsalo 2)

Both chopper transistors were short-circuit and RB713 was open-circuit. Lots of bad joints were resoldered, including a very bad one at the line scan coupling capacitor CB532 (0·33µF, 250V). Further inspection revealed that this capacitor had failed – bulges were present. It's no longer available from NCS. Fortunately C831 (0·33µF, 400V) from the Ferguson TX10 chassis has the same pin spacing and will fit. It's available from Willow Vale. **P.H.**

Sony AE1 Chassis

Bad joints in the IF section on board A give a lot of problems. I've had intermittent loss of colour, poor picture or sound, picture rolling and also intermittent failure to stop in the search-tuning mode. In all cases the bad joints have been either on the earthing lands that anchor the screening plate mounting pins or around T101 and T102. **P.H.**

Akura CX26

This set was stuck in standby. I didn't have a circuit diagram but found that the HT supply to the line output stage was at 116V, which seemed to be reasonable. Fortunately many voltage readings are printed on the PCB. One that's marked "5V" produced a reading of only 1·4V – it's by the edge connector. Checks in the 5V supply brought me to C841 (470µF, 16V) which was leaky. When a replacement was fitted I had 7V at the cathode of D809. The 5V supply was back and the set worked all right. **E.B.**

Hitachi NP83Q Chassis

I wasted much time before I found the cause of this fault: the sound would intermittently crackle, with a volume variation and distortion. After replacing the audio output chip and most of the electrolytics in this area I was still no farther forward. The headphone socket was given a clean bill of health. Then I noticed, tucked away at the other end of the front, a flap with bass and treble controls behind it. Yes, you've guessed it: they had dirty tracks! **E.B.**

Goodmans 2575

This set was dead, with smoke coming from C134 (10nF, 1·6kV) because of a dry-joint at one of its connections. I was able to clean up the PCB and replace C134. Then I found that D45 (BY228) had also suffered and was short-circuit. Once this had been replaced there was sound and a picture, but the width was excessive and there was no EW control. As the voltages around the TDA4550 pincushion correction chip IC18 were nothing like what they should be I replaced it. This finally restored the set to its correct working condition. **E.B.**

Grundig CUC51A Chassis

There was no audio output from one of these receivers. A check at pin 3 of the TDA1905 audio output chip produced a reading of 0V. Further checks showed that R366 (12Ω) was open-circuit and C366 (1,000µF, 25V) short-circuit. Replacing them restored the sound. **E.B.**

Ferguson TX100 Chassis

Loss of the picture, with just a screenful of snow, said the report that came with this remote-control set. And the fault didn't occur very often! Various thrashings were handed out to the tuner and the remote control panel, but no disturbance testing would instigate the fault. Heat and freezing didn't help either. After a couple of hours however the signals did disappear and we found that the 9V supply to the remote control panel was missing. The unusual cause was that winding 3/4 on the chopper transformer was going open-circuit intermittently. **C.W.**

Panasonic Z5 Chassis

No signals was the complaint with this portable. When the contrast was turned up, just a little noise occasionally appeared on the screen. A dead IF strip was suspected, but a meter prod applied to the tuner's output produced a little noise while applying the prod to the output from the SAW filter produced a lot of noise. So attention was turned to the tuner unit.

The pin functions are printed on the PCB, which is handy but unfortunately misleading. The pin marked 30V is actually the tuning voltage, which should vary. It did not. A quick scope check on the series data and clock lines showed a change in activity when the tuner's buttons were pressed. When the tuner was taken apart it was soon apparent why it didn't work: the 4MHz crystal wasn't soldered to the board. Note also that the only supply to the tuner is MB (11V). BT is not connected. **C.W.**

Tatung C Chassis

One of these sets would cut out and revert to standby on high-brightness scenes. When I monitored the HT voltage I found that it dropped as the brightness increased. The cause of the fault was traced to CE803 (220µF, 16V) which had dried out. It's the reservoir capacitor for the supply to the TDA4605 chopper control chip IC801. Since it is mounted next to a hot resistor, it's advisable to fit a high-temperature component in this position. **G.D.**

GoldStar PC04A Chassis

The cause of various odd field faults, ranging from top expansion to total field collapse, has been traced to D301 (1N4003). This diode may test OK, and may appear to have the correct voltage across it, but change it before you consider IC replacement. If the TDA1170N field timebase chip does have to be replaced, change D301 and R320 (10Ω, 1W) as well, also any capacitors that look poorly. It's essential to obtain a genuine GoldStar replacement chip – others won't work properly.

Sets fitted with this chassis include the **GoldStar CIT2168** and the **Matsui 2091. G.D.**

Panasonic Alpha 1 Chassis

This set was tripping and the

SR2KN avalanche diode D854 was short-circuit. The usual cause of this situation is the STR54041M chopper chip IC801. This time however the cause was C808 (10µF, 50V) which had gone low in value. **G.D.**

Philips KT3 Chassis

No problem these old sets. Except this one! The symptom was interference on the screen, especially with bright scenes. In addition the colour would disappear into hum bars. As no voltage variation could be found, a wholesale capacitor replacement was undertaken. This made matters worse, as did replacement of the badly rusted EHT cap. A leak in the CRT? No, and no panel was to blame either. The cause of the trouble was eventually traced to R401 in the tuning circuit. It had risen in value to 25kΩ. Another loss leader! **G.D.**

Matsui 2180TT/Saisho FST212T

All the symptoms of a faulty tube were present – streaking colours, low contrast and the grey scale couldn't be set up. The cause was the TA7778P RGB interface chip IC701 however. **G.D.**

Nikkai French Chassis

No picture or sound because the 12V, 1·3W zener diode has gone short-circuit and its feed resistor (10 or 12Ω, 2 or 3W fusible) open-circuit has been mentioned before. To avoid a recurrence, always replace the 47µF capacitor (often C909) in the power supply, even if it tests OK. Use a good-quality, high-temperature component.

The cause of an apparently dead set is often the 0·68Ω LT feed resistor going open-circuit for no apparent reason.

If the chopper transistor has failed, replace the previously mentioned 47µF capacitor, the three transistors in a group beside it and the 2·2Ω fusible return feed resistor.

The chassis is used in Bush, Alba and Cascade sets. Component reference numbers seem to vary. **G.D.**

Philips G110 Chassis

This set was dead apart from a loud buzzing noise. After removing the line scan plug SG15 then connecting a meter and lamp across the 47µF HT smoothing capacitor C2631 we switched on and were rewarded with the correct 148V and a bright light. So the power supply was OK.

We switched off and checked the resistance between the collector and emitter of the line output transistor. As there were no shorts here, a new transformer was fitted. We now had a working set, but there was a one-inch band down the left-hand side of the screen – as if the line centring was out. We went straight for the two surface-mounted transistors Tr7594 (BC848) and Tr7593 (BC858). They were as short as short could be. No other component seemed to be faulty. So we fitted two new transistors, and also replaced the two 10µF capacitors C2593/4 which appeared to be a little low in value. The set was now restored to full working order.

On returning the set we were told that the one-inch band down the left-hand side had been there for ages! It's odd that the two 1Ω fusible resistors R3593/4 hadn't blown. Their values were spot on and there were no signs of distress. **D.S.**

Servicing the Panasonic Alpha 2 Chassis

John Coombes presents a detailed fault-finding guide for these popular sets

This 90° chassis was used mainly in the popular Model TX21T1, which includes teletext. Two less often encountered models are the TC21R1 which doesn't have teletext, and the TX21V1 which has teletext and also Nicam stereo sound. The first sets appeared in 1989, the chassis remaining in production until about 1994. The following notes are based on the TX21T1 but in the main also apply to the other models mentioned above.

Power Supply Faults

The power supply circuit is shown in Fig. 1. It's based on the Sanken STR54041M chopper chip which has built-in regulation. Q802 provides standby switching; Q801 acts as an excess-current trip.

If the set is dead with the 3·15A mains fuse F801 open-circuit, the first suspects are the D4SB80Z mains bridge rectifier D801 or the ERZC10DK621C mains transient suppressor D804, either of which could be short-circuit. A replacement fuse might hold if D804 has split apart, thus removing the short-circuit. If these two items are OK, the STR54041M chopper chip IC801 is probably short-circuit.

If the set is dead but the mains fuse is OK, check for dry-joints around the chopper transformer T801. If this is OK, there are two main possibilities. Check the 560kΩ, 0·5W start-up/bias resistor R803 which could be open-circuit or high in value, then if necessary the C2408M HT rectifier D851 which could be short-circuit or leaky. If D851 is short-circuit, the SR2KN over-voltage protection diode D854 is also likely to be short-circuit. In the event of D851 and/or D854 being faulty, check for shorts in the line output stage – see following section.

If the receiver is stuck in the standby mode, check whether the TLP621GR-LF2 optocoupler D811 is faulty. If the receiver works for a short time then cuts out and fails to work until pins 3 and 4 of the optocoupler are shorted together, replace D811.

Sometimes you may find that the receiver works for a short time then cuts out, with a loud squealing noise from the power supply. This usually means that the STR54041M chopper chip IC801 is faulty, producing high output voltages. Check IC801 and D854. If still in trouble, check the line output stage – see following section.

Intermittent operation can be the result of dry-joints around the chopper chip IC801 and/or the transformer T801.

Line Timebase Faults

The most common line output stage fault is a short-circuit output transistor (Q551, type 2SD1439RL). This can be caused by dry-joints at the line driver transformer T531. If you are lucky and deal with these before Q551 fails, the symptom will have been intermittent black lines at the right-hand side of the screen. A dry-joint at the collector of Q551 will also, if left, ruin the transistor. When Q551 is short-circuit, the usual symptom is no sound or raster with a ticking noise from the power supply.

Q551 will also fail if the HT is too high, or maybe the HT has been too high and Q854 has gone short-circuit. The HT can rise as high as 160-200V when IC801 is faulty. You may also find that the fusible resistor R567 (TSF19012) in the HT feed to the line output stage is open-circuit. Thus the items to check when there is a whining noise from the power supply are Q551, R567, D854 and IC801.

Shorted turns sometimes develop in the line output transformer T551. In this event Q551 may be short-circuit. R567 open-circuit and D851 may be damaged.

For intermittent no results with a loud whistle, check for dry-joints around the line output transistor Q551. Resoldering here should restore normal operation.

If there is no sound or raster and Q551 and T551 are both OK there are several possibilities. Check whether the line output stage tuning capacitor C556 (680pF, 2kV) is short-circuit or R551 (8·2Ω, 7W) in the HT feed is open-circuit. R851 (2·2Ω, 0·5W) can go open-circuit, removing the supply to the line driver stage. The line driver transformer T531 may be dry-jointed or the driver transistor Q501 (2SD836ALB) open-circuit. Dry-joints around the line driver transistor Q501 can result in intermittent loss of the sound and raster.

The other possibility in the event of no line drive is a problem with the line generator. Check for 12V at pin 10 of the TDA2579A timebase generator chip IC501.

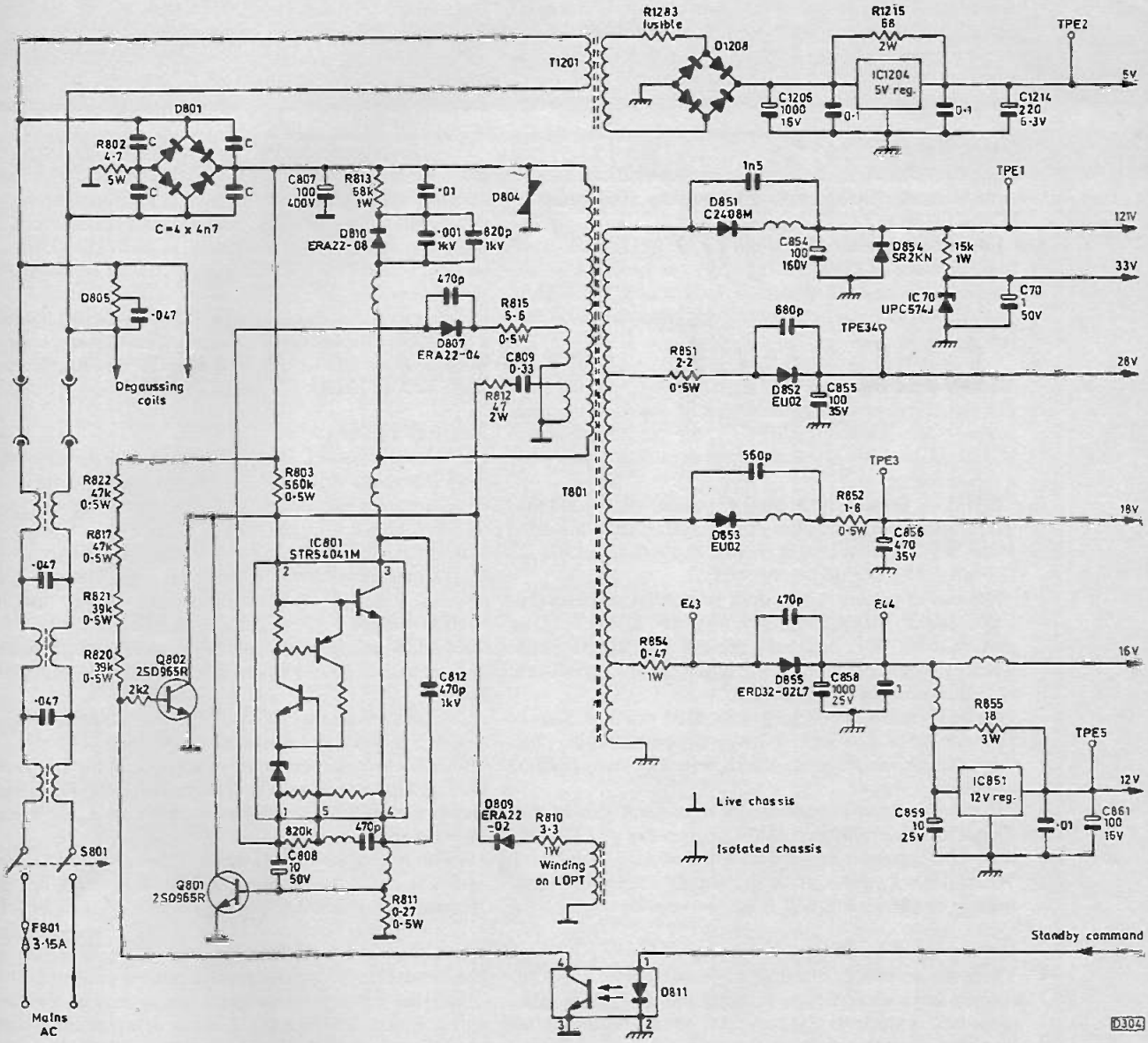


Fig. 1: The power supply circuitry used in the Panasonic Alpha 2 chassis. IC851 is type AN78M12LB, IC1204 is type AN78M05LB or L78M05-M-RB. D801 is type D4SB80Z, D1208 type S1WBS10.

The 121V supply is used by the line output stage; the 33V supply is the tuning voltage source; the 28V supply is used by the field output chip and the line driver stage; the 18V supply is used by the audio output chip; the 16V supply is used by the IF panel, which incorporates a separate regulator; the 12V supply is a general line for the main panel; the 5V supply is used by the remote control/microcontroller panel.

If this voltage is missing, check the AN78M12LB 12V regulator chip IC851 which could be short- or open-circuit and if necessary C861 (100µF, 16V) which could be short-circuit. No or low voltage at pin 10 of IC501 could be caused by a short-circuit within the chip. If the voltage at pin 10 is OK, check for dry-joints around the chip.

If the sound is OK but there is no raster, check the tube's heater supply. There could be dry-joints at pins 7 and/or 10 of the line output transformer or at plug/socket E7, or R557 (0·56Ω, 0·5W) could be open-circuit. Intermittent loss of the raster suggests dry-joints at pins 7/10 of T551. Another possibility for loss of the raster is dry-joints at pins 1 and 3 of the scan coil plug/socket E4. The scan coils could be open-circuit, but this is very rare.

Field Faults

There are several possible causes of field collapse. The AN5521 field output chip IC451 could be shorted internally. Check for low d.c. voltages at its pins. There should be 28V at pin 3 of IC451. This supply could be missing because fusible resistor R484 (TFS19631) or diode D451 (ERA15-02) is open-circuit or coil L451 dry-jointed.

There will be field collapse if C403 (10nF, 50V) is leaky or, less likely, R452 (3·9kΩ) is open-circuit.

If necessary check that the drive and ramp generators in IC501 (TDA2579A) are working correctly. If not, IC501 is probably faulty – check it by replacement.

Another possibility is dry-joints at pins 2 and 4 of the scan coil connector E4. Check whether the field scan coils are open-circuit.

Striations

Striations, with double lines and picture distortion, can be the result of a brushing effect because of incorrect positioning of the EHT/focus/A1 leads. We have also had R469 (470Ω) cause this fault – it was open-circuit.

Sync Faults

Sync faults are rare. The most common fault is loss of sync with the picture then disappearing. The cause is IC501 (TDA2579A).

Loss of sync can occur when R572 (68kΩ) has gone high in value or C507 (4·7µF, 50V) is leaky. Another possibility with text models is failure of C3550. This 1µF, 50V non-polarised electrolytic capacitor is on the text panel.

Video Faults

For no video or intermittent loss of the video signal suspect the TVSM51326P TV/AV switching chip IC2601. Check its DC conditions then if necessary fit a replacement.

If IC2601 is OK, check the DC conditions around the TDA3505 video controller chip IC602. Check for dry-joints here and that 12V is present at pin 6. If not, C627 (220µF, 16V) should be checked.

For loss of picture with a dark screen the suspects are C626 (10nF, 50V) and C311 (0·47µF, 50V). For no picture with no brightness control operation check whether C309 (10µF, 50V) is leaky. These capacitors are all associated with IC602.

If the picture is poor with very little contrast, check whether R562 (130kΩ, 0·25W) is open-circuit. This fault can be intermittent. R562 is in the beam limiter circuit.

If there's a faint line down the right-hand side of the screen C858 (1,000µF, 25V) is open-circuit. It's the reservoir capacitor for the feed to the 12V regulator. When it goes open-circuit the supply is reduced and there is ripple on the 12V line.

Tuner/IF Faults

There are several things that might have to be checked if there is a snowy picture with the sound all right. The tuner unit is suspect: you may have to fit a replacement to prove that the gain of the original tuner is low. Check for about 3-4V at pin 4 (AGC input). If this voltage is missing, check whether C117 (10nF) is short-circuit or the RF AGC control R135 is set too low. These items are on the IF panel. If still stuck, check that there is 12V at pin 7 and 5V at pins 10 and 12. Check back to source if these voltages are incorrect.

If stations cannot be tuned in correctly, the SAB3035 CITAC chip IC171 is suspect. Check the DC conditions and by replacement if necessary.

If stations cannot be stored, the microcontroller chip IC1203 is suspect. It's on microcontroller/remote control board M. The type varies: it's an MAB8461PW134 in the T1 and V1 models, an MAB8441PT090 in the R1 version.

If there is a blank raster and no sound, check whether R149 (33Ω) on the IF panel is open-circuit.

Colour Faults

For no colour or intermittent loss of colour the TDA4510 decoder chip IC601 and the TDA3505 video control chip IC602 are suspect. Check the DC conditions carefully and the chips by replacement if necessary.

For poor colour check whether C612 (10nF) is leaky. For unlocked colour check whether C642 (another 10nF ceramic capacitor) is leaky.

If there is an intermittent decrease in the chroma level, check for dry-joints at the chroma delay line DL601. If resoldering doesn't cure the problem, replace DL601.

For loss of one colour, check whether the relevant 2SC2923RL output transistor is dry-jointed or open-circuit – Q351 green, Q352 blue, Q353 red. Check for dry-joints at the CRT pins and for poor connections at plug/socket Y2. If still in trouble, IC602 (TDA3505) is suspect – check its DC conditions then by replacement if necessary.

For a green, red or blue picture check whether the relevant RGB output transistor emitter decoupling capacitor is leaky – C351 (220pF) green, C352 (270pF) blue, C353 (220pF) red.

Sound Faults

For loss of sound, check the voltages around the AN5265 audio chip IC253 (the arrangements differ in the V1 stereo model). If the 18V supply at pin 9 is missing, check whether R288 (12Ω, 1W) is open-circuit or C272 (470µF, 25V) short-circuit. Alternatively IC253 could be faulty. If the 12V supply at pin 1 is missing, R221 (56Ω) is probably open-circuit.

There will be loss of sound should C269 (10nF) be leaky. This can be confirmed by checking whether the voltage at 2 of IC253 is low (there should be about 5V here).

If the sound output is distorted, check whether C2442 (100pF) is leaky. It's on panel H (AV/text).

If, after a long period of operation, there is sound muting with no volume control operation the PCD8582 memory chip IC1202 on the remote control/microcontroller panel is faulty.

For no Nicam sound (V1 model) check C2549 (10nF) which is connected to pin 9 of the TA8662N Nicam decoder chip IC2502.

Remote Control Faults

The handset is the usual cause of remote control faults. Check the battery connections for corrosion or dry-joints. Check whether the LED is dry-jointed. Check whether the crystal is operating correctly – look for dry-joints or broken legs.

If the handset is OK, check for 4·4V at pin 9 of the UPC1474HAL remote control decoder chip IC1101. If this supply is missing, R1104 (100Ω) is probably open-circuit. Alternatively the PN323B photodiode D1101 could be dry-jointed or open-circuit.

Teletext Faults

If there is no text, check that IC3501, IC3502 and IC3506 are receiving their 5V and 12V supplies. For loss of the 12V supply, check whether IC2402 (L78M12M) is short- or open-circuit. For loss of the 5V supply, check whether IC3505 (L78M05M) is short- or open-circuit. If the 5V supply to IC3502 is missing, check whether R3526 (1Ω, 0·5W) is open-circuit or C3524 (2,200µF, 6·3V) short-circuit. IC3502 (SAA5243P/E) and IC3506 (M68400P-12L or an alternative) are suspect. Check the DC conditions at their pins, then by replacement if necessary.

Ripple on an LT line will will result in incorrect teletext. Check the relevant decoupling capacitors. Remember that there will be text faults if the received signal is substandard.

For loss of text sync check C3517 (10nF).

LINEAR ICs/JAPANESE TRANSISTORS

Part	Price
TA8164P	100p
TA8184P	350p
TA8189P	130p
TA8200AH	325p
TA8201AK	300p
TA8205	250p
TA8207K	175p
TA8210	300p
TA8211AH	200p
TA8214K	260p
TA8215	300p
TA8216H	300p
TA8217P	120p
TA8220AH	500p
TA8221AH	600p
TA8225H	475p
TA8225L	475p
TA8227	260p
TA8229K	200p
TA8400P	200p
TA8410K	200p
TA8410P	200p
TA8432	200p
TA8605N	350p
TA8606N	350p
TA8607P	320p
TA8611AN	250p
TA8615N	480p
TA8628N	350p
TA8631	500p
TA8632N	550p
TA8644N	425p
TA8646	375p
TA8653N	1500p
TA8659AN	900p
TA8690N	700p
TA8691N	450p
TA8701AN	275p
TA8718N	550p
TA8720	525p
TA8739P	450p
TA8872N	450p
TAA550	25p
TBA120S	40p
TBA396	70p
TBA520	120p
TBA530	100p
TBA540	90p
TBA560	90p
TBA800	40p
TBA810AS	40p
TBA820	55p
TBA820M	35p
TBA920	100p
TBA950	100p
TBA990	60p
TC5020	200p
TC5081AP	80p
TC5082P	170p
TC5090A	230p
TC9125BP	410p
TC9130P	150p
TC9134	750p
TC9135P	125p
TC9137P	600p
TC9138AP	150p
TC9142	320p
TC9143	300p
TC9145	150p
TC9148	200p
TC9149	225p
TC9150	425p
TC9151P	425p
TC9152	425p
TC9153	300p
TC9154AP	225p
TC9156	300p
TC9158P	450p
TC9162	275p
TC9163	375p
TC9164	400p
TC9167P	100p
TC9172P	300p
TC9174P	325p
TC9176P	500p
TC9177P	225p
TCA9940	100p
TCEP100	100p
TD62308AP	200p
TD62382	200p
TD62506	200p
TD62705	250p
TD6304AP	300p
TD6306P	350p
TD6350P	200p
TD6359P	300p
TDA1001	200p
TDA1002	200p
TDA1003	150p
TDA1005A	175p
TDA1010A	80p
TDA1011	75p
TDA1012	120p
TDA1013A	110p
TDA1015	85p
TDA1016	140p
TDA1020	110p
TDA1022	330p
TDA1023	130p
TDA1024	160p
TDA1025	320p
TDA1028	175p
TDA1029	200p
TDA1035	160p
TDA1038	500p
TDA1041E	250p
TDA1041P	180p
TDA1044	110p
TDA1047	200p
TDA1048	200p
TDA1053	300p
TDA1054	180p
TDA1057	60p
TDA1059B	40p
TDA1060	140p
TDA1062	140p
TDA1068	75p
TDA1072	150p
TDA1074	280p
TDA1077	250p
TDA1082	275p
TDA1083	95p
TDA1085	170p
TDA1087	60p
TDA1092	100p
TDA1097	475p
TDA1151	40p
TDA1154	50p
TDA1170	85p
TDA1170N	85p
TDA1175	175p
TDA1180	120p
TDA1185A	190p
TDA1190	80p
TDA1200B	80p
TDA1220	75p
TDA1235	300p
TDA1236	240p
TDA1251	150p
TDA1270	160p
TDA1327	200p
TDA1405	50p
TDA1410	220p
TDA1412	35p
TDA1506	275p
TDA1508	175p
TDA1510	170p
TDA1512	180p
TDA1514A	450p
TDA1515A	200p
TDA1516Q	350p
TDA1517	260p
TDA1519	200p
TDA1519A	200p
TDA1520	275p
TDA1521	250p
TDA1522	110p
TDA1524	200p
TDA1526	225p
TDA1534	2000p
TDA1540	420p
TDA1541	750p
TDA1542	260p
TDA1543	300p
TDA1552Q	350p
TDA1553AQ	375p
TDA1555Q	375p
TDA1557Q	350p
TDA1558Q	350p
TDA1560Q	675p
TDA1571	300p
TDA1572	175p
TDA1574	125p
TDA1576	170p
TDA1578A	210p
TDA1579	200p
TDA1589	275p
TDA1591	275p
TDA1596	200p
TDA1598	250p
TDA1600	275p
TDA1602A	400p
TDA1670A	230p
TDA1675	250p
TDA1701	300p
TDA1771	250p
TDA1870A	200p
TDA1872A	275p
TDA1904	80p
TDA1905	80p
TDA1908A	90p
TDA1910	225p
TDA1940	180p
TDA1941	300p
TDA1950	175p
TDA2002	50p
TDA2003	65p
TDA2004	150p
TDA2005	160p
TDA2006	70p
TDA2007	120p
TDA2008	100p
TDA2009	160p
TDA2010	150p
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TDA2030H	100p
TDA2040	140p
TDA2048	600p
TDA2051V	450p
TDA2052V	525p
TDA2054M	110p
TDA2107	250p
TDA2148	350p
TDA2151	375p
TDA2170	260p
TDA2220	200p
TDA2270	250p
TDA2320	80p
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TDA2502	175p
TDA2503	200p
TDA2504	200p
TDA2505	300p
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TDA2507	450p
TDA2507T	450p
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TDA3190	100p
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TDA3507	450p
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TDA3541	175p
TDA3560	260p
TDA3561	300p
TDA3561A	300p
TDA3562	260p
TDA3562TF	300p
TDA3563	350p
TDA3564	325p
TDA3565	275p
TDA3566	280p
TDA3567	350p
TDA3569	300p
TDA3570	375p
TDA3580	400p
TDA3586	750p
TDA3590	300p
TDA3591	360p
TDA3592A	350p
TDA3601Q	375p
TDA3602	225p
TDA3611	450p
TDA3640	350p
TDA3645	400p
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TDA3653	150p
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TDA3765V	225p
TDA3771	460p
TDA3780	400p
TDA3791	300p
TDA3800	350p
TDA3803A	500p
TDA3810	200p
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TDA4001	325p
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TDA4052	500p
TDA4060	500p
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TDA4661	225p
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TDA4700A	750p
TDA4714C	350p
TDA4716C	450p
TDA4718A	500p
TDA4725	750p
TDA4800	360p
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TDA5332T	150p
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TDA5660P	250p
TDA5700	200p
TDA5701	200p
TDA5708	400p
TDA5709	450p
TDA5800	600p
TDA5820	370p
TDA5832	200p
TDA5850	175p
TDA5930	225p
TDA6100Q	150p
TDA6101Q	120p
TDA6111Q	225p
TDA6200	750p
TDA6600-2	700p
TDA6610-2	1100p
TDA6612-2	900p
TDA7000	170p
TDA7010T	120p
TDA7020T	175p
TDA7021T	200p
TDA7050	200p
TDA7052	120p
TDA7053	200p
TDA7056	200p
TDA7057Q	225p
TDA7072	175p
TDA7077	175p
TDA7211	150p
TDA7220	100p
TDA7222	200p
TDA7230A	225p
TDA7231A	80p
TDA7233	150p
TDA7240	175p
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TDA7245	300p
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TDA7255	500p
TDA7256	600p
TDA7262	425p
TDA7272	170p
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TDA7274	60p
TDA7275	75p
TDA7282	50p
TDA7284	100p
TDA7302	450p
TDA7310	800p
TDA7313	650p
TDA7318	550p
TDA7330A	700p
TDA7350	650p
TDA7359	300p
TDA7360	700p
TDA7361	175p
TDA7370V	600p
TDA7374V	600p
TDA7770	225p
TDA8114	225p
TDA8115	200p
TDA8116	350p
TDA8120B	550p
TDA8124	250p
TDA8134	225p
TDA8135	225p
TDA8136	225p
TDA8137	200p
TDA8138	200p
TDA8138A	200p
TDA8138B	200p
TDA8139	200p
TDA8140	200p
TDA8143	160p
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JAPANESE TRANSISTORS

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2SC1678	80p	2SC2259	60p	2SC2712	20p	2SC3246	50p	2SC3782	75p	2SD291	250p	2SD880	40p	2SD1313	1000p	2SD1758	75p	2SK241	30p
2SC1683	100p	2SC2261	700p	2SC2714	20p	2SC3259	350p	2SC3783	300p	2SD313	25p	2SD882	25p	2SD1326	200p	2SD1760	80p	2SK246	30p
2SC1684	30p	2SC2267	90p	2SC2716	50p	2SC3260	220p	2SC3787	100p	2SD315	75p	2SD889	35p	2SD1327	150p	2SD1761	60p	2SK300	25p
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2SC2141	60p	2SC2636	40p	2SC3169	150p	2SC3657	400p	2SC4770	250p	2SD836	50p	2SD1272	200p	2SD1667	120p	2SK118	50p	2SK1377	150p
2SC2153	40p	2SC2637	120p	2SC3170	300p	2SC3659	600p	2SC4820	225p	2SD836A	50p	2SD1273	50p	2SD1668	120p	2SK126	100p	2SK1400	250p
2SC2166	80p	2SC2640	1800p	2SC3173	180p	2SC3668	120p	2SC4826	70p	2SD837	55p	2SD1274	80p	2SD1669	85p	2SK133	650p	2SK1404	290p
2SC2168	120p	2SC2653	100p	2SC3175	150p	2SC3675	100p	2SC4924	300p	2SD838	500p	2SD1275	50p	2SD1677	300p	2SK147	160p	2SK1461	220p
2SC2188	70p	2SC2654	180p	2SC3178	125p	2SC3678	280p	2SC4927	500p	2SD841	110p	2SD1276	60p	2SD1680	225p	2SK152	40p	2SK1462	425p
2SC2200	250p	2SC2655	75p	2SC3179	70p	2SC3679	140p	2SC5002	450p	2SD844	200p	2SD1277	190p	2SD1683	45p	2SK161	30p	2SK1487	250p
2SC2209	50p	2SC2656	550p	2SC3180	175p	2SC3680	380p	2SC5003	350p	2SD850	170p	2SD1279	600p	2SD1684	70p	2SK163	40p	2SK1507	475p
2SC2218	50p	2SC2660	100p	2SC3181	200p	2SC3685	450p	2SC5044	250p	2SD856	48p	2SD1288	175p	2SD1706	325p	2SK168	40p	2SK1529	700p
2SC2221	650p	2SC2665	200p	2SC3182	120p	2SC3687	300p	2SC5129	500p	2SD858	250p	2SD1289	250p	2SD1707	400p	2SK170	50p	2SK1537	400p
2SC2228A	60p	2SC2668	10p	2SC3198	30p	2SC3688	550p	2SC5149	400p	2SD863	23p	2SD1291	280p	2SD1708	375p	2SK184	35p	2SK1544	900p
2SC2229	15p	2SC2671	100p	2SC3199	40p	2SC3692	150p	2SD188	350p	2SD864	200p	2SD1292	60p	2SD1710	200p	2SK192	45p	2SK1767	275p
2SC2230	80p	2SC2681	170p	2SC3202	25p	2SC3715	480p	2SD198	140p	2SD866	120p	2SD1293	70p	2SD1718	275p	2SK193	40p	2SK2038	295p
2SC2233	100p	2SC2682	70p	2SC3209	120p	2SC3717	120p	2SD199	195p	2SD866A	140p	2SD1297	300p	2SD1729	230p	2SK195	150p	2SK2039	750p
2SC2235	60p	2SC2688	27p	2SC3210	550p	2SC3729	450p	2SD200	180p	2SD867	350p	2SD1302	20p	2SD1730	275p	2SK197	140p	2SK2134	300p
2SC2236	20p	2SC2690	60p	2SC3211	220p	2SC3746	100p	2SD201	260p	2SD868	260p	2SD1306	45p	2SD1732	325p	2SK212	35p		
2SC2237	540p	2SC2694	3500p	2SC3212	260p	2SC3747	120p	2SD213	250p	2SD869	150p	2SD1308	80p	2SD1739	225p	2SK214	170p		
2SC2238	45p	2SC2705	50p	2SC3225	50p	2SC3748	100p	2SD234	90p	2SD870	140p	2SD1309	140p	2SD1740	125p	2SK216	200p		
2SC2240	15p	2SC2706	250p	2SC3242	30p	2SC3752	250p	2SD257	195p	2SD871	260p	2SD1310	140p	2SD1748	90p	2SK223	50p		

REPLACEMENT VIDEO HEADS

Model	Price
AKAI	
VS105, 112, 115, 116, 120, 125, 126, 201, 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8, VSP82	1000p
VP7100, VS9300, VS9500	650p
VP7200, VS9700, VS9800	1200p
VS1	1250p
VS2	1200p
VS3	1350p
VS10	1350p
VSP1	2100p
VS33,35, 37, 38, 38EOG MKII, 53, 55, 66, 765, 766, 767, 768, 865, 867, VSF30, 33, 4, 400, 410, 420, 430, 440, 441, 450, 455, 480, 490, 497, VSG51, 54, 55, VXS450, VXS470	2250p
VS512, VS515, VS516	2250p
VS462, 465, 467, 467EOG2, VSF12, 15EK, 15EOH, 300, 301, 310, VSF320, 330, 340, 350, VSG30, 33, 34, 35	2300p
VS11, VS12	1200p
VS6, VS8, VS9	2400p
VSX9	2250p
VSA1100, 1110, 650, VSF500, 510, 550, 560, 580, 590, 600, 650, VSG60, 64, 65, VSG70, 73, 74, 75, VSX560, 580	3600p
VS155, VS165	2300p
VS20, 22, 23, 24, 25, 26, 27, 422, 425, 426, 427, 485, VSF10, 11, 180, 190	1250p
VSF200, 210, 220, 221, 222, 230, 240, 260, 261, 262, 265, 270, 275, 280, VSF290, 510, 550, VSG20, 204, 205, 206, VSG21, 211, 212, 215, VSG217EOG, 23, 24, 25, 405, 411, 415, 417, VSP 100, 100EM, 110, VSP88, 88KC, 8111, VSP9, VSR100, 100EDG, 100EM, 110, VSX400	1250p
VSR9	1300p
VS 109, VS603, VS606, VS607	2500p
VS75	2500p
VS965, VC967	3450p
VSF400, 410, 420, 430, 440, 441, 450, 455, 480, 490, 497, VSX450, 470	2850p
VSG20, 204, 204, 205, 206, 20, 21, 211, 212, 215, 217, 225, 23, 24, 25, VSP100, 110, 88, VSR100, 110, VSX400	1950p
VSG415, VSG415EA, VSG425	2800p
VS75, VSA77	3500p
VSF1000, VSF1010, VSF1030	5800p
ALBA	
VDR3000, VCR4000, VCR5000, VCR6000	1650p
VTV10	1000p
VCR7000, 7800, 8000, 8800	1100p
AMSTRAD	
VCR4500, VCR5200, VCR9000, TVR1	900p
VCR7000	1000p
VCR1000, 2000, 6000, 61000, 62000, 8600, 8602, 8700, 9005, DD8900, DD8904, TVR4	1100p
TVR2, TVR3, VCR4600, VCR4600 MKII, VCR400	1100p
VCR8800, VCR8804, VCR9340	2100p
VCR8603, VCR8604, VCR8704, VCR8714	1350p
VCR9140, VCR9142	2550p
VCR9340	3650p
VCR9244	3450p
UF020, 22, VCR3000, 3002, 9500	1750p
FISHER	
FVHP420, 510, 520, 530, 615, 618, 620, 622, 710, 711, 715, 716, 720, FVHP721, 722, 730, 830, 905, 906, 907, 908, 910, 911, 915, 915, 918, FVHP5000, 5001, 5005, 5050, 5075	1100p
VBS3500, 7100, 7500, 7600, 9900, VBR330	1800p
VBS7000, VBS7100, VBS9000	2000p
FVHP600, 711, 715, 721, 722, 730, 830, 5100, FVHD720	1100p
FVHP725, FVHP830, FVHP980	2500p
FVHP980	2700p
FVHP975	2400p
FVHD407, FVHD140, FVHP1, FVHP10, FVHP20	1150p
FVHD230, FVHP1100, 1200, 130, 1340, 1410, 2000, 200, 210, 300, FVHP310, 410, 420	1800p
FVHD250, 270, 370, FVHP1500, FVHP250	2700p
FVHP132, 1400, 1440, 320, 440, 445	3550p
FVHP470S, FVHP475HV	4800p
FVHP1250, FVHP430S	1950p
GOLDSTAR	
8000 3HSSDB, GHV121, RQ2011, 2031, 2051	1900p
GVH51, GVH122, VCP4000, VCP4100, VCP4200	1100p
GHV1232, 1233, 1241, 1242, 1243, 1244, 1245, 1246, 1265, 1290, 1291 GHV1295, 1296, 1891, 8210, 8215, 1221, 1240, 1241, 1247, 1248, 2145 VCP400, VCP4130, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316, VCP4320, 4321, 4325, 4326	1100p
C211, GHV1392P, 1393P, 1900P, 1290, 1291PQ, 1293IQ, 1295P, GSE1295PQ, GSE1296, 1297, 1891, 1910, 20005, 2000, GSEC200, GSEC205, 211, 2301, GSEG2301, GSEQ12, 204, 20, 22, P416P, P500P QUISY22, QUISY24, RC205P, RG11P, RG20, RG2001, RQ20, RQ204HP, RQ241, VCP100P, GSEG10	1600p
GHV4400, 4400, GSE-Q404P, QUISY40, RC405P	2350p
GSEQ121, RQ2011, RQ2031, RQ2051	1950p
G.E.C.	
4000H, 4001H, 4002H	1200p
V4001H, V4004, V4100	1200p
V4005H	1500p
GRANADA	
CSI, DS2	1600p
VHSAH1	1100p
VHSAH3	2400p
VHSAN3	800p
VHSAY3	1200p
VHSBH1, VHSCH1	2100p
VHSBP1	850p
VHSBY3	2600p
VHSD52	1600p
VHSEH2, VHSDH2	1600p
VHSEY1, VHSEY2	1400p
VHSFS1, VHSFS2	1300p
VHSFG2, VHSFG4, VHSF63, VHSFB3	1300p
VHSTJ1, VHSTJ2, VHSTJ3, VHSWJ3, VHSYJ2	700p
VHSVH4, VHSWH1, VHSXH1, VHSYH2	1600p
VHSWJI VHSXJ3	700p
GRUNDIG	
VS410, 415, 435, 450, 456, 460, 500, 505, 510, 520, 521, 530, 546	1600p
BARCELONA, MVS5400, 440, 500, 600, SE5100, 6100, 6110, 9100 TVR4500, 4510, 5510, VS400, 440, 441, 500, 505, 510, 518, 600, 610, VS5180, VS6190, 700, 900, 901, 902, 9091, GV200, 201, 2092, SE2100, 5110	1400p
MADRID, SE5140, VS540, VS5480	3000p
MVS550, 620, VS550, 620, 630, 640, 790, 930, 940	2400p
VS120	2300p
VS680, GV280	4600p
VS150, VS740	4400p
VS170	4600p
MVS660, SE6160, VERONA, VS660, VS6690	3500p
GRUNDIG	
MVS710, 720, 910, SE7120, 9120, VS710, 716, 720, 800, 810, 910, 920, VS922, 9291, GV210, 211, 220, 2292, MV2105, 2116, SE2120	1700p
HINARI	
VXL2, 3, 4, 20, 25, 35	1000p
VXL5, V20H	1050p
VXL6	1200p
VXL7	1300p
VXL8, 9, 10, 11, 19, 90, VCR34H, VTV 100	1100p
200	
HITACHI	
VT11, 14, 15, 16, 30, 33, 34, 330, 340, 503, 640, 5030, VTP10, 30	1000p
VT7, VT17, VT18, VT19	2000p
VT35, VT350, VT38, VT39	2300p
VT100, 110, 111, 112, 113, 115, 118, 120, 125, 128, 220, 225, 400, 405, VT410, 413, 414, 415, 416, 418, 510, 515, 517, 518, 520, 525, 526, VTM625, 626, 725, 210, 211, 215, 726, 727, 728, 820, 821, 825, 920, 921	1400p
VT3000	650p
VT4000, VT4200, VT5000, VT5500, VT5600	1100p
VT77, 680, 6500, 6700, 6800, 7000, 8000, 8030, 8040, 8100, 8300, 8500	3000p
VT8700, 9000, 9300, 9500, 9700, 9900	1000p
VT8, 9, 56, 57, 570, 575, 576, 580, 585, 588	3200p
VT65	2400p
VT130, 135, 138, 145, 250, 255, 258, 420, 425, 426, 428, 430, 431, 435	6050p
VT438, 535, 536, VTL30, 301, VTM630, 635, 636	1900p
VT52, VT60, VT61E, VT62E, VT63, VT64, VT640	1100p
VT168, VT150, VT260, VT450, VT498 (4 HEAD)	2200p
VT530	2050p
VT522, VTM212, 620, 622, 720, 722, 822, 922, 925	1650p
VT660E	2600p
VT570, VT575, VT580, VT585, VT588, VTF70	3100p
VT540, 545, 546, 548, VTD660, 665, VTM598, 640, 645, 646, VTM730, 731, 735, 736, 740, 745, 746, 748, 753, 754, 830, 831, 835, 838, 840, VTM841, 845, 930, 931, 935	2600p
VTF770, 774, 775, 860, 861, 865	4100p
VT85, VT86, VT88	2600p
VTF780, VTF785	4800p
VTF180, VTF185, VTF280	8500p
VTF350, VTF351	5160p
VTM220, VTM220E, VTM220UK	5150p
VTS390E	5150p
J.V.C. & FERGUSON	
HR2200, 3300, 3320, 3330, 3350, 3360, 3660, 3750, 3860, 4100	1650p
3292, 8900, 8901, 8902, 8903, 8906, 8922, 8928, 3V01, 3V06, 3V22	600p
HR3660, 7600, 7610, 7650, 7700, HRD110, 111, 120, 121, 220, 225, HRS100, 8904, 8923, 8924, 8925, 8929, 8935, 8941, 8943, 8944, 3V16, 3V23V24, 3V31, 3V35, 3V36, 3V38, 3V39, 3V49	625p
BR1600, HRD140, 141, 142, 143, 150, 152, 156, 157, 158, 160, 5101 HRS10, 8947, 8948, 3V42, 3V44, 3V45, 3V46, 3V47, 3V52, 3V54, 3V55, 3V56, 3V57	1150p
HRD154, 170, 171, 210, 211, 217, 310, 320, 321, 350, 521, 522, 525, 526, HRD527, 540, 550, 560, 590, 770, HRDX20, HRDX22, 8950, 8951, 3V64, 3V65, FV10, FV11, FV20, FV21, FV26	1300p
HRD565, HRD566, 3V48	2200p
HRD725, HRD755, 3V43, 3V53	2850p
8930, 8931, 8933, 8940, 3V29, 3V30	700p
8945	2400p
3V00, 8902, 8903, 8909, 8912, 8922	1000p
FV31, FV41R	1500p
FV37, FV43H, HRD860	3100p
BR7000E, BR7000S, BR7030, BR7030/40H, BR7040	2600p
HR7200, 7300, 7350, 2650, BR6200	700p
HRD455	2000p
HRD520	1400p
HRD300, 400, 580, 600, 620, 640, 650	2000p
HR4100	1000p
HRD750, HRD830, HRD860	3300p
HRD250, HRD257	2300p
3V32, 8942, HR7655	2200p
HRD180, 190, 230, 610, 3V59, FV12L, FV20B, 26, 30, 32, 33, VC141L	2050p
HRD370, HRD430, HRD470, 3V58, FV13H	2300p
HRD530, HRD700, HRD840, HRD870, HRD910, FV14T, FV57H	3100p
GRC1, GRC2, 3 V41	2800p
BR9060, HRD330, 337, 440, 441, 637, 641, 650, 670, 720, 730, 740, 820	
HRFC100, SR3300MS, FV44L	2100p
HRD950, HRD960, HRD980, FV46	5000p
HRS5000, HRS5500, 5800, 9000, FV395,BRS600, SRS368E	5550p
FV22L	1400p
FV42	2600p
VR182LV, VR202LV	1950p
FV67HV, FV68TX, FV77	3800p
R2000 SERIES	4500p
FV61LV, FV62LV, FV67HV	4000p
FV42L	£101.00p
VP160L, VR172L	1950p
HRJ200, HRJ205	3300p
HRJ600EG, HRJ600EK, HRJ605EG, HRJ605UK, HRJ610EK	7100p
HRJ300, HRJ305, HRJ315, HRJ316EG,HRJ318E	3750p
HRJ615, HRJ715, HRJ815	9200p
HRJ400, HRJ405, HRJ407MS, HRJ41 OEK, HRJ415, HRJ416	5850p
MATSUI	
VX500E, 800A, 810A, 820, 80A, 770B, 7738	1200p
VCRL3, VX730, VX750	1450p
VX735, VX755, VX990	1500p
VX735A, VX765, VX850	1750p
VX600	1100p
VX900	2650p
MITSUBISHI	
HS303, HS304, HS320, HS700	1400p
HS306, HS318, HS710	1400p
HS307	2300p
HS319	1900p
HS330	2300p
HS400	2800p
HS349, HSE27, 31, 32, HSB27, 31, 32, HSM33, 34, 35, 37G	2150p
HS411	1900p
HSE30, HSB30	2000p
HS338	1900p
HSE10, HSE11, HSE20, HSE21, HSE41,	
HSB10, HSB20	2100p
HS300, HS301, HS302, HS310, HS273, HS550Q	1350p
HS200	650p
HS337, HS347	1400p
HSB12, HSE12, HSE22, HSM16G, 18, 23, 25, 30, MX1	2100p
HS411EZ, HS411GZ	2600p
HSB11, HSB21	2000p
HSB52, HSE50, 52G, HSM36, 50, 54, 55, 57, 58, 60	3300p
HSE61	3000p
HS410	3250p
HS412, HS421GZ	4000p
HS5300, HS5424, HS5600	3050p
HSM20, HSM55	2250p
HSM40	2850p
HSM59, HSM68E	6050p
NV300, 322, 332, 333, 340, 390, 2000, 2010, 3000, 7000, 7200,7500, NV7800, 7850, 8170, 8200, 8400, 8600, 8610, 8620	625p
NV777, NV330	1150p
NV8050, NV8051	2800p
NATIONAL PANASONIC	
AG1000, 1050, NV250, 260, 280, 450, 460, 465, 470, 480, 650	1600p
AG6010, AG6015	2500p
AG6840	2400p
NV100, NV200, NV370, NV380, NV630	725p
NVD80, NVH65	3400p
AG5150, AG5250, NVF65, NVH75, NVH77	3200p
NVF51	4200p
NVGI9	2300p
NVJ30, NVHJ33, NVL10, 20, NVL21, NVG30, 31, 40, 130, NVJ37, 40, 42, NVSD30, 10EE, 11, 2, 30, 35	1450p
NVJ35, NVG46	1700p
NVM1, NVM3, NVM5	4200p
AG2100, AG2200	700p
NV430, NV431, NV433, NVSD2, NVSD22, NVSD25, NVSD3	1000p
NV730, NV730F, NV770 4 HEAD	1450p
NV366	1850p
NV21 HQ, NV 180, NVD48	2000p
NV7881	2500p
NV810, NV8301	2400p
NV850, NV950	2750p
NV870, NV890, NV970	3200p
AG6024, NVG33, 46, NVL23, 25, 28, NVJ47, 49, 700PX, NVSD20EE, 400, 44, 45	1450p
NVG10, 11, 12, 14, 16, 120, NV250, 280, 450, 465	1500p
NVG18	1800p
NVG20, 21, 22, 25, 28, 200, NVD48	1700p
NVG50, NVG300	2000p
NVG45	1450p
NVH70	3600p
NV688	2400p
NV900	1050p
AG6800, AH6810, AG6820	2600p
AG6100, AG6200, AG6300	2600p
NVG7, NVG9, NV230	1050p
NV780	2400p
NVG 15, NVG400	2600p
NVM7, NVMC20	3800p
NVF70	5200p
NVJ45, NVJ47	2000p
NVSD40	2250p
NVF75, NVF77	4750p
NVF55	4000p
NVFS200, NVFS88, NVSF90, NW8000	4600p
NVHD90, NVHD 100, NV HD 101, NVHF 100	3100p
NVSD1	1400p
AG7330, AG7350, AG7355, AG7450	5000p
NVFS 100	5000p
NVFS1	4850p
N.E.C.	
N9011, 9012, 9013E, 9014E, 9014G, 9015, 9016, 901A, 902A, 9033, N9034, 9040, 9053, 9054, 9055, 9056, 9063, 9065, 9066, 906, 9077, N9096, DX1000, 1600, PX1200	1150p
N911A, 914C, 915A, 916A, 917, 9110, 9120	2400p
PVC600, 740, 744, 754, 783E, 764, PV2300, 2400, 760, 794, 770, 774	1650p
N380, N381, N830, N831, N832, N833, N834, N835, N836	700p
82611AH1 (FOR MODEL DX3000), DX4000, N9610, NS7000	3000p
N895	3150p
N9052, N9530, DX2000	3400p
VCP1	1700p
PVC2300, 2400, 740, 744, 760, 764	1400p
DS6000	3500p
D5600	3500p
VH3, VH555, VH600, VH700, VH844, VH900,	
VH1000 (ALL MODELS)	1100p
VH1, VH2A	700p
D1000, D1100	1600p
D1000X, D1500X, D4500, VPCD100, D1200, D2000X, D5000	1600p
VR6480, VR6520, 64VR60, VR6420	725p
VR6711 4 HEAD	1800p
VR6440	2500p
VR6441, VR6540, VR6541, VR6640, VR6642	1300p
DV761, VR512, 522, 5229, 63SB7, VR6760, VR6761, VR6762, VR63SB7 7172	7200p
VR6920	2750p
41DV2, 4SB11BVR412, 415, 6485, 6490,	
6880	1600p
VR6948	4850p
20DV1, 20DV2, 20RW7, 21DVI, 21DV2, 21DV3, 2SB01, 02, 11, 12, 30DV2, 31DVI, 31DV2, 31DV3, 3SB02, 03, 05, 11, 12, 13, 68SB4, 71SB4, 86SBI, 91SB2, 92SB2, DV186, 190, 291, 292, 468, 471, VR201, 202, 203, 2115, 212, 213, 223, 231, 232, 302, 303, 305, 311, 312, VR313, 3210, 3219, 322, 3229, 323, 501, 6180, 6182, 6185, 6290, 6291, VR6293, 6362, 6367, 6467, 6468, 6470	4600p
VR3260, 6349, 6442, 663, 6448, 6449, 6542, 6643	1250p
VR601	1800p
49SB6, VR6548, VR6648, VR6843	2750p
SAISHO	
VR100, 605, 705, 805, 905, 1000, 1100, 1200, 1600	1200p
VR3300X, VR3600X, VR3650X, VR3800	1400p
VR3200, VR3500	1400p
VR2000, VR3300, VR3600	1400p
VR2500	2650p
VRS5000X, VX6000A, VXL12X	1600p
SALORA	
6500, 6600	1600p
SV7300, SV8200, SV8300, SV9200	1500p
SV7400, SV8400	1600p
SV8100	1200p
SV900, SV9900	3450p
SV601, SV611, SV6910	1500p
SV800, SV810	2800p
SV6700, SV8710, SV8750	1500p
623N, SV6800, SV6900, SV8850, SV8870, SV8970	1750p
SV88110, SV8910	2650p
823N, SV8920	3500p
923N	4500p
SV8600, SV8700	1550p
SV8420	2400p
SV8620	2100p
SV9300	2500p
SV8830	2200p
SV8720	2250p
SV8520	1900p
SAMSUNG	
SV8500	1500p
SVX301, VB900, 910, VVT510, VT320, 5600, VX510, 511, 520.616, VX626, 627, 717, 614, 619, 629, 710, 712, 720, 730, 970, 971, 972, SV716, 717, SVX303, 305, VB510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 710, 971, V1520, 616, 621, 626, 900, 910, 1200p SVX319, VB770, V1710, 730, 731, 735, 750, 751, 770, VB750, VK8220, VX750, VX7330, VK770, VK8225, VR1730, 1735, XR20	1900p
V11560, VN1560, VN1661, VX1530, VX1560, VX1561, VX1580	2200p
PL30LR, PX3031, 31R, 32R, 990, 992, 991, PXP30, PXR30, VX 1260, SVX503, SX3230, 3231, 3260, 3261, VK30, 300, 1230, 1260, 1261, VK30R, 31R, 32R, VXK300, 301, 306, 320, 321, 326, 336	1900p
S11230, 1240, SVX600, SX1230, 1231, 1260, 1261, 7120, 7121, 7220, SX7221, 7230, 7301	4800p
SANYO	
VTC5000, 5400, 600, 6000, 6010, 6500, VPR5000, VTC 1500, VTCM 10, 11, 20, 21 VTCM25, VTC2000, S100, 5150, 5300, 5400,	
VTC5350, 5370, VTCNX10, VTCNX15, 20, 30, VPR5800	1800p
VTC5500, 5550, 9100, 9300, 9350, 9355, 9455, 9500	1900p
VHR1110, VHR1150, VHR1300, VHR1700, VHR2300, VHR2370	1200p
VHR3200, 3270, 3100, 3110, 3150, 3300, 3400, 3310, VHRD500	1500p
VHR1500, VHR2500, VHR3330	2100p
VHR2700	2450p
VHR7900	3000p
VHR5700, VHR7700E, VHRD4710	2700p
VHR150E, 153, 154, 1501R, 240, 250, 251, 27, 350, 474, 5350E, 7500, VHR7530, 7540, 8500SP, 8800, VHRD5350E, 5450E, 6550	3850p
TLS1000P, TLS1001P, TLS1100	3100p
VHR120, 130, 14, 141, 143G, 145P, 151, 15, 16, 171, 220, 23, 244, 274, VHR310, 330, 4100, 4105, 4200, 430, 4300, 4400, 4500, 5080, 5100, VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHRD4400, 4410, 4500, 4600, VHRD4610, 6700, 4800	3100p
TLS2000	4250p
VHR5300, VHR6500, VHR7400	4500p
VHR3500EX	2150p
VHR16, 235, 335E, 4150, 4160, 4350, 7250, 7260, 8250	1950p
VTC3000	1400p
SHARP	
VC390, VC393, VC496	2750p
VC488	4200p
VC779	1800p
VC789, VC790	2900p
VC200, 220, 300, 381, 383, 384, 385, 386, 387, 388, 471, 477, 481, 482, VC483, 486, 3300, 8381, 9100, 9300, 9400, 9500, 9600, 9700	1100p
VC108, 208, 382, 402, 405, 408, 500, 550, 571, 573, 581, 582, 583, VC5W20E, 600, 651, 674, 681, 684, 6V3, 750, 780, 781, 683, 684, 402, VC500, 571, 573, 580, 584, 600, 682, 693, 700, 772, 7810, 782, 7822, VC783, 8481, 8581, VCA10, 100, 102, 103, 1031, 103, 104, 105, 106, VCA111, 113, 116, 131, 140, 202, 203, 211, 234, 244, 254, 255, 30, 35, VCA40, VCB311N, 320, VCD801, 802, VCM73, VCT212, 310, 410, VCT510, 72, VCT1314, VCTS313	1100p
VC6000, 6200, 6300, 7300, 7700, 7750, 8000, 8300	1800p
VC793	3000p
VC473, VC785, VC786	2200p
VC699, VCA501, VCA602	2800p
VC585, VC685	2000p
VC90ET	3900p
VFH815	2800p
VC800, VCH851, VCH852, VCH882	2700p
VCH80, VCH81, VFH815	2800p
VCA33, VCA36, VCA43, VCA44, VCA46,	
VCA49	1500p
VCA55, VCA63	2200p
VC570	2800p
SONY	
DSR-19R FOR SL-T 9ME	3100p
DSR-21 R FOR SLC 8-C9	2600p
DSR-35R FORC20, C30, C40, SLF1UB, SLF1E2 PIN, SLC24PS, 33E, 34, 44PS, SLF11, 30PF, 35, 60PS, SLK85, SLT20ME, 30ME, SL100	1500p
DSR-43R FOR SLC7 RANGE, SL5000, SL5100, SL3000 1 PIN, SLC5E, SL38ES, SL37E	1300p
SL3000, SL8000, SL8080, SLC5E, SLT7ME	1600p
SLV201, SLV202	2000p
SLK95, SLT50ME	2900p
SLV275, SLV373VB, SLV410, SLV412, SLV427, SLV474	2200p
DSR49R, SLHF100P, SLHF100UB	3850p
SLV656, SLV715, 725, 727, 757, SLV777, SLV815, SLV825	4600p
SLV353UB	2600p
CCDF340E, CCDF500E, CCDV90E, CCDV95E, CCDSP5E	4800p
SLV801, SLV802	3550p
SLV310, SLV315, SLV325, SLV335	1600p
SLV210, SLV212, SLV270, SLV273, SLV285, SLV300	1150p
SLV125, 213, 225, 252, 255, 262, 280, SLVX1, 20, 3	1750p
SLV363, SLV416, SLVX50, SLVX55	2750p
SLVX75, SLVX90, SLVX95	3000p
SLV282, SLVX30, SLVX35	2025p
SLHF100P, SLHF100UB	3850p
SLVE7, SLVE8, SLVE9	5160p
SLVE90	5150p
SLV615, SLV625, SLVE600, SLVE700, SLVE800	3450p
TOSHIBA	
V63	1600p
V9680	3400p
V8600, V8650, V8700	3000p
V21, V31, V32, V33, V50, V51, V52, V53,	
V9600	1450p
V55, V57	700p
V71, V73, V74, V75, V77, V80, V81, V82, V83, V841V85, V86, V87, V88	1200p
DV90, 96, 97, NM3, V108, 109, 199, 200, 202, 205, 207, 209, 80, 93, 94	1450p
V5470, V5480	1300p
V600	2360p
V880MS	2600p
V700G	3700p
V500G, V509G	2500p
V9680	2900p
V300G, V301, V305, V306, V309G	2550p
V61, V63	1700p
V110, V120, V130, V140, V210, V211, V212,	
V220, V221, V222	1500p
V711, V880	3850p
VCPB1E, VCP2C2	1200p
V65, V66, V6	1250p
V312, V322, V412	2600p
V91G	4600p
V609, V610V610B, V610UK, V611, V659F, V660, V660F	3200p
V312, V4037, V413G	9200p
V703W, V813G	5200p
V95G	8000p

PINCH ROLLERS/VCR BELT KITS

Model	Price

AKAI
VS10, VS9300, VS9500, VS9700, VS9800, VP7100, VP77 165p
VS1, VS2, VS3, VS4, VS5, VS6, VS8, VS9, VS12, VS15 165p
VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, 240, 244, 245, VS247, 248, 250, 512, VS515, 516, VSX9 165p
VS201, 301, 303, 304, 603, 606, 607, VSP8, VSP82, VP58, VP82 165p
VS125, VS155, VS165, VS220, VS240, VS250, VS512 165p
VS22, 23, 25, 35, 37, 38, 53, 66, 75, 422, 425, 426, 427, 462, 465, 467, VS485, 765, 766, 767, 768, 865, 867, 965, 967, VSA77, VSA650, VSF10, 11, 12, 15, 180, 190, 200, 210, 220, 221, 222, 230, 240, 30, 33 VSF330, 4, 500, 550, VSP88, VSR100, VSX400, 450, 470 165p
VSF260, 261, 262, 265, 270, 274, 275, 280, 290, 340, 350, 410, 420, 43C VSF441, 440, 450, 455, 480, 490, 497, 510, 560, 580, 590, 599, 600, VSG20, 21, 23, 24, 25, 30, 33, 34, 35, 51, 54, 55, 60, 64, 65, 70, 73, 74, 75, VSP110, VSX360, VSX580 165p
VS17, 20, 22, 23, 24, 25, 26, 27, 35, 37, 38, 53, 55, VSA77 775p
PINCH ROLLER ASSEMBLY
VS422, 425, 426, 427, 462, 465, 467, 485, 498, 765, 766, 767, 768, 865, 867, 965, 967, VSA650, VSF10, 11, 12, 14, 15, 180, 190, 200, 210, 220, 221, 222, 230, 240, 30, 300, 301, 310, 320, 33, 330, 4, 500, 510, 600, VSR110, VSX100, 400, 450, 470 800p
PINCH ROLLER ASSEMBLY
VSS99 165p

ALBA
VCR3000X, VCR4000 165p
VCR5000, VCR6000 165p
VCR161, VCR222 180p
VCR7000, VCR7800, VCR8000, VCR8800 165p
VTV10 165p

AMSTRAD
VCR1000, 2000, 4500, 4600, 4700, 5200, 6000, 6100, 6200, 8600, VCR8602, 8603, 8604, 8700, 8704, 8714, 8800, 8804, 9000, 9005, VCR9244, 9340, DD8900, 8904, TVR1, 2, 3, 4 165p
VCR7000 165p
DD8900, DD8904, VCR6000, 6100, 6200, 8600, 8602, 8603, 8604, VCR8700, 8800, 900>9, 9140, 9244, 9340 700p
PINCH ROLLER ASSEMBLY PART NO: 153148
TX3650, UF20, VCR3000, VCR3002, VCR4000, VCR9500 300p
PINCH ROLLER ASSEMBLY PART NO: 2554966
DD8900, 9904, TX3650, UF20, 22, 24, VCR3000, 3002, 9500 165p
VS1004 VS1104 165p

FERGUSON
3V00, 3V01, 3V16, 3V22, 3V23, 3V24, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922, 8923, 8924, 8925, 8929 165p
3V29, 3V30, 3V31, 3V32, 3V52, 8930, 8931, 8933, 8940, 8941, 8942 165p
3V35, 3V36, 3V38, 3V39, 3V42, 3V43, 3V44, 3V45, 3V48, 3V49, 3V53, 3V54, 3V55, 3V56, 3V57, 3V58, 3V59, 3V65, FV10, FV11, FV12, FV14, 8943, 8944, 8945, 8947, 8948 165p
3V52 165p
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FV37H, FV44L, FV46T, FV43H, FV57H 165p
3V35, 3V36, 3V38, 3V39, 3V49, 8943, 8944 1100p
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PINCH ROLLER ASSEMBLY
FV37, FV57, FV58 350p
PINCH ROLLER ASSEMBLY
FV31R 185p
FV41L, FV42L 926p
PINCH ROLLER ASSEMBLY
3V58, 3V59, 3V64, 3V65, FV10, 11, 12, 13, 14, 20, 21, 22, 26, 30, 32, 33 FV39, VC141L 875p
PINCH ROLLER ASSEMBLY
FV43H, FV44L, FV45X, FV46T 700p
PINCH ROLLER ASSEMBLY
FV61, FV62, FV67, FV68, FV70, FV71, FV72, FV74, FV77 775p
PINCH ROLLER ASSEMBLY

FISHER
FVHP420, 520, 530 165p
FVHP615, 618, 620, 622, 710, 711, 715, 718, 720, 721, 722, 725, 730, FVHP810, 830, 840 165p
FVHP905, 906, 907, 908, 910, 911, 915, 916, 918, 970, 975, 980, 990, FVHP 5000, 5005, 5050, 5075, 5100 165p
VBR330, VBS3500, 7000, 7100, 7500, 7600, 9000, 9900 165p
FVHD230, 250, 270, 370, 2000D, FVHP3, 210, 250, 300, 310, 1100, FVHP1200, 1250, 130, 132, 1340, 1340, 1400, 1410, 1440, 1500, 200, FVHP320410, 420, 430, 440, 445, 470, 475, FVSP290S, 495, 2905 165p
FVHD140, FVHD40, FVHD55, FVHP1, FVHP10, FVHP20 165p
FVHD140, 40, 55, FVHP1, 10, 25, 30, 40, 4000, FVHS10, 30 1350p
PINCH ROLLER ASSEMBLY

GOLDSTAR
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GHV1247, 1248, 1250, 1266, 1290, 1291, 1295, 1296, 1392, 1393,
GHV1891, 1900, 2145, 3000, 3010, 4400, 4410, 51, 8000, 8200, GHV8210, 8215, 8430GHVP1240, 1241, 1247, 1248, 1290, 1291, GHVP1295, 1296, VCP4000, 4100, 4130, 4200, 4300, 4301, 4305, VCP4306, 4310, 4311, 4315, 4316, 4320, 4321, 4325, 4326, 4350, GSE1290, 1291, 1295, 1296, 1297, 1891, 1910, 20005, 2000 165p

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PINCH ROLLER ASSEMBLY
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VXL2, VXL3 165p
VXL4, VXL20, VXL35 165p
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V20H, VXL5, VXL6 MOD KIT 276p

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HR2650, 7200, 7300, 7350, 7600, 7610, 7650, 7655 165p
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HRD520, 540, 550, 560, 580, 600, 610, 620, 637, 640, 641, 650, 660, HRD670, 720, 730, 740, 770, 820, 830, 840, 860, 870, 880, 910, 960, HRD980, HRDX20, 22, 25, HRJ200, 205, 210, 215, 300, 315, 316, 318 HRJ400, 405, 407, 410, 411, 415, 416, 507, 600, 605, 610, 616, 715, 815 HRJ97, HRS4700, 5800, 5900, 6800, 6900, SR3200, 330, 368 165p
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PINCH ROLLER ASSEMBLY
BR7030, BRS600, HRD160, 170, 171, 180, 190, 210, 211, 217, 227, HRD230, 271, 300, 310, 320, 321, 330, 337, 350, 400, 430, 440, 441, HRD470, 500, 530, 700, 750, 950, HRS5000, 5500, 9000 876p
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HRJ600, HRJ605, HRJ815, HRS9200 875p

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HSE11, 12, 16, 17, 21, 22, 27, 31, 32, 41, 51, 52, 5300, 5424, 5600, HSB11, 12, 16, 21, 27, 31, 32, 41, 51, 52, 82, HSM1000, 110, 120, 150, HSM16, 170, 18, 190, 210, 23, 25, 250, 27, 30, 33, 34, 35, 36, 37, 370, 38, HSM380, 40, 45, 450, 50, 54, 55, 555, 57, 58, 59, 60, 68, HSMS2, 9, HSMX1, 18, 19, 2, HSS11, 12, 14, 15, 17, 19, 21, 25, 5600, HVF125, HVF150, 303, 85, SV8900, 8930 169p
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NVHD100, NVHD101, NCHD90, NV5D30, NVSD40 1125p
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VR501 PR38 165p

SANYO
VHR1100, 1110, 1150, 1200, 1300, 1500, 2100, 2300, 2370, 2500, VHR2700, 3330, MVR220 165p
VTC5000, 5150, 5300, 5350, 5400, 5500, 6000, 6010, 6500, 9100, VTC9300, VTCM10, 20, 11, 21, 30, 31, 40, 50, VPR5800 165p
VHR3100,3300, 3310, 3400, 3500, 3700, 3800, VHRD500, 700 165p
VTC3000 165p
VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, 194, 22 0VHR23, 235, 240, 244, 250, 251, 274, 27, 297, 310, 330, 335, 350, 390, VHR4100, 4105, 4150, 4200, 430, 4300, 4350, 4400, 474, 4770, 5080, VHR5100, 5200, 5300, 5350, 5600, 5700, 5850, 7100, 7200, 7250,VHR7260, 7300, 7400, 7440, 7500, 7520, 7530, 7540, 7700, 774, 780, 0VHR7810, 8000, 8070, 8100, 8200, 8250, 8500, 8800, VHRD4400, 4410, 4500, 4600, 4610, 4710, 4890, 6700, VHRS700165p
VCR100 165p
VHR120, 135, 150, 190, 4150, 4160, 4350, 5200, 5240, 5350, 7200, 7250, 7260, 7700, VHRD4410, 4610, 4710, 4890, 5450, VHRS700 975p
PINCH ROLLER ASSEMBLY
VHR3100, 3200, 3300, 3310, 3400, 3700, 3800, VHRD500, 7000 1350p
PINCH ROLLER ASSEMBLY

SHARP
VC200, 381, 383, 384, 385, 386, 388, 390, 393, 800, 2300, 3300, 6000, VC6200, 6300, 7300, 7700, 7750, 7800, 8300, 838, 9100, 9300, 9400, VC9500, 9600, 9700, 9800 165p
VC300, 387, 402, 471, 473, 477, 481, 482, 483, 486, 488, 496, 500, 671, 573, 581, 582, 583, 584, 585, 8481, VC5F3, VC5W20E, VCA1031 165p
VC108, 208, 405, 408, 550, 600, 651, 671, 674, 681, 682, 684, 685, 693, VC699, 700, 772, 750, 779, 780, 781, 7810, 782, 782MK2, 7822, 783, VC785, 786, 787, 793, 800, 7810, 7822, VC772, VC6F3, VC6V3, VCA 100, 102, 104, 131, 140, 170, 202, 203, 211, 234, 303, 501, 502, VCA602, 5011, VCD801, 802, 851, 852, 881, 882, VCM73, VCT73, VCT72, VCB361 165p
VC220 165p
VCA10, 30G, 60, 103, 105, 106, 111, 113, 131, 211, 244, 254, 33, 35, 36, VCA37, 39, 40, 42, 454, 46, 47, 48, 50, 505, 51, 52, 53, 54, 55, 57, 58, 505, VCA80, 605, 615, 62, 63, 67, 68, 1031, 11613, VCB311, 320, VCBS97, VCD805, 806, 810, 815, VCH80, 81, 865, 910, VCS 1000, VCT212, 310, 410, 510, 610, VCT1314, VCTS313 525p
PINCH ROLLER ASSEMBLY

SAISHO
VHL3, VR1000, 2000, 2500, 3200, 3300, 3500, 3600, 3650, 3800, VRS4400, VRS5000 165p
VR3400 180p

SAMSUNG
SV716, 717, VB510, 520, 610, 616, 617, 619, 620, 626, 627, 629, 900, V910, V1510, 520, 611, 616, 621, 626, 900, 910, VX510, 520, 616, VX617, 619, 626, 627, 629 165p
SVX301, 303, 305, 307, 319, 322, VB710, 713, 750, 770, 971, 8220, VB8225, V1710, 730, 750, 770, 790, 8220, 8225, 970, VX710, 712, VX720, 730, 750, 770, 790, 825, 8225, 970, 971, 972, 8220, PX980, 981, 982, SE9000, 9001, SX7120, 7121, 7220, 7221, 7230, SX7301, VK8220, VPX31 165p
VX9880 165p
PX31 R, 32R, PXR30, SV80, SX3230, 3231, 3260, 3261, VS390, VX30, 31, 32, 3580, 3561, 370, 375, 380, VXK300, 301, 306, 307, 320, VXK321, 326, 330, 331, 336, 337, 350, 351, 356 165p
PX990, 991, 992, S11230, 1240, SVX4000, 503, 504, 600, SX1230, SX1231, 1260, 1261, 1566, V11580, VPK43, VX1230, 1260, 1261, VX1560, 1561, 1850 165p

SONY
SLC5, 6, 7, SL3000, 8000, 8080, 8200, SLJ 10, SLT6ME, SLT7ME 165p
SLC9, 20, 24, 30, 33, 44, SLHF100, SLF1, 11, 20, 25, 30, 35, 60, 100, SLF200, SLF60PS, SLF90E, SLFH150, 850, SLK88, 95, SLT20ME, SLT30ME, SLT50ME 165p
BMC 100, BMC200, BMC500 165p
SLV201, 202, 301, 302, 401, 402, 801, 802 165p
SLV210, 270, 273, 275, 300, 353, 373, 410, 415, 474, 656, 715, SLV757, 777 165p
SLV255 165p
SLV275, 282, 315, 325, 353, 363, 373, 410, 415, 416, 474, 625, 656, SLV715, 725, 727, 757, 777, 815, 825, SLVX30, 50, 55 165p
SLV125, 213, 225, 252, 255, 262, SLVXI, 20, 3 165p
SLV215, 216EE, 275, 282, 315, 325, 353, 363EE, 373, 393, 410, 415, SLV416EE, 474, 494EE, 555UC, 559, 575UC, 579, 585HF, 595HF, SLV60W, 615, 625, 656, 676UC, 686HF, 696HF, 715, 725, 727, 757, SLV767B, 777, 815, 825, SLVE7, 8, 9SLVX30AS, SLVX35AF, SLVX50AS, SLVX55DH, SLVX65BR, SVO140, 160 1250p
PINCH ROLLER ASSEMBLY PART NO: X37277701
SLV210, 212, 270, 273, 275, 285, 300, 310, 335, 425, 427 350p
PINCH ROLLER ASSEMBLY
SV5700,8750, 9700, VHR3100, 3200, 3300, 3310, 3400, 3700, 3800, VHRD500, 700 1390p
PINCH ROLLER ASSEMBLY

Model	Price

SL100, 200, SLC20, 30, 33, 34, 40, 44, 50, 88, 9, SLF1, 20, 25, 30, 35, 45, SLF50, 65, 73, 90, SLHF100, 150, 950, SLK85, 95, SLO1700, SLS550, SLT0, 30, 50 300p
PINCH ROLLER ASSEMBLY

VCR BELT KITS

AKAI
VP7100, VS9300, VS9500, VS9700, VS9800 120p
VS1, VS2, VS3, VS5, VS12, VS15, VP88100p
VS10 65p
VSX9, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 240, 244, 245, 247, 248, 250, 512, 515, 516 300p
VS22, VS23, VS25, VS35, VS37, VS38, VS53, VS55, VS66 80p
VS4, VS6, VS8, VS9 120p
VSA77 140p
VSS99 105p

ALBA
VCR40000 130p
VCR5000, VCR6000 105p
VCR161, VCR222 100p
VCR3000X, VCR4000, VCR4000X 75p
VCR7000, VCR7800, VCR8000,VCR8800110p
VTV10 105p

AMSTRAD
TVR123, VCR4600, VCR4700, VCR5200 110p
VCR7000 80p
VCR1000, 2000, 6000, 6100, 6200, 8600, 8602, 8603, 8604, VCR8700, 8704, 8714, 8800, 8804, 9000, 9005, 9244, 9340, DD8900, DD8904, TVR4 110p
TX3650, UF20, 22 24, VCR3000, 3002, 4000, 9500 75p
VS1004 105p

BLAUPUNKT
RTV100 200p
RTV200, RTV222, RTV224 90p
RTV202, RTX200 150p
RTV322, RTV248 100p
RTV306, 307, 309, 310, 311, 312, 328, 414, 434, 444, 707 135p
RTV211, RTV214 140p
RTV324, RTV32565p
RTV315, RTV316, RTV319, RTV320, RTV317 50p
RTV301, RTV333, RTV338, RTV404, RTV424 86p

FERGUSON
3292, 3V00, 3V01, 3V16, 3v22, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8912, 8922 120p
3V23, 8923, 8924, 8929 65p
3V29, 3V30, 8930, 8931, 8933, 8940 75p
3V31, 3V32, 8941, 8942 75p
3V35, 3V36, 3V38, 3V39, 3V49, 8943, 8944 75p
3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948 55p
3V58, 3V43, 3V44, 3V59, 3V64, 3V65, 8950, 8951, FV10, FV11, FV12, FV13, FV14, FV20, FV21, FV22, FV26, FV32, FV39, VC141L 55p
FV31R 110p
FV61L, FV62, FV67, FV68, FV70, FV71, FV72, FV74, FV77 50p
FV43H, FV44L, FV46T, FV57H 100p
FV37H 80p
3V52 55p
FV41R, FV42L 100p

FIDELITY
HQS200, VCR1000, 2000, 600, 6000, 6100 180p
VCR100 160p
VTR1000, VTR1001 100p
TX3650, VCR3000, VCR3002, VCR9500 75p

FISHER
VBS7000 245p
VBS9000 120p
FVHP520, FVHPS30, FVHP420 60p
FVHP615, 618, 620, 622, 710, 711, 715, 720, 721, 722, 725, 730, FVHP830, 840 75p
FVHP905, 906, 907, 908, 910, 911, 915, 916, 918 75p
VBR330, VBS7500, VBS7600, VBS9900 100p
VBS3500 75p
FVHD140, FVHD40, FVHD55, FVHP1, FVHP10, FVHP20 110p
FVHD230, 250, 270, 370, FVHP1100, 1200, 1250, 130, 132, FVHP1340, 1400, 1410, 1440, 1500, 2000, 200, 210, 250, 3, 300, 310, 320, 2000, 410, 420, 430, 440, 445, 470, 475, FVSD2905 85p
FVHP5000, 5005, 5050, 5075, 5100, 975, 980, 990 95p

G.E.C.
4005 150p
V4004 100p
V4007 80p

GOLDSTAR
GHV1221, 1232, 1233, 1240, 1241, 1242, 1243, 1244, 1245,
GHV1246, 1247, 1248, 1250, 1266, 51, 8000, 8200, 8210, 8215,
VCP4100, VCP4130 80p
GHV1290, 1291, 1295, 1296, VCP4000, 4200, 4300, 4301,
VCP4305, 4306, 4310, 4311, 4315, 4320, 4321, 4325, 4326 120p

GRANADA
VHSH1, VHSAH3 100p
VHSVH4, VHSWH1, VHSXH1 60p
VHSYH2 50p
VH5BH1, VHSCH 1 150p
VHSBP1 135p
VHSAN3 110p
VHSDS2 125p
VHSAY3 125p
VHSBY3 100p
VHSEY1, VHSEY2 70p
VHSCC1 100p

VCR BELT KITS/VIDEO LAMPS & SWITCHES

Model	Price
GRANADA	
VHSDP1, VHSFV2	80p
VHSTJ1, VHSTJ2	150p
VHSTJ3	65p
VHSWJ1, VHSWJ2	120p
VHSXJ3	85p
VHSYJ2	80p
VHSFJ2	140p
VHSFS1, VHSFS2	130p
VHSFG1, VHSFG2, VHSFG3, VHSFG4, VHSF83	180p
GRUNDIG	
MVS400, 440, VS400, 410, 415, 435, 440, 441, 450, 456, 460	55p
VS180, 200, 220, 226, 262, 265, 267, 2X40800, 0850, 0880, 1600, 2000, 2080, 2200, 2280, MVS200RC	90p
VS150	160p
VS310, 311, 315, 320, 326, 340, 345, 380, 385, 445	85p
VS160	75p
LC290N, LC295SN, SVS 180, VS 170 VS 160, BARCELONA, FLORENZ, GV4000, 4000, 4001, GV4002, 400, 401, 4010, 402, 403, 404, 405, 406, 407, 4092, 410, GV411, 412, 414, 415, 416, 417, 4192, 4200, 420, 430, 434, 435, GV437, 440, 450, 4592, 460, 464, 470, 500, 501, 5050, 5095, GV5105, 511, 530, 5395, 540, 560, 5695, MV4005, 4105, SE4100, 4104, 4120, 5102, 5104, 5106, TVR37001	70p
HINARI	
VXL2	80p
VXL7, VXL8, VXL9, VXL10, VXL11, VXL19, VXL90, VCR34, VTV 100, 200	180p
VXL4, VXL35, VTV300	70p
VXL5, VXL6	160p
VXL3, VXL20	90p
HITACHI	
VT11, 14, 16, 17, 19, 33, 330, 34, 35, 350, 38, 39, 88, 185, 5030	85p
VT5000, VT5500, VT18	120p
VT7000, VT8000, VT8030, VT8040, VT8300, VT8500, 8700	60p
VT680, VT6500, VT6800, VT9300, VT9500, VT9700, 9900	75p
VT52, VT57, VT61, VT62, VT63, 64, 65, 85, 86, 640	90p
VT3000	120p
VT100, 110, 111, 113, 115, 118, 120, 125, 126, 130, 135, 138, VT145, 150, 168, 170, 175, 220, 225, 250, 255, 258, 260, VTL30	90p
VM500 VM600	90p
J.V.C.	
HR3300, HR3330, HR3360, HR3660, HR4100	130p
HR7200, HR7300	70p
HR7350, HR7600, HR7610, HR7650, HR7655	75p
HR7700	75p
HRD110, 111, 120, 121, 220, 225, SP5000	90p
HRD140, 141, 143, 150, 152, 157, 158, 160, 190, 250, 257, 310, HRD455, 565, 566, 725, 755, HRP50	55p
HRD170, 171, 180, 210, 21 1, 217, 230, 300, 320, 321, 330, 337, HRD350, 370, 400, 430, 440, 44 1, 500, 530, 700, 750, 950, HRS5000, 5500, 8000, 9000, BR9060, BRS600, 805, 920, 925	50p
HRD227, 520, 52 1, 522, 527, 600, 610, 620, 637, 641, 650, 830, HRD840, HRDX20, 22, HRJ200, 205, 300, 305, SR330, HRS10	80p
HRD840, 550, 560, 580, 590, 640, 660, 670, 720, 730, 740, 770, HRD820, 860, 870, 880, 910, 960, 980, HRDX20, 25, HRJ2 10, HRJ215, 315, 316, 318, 400, 405, 407, 410, 411, 415, 416, 507, HRJ5 10, 615, 715, 97, HRS4700, 5800, SR3200, SRS358E	60p
HRJ600	40p
LOGIK	
VR955	180p
MATSUI	
VX500, 730, 735, 750, 755, 765, 850, 6000, VS888	75p
VX1000, VX2000, VX2500, VX3000, VX6000	100p
VX800	70p
MITSUBISHI	
HS200	200p
HS300, 301, 302, 307, 310, 337, 338, 347, 349, 411, 412, 421, 480, HSB10, 20, 30, HSE10, 20, 30, 70	110p
HS303, HS304, HS306, HS307, HS330, HS400, HS700	110p
HS318, HS319, HS410	110p
HSM1000, 16, HSM23, 25, 33, 34, 35, 37, 54, 55, 57, 58, 59, 68	65p
N.E.C.	
N830, N831, N832, N833	100p
N895	80p
PVC2300, PVC2400	190p
DX1000, 1600, 1800, 2000, 3000, N9012, 9013, 9014, 9016, N9033, 9034, 9053, 9054, 9055, 9056, 9066, 9096, 9110, 9120, N9510, 9520, 9530, 9610	85p
NATIONAL PANASONIC	
NV300, NV330PX, NV332, NV333 NV340, NV366	100p
NV777, NV788	100p
NV2000, NV2010, NV3000	100p
NV7000, NV7200, NV7800	95p
NV8600, NV8610, NV862	145p
NV230, 250, 280, 430, 431, 433, 450, 460, 465, 470, 550, 730, NV770, 810, 870, 890, 970, AG 1000, 1050	110p
NV370, NV380, NV480, NV630, NV780, NV830, NV850	70p
NV600, NV688, AG6010, AG6015	100p
NVG7, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, 400, NVH70	50p
NVFV1, NVM10, 3000, 3300, 40, 7, 9000, 9900, NVMS1, 4	70p
NVM 1, NVM3, NVM5	70p
PHILIPS	
VR6460, VR6920	170p
VR6540	100p
VR6442, VR6542	70p
VR2025, VR2580	100p
DV186, 190, 286, 291, 292, 468, 471, 562, 571, 761, VR201, 202, 203, 211, 2115, 212, 213, 223, 311, 312, 313, 3210, 3219, 322, 32, 29, 323, 535, VR20DV1, 20DV2, 20RW7, 21DV1, 21DV2, 21D, V3, 25BO1, 25BO2, 11, 12, 302, 303, 305, 31DV1, 31DV2, 31D, V3, 3SB11, 3SB12, 3SB13, 72SB8, VR30DV2, 35BO2, 35BO3, 635B7, 715B4, 715B5, 715B8, VR865B2, 81582, 92583, VR6180, 6182, 6185, 6285, 6290VR6291, VR6293, 6362, 6367, VR6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, VR6676, 6710, 6760, 6761, 6762, 6870, 6970, 6975, VR68SB4, 86SBI, 92583	85p
VR445B9, VR445B920, VR445B922, VR6443, 6843, 6843, VR6943	100p
VR3260, 6349, 6448, 6449, 6548, 6648, 49SB820, 6448695, 49SB6	110p
VKR6850, VKR8855	70p
VR501	110p
VKR6800, VKR6810, VKR6820	70p
SE4104, VR231, 2310, 2319, 231, 232, 2329, 237, 23, 241, 2410, 2419, 242, 243, 245, 2469, 247, 2479, 251, 252, 256, 257, 258, 33, 19, 332, 3329, 333, 337, 339, 3419, 342, 343, 3469, 347, 3479, 35, 1, 352, 357, 358, 422, 4229, 432, 437, 442, 4229, 432, 437, 442, 44, 5, 4469, 447, 4479, 451, 452, 457, 458, 459, 512, 522, 5229, 6379, 642, 647, 722, 7229, 723, 7379, 747, 8389, 948, 9489	70p
SAISHO	
VR2000, VHL3	90p
VR3800, 3200, 3300, 3500, 3600, 3650, VRS4400, 5000	75p
VR3400	100p
SAMSUNG	
SV716, 717, V1616, V-621, V1626, VX616, VX617, VX619, X626, VX627, VX629, VX714	85p
VB520, 510, 610, 616, 617, 619, 620, 626, 627, 629, V1510, 520, V1611, 616, 621, 626, VX510, 511, 520, VT320, 5600	100p
VB900, VB910, V1900, V1910	110p
PX980, 981, 982, SE9001, SV9001, SVX307, 319, 322, VB750, 770, 8220, 8225, V1770, 790, 8220, 8225, VK8220, VPX31, VX750, VX770, 790, 8220, 8225, SE9000, 9001	90p
SVX301, 303, 305, SX7301, VB710, 971, V1710, 730, 750, 970, VX710, 712, 720, 730, 970, 971, 972	100p
VX9880	110p
SX7121	95p
SANYO	
VTC5000, 5150, 6000, 6500, VTCM10, 11, 20, 21, 30, 31, 50	75p
VTC5300, VTC5350, VTC5400, VPR5800	80p
VTC5500	70p
VTC9100, VTC9300	140p
VTC1100, 1300, 1500, VHR1100, 1110, 1150, 1200, 1300, VHR1500, 2370, MVR220	90p
VHR2100, VHR2300, VHR2500, VHR2700	100p
VHR3100, 3110, 3150, 3300, 3310, 3400, 3500, 3700, 3800, VHRD500, 700, TLS1000, TLS1001	80p
VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, VHR194, 220, 23, 235, 240, 244, 250, 251, 274, 297, 310, 330, VHR335, 390, 4100, 4105, 4150, 4200, 430, 4300, 4350, 474, VHR4770, 5080, 5100, 5200, 5300, 5350, 5700, 6850, 7100, VHR7200 7250, 7260, 7300, 7400, 7500, 7520, 7530, 7530, VHR7540, 7700, 774, 7800, 7810, 8000, 8100, 8200, 8250, 8500, VHR8800, 8801, VHRD4400, 4410, 4500, 4600, VHRD4610, 4710, 4890, 670075p	
VMD66, VMD68P	80p
VTR1000	70p
VTC6010	75p
SHARP	
VC200, 381, 384, 385, 386, 388, 390, 393, 838, 9100, 9300, 9500, VC9700	100p
VC7300, VC7700, VC7750, VC7800, VC8000	110p
VC8300	115p
VC300, 387, 471, 473, 481, 482, 483, 486, 488, 496, 8481	80p
VC402, 500, 571, 573, 581, 582, 583, 584, 585, VCSF3, VC8581	80p
VC108, 405, 408, 550, 600, 651, 674, 681, 682, 682, 684, 685, 693	
VC700, 750, 783, VC6F3, VC6V3	70p
VC208, 571, 772, 779, 780, 781, 782, 785, 786, 787, 793, 800, VC7810, 7822, VCA100, 102, 103, 104, 131, 140, 170, 202, 03, VCA234, 501, 502, 602, 5011, VCB311, 361, VCD801, 802, VCH851, 852, 882, VCM73, VCT72	75p
VCA10, 103, 105, 106, 113, 11613, 211, 234, 244, 254, 30, 33, 35, VCA36, 37, 40, 43, 454, 48, 50, 505, 51, 52, 53, 54, 55, 56, 57, 58, VCA60, 605, 615, 67, 68, 1031, VCB320, VCBS97, VCD805, VCD806, 810, 815, VCH80, 81, 85, 865, 910, VC51000, VCT212, 310, 410, 610, VCT1314, VCTS312, 313, VC790ET	80p
VCC10	70p
SONY	
SLC6, SLJ10, SLT6ME	140p
SLC5, SLC7, SLJ7, SLJ9, SLT7ME	140p
SLC9, SL8000, SL8080, SLT50	165p
SL8000E, SL8080E, SL8200, SL8600	175p
SLV255, 125, 213, 225, 262, SLVX1, 20, 3	95p
TOSHIBA	
V55, V57	85p
V33, V31, V32, V51, V52, V53, V9600, V9680	85p
V61, V63, V65, V66, V67	150p
DV80B, DV80D, V71, 73, 74, 75, 77, 81, 83, 85, 86	80p
V108, 109, 110, 120, 130, 140, 199, 209, 210, 211, 220, 221, 411, V421, 609, 610, 611, 659, 660, 711, 880	120p
V91 G, V95G	115p
V212, 213, 22-2, 312, 322, 403, 412, 413, 610, 703, 813	50p
VCP81E	110p

Model	Price	Model	Price
Models & Description	**Order Code**		
UNIVERSAL VIDEO LAMP 9V 80mV (310mm WIRES)	VL01		25p
PANASONIC VIDEO LAMPS	VL02		30p
SHARP VIDEO LAMPS	VL02		30p
HITACHI 5381682 (VT63, VT64) VIDEO LAMPS	VL04		135p
AIWA, AKAI, ALBA, AMSTRAD, BLAUPUNKT, FERGUSON, FIDELITY FISHER, FUJITSU, FUNAI, G.E.C., GOLDSTAR, GRANADA, GRUNDIG, HINARI, HITACHI, ITT, JVC (HRD SERIES), MATSUI, MITSUBISHI, NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA, SAMSUNG, SANYO, SHARP, SIEMEN, SONY, TELEFUNKEN, THOMSON, TOSHIBA	VL05		100p
AKAI, GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)	VL01		25p
BLAUPUNKT, ORION (VH1, 2A), NATIONAL (NV200, 2010, 3000, 7000, 8150, 8200, 8400, 8600, 8610, 8620), SHARP (VC2300, 6000, 6200, 6300, 7300, 7700, 8300)	VL02		30p
AKAI (VS10), GRANADA (VHSXJ3), TT (VR3993, 3994), JVC (HR2650, 7600, 7610, 7650, 7655), TELEFUNKEN (VR530, 535, 539, 550, 630, 650), THOMSON (V309, 316, 357, VK309, 411, TX8000), FERGUSON (3V31, 8941, 8942)	VL06		40p
AUTHENTIC (N850), DECCA (VR8300), GRANADA (VHSTJ3, WJ1, WJ3), ITT (VR3913, 3914, 3963) JVC (HT7200, 7300, 7350, 7700) TELEFUNKEN (VR450, 520, 529, 540, 549, 620, 640, 920, 1920), THOMSON (V4100, VK308, 309, 312, 410), FERGUSON (3V23, 29, 30, 8923, 8924, 8929, 8930, 8931, 8940)	VL07		40p
GRANADA (VHSAY3), SHARP (VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700)	VL08		45p

PANASONIC MODE SWITCHES

NV2000, 2010, 7000, 7200, 7800 (VS50048)	
NV230, 260, 430, 810, 870, 2300, 4300 (VSS0110)	£3.50
NV830 (VSS0091)	£2.25
NV300, 333, 340, 366, 688, 777, 778 (VSS0060	£2.10
NVG21, 25, NVH65, NVD80 (VSS0175A)	£3.75
	£2.00

Price	Model	Price
	ON/OFF MAIN SWITCHES	
GRUNDIG		
PART NO:	29703, 29102	
USED ON:	C7500, C7500TT, C8500, C8502, C8712, C8714, C8894, M68-190, M68-190/99, M70-195, P40-345, ST66-1602, T55-340, V7722	
PRICE:	140p	
MATSUI/SAISHO		
USED ON:	MATSUI-2190, SAISHO-PST21 30TX	
PRICE:	140p	
PHILIPS		
USED ON:	K30, K35, K40, KT3, KT4	
PRICE:	£0.95	
SONY		
PART NO:	(POWER SWITCH + REMOTE SWITCH)	
USED ON:	KV1612, MK1, KV1612, MK2, KV1614, KV2052, KV2056, KV2062, KV2068, KV2212, KV2216, KV2252, KV2256, KV2704 KV2705, KV2706, KV2752PE3, KX20PS1, KX20PS2, KX27PS1	
PRICE:	1.50p	
PART NO:	(POWER SWITCH + REMOTE SWITCH	
USED ON:	KV2022, KV2024	
PRICE:	200p	
PART NO:	(POWER SWITCH 26mm)	
USED ON:	KV1400, KV1440, KV2040, KV2060	
PRICE:	125p	
PART NO:	(POWER SWITCH 21 mm + REMOTE SWITCH)	
USED ON:	KV2020	
PRICE £2.00		
PART NO:	2 PIN (FUNCTION SWITCH)	
USED ON:	KV1612, MKK, V1612, MK2, KV2052, KV2056, KV2212, KV2215, KV2216, KV2252, KV2256, KV2704, KV2705, KV2706, KV275PE3, KV2756PE3	35p

REPLACEMENT IDLER TYRES		
AKAI M132773	M32773	IT01
	MZ366960J2	IT02
GOLDSTAR	VXP0521	IT17
HITACHI	6861471	IT03
	6861482	IT04
	6886971	IT05
JVC/ FERGUSON	PU 48967B	IT06
	PU 51380	IT07
	PU 51402A	IT08
	PU 55373	IT09
	PU 55374	IT10
NATIONAL	VXP 0329	IT11
PANASONIC	VXP 0343	IT12
	VXP 0344	IT13
	VXP 0401	IT14
	VXP 0433	IT15
	VXP 0463	IT16
	VXP 0521	IT17
	VXP 0581	IT18
SANYO	1430662T15620	IT19
SHARP	NIDL005GEZZ	IT20
	NIDL0006GEZZ	IT21
	NPLY0107GEZZ	IT22

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16p EACH FOR A PACK OF 5 FOR EACH MODEL
13p EACH FOR A PACK OF 10 FOR EACH MODEL

VIDEO SERVICE KITS

AMSTRAD
VCR700
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BELT SET. PINCH ROLLER. REEL IDLER. VIDEO LAMP
Order Code: SK41 £5.50

FERGUSON & JVC
3V42/43
HRD455/HRD725

Contents		*Economy Kit Contents*	
BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND		BELT SET, PINCH ROLLER SUPPLY CLUTCH, TAKE UP CLUTCH	
Order Code: SK37	£16.00	ORDER CODE: SK38	£9.00

3V58/59/64/65
HRD170/180/210/230/300/320/370/400/430/530/700/750
HRS5000
Contents
BELT SET, PINCH ROLLER, IDLER ARM, TENSION BAND
Order Code: SK44 £7.00

3V29/3V30
HR7200/7300/7350
Contents
BELT SET, PINCH ROLLER. TENSION BAND, IDLER TYRES
Order Code: SK05 £5.00

3V35/36, 38/39/49
HRD110/111/120/225
Contents
BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES
Order Code: SK04 £5.00

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

Contents		*Economy Kit Contents*	
BELT SET, T/U REEL TABLE TYRE. PINCH ROLLER. REEL IDLER. T/U CLUTCH. T/U IDLER. TENSION BAND. VIDEO LAMP		BELT SET, T/U REEL TABLE TYRE. PINCH ROLLER. REEL IDLER TYRE. T/U IDLER TYRE. T/U CLUTCH	
Order Code: SK33	£11.00	ORDER CODE: SK34	£5.00

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

Contents		*Economy Kit Contents*	
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER. REEL IDLER. TENSION BAND		BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. T/U CLUTCH. T/U IDLER TYRE. REEL IDLER TYRE	
Order Code: SK35	£10.00	ORDER CODE: SK36	£5.50

3V29/3V30
HRD7200/7300/7350

Contents		*Economy Kit Contents*	
BELT SET. T/U REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLER. T/U CLUTCH. T/U IDLER. TENSION BAND. VIDEO LAMP		BELT SET. T/U REEL IDLER TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. REEL IDLE TYRE. T/U IDLER TYRE. T/U CLUTCH	
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3V44/45/48/53/54/55/57
HRP50/HRO140/150/158/160
HRD250/257/565/566/755

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

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

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

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

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER. IDLER. GEAR IDLER UNIT. TENSION BAND		BELT SET. PINCH ROLLER. IDLER TYRE	
Order Code: SK68	£11.00	ORDER CODE: SK69	£300

HITACHI
VT11/VT33
Contents
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES
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VIDEO SERVICE KITS *(Cont.)*

VT11/VT33

Contents		*Economy Kit Contents*	
BELT SET. T/UP REEL TABLE TYRE. SUPPLY REEL TABLE TYRE. PINCH ROLLER. FF/REW IDLER. CLUTCH PLATE. TENSION BAND		BELT SET. PINCH ROLLER. FF/REW IDLER TYRE. T/UP REEL TABLE TYRE. SUPPLY REEL TABLE TYRE	
Order Code: SK45	£13.00	ORDER CODE: SK46	£3.75

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

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER, FF/REW ARM. CLUTCH PLATE. TENSION BAND		BELT SET. PINCH ROLLER FF/REW IDLER	
Order Code: SK49	£14.00	ORDER CODE: SK50	£3.00

VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/48/450/498/510/520/25/26/530/35/36/540/545/46/48/570/75/576/580/85/88
Contents
TIMING BELT. PINCH ROLLER. FF/REW ARM. CLUTCH BASE. TENSION BAND
Order Code: SK52 £9.75

VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/VTL30
Contents
BELT SET. PINCH ROLLER. FF/REW ARM. CLUTCH PLATE. TENSION BAND
Order Code: SK51 £14.00

PANASONIC

NV2000/NV2010		NV7000/NV7200/NV7800	
Contents		*Contents*	
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES		BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRES	
Order Code: SK03	£5.00	ORDER CODE: SK02	£5.00

NV300/NV330/NV333/NV340/NV366
Contents
BELT SET. PINCH ROLLER. TENSION BAND. IDLER TYRE
Order Code: SK01 £5.00

NV2000/NV2010

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER. FF IDLER. PLAY IDLER. TENSION BAND. VIDEO LAMP		BELT SET. PINCH ROLLER. IDLER TYRE. PULLEY TYRE	
Order Code: SK13	£6.00	ORDER CODE: SK14	£3.50

NV7000/NV7200/NV7800

Contents		*Economy Kit Contents*	
BELT SET, PINCH ROLLER, IDLER UNIT. PLAY IDLER. TENSION BAND		BELT SET, PINCH ROLLER IDLER TYRE. CLUTCH TYRE	
Order Code: SK11	£8.50	ORDER CODE: SK12	£3.25

NV300/NV330/NV333/NV340/NV366

Contents		*Economy Kit Contents*	
BELT SET, PINCH ROLLER, IDLER UNIT. PLAY IDLER. TENSION BAND		BELT SET, PINCH ROLLER IDLER TYRE. PLAY IDLER	
Order Code: SK15	£7.00	ORDER CODE: SK16	£3.25

NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG16/NVG18/NVG30/NVG120/NVG130/NVG400/NVH65 (PX/AC)/AG1810 (P/K)

Contents		*Economy Kit Contents*	
LOADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER TENSION BAND		LOADING BELT. CAPSTAN BELT. PINCH ROLLER. IDLER. TYRE	
Order Code: SK27	£6.00	ORDER CODE: SK28	£3.00

NV332

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

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

Contents		*Economy Kit Contents*	
BELT SET, PINCH ROLLER, IDLER. TENSION BAND		BELT SET. PINCH ROLLER IDLER TYRE	
Order Code: SK23	£6.00	ORDER CODE: SK24	£3.25

NV600/NV688

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

NV730/NV770

Contents		*Economy Kit Contents*	
SLOT IN BELT. LOADING BELT PINCH ROLLER. IDLER UNIT. TENSION BAND		SLOT IN BELT. LOADING BELT. PINCH ROLLER. IDLER TYRE	
Order Code: SK19	£5.00	ORDER CODE: SK20	£3.00

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

Contents		*Economy Kit Contents*	
BELT SET, PINCH ROLLER, IDLER. TENSION BAND		BELT SET, PINCH ROLLER IDLER TYRE	
Order Code: SK21	£5.00	ORDER CODE: SK22	£2.75

NV777/NV788

Contents		*Economy Kit Contents*	
BELT SET, PINCH ROLLER, IDLER UNIT. TENSION BAND		BELT SET, PINCH ROLLER IDLER TYRE	
Order Code: SK17	£6.00	ORDER CODE: SK18	£4.00

VIDEO SERVICE KITS *(Cont.)*

SHARP
VC381

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER. REEL IDLER. TENSION BAND. VIDEO LAMP		BELT SET. PINCH ROLLER REEL IDLER TYRE	
Order Code: SK47	£8.00	ORDER CODE: SK48	£3.25

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

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER. REEL IDLER. TENSION BAND		BELT SET. PINCH ROLLER REEL IDLER	
Order Code: SK60	£9.50	ORDER CODE: SK61	£5.00

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

Contents		*Economy Kit Contents*	
BELT SET. PINCH ROLLER. REEL DRIVE UNIT. TENSION BAND		BELT SET. PINCH ROLLER REEL DRIVE UNIT TYRE	
Order Code: SK64	£13.50	ORDER CODE: SK65	£3.75

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

Contents		*Economy Kit Contents*	
BELT SET, PINCH ROLLER. REEL DRIVE UNIT. TENSION BAND		BELT SET. PINCH ROLLER REEL DRIVE UNIT TYRE	
Order Code: SK62	£13.50	ORDER CODE: SK63	£5.00

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BACKUP BATTERIES

REPLACEMENT PHILIPS NI-CAD BACKUP BATTERIES
Replaces Ferguson Part No:
00E6-067-001, used on TX10, L2V 90p
Replaces Philips Part Nos:
138-10138, 138-10313. 1.2V – 90mAh 75p
Replaces Philips Part Nos:
138-1229, 2.4V – 90mAh £1.35
REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES
Replaces Ferguson Part Nos:00E6-066-001, 2.4V
Used on: 3V35, 3V56, 3V58, 3V65 150p

REPLACEMENT LINE OUTPUT TRANSFORMERS

Description	Price	Order Code
HITACHI 2433752	1500p	LOT01
ORION 3714002	1500p	LOT02
FIDELITY ZX300	1500p	LOT03
FE TX100 90 DEG	1500p	LOT04
SABA 490007182	1500p	LOT05
FE TX90 WHITE	1650p	LOT06
ITT D307/37 EQ	1600p	LOT07
BLAUPUNKT 210	1600p	LOT08
GRUNDIG 2922010	1600p	LOT09
ITT CVC800/1/3	1500p	LOT10
ITTD218/37 EQ	1600p	LOT11
NORMENDE 5255	1600p	LOT12
SABA 81000 200	1600p	LOT13
SALORA T236 EQ	1650p	LOT14
SABA 811-50-24	1600p	LOT15
SABA 770223500	1600p	LOT16
TELEFUNKEN AT1	1450p	LOT17
TELEFUNKEN EQ	1400p	LOT18
SALORA FM0218B	1600p	LOT19
NORMENDE 5255	1600p	LOT20
ITT CVC 1150/1	1500p	LOT21
ITT COMPACT 80	1500p	LOT22
FE TX100 GREEN	1400p	LOT23
HINARI CT4/5 5113	1500p	LOT24
SELECO 6320410	1600p	LOT25
BLAUPUNKT 8667	1600p	LOT26
ITT COMPACT B1	1450p	LOT27
ITT CT3326 MUL	1500p	LOT28
ITT D066/37 EQ	1600p	LOT29
ITT 3546 EQ	1500p	LOT30
LUXOR 5810110	1600p	LOT31
SABA 849380920	1600p	LOT32
HITACHI 2434141 CP	1200p	LOT33
FE TX100 110 D	1500p	LOT34
HANTAREX 28021	1600p	LOT35
SHARP C3700 EQ	1600p	LOT36
HITACHI 2432981 CP	1300p	LOT37
FERGUSON 00D3-508-002 Fits Chassis TX99 41cm + 51cm Used On: 51K2, 51J8, 51J7, 41H3, 41H3, 41H2, 51K3	1650p	LOT38
PANASONIC TLF14567F Used On: TC2043, TC2243, TX300	1850p	LOT39
PANASONIC TLF14568F Used On: TX2231, TX2244	£15.00	LOT40
PANASONIC TLF14584 Used On: TC2210, TC2160, TX1752, TX2112 TX2112, TX2162, TXC22	2000p	LOT41
PANASONIC TLF14586F TC1651, TC2051, TC2061, TC2253, TC2263, TX5500	£18.00	LOT42
HINARI Used On: CT15	1600p	LOT43
HITACHI 2434274 CPT2174, CPT2176, CPT2178, 2434274	1250p	LOT44

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Satellite PSU Repair Kits

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

MAKE & MODEL	ORDER CODE	PRICE
PACE PRD800, PRD900	SATPSU1	650p
PACE SS9000, 9200, 9010, 9210, 9220	SATPSU2	650p
AMSTRAD SRD510, SRD520	SATPSU3	650p
AMSTRAD SRD500	SATPSU4	650p
AMSTRAD SRX340, SRX345, SRX350	SATSPU5	650p
PACE 0100/150	SATPSU6	650p
CHURCHILL DZMAC	SATPSU7	650p
PACE MSS100	SATPSU8	730p
PACE MSS200/300 APPOLL	SATPSU9	900p
PACE MSS500/1000	SATPSU10	1230p
FERGUSON SRD4	SATPSU11	835p
ECHOSTAR SR5500	SATPSU12	1735p
ECHOSTAR 6500/7700/8700	SATPSU13	3125p
AMSTRAD SRD600	SATPSU14	3125p
MIMTEC (Surensen)	SATPSU15	775p
AMSTRAD SRD700/SR950/SRX100/301 SRX501/1002/2001/SRD2000 SAT250	SATPSU16	730p

PACE 9000 SWITCH MODE TRANSFORMER
Order Code: **PACE 9000** Price: **800p**
PACE PRD800/PRD900 SWITCH MODE TRANSFORMER
Order Code: **PRD800** Price: **550p**

SATELLITE TUNERS
PACE PRD800/MSS200 2Ghz
Order Code: TUNER 01 Price: **1650p + VAT**
PACE PRD900/MSS1000 2Ghz
Order Code: TUNER 02 Price: **1650p + VAT**

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POWER SUPPLY REGULATOR
ALBA CTV10 TRAVELLER
NIKKAI BABY 10
ORDER CODE: BABY 10
PRICE: 1200p + VAT

Audio Control Head

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

AMSTRAD ORIGINAL NO: 153134
Used on: AMSTRAD DD8900, 8904, VCR2000, 6000, 6100, 8600, 8602, 8603, VCR8604, 8700, 8704, 8714, 9800, 9005, 8244
Also fits: ANTECH, BONOSTEC, CASIO, CROWN, FIDELITY, GOLDHAND, GRANADA, HINARI, MARQUANT, OMEGE, PROFEX, SCHNEIDER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA, UNIVERSUM **ORDER CODE: AH02 PRICE: 1450p**

Replacement Audio Control Video Sound Head for National Panasonic

PART NUMBER	MODELS	PRICE
VBR 0091	NV67 etc	875p
VBR0050	NV300, NV340 etc	875p
VBR0061	NV777 etc	875p
VBR0103A	NV250, NV450 etc	625p
VBR0125		625p

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- 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
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Cassette DC Motors

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

Replacement Video Cassette Housings

NAME	MODELS	CODE	PRICE
AKAI	VS35, VS53, VS55, VS56, VS75	CH18	3200p
GRANADA	VHSDP1	CH05	1100p
	VHSYJ2	CH01	2800p
GOLDSTAR	GHV1290P, 1291P, 1295P, 9400, 73401, GSE1295P, GSE1891P, 20001Q, 20051Q, VCP4200, 4300, 4301, 4305, VCP4306, 4311, 4315, 4316, 4320, 4321, 4325	CH25	2000p
	GHV51, 1221, 1232, 1240, 1241, 1242, 1244, 1246, 1248, GHV8000, 8200	CH26	2900p
FERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, 3V49, HRD 110, 111, 120, 121, 225	CH01	2800p
	3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD 140, 141, 150, 157, 158, 160, 250, HRD257, 455, 565, 566, 725, 755	CH02	2800p
	8948, 8950, FV10B, 12L, 13H, 14T, 20B, 21R, 22L, 26, 395, HRD230, 430, 530	CH03	2800p
	3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRD370	CH04	2800p
	FV31R	CH19	4300p
	HRD515, 520, 527, 540, 550, 580, 600, 610, 620, 660, 670, HRD830, 840, 850, 860, 4050, 6600, FV37H	CH20	2200p
	HRD540, 580, 830, 860, 910, 960, HRD970, HRDX20, FERGUSON FV57H	CH27	2400p
I.T.T.	VR3605, VR3905	CH01	2800p
	VR3916, 3926, 3946, 3948, 3975, 3986, 3995, 3997, 6948	CH02	2800p
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2800p
NATIONAL PANASONIC	NV730	CH06	4300p
N.E.C.	N830EG, N831EG, N831EG, N832, N832EG	CH01	2800p
	N895	CH02	2800p
PHILIPS	CASSETTE LIFT ASSEMBLY (69120386) DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 8285, VR6290, 6291, 6293, 6362, 6367, 6393, 6467, 6468, 6470, VR6561, 6570, 6760, 6761, 6870, 6970	CH05	1100p
	VR6443	CH22	2900p
	VR6448	CH23	2500p
	49SB6	CH24	2500p
SHARP	VCA100, VCH851, VCH852	CH22	2900p
	VCA103, 103GV, 106, 106GVM, 254GVM	CH23	2500p
	VCS211, 244, 5055, 605, VCB230, VCD806S, 810G, VCT212, 310, 410G, 610	CH24	2500p
TELEFUNKEN	VR2970	CH02	2800p
THOMSON	V320, 321, 323, 326, 4200, 4300	CH01	2800p
	V342, 343, 352, 353, 360, 364, 368, 4210, 4230, 4260, 4400, V5500, 6000, 8540	CH02	2800p
TOSHIBA	V55, V57	CH01	2800p
	V65, V66	CH02	2800p

Service Aids

DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER	75ML	SP01	180p
SWITCH CLEANER	175ML	SP02	180p
SILICONE GREASE	200ML	SP03	210p
FREEZE IT	170ML	SP04	320p
FREEZE IT	400ML	SP16	600p
FOAM CLEANER	400ML	SP05	200p
ANTI-STATIC	150ML	SP06	190p
AEROKLEANE	135ML	SP07	220p
AERO DUSTER	150ML	SP08	310p
AERO DUSTER	400ML	SP17	550p
PLASTIC SEAL	200ML	SP09	250p
GLASS CLEANER	250ML	SP10	160p
COLDKLENE	250ML	SP13	230p
EXCEL POLISH 80	250ML	SP18	150p
ADHESIVE 120	400ML	SP19	190p
LABEL REMOVER 130	200ML	SP20	240p
REFURB 140	400ML	SP21	240p
TUBE SILICON GREASE	50 GRAMMES	SP11	210p
TUBE SILICON SEALANT WHITE	75ML	SP22	280p
TUBE SILICON SEALANT CLEAR	75ML	SP23	280p
TUBE HEAT SINK COMPOUND	25 GRAMMES	SP12	150p
DRIVE CLEANER	200ML	SP24	150p
SCREEN CLEANER	200ML	SP25	150p
COMPUTER CARE KIT	–	SP26	2100p

All the above items are manufactured by Servisol
If you purchase more than one Servisol Product, postage & package will be charged as follows:
300p for 5 cans 450p for more than 5 cans

Cassette Tape Heads

HEAD TYPE	PRICE
MONO HEAD	90p
STEREO HEAD	140p
MINI HEAD	150p
AUTO REVERSE HEAD	200p

Soldering Accessories

DESCRIPTION	CODE	PRICE
ANTEX SOLDERING IRONS		
25 WATT 240 VAC (XS25W 240V)	S101	900p
15 WATT 240 VAC (XS15W 240V)	S102	900p
25 WATT SPARE ELEMENT	S103	450p
15 WATT SPARE ELEMENT	S104	450p
SOLDERING STAND & SPONGES		
SOLDERING STAND (MADE BY ANTEX)	S108	350p
SPARE SPONGE	S109	55p
SOLDER		
18 SWG 500 GRAMMES	S110	500p
20 SWG 500 GRAMMES	S111	650p
22 SWG 500 GRAMMES	S112	700p
DESOLDERING AIDS		
SOLDER MOP STANDARD GAUGE 1.2MM X 1.5M	S107	80p
SOLDER MOP 1.2MM X 10M	S113	400p
DESOLDERING PUMP	S105	320p
SPARE NOZZLE	S106	60p

FAULT FINDING GUIDE 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.

Video Recorders Edition 4
Lists more than 4500 faults for 43 different brands
Price £12.75 – No VAT. Order Code: BOOK01

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 semiconductors in much greater detail plus marketing data on SMD devices and a separate generic table of all type designations.
Price: £40.00 only – No VAT (+ £5 Postage).
Order Code: BOOK06

VIDEO CLEANING STICKS

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

VIDEO MAINTENANCE TOOLS
Set of 8 Allen keys packed in a plastic wallet
Order Code: TOOL9
Price 125p
Specifically designed for video maintenance

UNIVERSAL HEAD EXTRACTOR TOOL
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 brand heads.
PRICE – 600p

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

REPLACEMENT LINE OUTPUT TRANSFORMERS/CD PICK UPS

REPLACEMENT LINE OUTPUT TRANSFORMERS

Part No.	Code	Price
AKAI		
45150344	LOT56	1650p
101-214017-03	LOT278	1600p
101-220005-03A	LOT72	1600p
D 050/37	LOT27	1450p
D 053/37	LOT207	1550p
D 056/37	LOT56	1650p
D 059/37	LOT200	1600p
D 069/37	LOT56	1650p
FCM 2015 AL	LOT78	1500p
FERGUSON		
00 D-3-508-001	LOT38	1650p
00 D-3-508-002	LOT38	1650p
00 D-3-508-003	LOT276	1550p
00 D-3-515-001 PL1	LOT276	1550p
00 D-4-208-001	LOT79	1800p
00 D-4-208-002	LOT79	1800p
00 D-4-235-002	LOT240	1250p
00 D-4-235-002 HTI	LOT81	1600p
00 D-4-235-00201G	LOT81	1600p
00 D-4-260-004 HTI	LOT38	1650p
00 H-0-701-2400	LOT182	1550p
06 D-3-083-001	LOT82	1400p
06 D-3-083-002	LOT82	1400p
06 D-3-084-001	LOT23	1400p
06 D-3-087-001	LOT23	1400p
06 D-3-088-001	LOT84	1450p
06 D-3-093-001	LOT204	1600p
06 D-3-095-001	LOT87	1450p
06 D-3-095-002	LOT87	1450p
06 D-333-512-001	LOT204	1600p
FETX 100 90 DEG	LOT04	1500p
FETX 90 WHITE	LOT06	1650p
FETX 100 100 DEG	LOT34	1500p
GRUNDIG		
29201.008.01	LOT153	1750p
29201.014.01	LOT140	1850p
29201.015.01	LOT149	1400p
29201.017.01	LOT60	1250p
29201.018.01	LOT163	1300p
29201.018.02	LOT61	1700p
29201.019.01	LOT62	1250p
29201.019.02	LOT82	1250p
29201.022.01	LOT63	1700p
29201.022.02	LOT166	1800p
29201.022.03	LOT165	1750p
29201.022.04	LOT165	1750p
29201.022.04A	LOT165	1750p
29201.024.01	LOT65	1700p
29201.024.04	LOT164	1800p
HINARI		
154 138 K	LOT24	1500p
51 13914 1	LOT24	1500p
51 14184 1	LOT24	1500p
CF 44 A	LOT24	1500p
HM51 1411834-1	LOT24	1500p
HITACHI		
2424593	LOT44	1250p
2432101	LOT79	1800p
2432461	LOT169	1500p
2432611	LOT80	1800p
2432651	LOT80	1800p
2432751	LOT169	1500p
2432981	LOT37	1300p
2432982	LOT37	1300p
2433011	LOT171	1650p
2433012	LOT171	1650p
2433014	LOT171	1650p
2433212	LOT168	1500p
2433291	LOT172	1700p
2433301	LOT246	1600p
2433441	LOT188	1900p
2433442	LOT191	1600p
2433451	LOT81	1600p
2433452	LOT82	1400p
2433453	LOT82	1400p
2433455	LOT234	1600p
2433521	LOT85	1600p
2433581	LOT22	1500p
2433721	LOT83	1600p
2433751	LOT01	1500p
2433752	LOT01	1500p
2433752	LOT250	1600p
2433891	LOT23	1400p
2433892	LOT84	1450p
2433893	LOT23	1400p
2433952	LOT33	1200p
2434002	LOT200	1600p
2434141	LOT33	1200p
2434274	LOT44	1250p
2434453	LOT86	1600p
2434455	LOT234	1600p
2434593	LOT44	1250p
2435062	LOT296	1600p
2435121	LOT87	1450p
2435131	LOT251	1600p
2435141	LOT282	1450p
2435301	LOT88	1450p
2435671	LOT89	1600p
2436201	LOT109	1450p
2436202	LOT109	1450p
2432101-2	LOT79	1800p
2433451H	LOT81	1600p
2433453H	LOT82	1400p
2433891H	LOT23	1400p
2433892G	LOT84	1450p
I.T.T.		
4515 01 08	LOT113	1400p
4515 01 15	LOT136	1600p
4515 01 16	LOT139	1675p
4515 01 17	LOT139	1675p
4515 01 19	LOT169	1500p
4515 01 24	LOT137	1600p
4515 01 46	LOT136	1600p
4515 03 01	LOT169	1500p
4515 03 02	LOT180	1550p
4515 03 04	LOT169	1500p
4515 03 05	LOT180	1550p
4515 03 06	LOT168	1550p
4515 03 08	LOT22	1500p
4515 03 09	LOT178	1500p
4515 03 10	LOT168	1550p
4515 03 13	LOT30	1500p
4515 03 14	LOT174	1700p
4515 03 15	LOT22	1500p
4515 03 18	LOT192	1650p
4515 03 19	LOT30	1500p
4515 03 20	LOT190	1650p
4515 03 22	LOT196	1550p
4515 03 24	LOT194	1550p
4515 03 25	LOT22	1500p
4515 03 26	LOT198	1550p
4515 03 28	LOT27	1450p
4515 03 29	LOT193	1550p
4515 03 30	LOT179	1550p
4515 03 31	LOT207	1650p
4515 03 34	LOT56	1650p
4515 03 35	LOT193	1550p
4515 03 38	LOT27	1450p
4515 03 40	LOT200	1600p
4515 03 41	LOT56	1650p
4515 03 43	LOT196	1550p
4515 03 44	LOT56	1650p
4515 03 46	LOT201	1650p
4515 03 50	LOT27	1450p
4515 03 51	LOT27	1450p
4515 03 75	LOT56	1650p
4516 16 01	LOT22	1500p
MITSUBISHI		
731003	LOT51	1650p
Z76-16399	LOT49	1800p
334 B 07803	LOT50	1700p
334 B 078030	LOT50	1700p
334 B 08104	LOT74	1600p
334 B 08108	LOT295	1600p
334 P 18506	LOT51	1650p
334 P 18507	LOT75	1600p
5908-05008A-AA	LOT70	1500p
D 108/37	LOT49	1800p
DCF1577	LOT273	1700p
DCF2077A	LOT272	1550p
KFS 602268	LOT279	1550p
MSH-1FBW08	LOT78	1500p
NIKKAI		
BABY10	LOT67	1450p
ORION		
3714002	LOT02	1500p
PANASONIC		
TLF 14512 F	LOT39	1850p
TLF 14520 F	LOT40	1500p
TLF 14521 F	LOT39	1850p
TLF 14567 F	LOT39	1850p
TLF 14568 F	LOT40	1500p
TLF 14584 F	LOT41	2000p
TLF 14586 F	LOT42	1800p
TLF 15606 F	LOT256	2500p
TLF 70012	LOT78	1500p
TLF 70012 F	LOT78	1500p
TLF 70012A	LOT78	1500p
TLF 70018	LOT274	1650p
TLF 70018 F	LOT274	1550p
TLF 70161	LOT278	1650p
TLF 70162	LOT72	1600p
TLF 70162A	LOT72	1600p
TLF 70162B	LOT72	1600p
TLF 70162G	LOT72	1600p
TLF 77001 B	LOT274	1550p
PHILIPS		
4822 140 10142	LOT142	1800p
4822 140 101145	LOT134	1450p
4822 140 10146	LOT112	1700p
4822 140 10151	LOT102	2150p
4822 140 10161	LOT103	1250p
4822 140 10171	LOT104	2150p
4822 140 10176	LOT114	1150p
4822 140 10194	LOT105	1750p
4822 140 10198	LOT116	1750p
4822 140 10201	LOT104	2150p
4822 140 10236	LOT118	1750p
4822 140 10246	LOT111	1750p
4822 140 10247	LOT105	1750p
4822 140 10254	LOT107	1600p
4822 140 10263	LOT117	1750p
4822 140 10269	LOT210	1650p
4822 140 10271	LOT208	1650p
4822 140 10274	LOT123	1600p
4822 140 10282	LOT122	1600p
4822 140 10283	LOT104	1450p
4822 140 10294	LOT125	2150p
4822 140 10306	LOT110	1600p
4822 140 10325	LOT132	1300p
4822 140 10326	LOT122	1850p
4822 140 10328	LOT124	1450p
4822 140 10349	LOT106	1450p
4822 140 10353	LOT284	1450p
4822 140 10356	LOT284	1400p
4822 140 10367	LOT286	1400p
4822 140 10369	LOT109	1450p
4822 140 10381	LOT128	1450p
4822 140 10384	LOT127	2150p
4822 140 10395	LOT116	1750p
4822 140 10406	LOT73	1500p
4822 140 10421	LOT109	1450p
4822 140 17078	LOT103	1250p
SANYO		
094-00020/0.9	LOT113	1400p
094-00035/0.2	LOT162	1350p
094-01020/0.7	LOT59	1750p
094-01021/0.6	LOT59	1750p
094-01027/0.0	LOT186	1825p
094-01038/0.7	LOT245	1900p
094-01052/0.8	LOT186	1825p
094-01057/1.1	LOT285	1450p
610.018.6620	LOT189	1650p
610.018.6637	LOT215	1800p
SHARP		
RTRNF 1220 CEZZ	LOT39	1850p
RTRNF 1783 BMZZ	LOT202	1800p
RTRNF 1783 CEZZ	LOT202	1800p
RTRNF 1786 BMZZ	LOT211	1850p
RTRNF 1786 CEZZ	LOT211	1850p
RTRNF 2000 BMZZ	LOT214	1750p
RTRNF 2002 BMZZ	LOT307	1450p
RTRNF 2002 CEZZ	LOT307	1450p
RTRNF 2003 BMZZ	LOT308	1425p
RTRNF 2004 BMZZ	LOT307	1450p
RTRNF 2005 BMZZ	LOT308	1425p
RTRNF 2006 BMZZ	LOT308	1425p
RTRNF 2007 BMZZ	LOT307	1450p
RTRNF 2023 BMZZ	LOT310	1500p
SONY		
3753100	LOT275	1700p
1-439-243-00	LOT91	1700p
1-439-243-11	LOT91	1700p
1-439-243-12	LOT91	1700p
1-439-243-31	LOT229	1700p
1-439-243-32	LOT229	1700p
1-439-243-41	LOT229	1700p
1-439-244-00	LOT48	1800p
1-439-244-11	LOT48	1800p
1-439-244-21	LOT48	1800p
1-439-244-31	LOT48	1800p
1-439-256-00	LOT45	1800p
1-439-256-11	LOT45	1800p
1-439-256-21	LOT45	1800p
1-439-256-22	LOT45	1800p
1-439-278-21	LOT230	1700p
1-439-280-00	LOT92	1700p
1-439-280-13	LOT92	1700p
1-439-286-00	LOT46	1800p
1-439-286-11	LOT46	1800p
1-439-286-12	LOT46	1800p
1-439-286-13	LOT46	1800p
1-439-286-21	LOT46	1800p
1-439-288-00	LOT228	1750p
1-439-288-12	LOT228	1760p
1-439-289-00	LOT47	1800p
1-439-289-21	LOT47	1800p
1-439-289-22	LOT47	1800p
1-439-289-31	LOT47	1800p
1-439-294-00	LOT93	1550p
1-439-294-11	LOT93	1650p
1-439-294-21	LOT269	1550p
1-439-303-00	LOT94	1700p
1-439-303-11	LOT94	1700p
1-439-303-31	LOT94	1700p
1-439-303-32	LOT94	1700p
1-439-311-00	LOT95	1550p
1-439-311-11	LOT95	1550p
1-439-311-13	LOT95	1550p
1-439-311-31	LOT95	1550p
1-439-311-32	LOT95	1550p
1-439-331-22	LOT96	1550p
1-439-331-41	LOT98	1550p
1-439-332-00	LOT99	1700p
1-439-332-11	LOT9	1700p
1-439-332-21	LOT99	1700p
1-439-332-41	LOT100	1700p
1-439-332-42	LOT101	1700p
1-439-332-52	LOT100	1700p
1-439-333-00	LOT270	1550p
1-439-333-11	LOT270	1550p
1-439-333-12	LOT270	1550p
1-439-363-11	LOT268	1550p
1-439-363-21	LOT268	1650p
1-439-387-11	LOT311	1600p
1-439-387-21	LOT311	1600p
1-439-416-11	LOT255	1750p
1-439-416-12	LOT255	1750p
1-439-416-21	LOT255	1750p
1-439-416-23	LOT255	1750p
1-439-416-41	LOT255	1750p
1-439-416-51	LOT255	1750p
1-439-430-21	LOT271	1550p
154125A	LOT275	1700p
TOSHIBA		
37010	LOT131	1450p
37011	LOT131	1450p
37012	LOT131	1450p
37013	LOT131	1450p
37014	LOT131	1450p
37015	LOT131	1450p
37016	LOT131	1450p
37017	LOT131	1450p
37018	LOT131	1450p
37019	LOT131	1450p
1810951	LOT55	1700p
2432751	LOT01	1500p
2433752	LOT250	1600p
23236023	LOT281	1650p
23236052	LOT131	1450p
23236098	LOT288	1400p
23236198	LOT288	1400p
23236255	LOT289	1500p
23236424	LOT129	1500p
23236425	LOT288	1400p
23236428	LOT289	1500p
3122113837011	LOT131	1450p
150F6D	LOT131	1450p
TFB 4039 AD	LOT293	1550p
TFB 4048 AD	LOT281	1550p
TFB 4048 BO	LOT281	1550p

CD PICK UPS

Models & Description	Order Code	Price
AIWA		
XC007	KSS151A	1900p
DX-990A, DX-D1A	KSS152A	1800p
CXL60, CXL66G, CXL80, CXN3100, CXN320, CXN3300, CXN360, CXN400, CXN430, CXN540, CXN550G, CXN990, CXN999, CXNV20, CXSL70, DXZ9100M, FDN636, FDN5636, FDN939, LCX50, LCX66G, LCX70M, LCX80, M7400, M75, NSX320, NSX350, NSX400, NSX430, NXS990, NSX992, NSX995, NSXD636, NSXD939, NSXV20, SXFN550,SXFN520, XC300, XC550, XC750, XC900, XC950, XCN992, XG320, XG360, XG400, XG990, ZD3000M, ZD3100M	KSS152A	2000p
CXAP1, CXL7, CXL8G, CXLC50P, CXZ58, DXM740, DXM75, DXM76, DXM77, LCX50, LCX7, LCX8G, LCXAP1, XC002, XC004, XC005, XC777	KSS210B	2000p
XP31, XP33, XP55, XP80G	KSS220A	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	2000p
DENON		
DCD1500II, DCD1520, DCDE3520	KSS151A	1900p
DCD1400, DCD600, DCD800	KSS152A	1800p
DCD1420, DCD520, DCD610, DCD620, DCD660, DCD810, DCD820, DCD860, DCD910, DCD920	KSS210A	2000p
DCD1015, DCD1290, DCD2060, DCD2060G, DCD315, DCD480, DCD580, DCD615, DCD715, DCD825, DCD890, DCD895, DN2000F	KSS240A	2600p
GOLDSTAR		
CD952A, CD952AJ, CD952LJ, CD952SJ, FFH101KL, FFH101WL, FFH222A/L, FFH272L, FFH333L, FFH373K, FJ606, FR606L	KSS210A	2000p
CD320A/L, CD630S/L, FFH212A/L,FFH212E	KSS210B	2000p
GRUNDIG		
CD350, CD435	HOPM3	2150p
CCD300, CD101MCD904, MC10, NEW ORLEANS CD	KSS210A	2000p
KRCD100, RR1900CD, RR2100CD, RR4000CD, RR610CD, RR700CD	KSS210B	2000p
CDP60, CDP90	KSS220A	2500p
CDP85	KSS331A	3400p
CD905	OPTIMA5	3600p
HITACHI		
DAW560	HOPM3	2150p
FX-10	KSS210A	2000p
AXC10	KSS210B	2000p
J.V.C.		
1990-1992, LATE 1987-1988 – XLE300BK, XLE31BK, XLE51BK, XLE90BK, XLME91BK, XLV101BK, XLV211BK, XLV222BK, XLV311BK, XLV331BK, XLZ101STN, XLZ111BK, XLZ449BK, XLZ558BK, XLZ611BK	OPTIMA3	4000p
CORADIO 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-Z428K, XL-Z511TN, XL-Z1050TN, XL-Z551TN, XL-Z552BK	OPTIMA5	3600p
1994 ONWARDS – CAE48BK, CAMCG7, CAMXG9, CAS20BK, CAS30BK, VAS50, CAS60RBK, MDS20, MXS30, MXS60, PCX105, PCX130, PCX95, RCX230, RCX320, RCX520, RCX620, RCX720, UXA4, UXA5, UXA55, UXC7, UXT1, UXT3, XLF115, XLF116, XLF215, XLF216, XLMC100BM, XLMXG7, XLMXG9, XLV163TN, XLV164BK, XLV174, XLV263TN, XLV264BK, XLV274BK, XLZ463TN, XLZ464BK, XLZ574, XLZ674, XTMXG7, XTMXG9, XTS60	OPTIMA6S	3300p
KENWOOD		
DP47, DP660SG, DP8020, DP87, L1000D	KSS152A	1600p
DP1030, DP1510, DP2010, DP2030, DP3010, DP3030, DP3050, DP4030, DP491, DP5010, DP5030, DP5040, DP520, DP7030, DP7040, DP7050, DP730, DP920, DP930, DP950, DPM650,DPM6530, DPM7730, DPM850, DPM991, DX6620, M225, M25, M450, M850, PD3030, PDM991, RDX25, RXDC3, RXDC3L, UD202, UD302	KSS210A	2000p
DPC42, DPC72, DPC77, DPC80, DPC92	KSS220A	2500p
DP1050, DP2050, DP3060, DP501, DP5060, DP722, DP76, DP85, DP89, M77A, PD3060, UD502, UD70, UD701, UD90, XE5	KSS240A	2600p
DPC321, DPC521, DPC531, DPC831K, DPC721, DPC731	KSS331A	3400p
DP1060, DP2060. PART No: RCTRH8136AFZZ	RH8136A	4500p
PANASONIC		
SLP177A, SLP202A, SLP212A, SLP222A, SLP277A, SLP377A, SLP477AK, SLP477A, SLPG100A, SLPG200A, SLPG400A, SLPG500AK, SLPG500AS, SLPJ24A, SLPJ26A, SLPJ27A, SLPJ28A, SLPJ325A, SLPJ37A, SLPJ38A, SLPJ46A	691-30209	5500p
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, CD600, 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, FW380I, FW40, FW41, FW46, FW56, FW66, FW68	CDM12.1	2200p
CD1210/40	CDM12.4	2200p
AZ8006	KSS210B	2000p
PW11	OPTIMA6S	3300p
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, PD522PD5700, PD65J PD6500, PD6700, PD6700, PD8700, PD970, PDCP420, PDCP520M, PDCP520T, PDJ400T, PDJ500T, PDJ800M, PDJ906M, PDP520M, PDS501, PDS601, PDS701, PDS701G, PDS901, PDT310, PDT510, PDZ, PDZ570T, PDZ74T, PDZ84M, PDZ970M, PXA1349, S125CDT, S135CDT, S303CDM, S303CDT, S505DM, S505DT, S707DM, S707DTM, S909DM, S990T, XCP410M, XCP418T, XDZ54T, XDZ55T, XDZ84M, XDZ84T, XRP310, XRP320	PEA1030	5300p
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	2000p
RCD1200, RCD1300, RCD1350, RCD1600, RCD2600, RCD990, RCD995, SCM6900	SOH90T4N	3800p
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	2000p
DCD10, DCD11U, DCD20, DCD30, DCD30AT, DCD6, DCD8U, DCMS1, DCX110, DCX120, DCX210, DCX220, DCX993, DCX994, MCDMS40L, MCDMS50L, MCDMS60L, MCDZ1L, MCDZ2L, MCDZ3L. PART No. 6142391303	614239	3300p
DCD12. PART No. 6450055966	645005	3700p
MCDZ31L, MCDZ41L, MCDZ81L, 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-39CD, 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-50CD, QT-60CD, QT80CD. PART No. RCTRH8124AFZZ	RH8124AF	2900p
DXR-8408. PART No. RCTTRH8130AFZZ	RH8130AF	2900p
CDS360E, 360H, 370, 450H/E, CMS150CDH, CMSR400CDH, CP150, CPR400, CPS360, 370. PART No. RCTRH8136AFZZ	RH8136AF	4500p
SONY		
KSS240A	KSS240A	2600p
KSS121A	KSS121A	3500p
KSS151A	KSS151A	1900p
KSS210A	KSS210A	2000p
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

VIDEO RECORDER POWER SUPPLY REPAIR KITS

PHILIPS
For ES7047 Chassis: CP110
Order Code: VCRPSU1 **Price: 675p**

PANASONIC
For ES 7054 Chassis: HSM
Order Code: VCRPSU2 **Price: 1125p**
For ES 7053 Chassis: JSM
Order Code: VCRPSU3 **Price: 900p**
For ES 7050 Chassis: KSM
Order Code: VCRPSU4 **Price: 1500p**
For ES 7051 Chassis: LSM
Order Code: VCRPSU5 **Price: 1500p**
For ES 7055 Chassis: MSM
Order Code: VCRPSU6 **Price: 1650p**
For ES 7052 Chassis: NSM
Order Code: VCRPSU7 **Price: 1750p**

NEW NATIONAL PANASONIC VCR SERVICE KITS

This Service Kit consists of the parts for the upperside of the G deck, G rev. deck and G2 deck.
Suitable for the following models:
AG5150, AG5250, AG5700, AG6024, NVF55, NVF55F, NVF65, NVF75, NVF77, NVJ30, NVJ33, NVJ35, NVJ36, NVJ37, NVJ40, NVJ42, NVJ45, NVJ46, NVJ47, NVJ48, NVL20, NVL21, NVL23, NVL25, NVL28. NVW1, NVFS100, NVFS200, NVFS88, NVFS90
This kit consists of the following:
Pinch Roller Unit, Mode Switch, PS Pull Out Gear, Sub Loading Arm Unit, Pinch Cam, Pinch Cam Cap, PS Unit, Cut Washer, Connection Gear, Cut Washer
Order Code: SK134 **Price: 1100p**

This Service Kit consists of the parts for the lowerside of the G deck, and the G rev. deck.
Suitable for the following models:
AG6024, NVF55, NVF55F, NVJ30, NVJ33, NVJ35, NVJ36, NVJ37, NVJ40, NVJ42, NVJ45, NVJ46, NVJ47, NVJ48, NVL20, NVL21, NVL23, NVL25, NVL28, NVW1
This kit consists of the following:
Main Cam Gear, Ring Gear, Sub Cam Gear, Timing Belt, Centre Gear, Play Arm Unit, Clutch Disk, Loading Gear (take up), Centre Pulley Unit, Loading Gear (supply), Loading Cam Gear, Cut Washer, Retainer Gear Unit, C Ring, Detent Arm
Order Code: SK135 **Price 1000p**

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: Tool23 **Price: 500p**

VOLTAGE TESTER

A terminal screwdriver incorporating continuity and voltage detection supplied complete with batteries on blister card. With Eusoslot and instructions for use.
Order Code: Tool11 **Price: 220p**

SPRING HOOK

Spring Hook, to unlock springs in audio tape recorders and VCR's
Order Code: Tool20 **Price: 265p**

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 meter with powering the LNB as well as in loop. Through operation with satellite RX powering the LNB.

Acoustical signal	:	On signal strength
LED indicator	:	Vertical/horizontal
Frequency range	:	900 to 2050 MHz
Input impedence	:	70 OHM
Power amplifier	:	18 DB
Detection range	:	–60 to –10 DBM
Max. Input SIngle	:	–10 DBM

Order Code: Tool22 **Price: 8500p**

DIGITAL MULTIMETERS

CM2300 DIGITAL MULTIMETER

Features:
- 3.5 LCD Display
- Height 12mm
- Max Reading 1999
- HV Indication for High Voltage
- Single Manual Rotary Switch for Function and Range Operation
- All Ranges Overload Protected
- 10A DC Current Test
- DC Voltage 2V/20V/200V/500V
- AC Voltage 200/500V
- DC Current 200mA
- Resistance 2kΩ/20kΩ/200kΩ/2MΩ
- Supplied with test probes

Order Code: CM2300 **Price: 975p**

CM2400T DIGITAL MULTIMETER WITH TEMP MEASUREMENT

Features:
- 3.5 LCD Display
- Height 12mm
- Maximum Reading 1999
- 10A DC Current Test
- DC Voltage 200mV/2V/20V/200V/1000V
- AC Voltage 200/750V
- DC Current 0.2mA/200mA/20mA/200mA/20A
- Resistance 200Ω/2kΩ/20kΩ/200kΩ/2mΩ
- Supplied with Test Probes
- Temperature measurement
- Continuity Test
- Diode Test and Continuity Check
- All Ranges Overload Protected

Order Code: CM2400T **Price: 1450p**

CM2900 PACKET DIGITAL MULTIMETER

Features:
- 3.5 LCD Display
- Compact and Lightweight Pocket Size
- Maximum Reading 1999
- DC Current and Resistance Overload Protected
- Slide Switches for Function and Range Operation
- Supplied in Wallet with Test Probes
- DC Voltage 2V/20V/200V/500V
- AC Voltage 200V/500V
- DC Current 200mA
- Resistance 2kΩ/20kΩ/200kΩ/2MΩ

Order Code: CM2900 **Price: 1150p**

CM2700 AUTORANGING DIGITAL MULTIMETER

Features:
- 3.75 LCD Display with Decimal Point
- 33 Segment Bargraph display
- Override Indication
- Rotary Switch for Function Selection
- Auto Power off (approx 15 mins)
- Auto Polarity with Indication
- Diode Test and Continuity Test with Buzzer
- All ranges overload protected
- Low Battery Indication
- Supplied with Test Probes
- DC Voltage: 320mV/3.2V/32V/320V/600V
- AC Voltage: 320mV/3.2V/32V/320V/600V
- DC Current A: 320µA/3200µA/32mA/320mA/10A
- AC Current A: 320µA/3200µA/32mA/320mA/10A
- Resistance: 320Ω/3.2kΩ/32kΩ/320kΩ/3.2MΩ/32MΩ

Order Code: CM2700 **Price 4050p**

CM3230 DIGITAL CAPACITANCE METER

Features:
- 3.5 LCD Display
- Height 18mm
- Maximum Reading 1999
- Capacitance 9 Ranges from 200pF–20000µF
- Measuring from 1pF–20000µF
- Single Manual Rotary Switch for Function and Range Operation
- Zero Adjust Knob

Order Code: CM3230 **Price: 3950p**

CM3900A DIGITAL MULTIMETER

Features:
- Large LCD Display
- Height 18mm
- Maximum Reading 1999 + Unit
- Single Manual Rotary Switch for Function and Range Operation
- Auto Power off (approx 15 min)
- Diode Test Function
- All Ranges Overload Protected
- Supplied with Test Probes
- DC Voltage: 200mV/2V/20V/200V/700V Accuracy ±0.5%
- AC Voltage: 200mV/2V/20V/200V/700V
- DC Current A: 200µA/20mA/200mA/2A/20A
- AC Current A: 200µA/20mA/200mA/2A/20A
- Resistance Ω: 200Ω/2kΩ/200kΩ/2MΩ/20MΩ/200MΩ

Order Code: CM3900A **Price: 2900p**

CM3920 DIGITALMETER WITH TEMP MEASUREMENT

Features:
- Temperature Measurement
- Diode and Transistor HFE Test
- Large LCD Display
- Height 18mm
- Maximum Reading 1999 + Unit
- Single Manual Rotary Switch for Function and Range Operation
- Auto Power off (approx 15 min)
- Diode Test Function
- All Ranges Overload Protected
- Supplied with Test Probes
- DC Voltage: 200mV/2V/20V/200V/1000V Accuracy ±0.5%
- AC Voltage: 200mV//2V/20V/200V/700V
- DC Current A: 2mA/20mA/200mA/20A
- AC Current A: 200mA/20A
- Resistance Ω: 200Ω/2kΩ/200kΩ/2MΩ/20MΩ/200MΩ
- Capacitance: 2nF/20nF/200nF/2µF/20µF

Order Code: CM3920 **Price: 4100p**

REPLACEMENT IDLERS & PULLEYS

Make	Models	Description
Hitachi	VT11, 14, 17, 19, 33, 34, 35, 38, 39, 52, 57, 61, 62, 63, 64, 65, 85, 86, 330, 350, 640, 16S, 5030	FF Rew Idler 6886792
Order Code: IDL01		**Price 100p**
Make	*Models*	*Description*
Hitachi	VT680, 6500, 6800, 9300, 9500VT9700, 9900	Play Idler 6861482 6861481
Order Code: IDL02		**Price: 180p**
Make	*Models*	*Description*
Blaupunkt	RTV301, 306, 307, 309, 311, 312, 315, 316, 317, 319, 320, 404, 414, 424, 434, 444, 478, 707	Idler
Goldstar	GHV1221, 1232, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, GHV1248. 8000, 8200, 8210, 8215, GVHP51, VCP4100, 4130	Idler
Grundig	MVS400, 440, VS400, 410, 440VS450, 460	Idler
National	NV230, 250, 260, 280, 370, 380, NV430, 431, 433, 450, 460, 465, 470, 480, 630, 650, 730, 780, NV810, 830, 850, 870, 890, NVG7, 9, 10, 11, 12, 14, 15, 16, 18, 30, 130, 400, AG1000, AG1050, 1200, 1500, 1810, AG2100, 2200, NVH65, 70	Idler Arm VXP 0521
Philips	VR6460, VR6520, VR6920	Idler Arm 40340162
Order Code: IDL08		**Price 100p**
Make	*Models*	*Description*
Amstrad	VCR7000	Idler 150280
Sharp	VC200, 381, 383, 384, 385, 386, VC388, 390, 393, 3300, 8381, 9100, 9300, 9500, 9700	Idler NIDL0005GEZZ
Order Code: IDL10		**Price: 100p**
Make	*Models*	*Description*
Philips	VR6540	Idler
Sharp	VC300, 387, 402, 471, 473, 477, VC481, 482, 483, 486, 488, 496, 500, 571, 573, 581, 582, 583, 584, 585, 8481, 5F3, 5W20E	Idler NIDL0006GEZZ
Order Code: IDL11		**Price: 100p**
Make	*Models*	*Description*
Akai	VS10	Reel Idler
Ferguson	3V23, 3V29, 3V30, 3V31, 3V323V35, 8923, 8924, 8929, 8930, 8931, 8940, 8941, 8942	Reel Idler PU48967
J.V.C.	HR7200, 7300, 7350, 7600, 7610, 7650, 7655, 7700	Reel Idler PU48967
Order Code: IDL20		**Price: 175p**
Make	*Models*	*Description*
Ferguson	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930, 8931, 8933, 8940, 8941, 8942, 8943, 8944	Take Up Idler PU 51402
J.V.C.	HR7200, 7600, 7650, 7655, 7300, 7350, 7610, HRD110, 111, 120, 121, 225	Take Up Idler PU 51402A
Order Code: IDL22		**Price 100p**
Make	*Models*	*Description*
Ferguson	3V39, 3V30, 3V31, 3V32, 3V353V36, 3V38, 3V39, 3V49, 8930, 8931, 8933, 8940 8941, 8942, 8943, 8944	Take Up Clutch PU 51380
J.V.C.	HR7200, 7600, 7650, 7655, 7300, 7350, 7610	Take Up Clutch PU 53462A PU 51380
Order Code: IDL23		**Price: 200p**
Make	*Models*	*Description*
Philips	DB532, VR6520, 6843, 644	Reel Idler
Sharp	VC600, 651, 681, 682, 684, 685, 693, 699, 700, 783, 6FR, 6V3, 6F3	Idler Assembly NPLYV0107GEZZ
Order Code: IDL88		**Price: 615p**
Make	*Models*	*Description*
Philips	VR6843, 6943, 44SB9, VR44SB920, 44SB922, 6943	Reel Drive Unit
Sharp	VC772, 780, 781, 782, 785, 786, VC787, 800, 793, 799, 7810, 7822, VCA100, 102, 104, VCA131, 140, 170, 202, 203, 234, 501, VCA602, 5011, VCD801, 802, VCH851, 852, VCH882, VCM73, VCT72, VC782MK11	Idler NPLTV0111GEZZ
Order Code: IDL90		**Price: 700p**
Make	*Models*	*Description*
N.E.C.	N911, 915, 916, 917, 9012, 9013N9014, 9016, 9033, 9034, 9053, N9054, 9055, 9056, 9066, 9096, N9110, 9120, 9510, 9520, 9530, N9610, DX1000, 1600, 2000, DX3000, PX1200	Idler Arm Assembly
Order Code: IDL245		**Price: 270p**
Make	*Models & Description*	
Philips	**Pressure Roller Assembly PS403-40205** DV186, 190, VR211, 2115, 212, 213, 223, 286, 291, 292, 311, 312, 313, 3210, 3219, 322, 3229, 323, 535BO, VR486, 471, 562, 582, 571, 761, 201, 202, VR203, 302, 303, 305, 6180, 6182, 6185, 6285, 6290, 6291, 6293, VR6362, 6367, 6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581VR6670, 6676, 6710, 6780, 6761, 6762, 6870, 6970, 6975, 86B1, 63SB7, 68SB4, 71SB4, 71SB5, 72SB8, 72SB8, 92SB31, 20DV1, 20DV2, 20RW7, 21DV1, 21DV2, 2SB01, 2SB02, 2SB11, 2SB12, 30DV2, 31DV1, 31DV2, 31DV, 33SB02, 3SB03, 3SB05, 3SB11, 3SB12, 3SB13	
Toshiba	V91, V95 Pressure Roller Assembly – PS403-40205	
Order Code: PR232		**Price: 300p**

REMOTE CONTROLS

Description	Code	Price
AKAI		
RC-V10A	RC876	750p
RCV 37 B	RC891	750p
V25A	RC896	750p
DECCA		
RC70	RC894	750p
FISHER		
RC905B	RC879	750p
GRANADA		
UNIVERSAL TEXT	RC309	750p
MK4 TEXT, 70155G, 70115G, 70133G	RC880	750p
95288E	RC882	750p
94490D	RC884	750p
GRUNDIG		
TP160E	RC107	900p
TP200, TP300	RC380	750p
TP400	RC401	675p
TP590-600	RC600	750p
TP390, TP610	RC610	750p
TP621	RC612	800p
TP630, TP650	RC650	750p
TP666	RC660	750p
TP661	RC661	750p
HITACHI		
CLE800-CLE830	RC140	700p
A617402/655602	RC1920	800p
A512120/230	RC900	750p
A514790	RC901	750p
A5088470	RC902	800p
A518612	RC903	750p
SCL002	RC904	750p
C2096	RC905	800p
A511940	RC906	750p
655602H	RC1920	800p

Description	Code	Price
ITT		
IFB13, 14, 15	RC143	800p
FS4	RC148	750p
RG305	RC305	675p
RG306	RC306	750p
FS9/1-10/1	RC307	750p
VS5 RUK	RC308	750p
VS4-1	RC308	750p
MULTICONTROL (17C20)	RC311	750p
LOEWE		
DC11	RC146	800p
MATSUI		
010270601	RC889	750p
VX770	RC892	750p
NOKIA		
SATELLITE	RC550	750p
ORION		
RC53	RC892	750p
PANASONIC		
EUR51200	RC200	800p
TC2200	RC204	750p
VSQ0357/NV730	RC202	750p
TNQ1621	RC203	750p
PHILIPS		
RC5002,5154	RC134	750p
KT3 NON TEXT	RC135	750p
69117032	RC178	800p
69117194	RC180	750p
RC5991-UNIV	RC300	580p
RC38	RC301	750p
KT3 TEXT	RC5301	750p
RC5352	RC5352	750p
RC5375	RC5375	750p
RC5 STANDARD	RC300	580p
RC5903	RC5903	700p

Description	Code	Price
SALORA		
SERIES L	RC190	750p
86173	RC882	750p
SANYO		
RC218, RC222, RC228, RC238	RC140	700p
JXGE	RC878	800p
JXDE	RC884	750p
VHR2300	RC890	750p
RC628	RC865	750p
SHARP		
G0121CESA, 123CESA, 204,,251	RC140	700p
SONY		
RM604, RM605, RM606	RC140	700p
32 CHANNEL	RC140	700p
RM613	RC141	750p
RM632, RM636	RC160	675p
TATUNG		
FXA	RC877	750p
RC70	RC883	750p
FX70 FASTTEXT	RC894	750p
TELEFUNKEN		
FB632	RC632ST	750p
FB639	RC639	750p
THORN/FERGUSON		
3V35-42	RC342	650p
3V31-32	RC344	750p
3V57-58	RC628	750p
TX10 TEXT	RC732	575p
TX10 STEREO TEXT	RC738	575p
TC9-90-100	RC740	675p
3V55, FV11	RC783	750p
TX100 FASTTEXT	RC789	650p
TX100 ST, FASTTEXT	RC789	650p
PROFESSIONAL	RC790	650p
TOSHIBA		
CT937	RC950	750p
CT9117	RC951	750p

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

SPECIAL OFFERS FROM 15/06/97 TO 15/07/97

MODELS	CODE	NORMAL PRICE	OFFER PRICE
SATELLITE PSU REPAIR KITS			
PACE PRD800, PRD900	SATPSU1	650p	600p
PACE SS9000, 9200, 9010, 9210, 9220	SATPSU2	650p	550p
AMSTRAD SRD510, SRD520	SATPSU3	650p	600p
AMSTRAD SRD500	SATPSU4	650p	600p
PACE SWITCH MODE TRANSFORMERS			
PACE 9000	PACE9000	800p	700p
PACE PRD800, PRD900	PRD800	550p	500p
PACE SETELLITE TUNERS			
PRD800, MSS200 (2 Ghz) (221-2077062)	TUNER01	1850p	1400p
PRD900, MSS500, MSS1000 (2Ghz) (221-2177012)	TUNER02	1650p	1400p

NIKKAI BABY 10 SUPPLY REGULATOR
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A True Story for Telly Folk

The saga of Johnny and his mum's VCRs. By Peter Graves

Tonight's true story for Telly Folk everywhere starts at a time long before the G deck rebuild kit was even a twinkle in its designer's eye and when SMDs could be found only on the top shelf of local newsagents.

Young Johnny Buoy had recently failed his maths exams and should have been spending the afternoon concentrating on his Media Studies, though his Mummy was convinced that he would one day turn out to be a much respected doctor.

Anatomy

It was with the study of anatomy in mind that, on this particular afternoon, while Mummy was out at work teaching, he pushed a tape firmly into the cassette housing of her lovingly cared for Panasonic NV333, switched on the television, sunk into the armchair and, before long, was engrossed in the pursuit of his own higher education.

Little Johnny was very appreciative of the accurate flesh tones provided by Mummy's brand new, large-screen TX100. He had just noticed the condensation forming on the lounge windows when a terrible thing happened.

Disaster

All of a sudden a snowstorm erupted on the screen. Johnny looked down at the VCR and saw that the little red play light had gone out. Horrified, he leapt from the armchair, executed a perfect nosedive, and on his descent sustained two very sore knees from the carpet.

Face to face with the VCR, Johnny pressed the play button. Nothing happened. Nothing continued to happen the next hundred times he pressed the button. In fact he pressed the button so hard that it became very floppy and wouldn't press any more. He did the same with the eject button until, tiring of the attention, it disappeared forever.

Poor Johnny stared at the machine, then peered into the lid. He could see the tape label plainly, swith the words "starring Mary Hinge" screaming at him. He would have to get the tape out before Mummy got home, or she would be very cross and would probably beat him all shades of red, green and blue. This, he pondered, would probably make a very good subject for a programme if only he could afford one of those new camcorder things.

Suddenly he had a brainwave. In a flash he returned to the lounge with his toolbox and quickly found just the thing he needed. He didn't know the name of it, but it was as big as a samurai sword and had a nice lever at the end. It was bound to do the job! With a satisfying 'clunk', the lid was open. But Johnny still had to deal with the problem of the threaded tape.

The friendly Video Store

The following day Mrs Buoy appeared in Mr Busto's friendly video repair shop.

"There's nothing much wrong with it" she declared. "It's just the lid. It won't stay down. My son said it was all right one minute then just went funny!"

Mr Busto soon had the poor machine on his workbench. Although he managed to find the remains of the cassette lock lever, the eject button was nowhere to be found. Neither were the tips of the video heads, nor the other half of the pinch roller.

Friendly Mr Busto soon found the cause of the original problem – an open-circuit mains fuse. He could barely see the break under his huge magnifying glass.

Mrs Buoy was slightly annoyed when told of the number of items that would have to be replaced, especially when Mr Busto added that it would probably need some drive belts and idlers as well.

"That's the last time I buy one of those flimsy Panasonics" she said. "You can keep it for spares."

Mr Busto placed the VCR gently in a safe corner of his workshop. It looked up at him in the sad way that neglected videos do, and he vowed that he would make her better. He was in need of a video machine himself but, as he was only a lowly video mechanic, he would have to purchase the spares one by one as he couldn't afford them all in one go.

Big John

Many moons have passed and Mrs Buoy has long since retired. Big John, as he likes to be called these days, works in an office operating a huge machine that calculates everyone's Council Tax.

His mother occasionally sends him to Mr Busto's shop with the video she bought from "those awfully nice Sony people". Friendly Mr Busto hasn't the heart to tell her the truth any more as he replaces all the smashed bits and realigns her G deck mechanism for the umpteenth time.

The rebuilt NV333 continues to give sterling service in Mr Busto's house, but is nowadays referred to affectionately as Polly Panna.

Goodnight Telly People everywhere!

Oh please God, please God, don't let it get jammed.

What a Life!

Stranger than ever customers, this time mainly with VCRs. Donald Bullock on his experiences at the counter and the workbench

"Tellywise, Mr. Bull, I've got problems" gasped scruffy Burt Crust as he staggered in with a monster TV set. "Hope it ain't going to cost too much, 'cos I've also got problems moneywise."

"Quiet, Crust" I said, brewing up the sweetest smile I could muster, "or I might develop problems temperwise." The set was a Grundig Supercolour B7500 (CUC220 chassis). "What's up with it?" I asked.

"Trouble picturewise" he said. "Well, worser really. There's just a line, like." He cast his eyes around. "Where's that nice young chap with all the savvy? He'll have it done in no time."

I waved him out and he disappeared as though riding a bike against the wind.

Steven came in and I jerked my thumb at Crust's set. "Field collapse" I said, "and the customer wants you to do it."

He went over the usual joints, then had a good tap around, but the raster wouldn't open out. I noticed a mint but dusty circuit sheet tucked into the floor of the set and pointed to it.

Steven dusted it off, opened it out and started to check voltages. Eventually he traced his way to the deflection module, which contains the line generator and field timebase circuits. "There's a voltage here that's hard to check" he said. "They call it voltage D, but it comes straight from a winding on the line output transformer, as pulses."

"Can't power the field timebase with pulses" I said.

But by now Steven had discovered an SKE4G1/04 rectifier diode (D2761) on the module. One of those little oblong things, as big as half an Oxo cube. "Don't like those" I said, "it's bound to be open-circuit."

It was. When a replacement had been fitted the 24V supply and the field scanning were restored. I went off to make the tea.

Mrs Bagstone and Sammy

As I went out Mrs Bagstone barged in with her awful child Sammy.

"Ah, the old 'un's out" she said to Steven. "Good. E's got so soddin' slow, ain't 'e? An' too much mouth lately." As she swung a Samsung SI1260 VCR on the counter Sammy playfully set about swapping the job cards on the sets on the floor, then started to dismantle the remote controls by using them as hammers.

"Don't be brazen, Sammy" Mrs Bagstone bawled. Then, to Steven, "he's ever so brazen. Just like 'is dad. Oh, his 'ead don't go round."

Steven looked first at Sammy, then cottoned on and looked at the machine.

By the time I'd made the tea she'd gone and Steven had the top off her VCR. The display was all right, also E-E operation. But neither the drum nor the capstan revolved. Time to check the outputs from the power supply. There was no always 15V output, and it didn't take long to establish that the 1N4001 diode D212 was open-circuit. When this had been replaced the always 15V supply came up but the problems remained. The 5V supply was missing because D109, another 1N4001 diode, was leaky. This time the new 1N4001 diode got everything going.

Steven had barely finished when Mrs Bagstone returned.

"It's done, Mrs Bagstone" he smiled. "I had to replace a couple of diodes."

"Already?" she bawled. "Only took you ten minutes. Diodes are cheap, ain't they? So you won't be charging me will you?" Then she turned to Sammy, who was stabbing the set tops with our ball pen.

"Sammy, don't be brazen. You'll annoy this nice young man if you carries on like that."

"Right" said Steven, having totted up the bill. "Fifteen pounds altogether, Mrs Bagstone."

The lady froze, shut one eye and glowered at him. "Next time I'll see the old man" she hissed, "you're just a rotten little upstart. Plain ignorant.

Different Job, Different Customer

What a contrast! Our next customer was Juliette Applebright. Poetry in motion. Quite properly, she ignored Steven and smiled at me.

"Could you do something for me?" she breathed.

I felt the need to say something up-to-date and snappy "Affirmative" I said, huskily.

She smiled and waved toward her car. Out crawled Pimple, her somewhat lacking boyfriend. He wafted in, barely able to deal with the weight of her Panasonic NVG21 VCR.

"All crooked" he croaked, leaning forwards and waving his face about in front of mine. "All crooked – the picture like."

As they departed, Steven took the VCR and plugged it in. The picture was all right at first.Then it began to wave and dance about. It then became steadier. And so on

Steven gave the machine the usual initial head and tape transport sevice and tried again more in hope than expectation.He then studied its operation.

"The capstan and drum speeds are varying" he announced as he settled down to the task of getting it right.A new BA6430S chip (IC2001) made no difference, but when he moved the machine towards the light the picture became normal. He evental ly found that the fault could be controlled by flexing the main panel, and after a lengthy time with the

magifier and iron he discovered a dry-joint in the servo section.Once this had been resoldered themachine worked normally.

The Major

Our next caller was Major Hagget, who strode in with a Philips colour set.

"Morning Bullock" he bristled. "Now, I hope this set doesn't drive you as mad as it has me. OK for days, then it cuts out. Sound and all. Wants a spell on the jankers if you ask me. Anyhow, over to you. I want it right, so do your best." Then he strode out.

Obviously one for Steven. He put it on his bench and tried it. The set was one of those fitted with theKT3 chassis – the model number was about two feet long. It worked all right, and continued to do so for several days. Then it suddenly hiccuped a few times, with the sound cutting out and the picture momentarily collapsing to a large, bright pool in the centre of the screen. After that it recovered and worked normally again for ages.

Our problem was the fault's brief duration. The set returned to normal operation before we could do anything. We tried removing the back and covering it with several layers of thick blanket, but even then we didn't have time to take any diagnostic action. So we decided to try a cold repair.

We took out the power supply module and set about cleaning off and remaking every soldered joint. Then we did the same with the timebase generator panel and the line output stage. This took us hours and got us nowhere. The fault remained.

We eventually found that slight pressure around the line output transformer would sometimes produce the fault. Further probing brought us to the cause of the trouble, which was where the EHT lead is connected to the transformer. The insulation at the end of the lead is stripped back half an inch and pressed home into a socket within the overwind moulding. The bare part of the lead had a spark-tarnished end. We cleaned it off, retinned it, pressed it firmly back and tried again. The fault had been cured.

"Good work" the major cried when he collected his set. "If there's another war I'll do my best to get you called up first. We'd need men of your calibre."

Mrs Barger and Oscar

Mrs Barger appeared at our door with her son Oscar. She was carrying an Akai VS427EKV VCR while he was nursing a large pile of coloured handbills.

"Give 'em a few, son" said Mrs Barger. "The sooner you gets rid of 'em the better."

"Don't like to, mam" said the boy.

She bundled him into the shop, and as she put the recorder on the counter he dropped all his handbills.

"It's jammed up" she said, tapping the machine. "We took it to Snoddy's first 'cos they gives free photos of the Spices Girls, but after looking at it they recommended you."

Meanwhile Steven was reading one of the handbills.

"Snoddy's for all your repairs" he read out. "Speed and efficiency combined."

"What are you handing these things out for?" I asked.

"Five quid" she said as she scooped them off the floor. "Wanna few on the counter for your customers?"

We waved her out and put her machine on the bench. It refused to rewind because the right-hand spool's brakes stayed on. In the fast-forward mode the idler wasn't making contact with the spool. We cleaned everything and carried out lubrication as necessary, but this made no difference. So we looked at the mode switch. It was very tarnished, but cleaned up like new. When we'd refitted it the machine worked well.

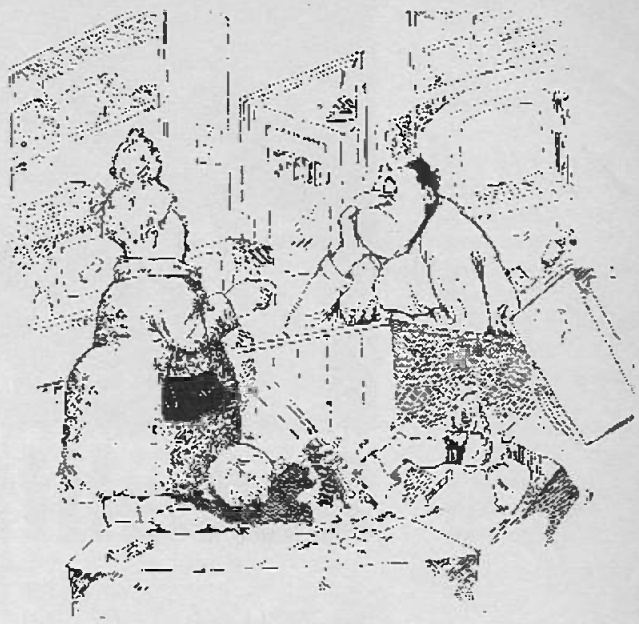
We then sat down and assessed our stress levels as a result of her unreasonable behaviour, including the handbills. We decided we'd need two pints of beer each to set us right. Taking this into account, we worked out her bill.

A Hairdryer

Our next customer brought in a modern hairdryer that appeared to be part hedgehog. It's mains lead was open where it met the plug. After repairing that I tried it. As there was a terrible clattering noise, I swiftly withdrew the plug from the mains supply.

"The noise is normal" Steven said. "Lots of 'em make that noise nowadays."

I looked at him in disbelief. "Well, there's no need for it" I said. "Forty years ago they were silent. Favourite was the Morphy Richards. I liked them because each one had a paper capacitor in the handle. It would go short-circuit and stop the thing working. I fixed them for a couple of quid a time. Not bad money. A pint of beer was a shilling then."



"He's ever so brazen, just like 'is dad."

Ecclesiastical Matters

A large scruffy car with a running board swung into view outside. Out bundled the portly Reverend Goode. His timid curate, the Reverend Blande, followed. He was carrying a Samsung video.

"Bless you, gentlemen" beamed the reverend. "My curate has problems."

"Problems" said the curate.

We nodded understandingly.

"It's the flecking picture" said the reverend.

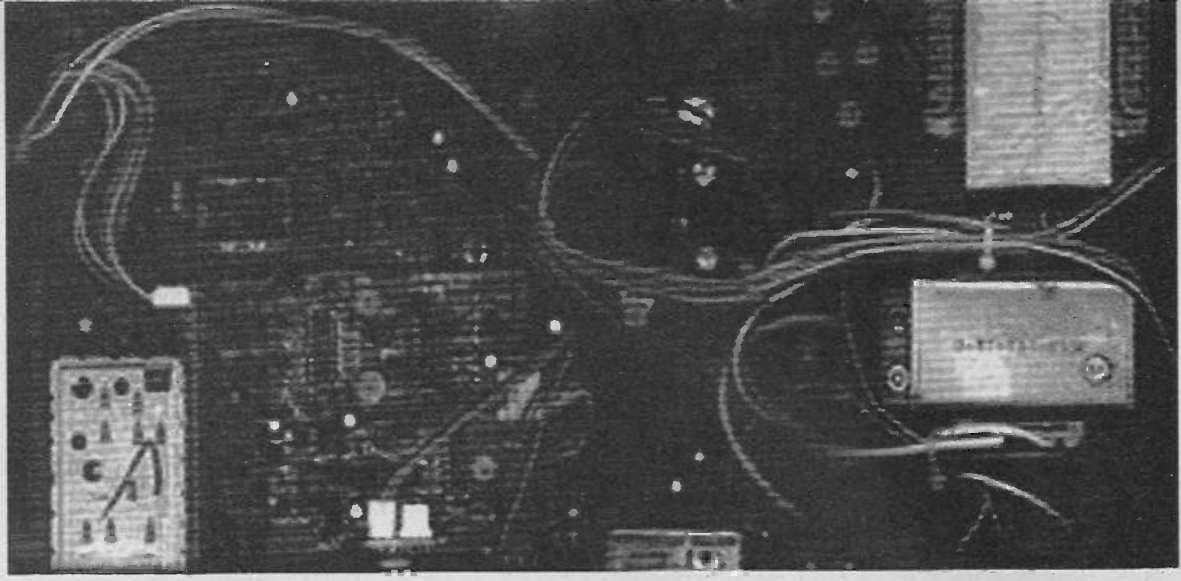
We spun round.

"Little flecks all over the place" he continued.

"Little flecks" said the curate.

They left the machine andtrouped out. It was an SI1260, and the picture it produced was covered with interference blips. When the sharpness control was adjusted, the blips almost disappeared at one point. We gave the machine a basic service to see whether this would help. It didn't.

After further checks we decided that the probable cause of the problem was hash on a DC supply. We checked the feeds to the signal circuits, then those to the power stages, all to no avail. Before long the only item we'd not looked at was the front control panel. There are two PCBs here, connected by a ribbon-cable plug-and-socket (CN704 and CN701) assembly. Careful examination revealed that the stranded conductor to connector ten was splayed, and that a single strand was split and was touching connector nine. Tidying this up cured the fault.



Satellite Notebook

Reports from Hugh Cocks

Pace Sockets

After repairing an SS or PRD series receiver I always check the audio output phono sockets and if necessary resolder them to the PCB. They can be subjected to mechanical stress when the PCB is refitted into the case. If the receiver is connected to an audio system, the problem may show up only back at the customer's house – the sockets are not normally used for test purposes in the workshop.

I often find that the decoder scart socket is reluctant to go back into its hole in the case, and can suffer some strain in the attempt. If it's not located properly, the plastic front panel will go on but the plastic buttons won't push the PCB switches properly.

An audio problem can occur when using an SS or PRD receiver with an Astra 1D converter that's switched in/out by the TV/SAT button on the remote control unit. When this button is pressed, the converter switches but the audio output from the phono sockets is muted. The UHF and the TV and VCR scart sockets are not affected. If the VCR scart is in use an audio feed can be taken from the decoder scart socket, either directly or by linking the scart socket's audio output pins to the phono sockets. Note however that when using the decoder's audio output both audio channels are permanently connected – selecting a mono output from either the left or the right channel isn't possible. **H.C.**

Baked LNBs

I've come across a couple of installations recently where the LNB had been wrapped in tin foil – not unlike a baked potatoe! This 'protection' didn't help much. Both LNBs (Cambridge types) had failed during the rainy season. It seems that water had become trapped between the foil and the LNB's body, and had then entered the LNB via the top cover seal. The rubber gasket may have become more compressed because of the heat, enabling the trapped water to get in more easily. **H.C.**

Wideband Signal Meters

Some installers don't like wideband signal strength meters, probably because they can be temperamental and because what you get is a 'relative' signal strength reading. I find them very useful for aligning dishes however, as they show up the slightest variation in the dish position. But they are not so well suited to lining up two LNBs with one dish, as you need to be sure that you are picking up the signals from the required satellite.

They survive rough treatment very well – this includes being dropped from a ladder! Our oldest one is now seven years old and is still working.

Some maintenance has to be done from time to time. The main problem that causes variable readings is that the PCB needs cleaning. Dust accumulates over a period of time, and this causes no end of trouble under humid conditions. Basically the circuit consists of an RF amplifier followed by a diode detector and then an operational amplifier. It's all rather high-impedance, and damp dust around the operational amplifier does nothing for the stability of the readings. Also make sure that the F sockets are tight and have good soldered joints. All F connectors used should make good contact with the coaxial cable braid: any poor contact along the path will result in intermittent readings.

If an LNB's performance is at all in doubt, the meter reading will be erratic. This is especially the case when there is water inside the LNB. If the meter is connected in line with a long cable run some of the higher IF channels, such as CNN, can appear sparkly. Don't make any subjective assessment of picture quality until the meter has been disconneted from the line. Finally, if at all possible make sure that it's difficult for water to get into the meter during use. **H.C.**

Pace MSS100 adjustments

One Pace MSS100 receiver we installed would regularly – every five minutes or so – produce audio hiss, the vision remaining OK. The cause of the hiss was that the audio demodulator phase-locked loop went out of lock intermittently.

The MSS100 has an adjustment for this in a service menu. Using the remote control unit, press F, menu, radio and store in quick succession. 'PLL Offset' will then be flashing, with a value beside it. This is normally +1, 0 or –1 – the range goes from –7 to +7. With the receiver concerned, the menu showed that the value was +2. The problem was cured by using the channel up/down buttons to alter this to –1, then pressing store.

The other adjustment in this menu is contrast, which has a default value of 47. With later receivers this shouldn't normally need adjustment, even with high-contrast, wide-deviation Eutelsat signals. If the UHF modulator produces buzzing on sound and a picture that bounces on peak whites during Euronews or NBC Super via Eutelsat (these are the brightest

channels), reduce the setting to 40 or a little below. Some early production receivers need contrast reduction: don't reduce it too much, as the Astra channels may start to look a little dim. **H.C.**

Pace Power Supplies

Several Pace SS and PRD series receivers that had obviously been recently repaired (not by us!) have come our way recently because they failed again within a short time. C5, C7 and C8 had been replaced in the PRD receivers and C9 in the SS receivers. In all cases 63V capacitors had been used and were bulging after their failure. This in turn resulted in the demise of the chopper transistor, the fuse etc. – the usual sorry saga.

The 63V rating is too high. These capacitors fail because they don't receive sufficient polarising voltage. Use 25V or, as an absolute maximum, 35V working voltage capacitors in these positions. preferably 105°C types for optimum reliability. **H.C.**

Pace Channel Downloading

Being able to download channel information between Pace receivers of the same type, or via a PC, is a great help. But problems can occur.

One of our customers has three MSS138 (the non-decoder version of the MSS100) and three MSS100 receivers in his vast house. He wanted some channels rearranged, and we thought that this would be an easy matter. Do the first receiver then programme the others from it – not mixing up the MSS100 and MSS138 receivers of course. Naturally this is what happened. They look exactly the same, especially when the MSS100 doesn't have a card in the slot.

When an MSS138 has been programmed from an MSS100 there will be no picture with any VideoCrypt channel. This is very confusing when it first happens to you. The remedy is to reprogram the MSS138 from another MSS138 or via the Pacelink PC downloading system. When using this technique, be careful not to load an MSS138 file into an MSS100 by mistake.

I tried the reverse situation, loading channel information from an MSS138 into an MSS100. The receiver will work all right, but you will have a second LNB menu (the MSS138 has two LNB input sockets), also 15/27MHz video IF bandwidth menu selection – this has no effect as the relevant tuner isn't fitted.

There's a 99-channel version of the PRD800. I believe it has been known as the PRD700 but have come across it only as the Thorn Sat 99. You can load it from the Pacelink system, but it will accept only the first 99 of the 120 channels in the file. Don't try to load the Sat 99's channel information into the computer, calling it a PRD800 (there's no Sat 99 file information in the Pacelink), as the receiver downloading will stop at 87 per cent complete on the computer and the operation will have to be abandoned.

Probably the easiest solution is to convert the 99-channel receiver to 120 channels – your customer is likely to appreciate the upgrade if nothing else! All you have to do to carry out the 21-channel upgrade is to remove two surface-mounted 4·7kΩ resistors, R551 and R553. They are marked 472 to indicate their value and are connected to pins 14 and 16 of the microcontroller chip (U2), immediately beside each pin. Unsolder them with care. **H.C.**

Pace VC100 Decoder

I've had to replace C2 (100µF) in a number of Pace VC100 stand-alone VideoCrypt decoder units in recent months. It couples the video input to the base of transistor Q1 (see Fig. 1), via a network that provides video de-emphasis if required.

Intermittent decoding with peak-white scenes, also intermittent poor video quality, were the complaints with one VC100 that came in recently. As usual, the culprit was C2. While I was checking voltages I noticed that slight reverse bias was being applied to it. The capacitor had been inserted the 'right' way round, and the circuit diagram shows its negative side connected to the junction of R4 and R5 with the positive side returned to chassis via R1 and R2. This arrangement might work if the incoming baseband video wasn't isolated and a positive DC voltage accompanied it, though the 82Ω terminating resistor R2 might be a little hot and bothered if the voltage was too high.

Anyway, fitting the replacement the right way round for correct biasing produced good results. This fault has taken three or so years to show up, presumably because the reverse bias voltage is only slight and C2 is mounted in a relatively cool spot.

No picture was the complaint with another VC100. Video was reaching the actual decoder module, and there was a decoded video output from the module. I replaced and reversed C2, but the cause of the problem this time was transistor Q22 (BC547B) in the unit's output amplifier/filter circuit.

The decoder's power supply is basically the same as that in the SS9200 receiver, but with only 5V and 12V outputs. It very rarely gives any trouble.

There's an export version of the SS9200 receiver without the VideoCrypt decoder board. This also has a trouble-free power supply. Presumably the additional current demand of the decoder panel and the consequent extra heat are what causes the power supply grief in the SS9200 integrated receiver-decoder. **H.C.**

Amstrad SRD600

The owner of one of these combined VideoCrypt/MAC receiver-decoders phoned to say that it no longer produced pictures or sound. I expected to find a dead power supply, but there was normal channel number indication and a quick check showed that the power supply was producing the correct outputs, with no overheating anywhere in the receiver. There were no outputs from the modulator or the scart sockets however.

While having a good look around I noticed that a small cable which connects the UHF modulator to the main PCB (the modulator and power supply are mounted on a separate panel) didn't seem to be making very good contact with the socket on the main PCB. Indeed some tape had been stuck over it during manufacture, the plug/socket being a sort of press-fit affair.

When I removed the tape and pressed the plug into the socket fully the UHF and scart outputs had been restored. To prevent recurrence of the problem I used a hot glue gun. Strange that the problem had taken several years to show up. **H.C.**

Pace MSS100 – Correction

The mains bridge rectifier's reservoir capacitor C3 was mentioned in a note on this model last month (see page 573). Its value must be 47µF, 400V. This is a special type that should be obtained from Pace or a specialist satellite receiver component supplier.

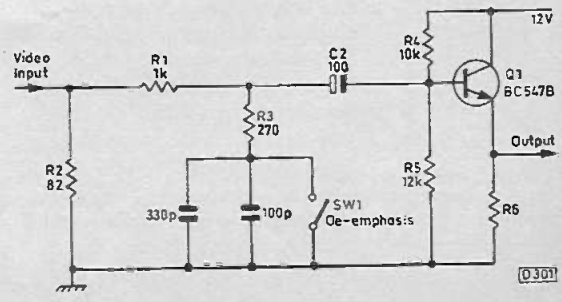


Fig. 1: The baseband video input circuit in the Pace VC100 VideoCrypt decoder. For some strange reason the original design has C2 connected the wrong way round. It often fails. Fit the replacement with the positive side connected to the junction of R4/5.

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: Service manuals (purchase/loan) or photocopies for the Canon camcorder Models E6E and E90E. Adrian Tullett, Unit 4, Hawkins Lane, Burton upon Trent, Staffs DE14 1QH. 01283 510 599.

Wanted: Remote control handsets for the Mitsubishi Model HSM55 VCR and the Mimtec Premiere 2IRD satellite receiver – or information on a source of supply. E.J. Edwards, 43 Hoose Court, Market Street, Hoylake, Wirral L47 5AB. 01516 320 614.

Wanted: Chip UN101 for a Canon portable VCR, or the power supply PCB that uses it. Also circuit diagram and wired remote control. K. Williams, 71 Yewtree Road, Hunts Cross, Liverpool L25 9QS. 01514 867 865.

Wanted: Service data and circuit diagram for the Protar Visto A14CM colour monitor. Keith Steele, 24 Moat Hall Avenue, Peel Green, Eccles, Greater Manchester M30 7LR. 01612 883 229.

For disposal: *Television* magazines from 1968 to 1992. Please write or phone for free list. John Stacey, 3 West Park, South Molton, North Devon EX36 4HJ. 01769 573 382.

Wanted: Circuit diagram for the Echostar 6500 satellite receiver, including the power supply part. H.S. Jeetley, 75 Hamsteadhall Road, Handsworthwood. Birmingham B20 1HU. 01215 238 992.

Wanted: Service manual (photocopy OK) for the Tektronix Model 453 scope. Also a Y output amplifier IC (part no. 155-0168-00) for the Tektronix 475A scope, or can anyone suggest an alternative, possibly from a different scope? P.H. Stanley, 1 Bagshaw Street, Newton, Hyde SK14 4TN. 01613 688 467 or 01614 940 498.

Wanted: Lower drum unit and video head assembly for the Panasonic NVF55 Nicam VCR. R.E. Marsh, 32 Fairlands, Bognor Regis, W. Sussex PO22 9BU. 01243 868 525.

Wanted: AC adaptor and instruction book for the Trigem SX386/20NP Gemnote. Have for disposal a Tektronix V520 PAL/NTSC vectorscope in need of repair. V. Smith, 175 Lyon Park Avenue, Wembley, Middx HA0 4HD. 0181 902 5447.

Wanted: Circuit diagram for the Technicolor 312E(1) camera power adaptor. Nickel-cadmium battery pack type 512 for the Technicolor VCR Model 212E. CVC video cassette tapes for the Technicolor 212E player. A. Rogers, 21 Pleshey Close, Thorn Church Meadows, Milton Keynes, Bucks MK5 6EP. 01908 504 657.

Wanted: Commodore 64 programmer's reference manual. John Mangan, 14 Chancery Lane. Huddersfield, W. Yorkshire HD1 2DT. 01484 435 014.

Wanted: Circuit diagram (photocopy OK) for the Uniden UST92 D2-MAC decoder. Also feature can (working ex-equipment OK) for the Philips widescreen TV Model 28PW9631/05. Graham Thomas, 4 Oak Tree Close, Buckley, Flintshire CH7 3JU. 01244 544 147.

Wanted: Transformer for the Telequipment D66A oscilloscope. G. Gwinnutt, 9 Llancaiach View, Nelson, Mid. Glam. CF46 6EW. 01433 450 382.

Wanted: Am still after Sinclair calculators, very early models – basic 4 function, kit information instructions, original box etc. Also Sinclair Blackwatch, kit information, instructions etc. *Television* magazine indexes Vol. 41 to 46 required. photocopy OK. D. Lee, 16 Devonshire Place, Claughton, Birkenhead, Merseyside L43 1TU16.

Wanted: Circuit diagram for the Pye CTV Model 37KV1242, also if possible the SW AP100 amplifier (CSR Ltd., Poole, Dorset). P.T. McKeever, 4 Castleview Park, Derry BT48 8DL. 01504 353 613.

Wanted: Manual (photocopy OK) for the Philips CD104, or even just advice on adjustments. S. Sheppard, 12 Bedford Road, Harrow, Middx HA1 4LZ. 0181 863 5150.

Wanted: Help with converting a Mitsubishi Model CT3703STX (Euro 4Z chassis) to accept an NTSC video signal. Does anyone have any information on the US or multi-system model? Also require a data sheet for the TDA4556 chip. Keith Bennett, 109 Flatts Lane, Normanby, Middlesbrough TS6 0NP. 01642 469 723.

Wanted: Reel-to-reel tape recorder capable of accepting 10·5in. diameter spools. Must be complete but not necessarily working. Vertical operation essential. Exchange considered. C. Toomer, 54 Hardie Avenue, Rugeley, Staffs WS15 1NT. 0188 958 478.

Wanted: To buy or borrow, handbook for setting up the Goodmans TX1200 VCR. H. Simmons, 9 Briggate Crescent, Whittlesey, Peterborough PE7 1DN. 01733 753 595.

Wanted: Coils T3/4/5 or surplus PCB for the Goodmans Quadro 901 mono TV/radio. Peter Dooley, 17 Hall Drive. Greasby, Wirral L49 1RW. 01516 773 670.

Wanted: 33·86(88)MHz ceramic resonator for a Creative Labs type CD220E CD-ROM drive, or a broken, complete unit for spares. Also a service manual or circuit diagram for the EMC EM1428 SVGA colour monitor. Julian Salt, 01476 861 107.

Wanted: ESM472C field chip for the Saba CTV Model T8612Q. John Holland, Re-Vision, 165 Albany Road, Coventry CV5 6NE. 01203 715 260.

Wanted: Operating instructions (photocopies OK) for the Telequipment S43 scope. Also type

3714002 LOPT used in Saisho/Matsui/Amstrad CTV sets. P. Guarini, 31 Aldgrson Avenue, Rawmarsh, Rotherham S62 7DE. 01709 371 188.

Wanted: 11TT01 teletext board for the Bush Models 2114/2020/2321 and a capstan motor for the Mitsubishi HSB30 VCR. P.A. Unwin, 86 Ivybridge Road, Styvechale, Warwickshire CV3 5PH. 01203 412 196.

For disposal: Gould OS1400 20MHz dual-beam digital scope with manual. Not working but CRT OK. Advance OS2100 35MHz dual-beam scope plus three plug-in extended range timebases. Full working order with manuals. Offers. Len E. Fleming, 72 Eastway, London E9 5JH. 0181 985 8659.

Wanted: Two STK0030 Darlington power packs. P. Smith, 20 Robbins Close, Bradley Stoke, Bristol. 01179 696 964.

Wanted: Information on the tuning and storage procedure for the Salora M chassis with Nicam, or copy/loan of user guide. Set is a Finlandia badged one. Iain Emerson, 74 Culloden Road, Balloch, Inverness IV1 2HH. 01463 790 357.

Wanted: STK2028 output chip for a Technics amplifier. A66-540X tube for a Philips receiver (K30 chassis). Service manual for the Samsung SI3260 (photocopy OK). Stuart Fletcher, 131 Walsh Avenue, Hengrove, Bristol BS14 9SQ. 01275 891 893.

Wanted: Remote control unit for the Hinari VTV300 TV/video, or information on a possible source of this. Contact John or Shaun at J.T. Bibbs TVs, 3 Church Street, Stapleford, Nottingham NG9 8GA. 01159 394 335.

Wanted: Working or non-working remote control handset or case only for the Sharp VCA63HM. Hinges and foldover front must be intact. Geoff Hunt, 22 Usk Road, Tilehurst, Reading RG30 4GH. 01189 421 119.

Wanted: Complete loading assembly and any other spares for the Amstrad VCR4600, also circuit. DER 8924 lower mechacon panel and circuit. ITT VR3984 spares, tuner panel, power supply and circuit. Circuit photocopies OK. K.J. Walters, Top Flat, 146 Locking Road, Weston-super-Mare, North Somerset BS23 3HQ.

Wanted: Cassette deck for the Philips VR6485/Granada VHSGP7. Chris Hayter, 10 Dukes Road, Eaton Socon, Cambs PE19 3DD. 01480 385 074.

Wanted: Chassis identification and/or circuit diagram for the Dainchi Model CTV1400. Ray Davis, 285C Bradley Lane, Holt, Trowbridge, Wilts BA14 6QE. 01225 782 787.

Wanted: Remote control unit and circuit diagrams (will photocopy and return if required) for the B&O Beovision Model 7102. D. Kenney, 45 Bicton Avenue, St. Peters, Worcs. WR5 3TF. 01905 351 905.

Wanted: Main and display boards for the Panasonic NVL20B VCR. Keypad for the Toshiba ER5720 microwave. Does anyone know of a source of circuit diagrams for phones? C. Raynor, 35 Northway, Lymm, Cheshire WA13 9AT. 01925 822 673.

Wanted: PCB with working power supply and/or service manual/ circuit diagram for the Wang 1413A computer monitor. Also manual/circuit for the Compaq 240 computer monitor. A.J. Crush, 56 Lower Road, River, Dover, Kent CT17 0QY. 01304 824 227.

For disposal: Dual-standard Bush monochrome TV dating from about 1966 with service manual, also many manuals and some radio/TV valves of that era. SAE G. Griffin, 8 Colton Road, Harrow, Middx HA1 1SG.

Letters

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, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Automatic ADX Control

Having now modified my Pace SS9200 satellite receiver along the lines suggested by Martin Pickering in his article (Automatic ADX Control) in the May issue, I would like to comment on a few points.

The SS9200 (I don't know about the SS9000) makes use of pin 14 of the decoder scart socket. With this model two decoders can be connected to the scart socket via a specially made up lead. The second decoder is for video only and uses pins 10 and 14 with pin 18 as the status line. This scart socket has several earth pins, but they are all associated with signal pins. The only other possible pin to use is no. 12, but this one is used to transmit data to a Pace positioner if one is fitted. I solved the problem by using pin 11 of the VCR scart socket. This pin is not used, and is soldered to an unconnected PCB pad - so you don't even have to cut the pin.

Use of a 270Ω, 0·5W resistor as the collector load for the BC547B transistor in the modification is not advisable. With 12V across it, when the transistor is switched on the resistor will dissipate a little over 0·5W. I used a 470Ω resistor.

The Pace SS9200 circuit diagram shows two additional 4·7kΩ resistors and a BC547B transistor (R293, R269 and Q40) associated with a box labelled "dual LNB option". I would not have expected to find these components fitted in a single-input receiver, but R269 and Q40 were present in mine.

A neater way of carrying out the modification would be to fit R293, R269 and Q40 in the allocated positions. The two resistors are surface-mounted types, their locations being on the underside of the board. Q40 is to the left of the tuner, looking from the top front. If fitted, R271 must be removed. Q40's load resistor was shown in the modification going to link 25, which is at 12V. A convenient point near Q40 to pick up this voltage is at the right-hand end of R109 – above and to the right of Q40. I stood the 470Ω load resistor up half an inch for maximum ventilation. The lead to the scart pin can be taken from the junction of Q40 and its load resistor. I didn't bother to fit the LED.

One other thing I found is that the setting up is the other way round, i.e. the 1D channels have to be LNB1 and the others LNB2.

Gareth Foster,
Twickenham, Middx.

Martin Pickering replies: The points raised are all correct. Although none of the forty or so conversions I have carried out has failed, for greater reliability it would be sensible to uprate the 270Ω resistor to 1W.

My reason for not using Gareth's neater method of mounting the components was to make it possible to fit them without having to dismantle the receiver. But as most users will want or need to fit the reliability upgrade kit, with high-temperature capacitors and an inductor to get rid of 'streaky pictures', the PCB would have to be removed anyway.

Future of the Trade

I feel that I should reply to Shane Humphrey's letter (April) in response to my earlier article. I'll take his points one by one.

(1) The profit margins associated with selling brown goods are, in my experience, so low that you won't make much of a living unless your turnover is huge (thousands of units a week). In fact even the big boys make little if any money from selling brown goods. The real money is made through finance, either HP agreements and/or extended warranties. Manufacturers get involved in price wars because the big retailers set the prices at which goods can be sold, even by the smaller retailers. In addition the big retailers are keen to promote their own brand goods, as there is far more profit in this. And as I pointed out in my original article, brown goods have no status value.

(2) Yes, as long as TV sets have a power supply and a line output stage, and VCRs and Hi-Fi units use cheap plastic cogs, they will require servicing. The problem is the cut-off point – the point at which repairs to a particular product become uneconomic. As equipment becomes cheaper, the cut-off point comes down – but the expenses involved in running a repair service rise. You could reduce your labour charges of course, but there comes a point where you won't be making any money.

(3) I was reading the February 1990 issue of *Television* the other day. A slump in servicing was reported, but it was hoped that there would be a rise in the price of new equipment. This never happened. New equipment is now on sale at even lower prices. The stage at which manufacturing to a standard rather than a price became the norm was never reached. Manufacturers' belief that their products must cost less than those of their rivals has not changed. So manufacturers profits fall and cuts have to be made. Two areas where these cuts have become apparent are in technical help and advice and spare parts ordering – with both you need to have a manufacturer's account. Spare parts stocking is put out to distributors, who in some cases charge up to double the manufacturer's trade price – and this *is* to the trade!

(4) See my answer under (2).

(5) I agree. The world of home computers is going to become more closely linked with that of home entertainment. But to fix this gear

you will have to have more and more specialist equipment. Will it be worth investing in this? Even now, I find that customers are turning down estimates of £50 to repair a VCR or TV set. What will it be like in the future? Will the thousands you have invested in jigs, desoldering irons, special scopes, logic analysers and so on pay off? Only time will tell, but I think not.

Michael Maurice,
Wembley, Middx.

Internet Info

Following the article "Internet Matters" by Martin Pickering, I would like your readers to know that there is an on-line information system which is not only for engineers but is also free to use. The Television Engineers bbs has been running for over two years, and was set up as a self-help forum for engineers to exchange tips and ideas.

The system is on 24 hours a day at 01275 879 005, with speeds up to 28,000bps. There are two interfaces to the system, the normal ANSI terminal mode or the new GUI which uses Microsoft Internet Explorer to browse the pages on the system. Anyone wishing to connect using the GUI must first download the client software in order to run the browser and other client software. This software is all you need to use the system – and it's free.

If anyone would like to try out the system and is having connection problems, I can be e-mailed on 100306.1241@Compuserve.

Jonathan Lye,
Clevedon, Somerset.

Service Manuals

When is a service manual not a service manual? When it is supplied by Sony UK, apparently. We ordered a manual for a Sony SLV625 from CPC of Preston.

Two days later it arrived, and with great relief I snatched the manual from our Governor and began searching for the deck timing instructions. I found the error codes but no timing instructions. As my frustration threshold was approaching, I passed the manual to our Fred. Now Fred is rapidly approaching retirement (he often talks about John Logie Baird and the arrival of 625 lines and colour, so we don't ask him his age). Eventually, having found his reading glasses, he studies the manual. This takes all of ten minutes, interspersed with sips of coffee made by our youngest engineer Ian. I wait with bated breath until Fred breaks his silence. "It's a bit different to the 3V29 – and there's no timing instructions for the deck". Maybe I'm not so thick after all! He pointed to some small writing – "supplement required for mechanical timing".

So I phone CPC who check our order, but they don't have the supplement. They suggest we contact Sony UK technical, who tell us it will cost an extra £2.88.

As my Volvo 740 workshop manual and my JVC manual came complete, I wondered what Trading Standards would have to say? They said if a service manual is sold as a service manual and not an instruction manual, it should cover all the sections of the unit. I have put this to Sony, but with no response to date.

M.A. Smith,
Weymouth, Dorset.

Editorial comment: It could simply be that the supplement covers a number of other models as well. It is often convenient to publish specific and general information separately. Unfortunately this can cause frustration and delay. Have readers any strong views on this?

Servicing the Accountants' Way

I have worked for large servicing organisations and have seen what goes on to reach productivity targets. Yes, it's exactly as Bob Chisholm described in the April issue. Local management do know what goes on, and encourage it. All they are interested in is the throughput.

This is a sad state of affairs and is why I am trying to get out of the servicing industry. I've been repairing TV sets, VCRs and audio equipment for ten years and have seen salaries increase by 1-1·5 per cent each year, not even keeping up with inflation. The more engineers I talk to in the trade, the more I hear "I want out" being said.

K.J. Woolley,
Pontefract, W. Yorkshire.

Secondhand Sets

Much of my work now involves supplying secondhand sets. I wonder if other engineers have similar experiences to mine in this respect? A typical chain of events this week went as follows.

A customer phoned, desperate for a cheap teletext set. As I didn't have one in stock, I made a rather unfavourable trade with another dealer for a working 22in. Panasonic receiver. On bench testing this set I decided that I could not in good conscience sell it with the rather poor CRT it had. As I had a scrap set with a suitable tube, I decided to change it.

While extracting this scrap set from the pile, the whole stack of sets behind it fell forwards and landed on the concrete floor – including the one I had just bought! After clearing up the mess I set about installing the replacement tube. Having done this I switched on the set, which now no longer worked. It had a raster, but no signals or remote control functions. Tests showed that the 5V supply was low at about 4V and the microcontroller chip was short-circuit. Why? To cut a long story short, the set is now scrap.

So to plan B. Under the bench I had a Grundig FST set with a known faulty microcontroller chip. I had managed to salvage a chip from a scrap chassis, as a new one costs in excess of £25. The original fault was that sometimes, when changing channels, the number would change but the station would not. When I fitted the replacement chip, the set came on in the text mode. The only way of getting a picture was to press the AV button, but this left the teletext page number at the top of the screen. The only way to change channels was to press the appropriate button three times! . . . Back under the bench.

The only other text set I had was a 22in. stereo Philips, which I was delighted to find came to life when it was connected up. But it wouldn't tune. Yes, you've guessed it, a faulty microcontroller chip.

I think I'll get a job cleaning drains.

Peter Nutkins,
Charmouth, Dorset.

Fireworks

I read the letter from S.Woodbridge-Smith (April) with interest. The fault with his Matsui receiver rang some bells – I had a similar time-wasting episode myself (but fortunately not a visit from the police).

The set concerned was a Matsui Model 1455, but I expect that similar models could be affected in the same way. C607 (47µF, 25V), the chopper transistor's base drive coupling capacitor, had an intermittent fault. When the fault was present, the HT rose alarmingly – giving rise to the fireworks noted in the previous letter. I had not realised this when I first repaired the set: when it bounced back, the line output transformer had failed! The moral, with this and similar sets, is to replace C607 before you touch anything else.

Incidentally I gather that the Matsui Model 1424 is subject to a recall by Dixons/Currys as it can catch fire

under a fault condition (what the fault is I'm not sure, but those blue disc ceramics in the power supply seem favourites).
Michael Bliss,
Harrold, Beds.

Modern Technology

A recent article in *The Observer* dealt with the problems many people experienced when the Ch. 5 tuners were busy. Often with no previous experience of modern electronic systems, and after only a short training course, the retuners had my sympathy. A few years ago I was called out to tune in a brand new Mitsubishi TV and VCR that the customer had purchased at some superstore many miles away. He had spent half a day poring over the user manuals and finally given up in despair. It took me an hour and a half to set up those monsters. The next day he phoned to say that he had pressed a wrong button and lost the lot!

The remote control handset has become an essential part of much equipment. The other day I had in a Matsui VCR that couldn't even be rewound without the remote control unit – needless to say the customer had omitted to bring it. People who move into the district have often lost their user manual, and getting a replacement can be very difficult. Others may have mislaid or dropped their handset, which with some sets can cost an arm and a leg: in the meantime the set cannot even be retuned to the local transmitter.

In my opinion manufacturers have lost touch with the needs of the vast majority of people as they vie with one another to devise increasingly sophisticated fronts to their products. Most of my customers look back with nostalgia to the days when they could, with the aid of a few simple instructions and controls on the set itself, manage the equipment themselves. The domestic electronics industry seems to be mesmerised by the infinite possibilities of modern technology into giving people complexities they neither need nor want.
L.P. Watkinson,
Holsworthy,
Devon.

Technical Advice from Akura

Much has been written in the past about the lack of technical support offered by manufacturers. Well all is not lost! I was recently asked to look at a Minoka brand TV set that was totally unfamiliar to me. The problem was no line drive, and I was able to localise the cause of the fault to a daughter board that controlled video, teletext and line drive. However in case I had missed something I rang Akura to seek further advice. The person I spoke to (Donald) could not have been more helpful. He gave me some key points to check, and I was able to confirm that the fault was indeed on the daughter board. As a matter of interest, I found that by unsoldering the reset pin at the video controller chip I could get the set going (without video).

Akura offers a service exchange on the panel for £39.60, and I received a replacement just a few days after sending the old panel back. The set then worked perfectly.

Top marks to Akura for fast and above all helpful service.
Richard Newman,
Croydon, Surrey.

Decline in VCR Quality

The design and build quality of today's VCRs leaves a lot to be desired, to put it mildly. A particularly worrying feature is the fact that so many operations, including rewind and fast forward, are carried out with the tape fully laced and the drum spinning. Some models even leave the drum rotating in the 'stop' mode. I can see that this might give a faster response to user commands, but it must surely be at the expense of greatly increased head and motor wear.

The mechanical arrangements have been cut to the barest minimum, with one motor to carry out several operations, such as load, lace up, take up and eject, using very flimsy plastic gears and cams. Control keys also tend to be of flimsy construction.

Though many years old my JVC HR7700, which is built like the proverbial battleship and is definitely out of fashion from the style point of view, remains in daily use and gives excellent quality pictures and sound. It is in a generally unworn condition.

It will be very interesting to see how new equipment performs and lasts with the construction methods now used. Perhaps we will eventually see a return to more substantial and lasting build quality. Are other readers of this opinion?
Barry G. King,
Wolverhampton.

Thanks

Many thanks to everyone who responded to my request for help in the April issue. I now have all the parts I require to complete the project. Special thanks to the anonymous donor of several valves and valveholders. I appreciate everyone's help and apologise to those to whom I have not been able to reply – it's just that I have been overwhelmed!
Colin Boggis,
Woking, Surrey.

How Insured are You?

I have been in the TV/video servicing trade for some twenty years, self-employed for the last four. Working mainly as a field engineer, my aim has been to carry out repairs in customers' homes wherever possible. One consequence of this is that I have to carry an ever increasing range of spares and tools with me. More recent models are making this increasingly difficult, so more trips to the workshop are becoming necessary.

After one such trip, I returned to my locked car to find just a large space where it had stood. A week later I was lucky enough to get the car back, almost undamaged – except for the locks and steering lock. But my tools and spares had gone, also a customer's VCR. Having been a victim of insurance small print in the past, I had taken the precaution of covering the business for fire, theft, flood and third party claims. The car had full comprehensive coverage for business use. So no problem, you might have thought.

Wrong! I was not covered for the tools and spares, nor the customer's video. Just what was I covered for? Well, had the VCR been stolen from my workshop it would have been insured. To get cover for equipment in a vehicle you need to take out a separate cover for "goods in transit". This wasn't recommended however, because the excess would be more than the value of what might be lost, in this case the VCR.

To add to my woes, the customer insisted on an immediate replacement of exactly the same type, no other would do. It was also claimed that the machine was virtually brand new, despite Akai having ceased production of the model two years previously.

In the end I had to put it down to experience and buy a replacement. As for the theft itself, I'm still not sure whether I was targeted or the low life simply struck lucky. The box of video spares would be of no use to anyone outside the trade, yet a box containing about twenty TV on/off switches of various types was left.

Such a loss of tools and transport could make it difficult for a one-man outfit to survive, especially as some insurance companies take a long time to pay out.
Geoff Hastings,
Epsom, Surrey.

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CNX62	£4.00	SAA1294.2	£25.00	STK5333	£13.80	STR59041	£6.80	TDA1170S	£1.80	TDA2582	£2.50	TDA4420	£2.20	TDA8190	£3.80	TMP47C434N-	
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LA4445	£3.00	SAA5243	£32.80	STK5422	£5.30	TA7680AP	£5.80	TDA1524	£6.80	TDA2670	£3.20	TDA4503	£7.80	TDA9403	£3.80	UC3844	£1.50
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VISA Access

Long-distance Television

DX and satellite TV reception, news from abroad and a review of the new edition of The Satellite Book. Roger Bunney reports

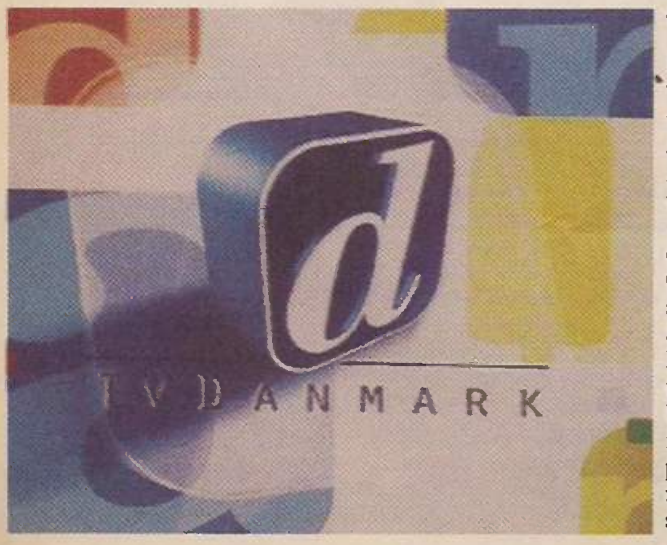
There were very few reports of any worthwhile DX-TV reception during April. Ch. E4 produced some unidentified Sporadic E signals mid month, but the hoped for early SpE opening didn't occur. With the excellent weather at the time there was some enhanced tropospheric propagation, producing Band III and UHF reception from France and the Benelux countries.

The first DX aerials have been erected at my new location. As expected, there is increased 49MHz interference – the house is in a new residential estate. Numerous narrow-band FM carriers have been noted at 49·495MHz upwards. There are particularly strong signals at 49·82MHz through to the out-of-band 50·08MHz. The latter signals resemble buzz saws – a continuous harsh buzz with no variation. They could come from a nearby industrial estate. When time permits, I'll try to locate the source.

A wideband Band I aerial (type WB2) now adorns the roof, but I hope to replace it with another aerial with an improved polar response, to reject ground-based interference. The new satellite dish is being assembled – the support pole has been set in concrete in a deep hole. Lack of spare time slows things down.

Robert Copeman (Sydney, Australia) has confirmed his reception of an unlisted ABC Ch. 0 (45·25MHz measured) transmission from a WNW direction. Anothony Mann in Perth has also reported Ch. 0 reception, via SpE. In theory, there are no ABC transmissions on this channel. A recent SpE catch by Robert was KVZK-TV 2 Pago Pago (American Samoa). It seems that overall the recent Australian SpE season has not been as good as in recent years. Reception has generally been restricted to Band I, with only the occasional opening extending into Band II (FM).

The new TV Danmark network logo.



Satellite News

There have been important changes within the the European footprint area, with Nethold dropping 19 Astra and Eutelsat digital transponders and two analogue Astra transponders that previously carried FilmNet programming (the Central European and Scandinavian services). The Scandinavian Supersport channel will also close. Nethold and FilmNet have merged to form a major satellite broadcaster across Europe, with interests in the Nordic region in particular. FilmNet will end up as a mainly movie package. The other service will provide general entertainment with Danish, Norwegian, Finish and Swedish sound.

A 50-50 partnership between Nethold and Telenor will create a new company to bring digital satellite services to the area, including pay TV and encrypted transmissions. A common MPEG-2/DVB digital standard is to be adopted for the operation's Scandinavian services: other programme providers will be encouraged to adopt the standard.

Star TV's India Sky Broadcasting (ISkyB) is planning a package of 17 mainly English digital channels, including movies, sports, entertainment and children's programmes. ISkyB has still to gain a broadcasting licence – the government's media bill has not yet been finalised. The PAS-4 satellite would be used. By now Ariane should have launched Insat-2D, which is to be located at 74°E. It will have twelve C band, six extended C band and three Ku band transponders.

Phoenix TV, a joint venture between ARD and ZDF, has joined the services from Astra 1D. Its programme schedule is based on news and current affairs. The US group HBO has started to provide services to Eastern Europe: capacity has been taken aboard the Israeli Amos-1 to supply cable operators in Poland, Hungary and the Czech Republic.

The Spanish government has told Canal Satellite Digital to sort out technical differences with rival Distribuidora Television Digital within the next two months. If agreement cannot be reached, the government will enforce adoption

of the Multicrypt standard by all Spanish broadcasters – the system is favoured by TVE, the state broadcaster.

Look out for cheap Nokia Media Master 9500 digital receivers. The German Kirch group is giving the digital units away to try to improve subscriptions to its DF1 service – there are at present estimated to be around 30,000 instead of the expected 200,000 or so subscribers. Kirch is in talks with Deutsche Telekom with a view to the service being taken up by Germany's largest cable system.

Meanwhile the German RTL service has announced massive profits from plain old free-to-air analogue TV. The managing director of RTL has commented that Kirch's plunge into digital TV is "a kind of electronic mad cow disease". RTL's turnover has reached £51m, an increase of twelve per cent on the previous year.

National Geographic TV (NGTV), a documentary/travel channel, is due to become available in the UK this August as part of the BSkyB package. It will extend to Scandinavia, Eastern Europe and Australia next year. Initial NGTV hours will be 1900-0100, rising to twelve hours daily when Sky's digital service comes into operation.

More satellite news gathering trucks are to be put on the road shortly. BT Broadcast Services has ordered fifteen. Several of the trucks will be equipped with two dishes to provide simultaneous hook-ups. Most will use MPEG-2 compression.

Terrestrial News

Germany: The BDXC reports that many new digital audio broadcasting transmitters are due to come into operation within the ch. E11 and E12 spectrum. They will have parallel operation in Band L (1·5GHz).

The Netherlands: A commercial service, Kanal 6, has been seen using ch. E3. We suspect that this is the Turkish transmitter mentioned last month.

Italy: MTV-Italy has signed a transmitter-sharing agreement with RETE-A. This, along with MTV-Italy's service via Telepiu-3, will give MTV up to 23 transmitting hours a day. The pay-TV service Telepiu may move to satellite distribution.

Denmark: A national network has been started by Scandinavian Broadcasting Systems (SBS) via Kanal 2, Copenhagen.

Norway: A new company, NRK Activum, has been set up by NRK to sell locally-made programmes and open new local-coverage channels. Activum is already holding discussions with the commercial channel TV2 with a view to running a joint pay-TV sports service.

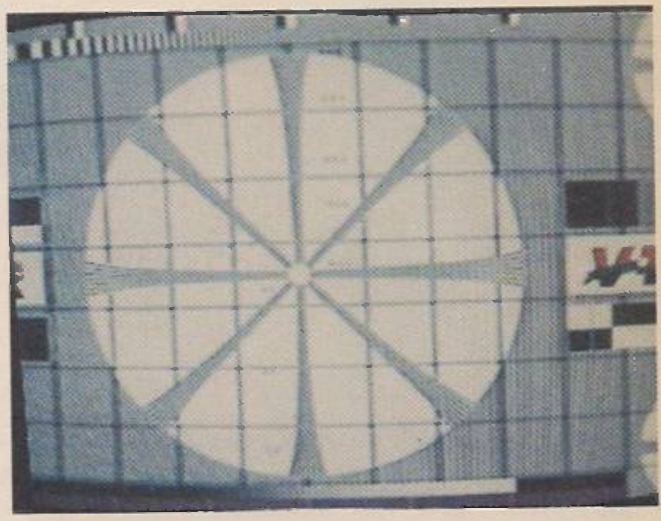
Hungary: Three applications have been received for the two franchises to operate Hungary's first national commercial TV network. A $50m a year fee will be charged for the licences. The successful applicants are due to be on air this September.

From Our Correspondents

Alan Smith reports from Thailand that the new Astro digital DTH service in Malaysia, from the MeaSat-1 satellite, provides two channels. The £400 installation charge includes a 60cm dish, a triple Ku band LNB and a Philips receiver/decoder. Subscription is £20 a month. A 60cm dish is the largest allowed: this prevents acceptable reception of any other satellite services – a less than subtle form of censorship! I wonder whether a 60cm dish will be sufficient to avoid rain fade during the season of heavy downpours?

Bindu Padaki (Bangalore, India) writes that he is at present very active with satellite TV reception. His earliest reception dates back to the days of the Russian Ekran bird, at 714MHz. He now has a 3·5m manually-tracked dish, and has tried out digital TV reception using Pace equipment. Recent sightings have included APstar-2R at 76·5°E, Intelsat 801 at 64°E, Thaicom-3 at 78·5°E, B Sat-1A at 110°E and Insat-2D at 74°E. Bindu echoes our own thoughts: we need a free-cycling MPEG-2 receiver with the flexibility to cover all available MPEG bit/FEC rate standards.

Bob French (Warwickshire) has had problems: the Jaeger H-H mount wasn't strong enough for his new 3·1m dish, which was badly damaged when it hit the ground. While awaiting a replacement he writes to confirm earlier reception of NASA-TV via Spacenet-2 at 69°W, just before the service moved to another satellite over the horizon in the UK. He also mentions that the 2M Morocco C-band (3·99GHz, right-hand circular polarisation) signal from Intelsat 706 at 53°W has been improved and that encryption is no longer used.



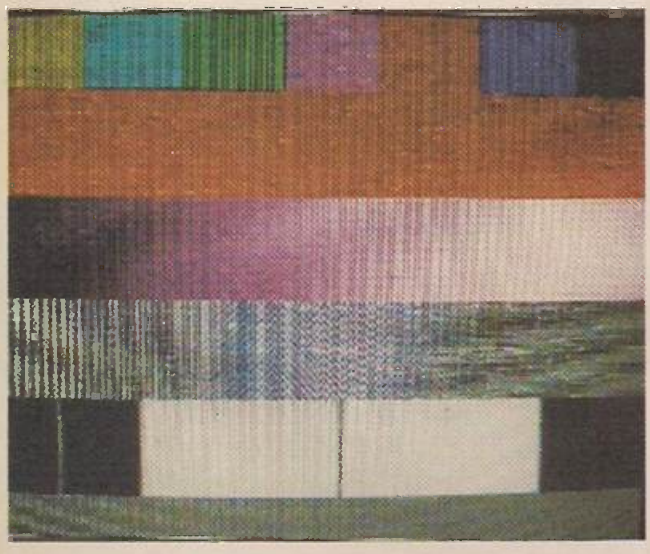
An unusual test pattern received via Telecom 2C during HD-TV 16:9 video tests. Photo from John Locker.

Roy Carman (Lake, Isle of Wight) would like to hear from any other satellite enthusiasts in the area. He lists the following as

Standard CBS NTSC pattern received from New York via Intelsat K at 21·5°W. Note that the time is in hours, minutes, seconds and frames (25 per second). Photo from John Locker.

sometimes active transponders aboard PanAmSat-3R (43°W), which is normally a quiet bird: check out 12·52GHz H, 12·578GHz V, 12·592GHz V, 12·601GHz V, 12·638GHz H, 12·667GHz H, 12·702GHz H, 12·731GHz V and 12·758GHz V. He recently received WTN/Starbird test transmissions at 12·601GHz V. Analogue is still alive and well!

Frank Lumen (Ayr) comments on the "FUCHSST 625 PAL" test pattern shown in the May issue (page 523). He thinks that it may be Fox TV, as fuchs is the German for fox. If this is a feed for the US Fox TV network, the signal would subsequently be converted to 525-line NTSC. Sounds logical to me. n



A new test pattern received by John Locker from Gorizont 32 at 53°E. Note sparklie reception quality.

Book Review

The Satellite Book, edited by John Breeds, 5th edition. Published by Swift Television Publications, 17 Pittsfield, Cricklade, Wilts SN6 6AN (01793 750 620) at £34 plus postage.

Satellite technology marches ever onwards. We now have or are about to have digital MPEG transmissions, multimedia and interactive operation, and use of the Ka band. It's come a long way since the Premiere film channel at 27°W and SAVE encryption. John Breeds and his books have come a long way as well!

It all started in the early days, when John created the *Satellite Television Installation Guide*, which was published by Nokia for the trade. John and his *Guide* subsequently became Swift Television Publications. He has revised the *Guide* on several occasions, and it remains essential reading for those entering the installation trade. But a more detailed and comprehensive tutorial on satellite TV was required. It soon came along in the shape of *The Satellite Book*, which has become an extremely popular reference source. The latest completely revised and updated 5th edition has just arrived. Its soft card cover conceals a unique collection of articles by experts within their own specialities and a wealth of essential information for those involved in the satellite business in one way or another.

The book is aimed primarily though not exclusively at the needs of installation engineers. Its pages bring out the fact that there is much more to satellite reception than just Astra, though fixed Astra installations are not overlooked. Safety is a major consideration, which is quite rightly featured in the early pages – dish mounting in a variety of locations, how to use a ladder, and even wall plugging, screws and bolts receive attention. The typical installation is clearly and concisely dealt with, from the dish through the LNB, polariser and cable to the receiver. The signal itself receives full consideration, with details of the downlink path from the satellite being well covered.

Fortunately it's all presented in easy-to-understand English, with large practical diagrams to make everything clear – some of these have large practical hands as well! Aspects that can be difficult to grasp – apex and polar elevation, azimuth and declination offset and so on – are all made clear. Every component in a typical installation is described in depth, with very little left out. The working theory of the ferrite (magnetic) polariser, or as the book more correctly describes it the ferrite polar selector, is for example covered in sufficient detail to enable anyone to understand how it works and how it plays its part in the receiving chain. The publication's contents extend beyond what you would expect of a practical guide, covering for example aspects of signal distribution (SMATV), dual LNB operation, downlink budget analysis, VideoCrypt encryption, customer care and the latest development, the DiSEqC system. Just about everything in fact – dishes, cables, feedhorns, footprints and all.

As a comprehensive reference and installation work the contents cannot be faulted. Technically tricky subjects are stripped down to basics so that everyone, enthusiast and engineer alike, can understand and enjoy the technology. As this has developed, successive editions of the book have met the challenge. The fifth edition includes a large section entitled "MPEG – Digital Television for ALL"!

Any complaints? Well, I would have liked more on the various actuator arm and H-to-H motor drive combinations with their control units, and D2-MAC is still with us. Thoughts perhaps for the 6th edition. But these are minor quibbles.

Overall it's an excellent book – for reference, work and bedtime reading. You can fax Swift Publications on 01793 752 399. Other details are given above. Postage is £3 in the UK, £5 to Continental Europe and £16 to other parts of the world (by air mail – it's heavy!). **R.B.**

John Edwards's Service Notebook

Bless you, Variac

A Philips set fitted with the KT3 chassis came in with its mains fuse blackened. But there were no obvious shorts. As I've not had one of these sets in for some time, I decided to replace the fuse and power the set via my variac, increasing the input gently. When the mains input reached about 110V AC, the bridge rectifier produced 150V across its reservoir capacitor. This voltage was present at the collector, base and emitter of the BUW84 chopper transistor – because diode D1461 (BY208) was short-circuit. After replacing this diode the set still refused to start up, even with the output from the bridge rectifier increased – slowly – to 250V (the nominal working voltage is 285V). The chopper transistor was not being switched on. Then I remembered a stock fault. The 12V zener diode D6300, which stabilises the supply for the TDA2581Q chopper control chip IC7322, was short-circuit.

After fitting a new BYX79-12 diode I wound up the mains supply once more, but there was still no life from the set. A scope check at the base of the chopper transistor showed that only needle pulses were present. So IC7322 was operating in the shut-down mode. As the voltages around the chip were all normal, quick fault diagnosis was not on the cards.

Excess current demand is sensed by the 1Ω resistor R1461, which is connected in series with the chopper transistor and is linked to pin 6 of IC7322. When the voltage across this resistor reaches a preset threshold, IC7322 reduces the chopper drive to a minimal pulse output. Where was the overload? In fact there wasn't one – R1461 was open-circuit. When this item had been replaced the set came to life at about 110V AC input and remained OK up to the normal mains AC input. I now had a great picture – but no sound.

No, it wasn't the speaker mute switch being turned on (though I've been caught out in the past). The 2·2Ω resistor R6303 in the feed to the audio output stage was open-circuit. After replacing this I at last had a working set.

All this brought home to me the benefits of using a variac. I'm convinced that it would have cost much more in time and components had the full mains input been applied each time the set was switched on and off during the repair.

A LOPT Trap

A Matsui 2092T had a faulty line output transformer. No big deal you might think, but it took three different replacement transformers before the set worked. With these sets it's essential that the part number on the replacement transformer is identical to that on the original one. You'll know if you've fitted the wrong transformer type, because there will be reduced width and a picture with no contrast when you switch on. Unfortunately suppliers just send you what's in stock, listed under the model number. You've been warned!

After fitting a new transformer, whether of the correct type or not, you may well encounter two more problems. So make a note of this for future estimates. First you might not be able to switch the set to standby using the remote control unit – instead the picture disappears into snow, the set remaining very much alive. Fortunately the cure is simple: replace the standby switching transistors Q504 (BF421) and Q503 (2SD401), one or both of which will be short-circuit. Use the correct types. We are talking about the non-relay version of the set of course.

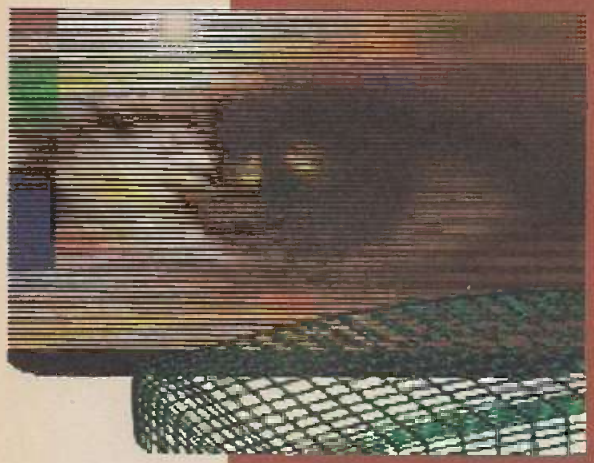
I thought my troubles were over when the correct transformer had been fitted, producing a correctly sized picture (with normal standby operation). Then I noticed that grey to dark areas of the picture were very dark, even with the brightness and contrast control settings at maximum. A dark suit for example appeared in black with no detail. When the first anode control's setting was advanced flyback lines appeared, with no improvement. The culprit was the TA8867N colour decoder and timebase generator chip.

Ferguson TX100 Chassis LOPTs

Apart from relay clatter a Ferguson set fitted with the TX100 chassis was dead. No problem here: check the line output transformer, which had failed. The BU508A line output transistor had survived, which is often the case. The next step was to look up the transformer required. All my suppliers' catalogues listed the green spot type, so one of these was obtained and fitted. But when I switched on there was a small raster with severe EW distortion. After a few seconds the picture faded to a blank screen. The BU508A transistor and D26 (BY228) in the EW diode modulator circuit had burnt out. Considering that it had been in operation for only a few seconds, the LOPT was very warm. Maybe it was faulty in some way.

As I removed it, I was embarrassed to see a little blue sticker on the line output transistor's heatsink. Oh well, we all make mistakes. After fitting a blue spot transformer, along with a new BU508A transistor and BY228 diode, I switched on and was amazed to find that the same fault symptoms were present, along with very bad line pairing, field roll and a definite smell of something cooking. The set was quickly switched off – but not quickly enough to save the transistor and diode.

I checked this and that and this again, but couldn't find anything wrong. While looking at the original LOPT, and praying for divine intervention, I decided to order a transformer with identical markings, i.e. forget blue and green spots, just order as originally fitted. It was marked FAT3758. All my suppliers offered a green spot type, but a feeling I had made me insist on a Konig 3758 type. Chas Hyde and Son came up with the required LOPT and when it was fitted, along with another transistor and diode, the set sprang to life with a normal picture, sound etc.



Monitors

Reports from
Chris Watton
John Edwards
John Pitt-Francis
and I. Field

Tiny Computers TM3401

This SVGA monitor was dead with the BUK455 FET chopper device Q801 short-circuit. It's hard to find the cause of such a situation without a circuit diagram. We replaced the FET and the 3842AN chopper control chip, then found that C815 and C816 were poorly jointed, also that one end of each of them could be pulled away from the PCB. The 0·33Ω safety resistor in the HT supply had blown, also R805 (50kΩ safety). We assume that the dry-jointed capacitors were the root cause of the problem, but one can never be sure. C.W.

Panasonic KMXF415A (C1381)

The complaint was intermittent picture fading. We found that there were very obvious dry-joints on all the tube's base pins. J.E.

AST VGALR14

This monitor had a short-circuit line output transistor (Q312, type 2SC3885A). The cause was the associated 6,200pF, 1·6kV line output stage tuning capacitor, which was dry-jointed at one of its legs. J.E.

AST CMC142B31

There was no display because the line drive was missing. Resoldering the pins of the LA7850 timebase generator chip cured the fault. J.E.

Philips CM8833 II

There was no field or line sync because the composite sync input was missing. As a preventative maintenance measure, we always resolder the scart and DIN plug connections. In this case we found that about 30 per cent of the connections were dry-jointed. Putting this right cured the fault. It also explained the accompanying note which said that there had been a similar fault six months previously, and that this had been cured by using a different output lead! J.P-F.

Samsung CQ4147

There were normal outputs from the chopper power supply, but the line drive output at pin 3 of the TDA4850 chip IC401 was missing. A new chip was tried but made no difference. The culprit turned out to be an 8·2V zener diode, D402 J.P-F.

CIG 1342/Philips CM11342

There was sound but no display. A check on the conditions at the CRT base panel showed that the RGB inputs were all high. When I moved back to the TDA3505 video control chip IC502 I found that the sandcastle pulse at pin 10 had the wrong shape. Why? Because there was no pulse from the line output transformer. The reason for this was physical: there was a crack in the PCB near pin 4. School monitors often get dropped – but wherever possible this doesn't get reported! J.P-F.

Packard-Bell PB8538

Intermittent screen fade, after anything from half an hour to 24 hours, was the complaint with this monitor. It was simply a matter of dry-joints on the CRT base panel.

It's worth having a good look around to see if there are any other poor soldered joints. Be careful when unsoldering the screening plate: the pads it's soldered to are a bit flimsy. I.F.

Royal DN1564G

The picture shifted sideways with the slightest movement of the chassis – the complaint had been "screen shrinks when moved". Almost every line output transformer pin was dry-jointed. Putting this right cured the trouble.

This is a push-button front panel job. One of the buttons produces a screen display showing the line and field scanning rates for the current video mode. If you press the restore factory default button you may have to adjust the geometry settings for each and every mode, pressing S for each one. I.F.

Samtron SC431

A loud buzzing that got worse as the monitor warmed up was the complaint. The two geometry magnets at either side of the deflection yoke are mounted on flimsy plastic struts, stabilised by a blob of brown glue. This becomes brittle and disintegrates. As a result, the magnets act as buzzer armatures! Double-sided foam sticking pads, silicone rubber or builders' mastic will cure the problem. I.F.

Amstrad PC14M39

There had been a power supply blow up – the FET chopper transistor was short-circuit, three resistors associated with it were all damaged and the UC3842 control chip had been destroyed. The cause was traced to the solder pad for the chopper transformer's feedback winding. It had severed all round from the resist-coated tracks that lead away from it – the fracture was so clean it could have been die cut. I.F.

Samtron SC428

The field scan was cramped at the top. After spending some time checking the components associated with the TDA8351 chip to no avail I decided on a new IC. This did the trick.

The geometry magnets at either side of the scan yoke look sturdier than those used in the SC431, but they can still buzz when warm should the brown glue disintegrate. I.F.

Answer to Test Case 415

– see page 633 –

It is not all that unusual for a perfectly good microcontroller chip to be turfed out of a TV set, VCR or whatever and be replaced with an identical, expensive chip that does nothing to solve the trouble. It's hard to blame the technician however when, as in this case, he has checked all the important points as he sees them. In a VCR the root cause of the problem generally lies with the deck in some way or another. In a TV set the cause may be another chip or a communication problem in the control system.

The problem with this Toshiba set was resolved by replacing the two eight-pin memory chips which, between them, store the operating software data. They are labelled QA07/8 on the circuit diagram and are shown as ICA07/8 in the parts list. The set came to life when the new chips had been fitted, and functioned correctly once the installation and user software had been reprogrammed and set up. Afterwards, there was time and interest enough to check the two EPROMs individually – by replacing them in the set separately. This proved that the actual culprit was Q/ICA07 (type µPD6254CX).

The customer thought that the cause of the problem was probably a loose wire. He insisted on paying a quarter of the rental charge for the week during which his set was away – arguing that he had been provided with only a quarter-sized picture! Happy days . . .

NEXT MONTH IN TELEVISION

Servicing the Salora M Chassis

This was one of the first chassis to appear in which signal processing and timebase waveform generation was carried out digitally. When you look in the back and see all those forty-pin chips, you tend to think of other urgent matters. The same basic things have to be done in the set however, but a somewhat different servicing approach is required. Chris Watton on how to go about it.

Panasonic Looks Ahead

At its recent European conference Panasonic presented the latest developments in TV and video technology, in particular flat-screen displays, digital video and DVD equipment. George Cole reports.

Servicing Aid for Motor-driven Satellite Systems

When dealing with motor-driven satellite TV systems it is helpful to have equipment that's portable and, if possible, battery operated. Pete Haylor had a need for a power system to provide dish drive and a means of checking the reed switch. The result was this simple arrangement, which cost all of £25 to build.

Hantarex Games Monitors

There's money to be made by servicing the monitors used in arcade games machines. One of the most commonly encountered is the Hantarex 9000 series monitor. Andy Gallacher has been busy on them: he provides guidance on the spares required, setting up procedures and common faults.

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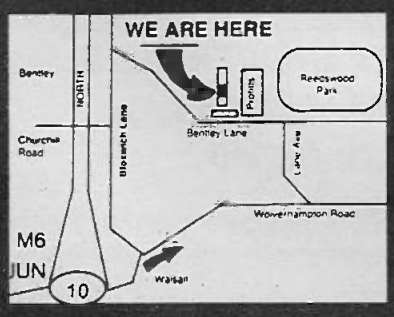

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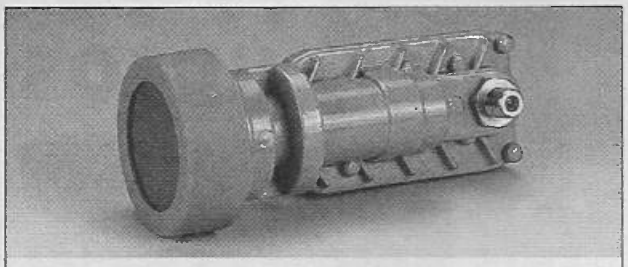

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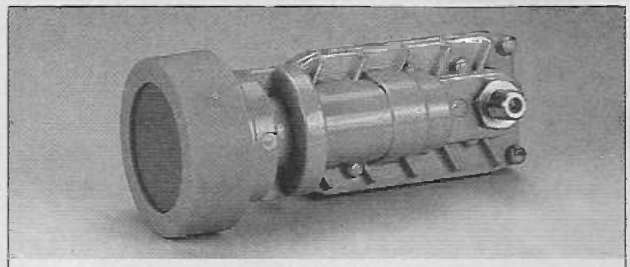

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LO FREQ.	9.750MHz	NOISE FIG.	1.0dB TYPICAL

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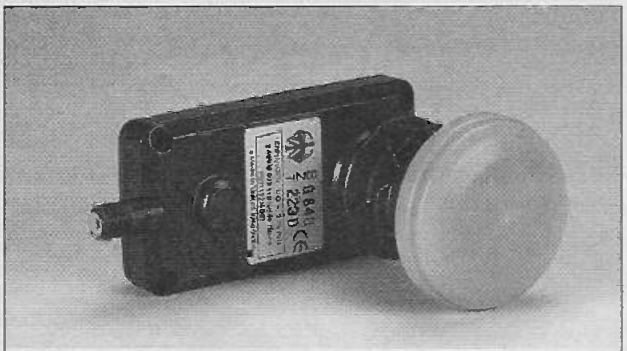

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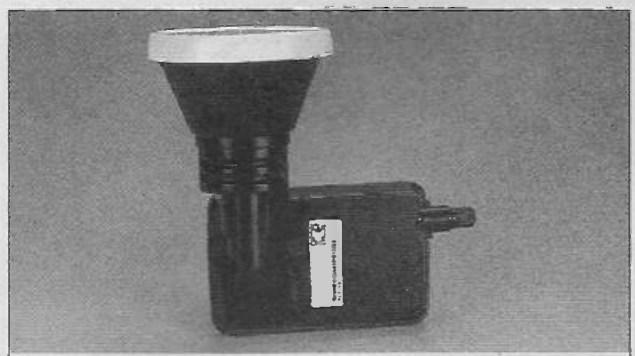

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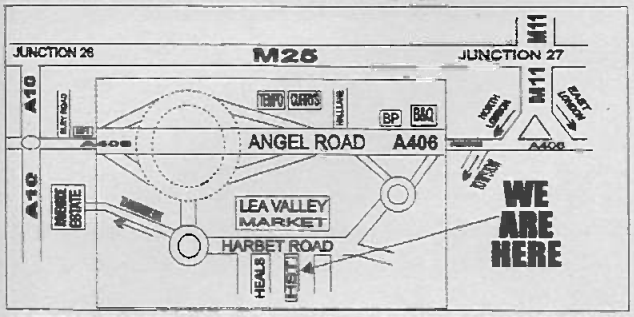

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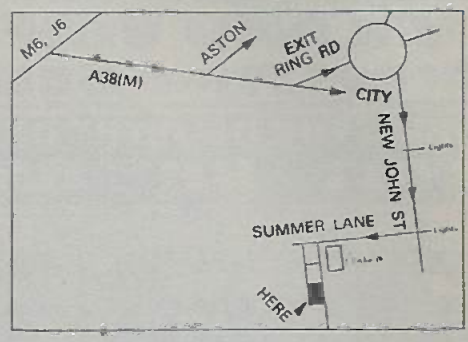

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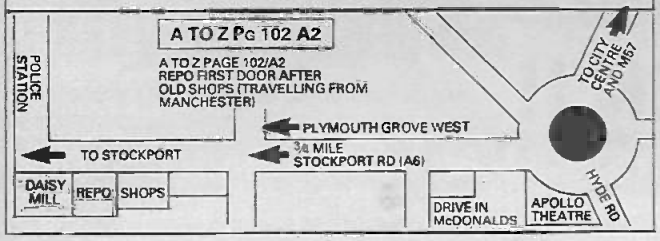

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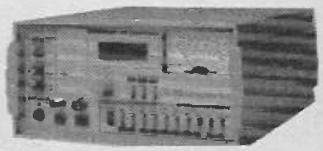

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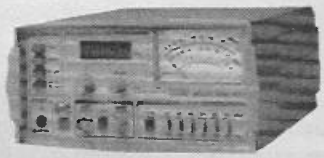

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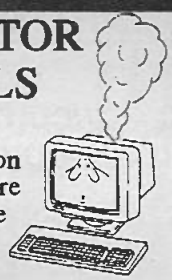

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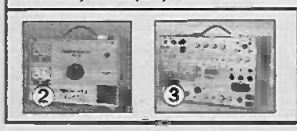

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7809	20p	2SD1576	£1.00	BU222	£1.00	BUX84	50p	BYX55/600	10p	ALP-15	£3.50	SS2000AF	£1.00	TDA3047	£1.00	TDA3710	£3.00	TEA2029C	£3.00
7812	20p	2SD1577	£2.00	BU326	£1.00	BUX84AF	50p	BYX71/60	20p	IK7ST		ST6385BB1/		TDA3048	90p	TDA3800	£2.00	TEA5620	£2.00
7812P	20p	2SD1807D3	15p	BU407	40p	BUY49	20p	BYZ106	10p	6391 B1	£3.00	/BFY	£2.00	TDA3083	£2.00	TDA3803A	£4.00	TIPL361A	90p
2SC940	£1.00	2SD1878	£1.00	BU506A	90p	BY187	5p	BZW-C110	5p	IN5401	3p	ST6393		TDA3180	£2.00	TDA4260	50p	TMP47C634N/	
2SC3795	£1.00	AN5521	£1.00	BU508AF	£1.00	BY208-800	8p	BZW83-C20	3p	IR106A	10p	B1/1M	£3.00	TDA3190	£1.00	TDA4420	£2.00	/2685	£1.00
2SC3973B	£1.00	AN5551	£1.00	BU508D	80p	BY228	15p	CA3123Q	50p	L298N	£4.00	STK4793	£5.00	TDA3505	£3.00	TDA4439	£2.00	TMP47C834N	
2SC4313	£5.00	AN5831	£2.00	BU508DF	£3.00	BY229	6p	CD4555BE	20p	LA7830	£1.00	STR4211	£3.50	TDA3506	£3.00	TDA4501	£3.00	R 107	£3.00
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2SC7350	15p	BDV658	50p	BU806A	£1.00	BY299-800	30p	HA1140	£1.00	M708 LBI	£1.50	STR6602D	£4.00	TDA3561A	£3.00	TDA4601	£2.00	UPC1378H	£1.00
2SD200	£1.00	BF669S	20p	BU807	50p	BY371-800	15p	HA1185	£1.00	M37204ECSP	£1.00	STR58041	£4.00	TDA3562A	£2.50	TDA4650	£3.50	UPD6376CS	£3.00
2SD401	40p	BF870	20p	BU808DFI	£1.00	BYV19-30	15p	HA1196	50p	M58658P	£1.00	TA8691N	£3.00	TDA3564	£3.00	TDA5930	£1.00	ZC409233P	£8.00
2SD716	£1.00	BPW41	85p	BUR2A	50p	BYV28-200	15p	HA11435ANT	£1.50	MN650	£1.00	TD003P	£2.00	TDA3565	£2.00	TDA8138	£1.80		
2SD787	30p	BU105/04	80p	BUR26	£1.00	BYV95B	10p	HA11804NT	£1.50	S13522V	£1.00	TDA3060	£1.40	TDA3566	£3.50	TDA8190	£3.00		
2SD789	30p	BU108	£1.00	BUK444/800	£2.00	BYV95C	12p	HA513385P1	£2.00	SAA1061	£3.00	TDA1365	£2.00	TDA3581	£3.00	TDA8349	£3.00		
2SD820	£1.00	BU124	50p	BUK445/600	£2.00	BYV96D	10p	HA513385P3	£2.00	SAA3018	£1.00	TDA1510	£1.70	TDA3590	£3.00	TDA8417-3	£3.00		
2SD868	75p	BU126	80p	BUK454/600	£1.00	BYW20-08-9	£1.00	HCF4520	50p	SAA3010	£2.00	TDA1521A	£2.00	TDA3591	£1.00	TDA8703	£3.00		
2SD880	30p	BU180A	65p	BUT11	50p	BYW29/50	15p	HCF4520BE	50p	SAA5231		TDA1543	£1.00	TDA3592A	£3.00	TDA9403	£1.50		
2SD1264	50p	BU204	60p	BUT11AF	50p	BYW95	10p	HD61404251	50p	(TEXT)	£2.00	TDA1908A	90p	TDA3650	£7.00	TDA9503	£3.00		
2SD1266	£1.00	BU205	75p	BUT13	£1.00	BYW95C	10p	HD6414815	£1.00	SAA5240A/P	£4.00	TDA2460	£2.00	TDA3653	£3.00	TDB2033	£1.00		
2SD1398	£1.00	BU206	£1.00	BUT18AF	£1.00	BYW98/2A		HE45258P	15p	SAA5241A/P	£4.00	TDA2541	£1.00	TDA3653AQ	£3.50	TDD1610S	50p		
2SD1415	£1.00	BU207	£1.00	BUT71/800	15p	100V	8p	HE84029BP	20p	SAA5243A/P	£4.00	TDA2582	£1.00	TDA3652	£3.50	TEA1029	£2.00		
2SD1427	£1.00	BU208	80p	BUW11	40p	BYX10	10p	HEF4093	20p	SAA5246A/P	£4.00	TDA2600	£2.00	TDA3653AQ	£2.00	TEA1039	£2.00		

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