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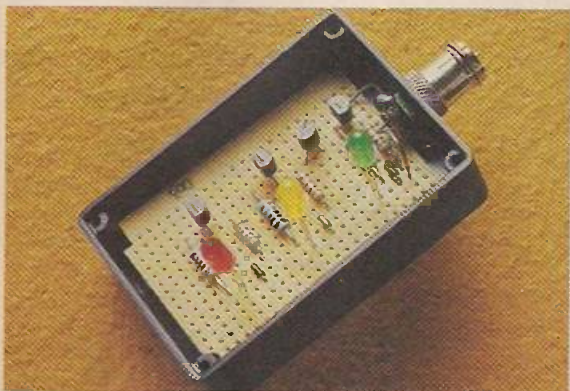


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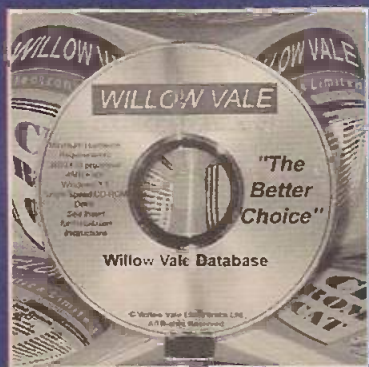
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The PC/TV Cauldron

Bill Gates, co-founder and chairman of Microsoft, does love his PCs. No doubt about that. He has been in great evangelical form recently, with presentations at the National Association of Broadcasters Convention in Las Vegas, the Windows Hardware Engineering Conference in San Francisco, and any number of interviews and reports. What it's all about is his vision that computing, entertainment and communications are converging, and his wish to see the PC playing the central role. There is a lot in all this, quite apart from Bill Gates's own vision and aims. And someone could make a great deal of money out of the outcome. The factors that are driving this convergence at the moment are digital TV, in particular the US intention to adopt digital technology to implement high-definition TV, and the growing impact of the Internet.

Our Bill has been busy with his plans, which could see the PC taking a major role in providing computing, interactive TV and other services. Just over a month ago Microsoft paid \$425m (about £265m) for WebTV, a company that has developed technology to enable its users to access the Internet via their TV sets. All they require is a set-top box that costs around \$350. This doesn't get Bill quite where he wants to be, because WebTV is at present incompatible with PC software. But once Bill gets going – well, he's signalled his intention to launch a WebTV model that runs a version of Windows next year.

The US HD-TV situation is a bit more tricky. The FCC has yet to lay down the regulations that will govern digital/HD-TV

in the USA. There is a conflict between the PC industry and the TV companies, which want HD-TV to be modelled on current standards, in particular with the traditional interlaced scanning. The PC industry would prefer progressive scanning, as used by computer monitors. There is clearly a major compatibility problem here. All one can say is that in the rapidly developing digital world it may be easier to resolve than earlier compatibility problems.

Bill Gates is not acting alone. Microsoft and Intel, the leading semiconductor manufacturer, have launched the PC98 initiative. This is a system that will feature high-speed microprocessors; fast SDRAM chips; faster buses; linkage to peripherals such as the DVD, digital cameras, scanners and video displays; Internet capability; and, all important, digital TV use. In their efforts to promote all this they have been joined by the leading PC manufacturer Compaq.

The rewards from all this endeavour could be huge. Microsoft predicts that by the year 2000 more than 40m PC98 specification computers could be coming off the production lines. The economies of scale would make it all feasible from the marketing point of view.

It all sounds so reasonable. But it is as likely that there will be a prolonged period when battles rage over precise standards and things don't develop quite as fast as the evangelists hope. For one thing, the user has to be taken into account, and may not wish to rush out and invest in all this technology. It is significant that WebTV produced half a million boxes last year and sold 30,000. The typical Internet user will

continue to access the system via a PC. Without any help from TV, the market for Internet-related products and services is reported by International Data Corporation to have reached \$18.5bn last year. IDC expects it to increase to \$92bn by 2000. But the bulk of the expenditure so far has consisted of computers and network systems, with on-line spending embryonic.

It's very difficult to make out how these markets will develop. The Internet is obviously taking off quite rapidly just now. TV is static but could move forward dramatically with digital technology and a vast increase in the number of channels available. In its largest market, the USA, the PC seems to be approaching saturation point – some 40 per cent of homes now have a PC.

The lessons learnt from interactive TV trials have not been all that encouraging. What most viewers have mainly wanted, you guessed it, is near video-on-demand movies. Will they want to watch them on Bill's PCs? Well, you sit close to your PC and use a keyboard and mouse. TV is supposed to be mainly a form of relaxation – you sit across the room and take in the programme.

It seems to this observer that there remains plenty of scope for both the TV and the PC, and that it is rather unnecessary to confuse the two. All right, PCs can display TV pictures and TV sets can be interactive and access the Internet. But most households that invest in all this technology will want to be able to make separate use of their TVs and PCs. Bill wants to sell us lots more PCs. Most people will simply want to sit and watch their TVs.

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2SB698	0.36	2SD1911	5.98	BC238C	0.87	BF245B	0.41	BY127	0.18	LM339N	0.56	STR59041	8.11	TD42586	7.69	TI32A	0.45
2SB716	0.43	2SD350A	1.97	BC307	1.86	BF256A	0.23	BY175	0.77	LM358N	0.52	STR6020	6.07	TD42611A	0.64	TI32C	0.48
2SB764	0.38	2SD400	0.34	BC307B	0.75	BF258	0.94	BY227	0.13	MM54811	13.85	STR61001	10.86	TD42611AQ	1.32	TI33C	1.82
2SB772	0.50	2SD401A	0.77	BC308	0.29	BF324	0.18	BY228	0.25	MM5481L	0.69	STR61816	7.89	TD42653A	4.78	TI36C	2.14
2SB774	1.61	2SD468	0.20	BC308B	0.19	BF381	0.19	BY229	0.25	MS4544L	2.84	STR64420	11.49	TD433018	6.75	TI36C	0.65
2SB891	0.60	2SD669A	0.64	BC309C	0.14	BF420	0.21	BY229A	1.80	MS8655P	4.95	T9053V	1.25	TD43505	2.40	TI36C	0.58
2SB892	0.35	2SD716	1.63	BC327	0.10	BF421	0.24	BY229B	1.80	MC13000P	7.69	T9064V	1.87	TD43560	3.85	TI36C	2.57
2SD1213	0.14	2SD756	0.47	BC328	0.14	BF422	0.19	BY255	0.14	MC14066B	0.21	T47205AP	2.27	TD43561A	5.30	TI36C	1.85
2SD124	0.48	2SD837B	1.12	BC337	0.14	BF423	0.14	BY256	0.18	MC14425P	1.29	T47227P	2.89	TD43562A	3.90	TI36C	1.25
2SD1318	0.19	2SD856	0.78	BC338	0.06	BF458	0.31	BY258	0.12	MDA2062	13.74	T47270P	2.72	TD43562ATF	8.97	TI072	0.00
2SD1573	0.35	2SD898B	0.41	BC368	0.18	BF459	0.43	BY259	0.12	MD2955	0.53	T47271P	2.70	TD43565	2.74	TL082CP	0.21
2SD1740	0.16	2SD965	0.87	BC369	0.18	BF460	4.82	BY260	0.35	MD2955	0.53	T47274P	4.93	TD43576B	10.31	TMP47C432AP8189	15.10
2SD1815	0.17	2SD1118	3.40	BC372	0.48	BF469	0.34	BY261	0.38	MD2955	0.53	T47280P	2.74	TD43576F	10.31	TMP47C434K3555	16.83
2SD1827	0.90	7406	0.89	BC517	0.10	BF470	0.38	BY262	0.18	MME13005	0.85	T47281P	3.20	TD43592A	4.27	TI2732	10.05
2SD1959	0.10	7407	0.89	BC546A	0.11	BF471	0.37	BY263	0.26	MME18004	2.05	T47688AP	5.37	TD43640	5.98	UC2829	2.40
2SD2001	0.23	74HC04	0.34	BC546B	0.12	BF487	0.57	BY264	2.55	MJE3051	0.74	T48201	3.93	TD43650	12.07	UC3842	1.44
2SD2023	3.10	7805	0.70	BC547	0.11	BF759	0.38	BY265	0.21	MJE3051	0.45	T48205AH	4.50	TD43653C	1.54	UC3844	1.20
2SD2060	0.10	7808	0.72	BC547A	0.04	BF763	0.23	BY266	0.21	MJE18004	2.05	T48207	2.74	TD43653C	2.35	UC3844H	1.91
2SD2178	1.00	7809	0.69	BC547B	0.11	BF788	0.52	BY267	0.21	MJE3051	0.45	T48210AH	3.38	TD43653CQ	2.57	UPC1230H	3.40
2SD2220	0.23	7812	0.52	BC548	0.06	BF869	0.25	BY268	0.53	MPS406	0.35	T48210H	4.79	TD43654	1.88	UPC1318AV	3.85
2SD2230	0.55	7815	0.82	BC548A	0.11	BF869S	0.48	BY269	0.31	MPS442	0.23	T48215H	4.96	TD43654Q	4.82	UPC1365C	1.78
2SD2235	1.38	7815	0.36	BC548B	0.06	BF871	0.41	BY270	0.21	MPS456	0.23	T48220H	4.82	TD44500			

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Could be adapted for laser listener, long range communications etc Double beam units designed to fit in the gun barrel of a tank, each unit has two semiconductor lasers and motor drive units for alignment. 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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HIGH POWER DC MOTORS, PERMANENT MAGNET 12-24v operation, probably about 1/4 horse power, body measures 100mm x 75mm 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

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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

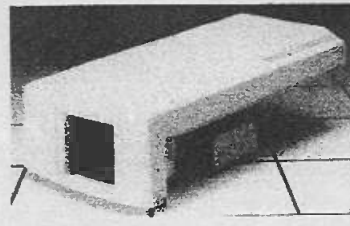
LIQUID CRYSTAL DISPLAYS Bargain prices, 16 character 2 line, 99x24mm £2.99 ref SM1623A

20 character 2 line, 83x19mm £3.99 ref SM2024A

16 character 4 line, 62x25mm £5.99 ref SMC1640A

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Pal, 1v P-P, composite, 75ohm, 1/3" CCD, 4mm F2.8, 500x582, 12vdc, mounting bracket, auto shutter, 100x50x180mm, 3 months warranty, 1 off price £119 ref XEF150, 10 or more £99 ea 100+ £89

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

25 SQUARE FOOT SOLAR ENERGY BANK KIT 1006"x6" 6v Amorphous 100mA panels, 100 diodes, connection details etc to build a 25 square foot solar cell for just £99 ref EP112.

CONVERT YOUR TV INTO A VGA MONITOR FOR £251 Converts a colour TV into a basic VGA screen. Complete with built in psu, lead and swears. 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 FR knowledge will be useful for setting up. Preamp req'd, 4 stage 80-108mhz, 12-18vdc, can use ground plane, yagi or dipole £99 ref 1021

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

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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

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***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: MAG16 12v psu is £5 extra REF: MAG5P2

***MINIATURE RADIO TRANSCEIVERS** A pair of walkie talkies with a range up to 2km in open country. Units measure 22x52x155mm.

BULL ELECTRICAL 250 PORTLAND ROAD, HOVE, SUSSEX. BN3 5QT. (ESTABLISHED 50 YEARS).

MAIL ORDER TERMS: CASH, PO OR CHEQUE WITH ORDER PLUS £3.50 P&P PLUS VAT. 24 HOUR SERVICE £4.50 PLUS VAT. OVERSEAS ORDERS AT COST PLUS £3.50

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Including cases and earpieces. 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 (KX) 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

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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 3-4000 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 output. £55 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 50 watts. £27.99 ref SICA11-05

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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 R7.

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 P011D. 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!

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STEREO MICROSCOPES BACK IN STOCK Russian, 200x complete with lenses, lights, filters 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.

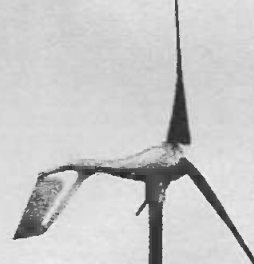
SECOND GENERATION NIGHT SIGHTS FROM £748 RETRON Russian night sight, 1.8x, infra red lamp, 10m-inf, standard M42 lens, 1.1kg, £349 ref RET1

LOW COST CORDESS MIC 500' range, 90 - 105mhz, 115g, 193 x 26 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 bicolor 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 die blades, carbon matrix blades, 3 year warranty, 12vdc output, control electronics, brushless neodymium cubic curve alternator, only two moving parts, maintenance free, simple rooftop installation, start up speed 7mph, max output (30mph) 380w. £499 ref AIR1

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Digital panel meter for just £8.95

The PM-128 is a 3.5-digit lcd panel meter with a full-scale reading of 199.9mV dc and is configurable for 20V, 200V or 500V full-scale reading by adding two resistors. Jumpers then set the decimal point position. Supplied complete with mounting bezel, this low-power meter is available exclusively to Television readers at the special price of £8.95 – fully inclusive of postage, packing and VAT – or even less in quantities above four off. The normal selling price is £12.95 – excluding VAT and postage.

Please use the coupon to order your panel meters, and address all correspondence relating to this order to Vann Draper Electronics at Unit 5, Premier Works, Canal Street, South Wigston, Leicester LE18 2PL, fax 0116 2773945 or tel. 0116 2771400.



Incorporating the ICL7106 a-to-d converter, this digital panel meter has a full-scale input sensitivity of 200mV and a high input impedance of >100MΩ.

PM-128 digital panel meter

Features

- Single 9V dc supply
- Low 1mA consumption
- Very high input impedance
- Overrange indication
- Dual-slope integration a-to-d conversion
- Decimal point selectable
- Auto polarity indication
- Guaranteed zero reading for zero input

Specifications

- Maximum input 199.9mV
- >100MΩ input impedance
- Liquid crystal display
- 13.5mm high characters
- Maximum display 1999 counts, auto polarity
- Reading speed 2-3 times a second
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*Overseas readers can also obtain this discount but details vary according to country. Please ring, write or fax to Vann Draper Electronics.

TELETOPICS

Success Story

The UK's foreign-owned TV manufacturing industry is going from strength to strength. According to the latest figures from the British Radio and Electronic Equipment Manufacturers' Association, output has nearly doubled since 1990. In 1995 5.8m sets were produced. Last year there was a 6.8 per cent increase to 6.2m. Projected figures for 1997 suggest that there will be a further rise in output – Panasonic (Matsushita) for example plans to increase production from 1m to 1.3m sets. One in three of all TV sets produced in Europe is now made in the UK, up from one in five seven years ago. The trade surplus last year was over £500m.

The accompanying table lists the main manufacturers and their production figures for 1996. Manufacturers subsumed under "others" include Sanyo and LG (GoldStar). Production is even more remarkable when computer monitors are taken into account. Sony for example produced over 1m monitors at Bridgend in addition to its output of 1.5m TV sets. Both products use CRTs manufactured by Sony in S. Wales. Hitachi expects to produce 120,000 monitors this year.

It is significant that spending on TV research and development has also increased in recent years. Many of the sets are designed as

well as being manufactured in the UK. Sony, Panasonic and Tatum all have substantial development departments, while Mitsubishi has recently set up a group that will specialise in digital TV systems.

UK TV set production in 1996

Manufacturer	Output
Hitachi	0.3m
JVC	0.4m
Mitsubishi	0.4m
Panasonic	1m
Samsung	0.7m
Sony	1.5m
Tatum	0.3m
Toshiba	0.7m
Others	0.9m

Satellite TV

Launch of Astra 1G (at 19.2°E) and 2A (at 28.2°E) has been delayed. A June launch was planned for 1G: the most recent date is in August. The launch of Astra 2A has been put back from August to possibly November. The reason for these delays is simply that Hughes Space and Communications, which is producing the satellites, has developed and will incorporate a new propulsion system. This will use less fuel, thus extending the lifetime of the satellites.

The dispute between SES (Astra) and Eutelsat over the orbital slot at 29°E has still to be resolved. Astra plans to locate at least two new digital satellites, 2A and 2B, at 28.2°E, but Eutelsat claims a prior right to 29°E. Regulations prevent the use of orbital slots this close. The dispute will be settled by the International Telecommunications Union (ITU).

Tektronix has been given a substantial order by BSkyB for the installation of video file servers and other equipment, which will be installed at BSkyB's Isleworth and Chilworth sites. The equipment at the latter site will be used for broadcasting feature films to subscribers to BSkyB's NVOD (near video on demand) service. This is due to start in the autumn.

GEC Plessey Semiconductor (GPS) has produced a complete

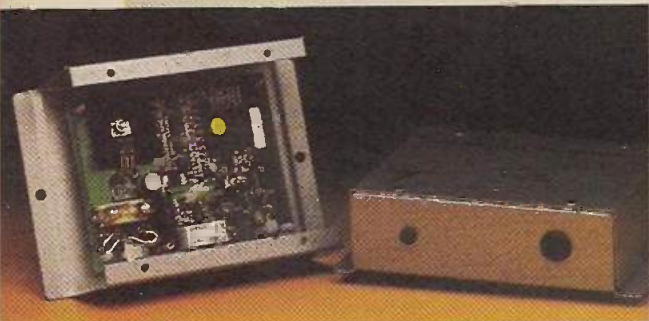
digital satellite receiver front-end design. Referred to as a network interface module (NIM), it will accept an RF input and carry out all the processing required to produce the bit stream for a baseband MPEG decoder. The NIM will use a set of five GPS front-end chips. According to a spokesman it will be the smallest NIM so far, about the size of two matchboxes.

DVB's HD-TV Option

The Digital Video Broadcasting (DVB) Project has announced that DVB will incorporate HD-TV as a future option for digital services. A new specification which describes the use of DVB standards for HD-TV transmissions is being drawn up – it will take into account the needs of both 50Hz and 60Hz countries.

The DVB Project office points out that because of the flexibility within the DVB standard there is no need to develop a separate DVB-HD standard. Instead, a guideline document will lay down the operating conditions for the video compression equipment selected by a broadcaster to generate an MPEG-2 data stream.

The Project now has 207 members from the broadcasting, manufacturing and regulatory sides of the industry. UK members include the BBC, Channel 4 and Granada: manufacturers include JVC, Nokia, Philips, Samsung and Sony.



Texcel Technology has introduced a cable TV signal monitor (see photo above). It provides confirmation that signals above a preset threshold are present, and detects signal degradation, in the range 100-400MHz. The monitor responds to the average of all TV channels present. It extracts the 15kHz line frequency signal, whose amplitude is not dependent on the video information, averages this and compares it with a preset limit. When the received signal drops below the preset value for a defined period, voltage-free relay contacts change over and an LED indicator turns off. When the signal is restored, the indicator lights again and the relay reverts to its original state.

Up to eight signal monitors can be used in conjunction with a combining unit that produces a single output when any of the monitors detects a failure. This input is latched and clearly displayed for maintenance purposes. For further details check with Texcel Technology PLC, Thames Road, Crayford, Kent DA1 4SB (phone 01322 557 722).

Channel 5

Channel 5 is now available as a free-to-air service via transponder 63 (10.92075GHz) aboard Astra 1D. Being soft-encrypted, only a VideoCrypt decoder is required. Use of satellite transmission brings the channel to an extra 2m homes – terrestrial coverage failed to meet forecasts.

In its first four weeks, Ch. 5 achieved an average 2.85 per cent share of total viewers. This was lower than expected, but not so low that any money will have to be returned to advertisers. Ch. 5's core target audience, 15-24 year olds, do not seem to be enthusiastic – in a poll 38 per cent said that it is the worst available channel.

Poor reception has been a problem. A poll conducted for Ch. 5 found that 14 per cent of viewers in the areas it serves experienced some sort of reception problem and may need a booster or new aerial.

London south of the transmitting aerial site (Beulah Hill) seems to be particularly poor. It now transpires that to meet French objections because of possible interference the Beulah Hill aerials are directional, with 250kW ERP to the north and only 2.5kW to the south.

Furthermore, the northerly radiation creates a strong ghost to the south because of reflection from the nearby Crystal Palace mast. This has been researched by G8MNY, who has written a report that appears in the Spring 1997 issue of the British Amateur Television Club's excellent journal *CQ-TV*. Incidentally, the club seems to be thriving. Anyone interested in joining can obtain details from Dave Lawton G0ANO, Grenehurst, Pinewood Road, High Wycombe, Bucks HP12 4DD (telephone 01494 528 899, e-mail 100046.1056@compuserve.com).



Chemtronics has launched the CIROZANE-based range of precision cleaners, which are non-flammable, fast-drying and non-ozone depleting. They are safe for use on plastics and metals. The range includes a cleaner/degreaser, a flux remover and a contact cleaner.

For further details check with Rocol Ltd., Rocol House, Swillington, Leeds LS26 8BS (phone 01132 322 600, fax 01132 322 740).

DVD-RAM Format Agreed

A worldwide standard for the RAM (recordable) version of the digital versatile disc (DVD) has been agreed by representatives of ten leading Japanese, European and US electronics companies led by Toshiba. The DVD-RAM will be able to store 2.6Gbytes of information, which is more than most computer hard discs but not enough to record a full length movie (it could store an hour of video). Matsushita plans to start producing DVD-RAM drives by the end of the year.

Toshiba's target date is next March. Hitachi's intentions are highlighted below.

Hitachi Developments

Hitachi recently unveiled a number of interesting new products – and talked about some that are in the pipeline. The company is now selling a DVD video player in Japan, but says it will not launch a European version until a "significant number of DVD titles" is available – at present there is only one. The company also plans to introduce a DVD-RAM player in Japan this summer. It will store up to 2.6Gbytes of data and cost the Japanese equivalent of about £500. Hitachi intends to follow up with a 5Gbyte version in 1998 and a 7Gbyte disc around the year 2000.

Blue laser technology could, according to Hitachi, lead to 14Gbyte DVD-RAM discs by 2002.

Further plans are to start marketing an MPEG-2 digital camera next year and to launch TV sets with built-in digital receivers in Europe by the middle of next year. Another product expected in Europe next year is a 50in. LC display made from a single panel. Hitachi is also developing TV displays that use progressive scan technology.

Aerial Groups Revised

Following the start of the Ch. 5 service, the Confederation of Aerial Industries Ltd. has drawn up a revised list of aerial channel groups, as follows:

Group	Channels	Colour code
A	21-37	Red
B	35-53	Yellow
C/D	48-68	Green
E	35-68	Brown
K	21-48	Grey
W	21-68	Black

The new SLAM96 (see photo above) range of signal level analyser/meters from Swires Research incorporates a spectrum analyser capable of displaying up to 64 channels. This enables variations in the base line to be seen at a glance, while the signal level meter gives the actual reading in dBs. Enhanced software correction is used, built into an EPROM, to compensate for variations in individual models. There are two versions, the SLAM96 which has a frequency range of 10-1,000MHz with a response accuracy of ± 1 dB. This is available at £725. For satellite installers the SLAM96s has a frequency range of 10-2,050MHz, with a response accuracy of ± 2 dB and an optional extended range to 2,150MHz. It can supply 14V to an LNB, eliminating the need to use a receiver when initially setting up a dish. This version is available at £795. For further details check with Swires Research, 40 Hornsby Square, Southfields Industrial Park, Laindon, Basildon, Essex SS15 6NZ (phone 01268 417 584, fax 01268 419 083).





Reports from
Simon Bodgett
and
David C. Woodnott

JVC GR60/65/70/77

A horizontal rolling green and magenta colour change is a not uncommon complaint with these camcorders. The cause of this peculiar effect is a faulty phase-lock loop in IC2 on the video PCB in the camera head. Crystal X101 is the usual culprit. The loop is locked by two lines, HD and CFMO, from IC303 (MC8181D, replaced by type EHD-GA1389A) on the encoder board. Once any faulty components have been replaced, the loop is set up by locking a vectorscope to an external reference then adjusting C3 until the displayed burst stops rotating. S.B.

JVC GRAX2 and GRAX5

Intermittent take-up reel stopping, with E03 showing in the viewfinder, is a complaint we sometimes get with the GRAX2. The problem arises when the customer supports the camcorder by holding the cassette housing door as well as using the strap. The force projected inwards and upwards pushes the cassette housing up, jamming the take-up gears.

An upgrade that consists of a replacement cassette support guide and a spacer for the upper inside lip of the door is available. It can also be fitted to the GRAX5, though the problem is less often experienced with this model.

Two problems arise if one of these camcorders is tested with the viewfinder disconnected. First, the manual tracking doesn't function.

Camcorner

Secondly and more importantly, the rewind end stop doesn't work. Thus if the camcorder is left in the rewind mode the ICP-N38 circuit protector CP1 will fail, sometimes exploding. S.B.

Ferguson FC07

A vertical white line (striation) on the camera E-E picture is a common fault with this model. A scope check on the video output signal with the lens capped usually shows this quite clearly as a leading edge. The culprit is C19 on the IMG/SSG PCB.

Various other capacitors on this PCB can be faulty, causing similar symptoms. Beware when replacing these components – the print is an exceptionally good conductor of heat, making the job more difficult than with boards that use thinner copper. D.C.W.

Sanyo VMEX20P

As this camcorder had been dropped, it was no great surprise to find that there was no camera E-E picture. Playback and all other functions were OK.

An internal inspection showed that the twelve-way connector between the CCD PCB and the camera process PCB had become detached from the latter. Only minimal print damage had been done, but unfortunately the connector couldn't be reused. It's not available from Sanyo as a spare part – you have to order the complete board. This makes it an expensive repair. Fortunately I was able to find a replacement connector in a Canon Model UC10 – the one that couples the A-V and main PCBs. D.C.W.

Sony CCDTR370E

Poor focus at the wide-angle setting was the reported fault – closeups were OK. Use of the Sony Lanlink (PC-based) interface enabled us to read the autofocus data easily. It was seen to be correct. Set up of the flange back adjustment cured the problem. When the new data was checked after the set up, the original data was found to have been corrupted.

Note that these set ups can be done using the RM95 remote control unit, following the method outlined in the service manual. No reason for the corrupted data was found – and the camcorder is still working correctly. D.C.W.

Sanyo VAR66D

This adaptor would power the camcorder via its DC socket but would not charge the battery. D0404 was found to be short-circuit and Q0303 open-circuit. Replacing these items cured the fault. D.C.W.

Canon UC8HiE

Playback picture shaking was the reported fault symptom. It did this more effectively with its own recordings – playback with a known good recording was almost normal. The brand or length of the tape seemed to affect the amount of 'shake'.

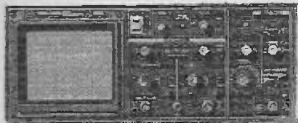
This model uses the Sony A mechanism, which is normally very reliable. We found that the back-tension 'string' was the cause of the problem. This and the supply reel were changed, then the back tension was set up. We've since had this problem with two other models that use the same mechanism. D.C.W.

Hitachi VME10E

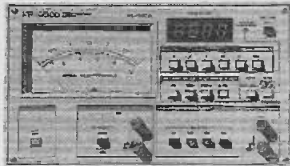
This camcorder came in with an audio fault. In both the record and the playback mode the sound would crackle and change level intermittently. As luck would have it we had another of these camcorders in, and were thus able to make a quick audio PCB swap over to prove that the cause of the trouble was on this PCB. Unfortunately there are no circuit details in the Hitachi manual, just a replacement PCB part number.

The ICs on the board are standard Sony devices however, used in various models. Also present are various surface-mounted electrolytic capacitors of the type known to fail almost everywhere they are found! So we replaced these and cleaned the PCB. At power up all was well. The customer was happy, not having to buy a new PCB. D.C.W.

NEW & HARDLY USED TEST EQUIPMENT



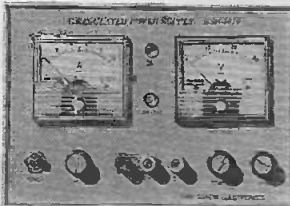
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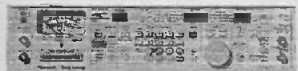
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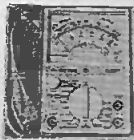
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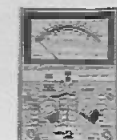
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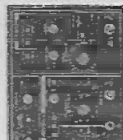
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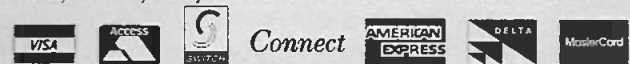
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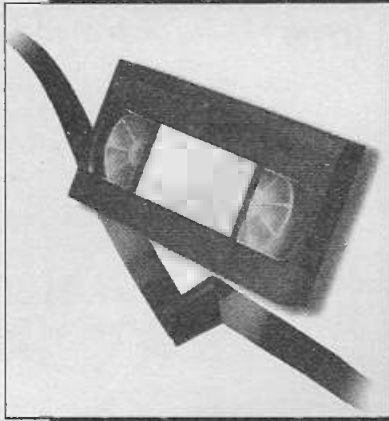
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Reports from
Philip Blundell AMIEEIE
Simon Bodgett
Christopher Nunn
Steven Leatherbarrow
Joe Cieszynski
Shane Humphrey
Graham Thompson
Eugene Trundle
Mervyn Deeley and
Michael Dranfield

JVC HRS4700

Although this is a high-specification VCR, we've had a number of complaints about poor pictures with S-VHS recordings. A sample tape was brought along with one machine that came our way recently.

The fact is that off-air recordings look worse in S-VHS than they do in standard VHS. Because the S-VHS bandwidth is wider than that of the received signal, the difference is filled with HF noise. With standard VHS this noise does not arise. Thus S-VHS playback of an off-air recording looks worse, because of the extra noise.

The customer was given back his tape, with some high-grade camcorder recordings (of our dogs running around). These did justice to the machine's excellent S-VHS capabilities. S.B.

Orion D3000SC

This VCR was at least alive, but there was no loading and no capstan or drum rotation. I found that the 13V zener diode D09 was short-circuit. It's next to the loading motor drive chip IC03. C.N.

Mitsubishi HSM48V

There was no picture, just a blue screen. In addition the sound war-

VCR Clinic

bled and the counter didn't work. The reason for all this was lack of CTL pulses. I checked the AC head and cleaned the machine but this made no difference.

Scope checks showed that there was no CTL pulse output at pin 2 of the MN67492MSV5 chip IC4A0 on the main board. Replacing this IC cured the fault. C.N.

Ferguson FV31R

This VCR wouldn't store any channels. The cause was traced to the BC337 transistor TK44, which showed signs of distress (it had bubbled out). Standby battery XK59 was responsible for TK44's distress. There should be 2.4V across it but the reading was 1.2V. C.N.

Toshiba V703B

This machine's power supply was pulsing and it wouldn't accept a tape. The cause turned out to be C813 (47µF, 16V, 105°C) in the power supply. It was low in value. We fitted a replacement rated at 63V, 105°C. Hopefully it will last a little longer than the original one. S.L.

Samsung SV801K

The deck tried but failed in its attempt to load a tape. It's a remarkably simple deck – one can only wonder why some manufacturers insist on using a multitude of cogs, pulleys, levers etc. to achieve the same result. But I digress.

On investigation I found that the main slider and master gear both had chewed teeth. Part nos. are 61641-0023-00 for the slider and 61472-0104-00 for the gear. Non Samsung account holders can order both parts, with an SS suffix, from CPC. The parts are B251 and B255 in the exploded view and parts list in the service manual.

Fitting them was straightforward and didn't, as so often, require reference to the manual for timing etc. S.L.

Hinari VXL9

A fault we've had on a few occasions popped up again recently. The symptoms are no E-E video or audio, with playback OK. You will find that there is no or very little video output from the machine's IF can, because C312 (470µF, 16V) is short-circuit or leaky. It couples the video signal to the switching chip IC208. S.L.

Ferguson FV10B

This machine's playback picture was marred by what appeared to be three or four lines missing every inch or so. The effect consisted of thin, horizontal black lines that varied in intensity with adjustment of the tracking control. We found that C801 (47µF, 25V) in the Motor 12V supply had gone low in value. The problem was not present in the record mode.

The relevant capacitor in JVC HRD170 series machines is C10. S.L.

JVC HRD230

The playback picture was marred by bent verticals which extended from the bottom to the top. Clearly the head drum was hunting, but why? I've come across various causes of this in the past, including a defective drum motor, dried up electrolytics in the power supply, and drag because of loss of nickel plating on the upper drum. This time the cause was very simple. A squeal came from the earthing brush on top of the head drum. When the slightest pressure was applied to it the squeal and the hunting stopped. Cleaning the brush and applying light lubrication cured the fault. J.Ci.

Panasonic NVSD40

There was no E-E or playback sound from the modulator – the sound was OK at the AV connector. We found that the 1k Ω chip resistor R7005 was open-circuit. It couples the sound signal to pin 4 of the RF converter. S.H.

Samsung SV301K

The E-E and playback sound were distorted. Checks showed that the 9V supply was missing at pin 9 of IC4303, the cause being a print crack between links W052 and W067. Print repair restored normal sound. S.H.

Panasonic NVSD40

This machine had been to another 'repairer'. When it came to us the fault was loss of the E-E and playback signals. The TV demodulator pack is connected to the main PCB by several plugs and sockets. PS701, PS702 etc. Their contacts can break internally if care is not taken when the panel is removed. Replacing PS701 and resoldering the other sockets where they are connected to the main PCB restored normal operation. S.H.

Amstrad VCR400

There was intermittent loss of sound in both the record and playback modes. The cause was a splash of solder, from manufacture, lodged at the bottom of the socket on the ACE head. It was intermittently shorting out the pins to the audio section of the head. G.T.

Samsung SV140I

No E-E operation was the complaint with this machine. The cause turned out to be failure of clock crystal XT901 associated with the on-screen display chip IC901. A new crystal restored the signals. G.T.

Sanyo VHR3100

This machine was dead. Checks in the power supply brought me to the GZB16C zener diode D5009 which was short-circuit. It's connected to the always 13V line. G.T.

Samsung VIK316

When these VCRs are switched to standby, the display should dim. In this case it disappeared. Capacitors C37 and C38 in the power supply were faulty. We also replaced C35, since this tends to give trouble. For those of you who have not come across failure of C35, the symptom is that the machine starts up then shuts down. G.T.

Quickies

Alba VCR7200: Intermittent loss of

the clock display was the fault with this machine. Crystal X6002 was dry-jointed.

Toshiba V404: Apart from a ticking power supply there were no signs of life. The cause was CP008 (100 μ F, 25V).

Daewoo V60: Tuning drift was the problem with this machine. The cause was the 33V stabiliser D851, which is type KA33V. G.T.

JVC HRD750

Complete loss of action was the symptom, with no output voltages at all from the power supply module. For once the culprit was not the kick-start capacitor C14, though we replaced this as a matter of course. It was the STR10006 chopper chip. E.T.

Sony SLVE250

This machine had a very intermittent fault: maybe once a month it would chew a tape badly. We saw this happen once in the workshop. The cassette went in and down then, immediately after completion of tape threading, the loading arms retracted. Back came the cassette, with a large tape loop hanging from it. The mode switch was the cause of the problem. E.T.

Panasonic K Deck

The K deck is less troublesome and easier to deal with than its predecessor, the G deck. This one crunched the tape under the descending pinch roller however, because arm P5 did not move far enough fast enough. The main lever (a plastic moulding, part no. VXL2307) was found to be cracked in the region of the P5 arm's driving notch. E.T.

GoldStar GSE1293IQ

Intermittent picture rolling was the complaint with this machine. We traced the cause to failure of the back-tension arm to move into the correct tensioning position in the play/record modes, because the mode-switch contacts were tarnished. Cleaning the switch cured the fault. M.D.

Grundig VS920

The symptoms were no clock display and clicking noises from the mechanism. We traced the cause to a 47 μ F, 25V capacitor in the power supply, on the primary side of the circuit. Use a 105 $^{\circ}$ C high-temperature replacement. M.D.

Samsung VI720

The complaint was that this machine was running slow. We traced the

Philips Turbodeck Models

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cause to the 3-3 Ω , 1W resistor R244, which had gone high in value. M.D.

Ferguson FV77

If the power supply is dead or tripping, the first thing to do is to replace CP11 (220 μ F, 25) which is on the primary side of the power supply circuit. Use a 105 $^{\circ}$ C type. If the machine remains dead, check the 0-47 Ω safety resistor RP91 and replace the little 100 μ F, 10V yellow capacitor CP60. This capacitor is next to IP02, the four-pin regulator. M.Dr.

Matsui VP940I

Tape spilling out during reverse search was the problem. With this deck the usual cause is the mode switch. A drop of bearing oil should also be applied to the capstan motor. This time however these measures didn't work.

We found that the fast forward/rewind clutch assembly was slipping, though the clutch itself wasn't faulty. In reverse search the back-tension band doubles up as a soft brake. This is where the cause of the trouble lay. There was too much braking pressure. A replacement lever sub brake, part no. 850P600311 (item 334 in the exploded view of the VP930I deck), cured the problem. It's driven from the master cam. Because a small plastic leg had broken off, it rode up and didn't release the brakes properly.

This problem could become as common as the limiter post failure in earlier Matsui machines.

Get the replacement from Willow Vale – it's nearly £1 cheaper than from other sources. M.Dr.

Matsui VP950I

The E-E picture had venetian blinds, though the playback picture was OK. In fact the symptom was identical to what you get with certain Pace satellite receivers when the 2-2 μ F capacitor in the tuner dries up. With this in mind, we removed the combined tuner, modulator and IF can. Inside the IF section there was a tiny 3-3 μ F, 50V capacitor, C227, which had gone open-circuit. A replacement cured the problem which, incidentally, disappeared when the signal from the aerial was attenuated. M.Dr.

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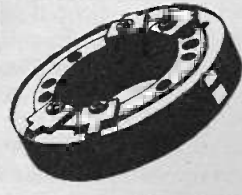
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Satellite TV

Polarisation Checker

This handy unit, designed and presented by **Michael Dranfield**, gives an instant check on the LNB supply voltage provided by a satellite receiver

This simple unit is a must for the satellite TV equipment installer/repairer. It enables the LNB supply provided by a satellite receiver to be checked within seconds – no fiddling about with a multimeter and bits of wire. The unit plugs into the receiver's LNB input socket. It employs three 5mm LEDs to give an instant, clear indication of the DC output voltage present, green for 13V (vertical polarisation), yellow for 17V (horizontal polarisation) and a third, red LED to indicate an output in excess of 22V. The latter can occur with some Amstrad receivers when there's a fault in the power supply: the last thing you want to do is to blow up your workshop LNB because a satellite receiver is defective.

The unit is small enough to be carried around in your pocket. In the event of signals of one polarisation not being available, you can decide instantly at the customer's home whether the cause of the fault is in the LNB or the receiver.

Circuit Description

The circuit used in the checker, which is self-powered from the receiver's LNB output, is shown in Fig. 1. When a channel with vertical polarisation has been selected, the receiver should provide a 13V output at its LNB F connector socket. In this condition ZD1 will conduct, Tr1 will switch on

and LED1 will be illuminated. When a channel with horizontal polarisation has been selected, 17V should appear at the receiver's LNB socket. ZD2 will then conduct, switching Tr3 on to illuminate LED2. Tr2 will also switch on, connecting Tr1's base to chassis. As a result, Tr1 and LED1 cease to conduct. Thus what we have is a simple bistable circuit. Only one of these LEDs can light up at any time, giving a clear V or H indication.

If the LNB voltage is in excess of 22V, ZD3, Tr4 and LED3 will switch on. The red and yellow LEDs will then be illuminated. The red LED is designated O for an overload, and warns the user not to connect an LNB until the fault causing the excess voltage has been put right.

Construction and Testing

Construction is simplicity itself. I used a small piece of Veroboard, the fine track type, with 16 x 24 holes. A push-on F connector is used for connection with the LNB socket.

The unit should ideally be tested using a variable bench power supply. Increase its output voltage slowly. At 12.7V the green LED should light up. At 16.7V the yellow LED should light and the green LED should go out. At 22.7V the yellow LED should still be alight and the red LED should come on as well. If all is well, the unit is ready for service.

Parts required

Tr1-4	2SC1815
ZD1	12V, 400mW
ZD2	16V, 400mW
ZD3	22V, 400mW
LED1	5mm green LED (Farnell 178-310)
LED2	5mm yellow LED (Farnell 178-311)
LED3	5mm red LED (Farnell 472-293)
R1/3/5	1k Ω , 0.5W
R2/4/6	560 Ω , 0.5W
Case	Farnell 645-680
0.15mm pitch Veroboard, 16 x 24 holes	
Push-on F connector	

The most expensive item in this project is the plastic case, which cost me 98p plus VAT. This gives an idea of the low cost of building the unit. I costed my prototype at just over £2.

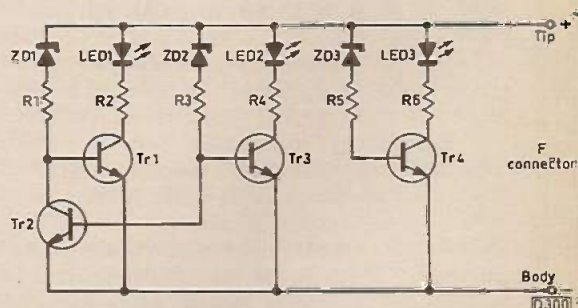
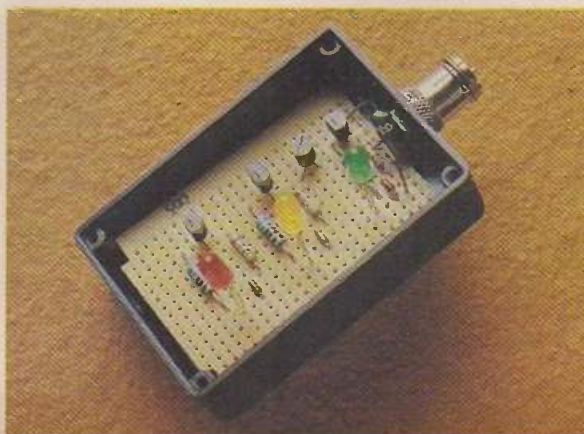
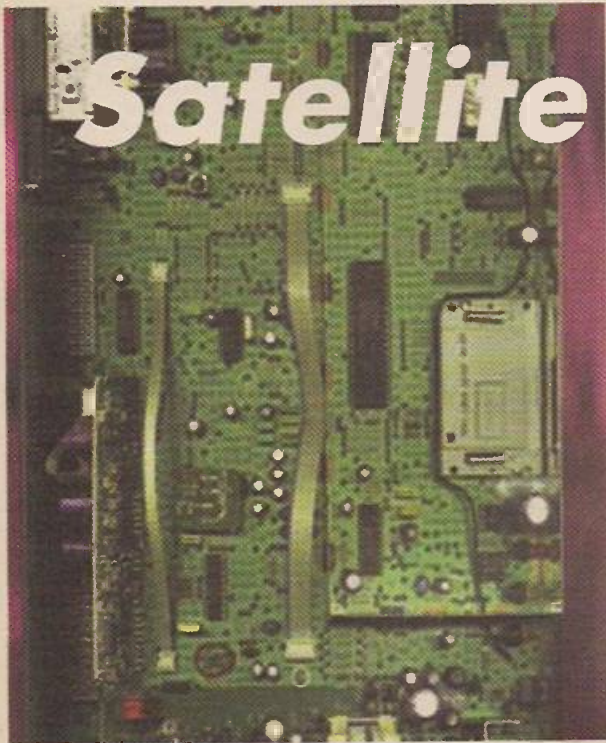


Fig. 1: Circuit diagram of the satellite TV polarisation checker.





Satellite WORKSHOP

Jack Armstrong

Ferguson SRD6

Whenever I lend out a service manual it comes back with a page missing. Unfortunately I find this out only when a receiver comes in for repair and I have no time to search for the errant sheet. Such was the case with a Ferguson SRD6 which had been brought to me by the owner of the Bull and Bushel.

He swore that no one had poured beer inside, though there were some rather suspicious-looking stains on top. Luckily the inside was clean. There was only 3V at the LNB input however. Without the relevant circuit diagram, I was forced to trace the supply track with an indelible red marker pen.

The culprit was easy to spot. Diode DK01 on the 22kHz tone board had become so hot that the solder had melted. I was reluctant to replace it, because the type is unfamiliar to me and I know that exactly 0.6V must be developed across it for the 22kHz tone to be recognised by the LNB. At 300mA, the worst-case dissipation is just 0.16W with the oscillator not running. I couldn't see

why it had run so hot. Cleaning and resoldering the joints provided a cure, but I wondered how long it would be before the pub owner brought it back again.

Astra 1D

Several extra Sky channels are now available, via Astra 1D. But receivers must be able to handle the lower frequencies used. Sky has dealt with the problem by providing a Global Communications ADX-plus channel expander.

I make a few pennies by modifying Amstrad SRD510 and other receivers to control these expanders automatically, with a menu option. Unfortunately one user reported that although her son had fitted the expander carefully, and had adjusted the menu settings accordingly, her SRD510 refused to produce anything other than the most dreadful snow showers on the 1D channels. The installer who came to see me about this said he'd made two calls so far and had not been able to remedy the situation. All I could suggest was to check the cable and replace the LNB. The following day he phoned me to report, rather sheepishly, that he'd discovered an Astra 1D notch filter fitted next to the LNB!

Internet Web Sites

SatCure now has a web site at

<http://www.netcentral.co.uk/~davsatz/>

You might also be interested in taking a look at a new one

<http://www.pandora.co.uk/clients/dsat/>

This is run by Alan Pearson at Discover Satellite in Middlesbrough, and is a fine example of how to convey information via the Internet.

Pace D150 Decoder

A foreign looking gentleman came all the way from Leeds to complain that his Pace D2MAC decoder said "no access" when he tried to view the 'CTV' package transmitted by Intelsat at 1°W. Why he came to me I'll never know. I'm not really interested in these exotic programmes.

Anyway, Pace was very helpful and sent me a new EPROM, part no. 807-2301009. According to the customer, who phoned me later, this solved the problem. Apparently some D2MAC channels use 'Symulcrypt', which is a combination of DMAC and D2MAC. Standard Pace D100 and D150 decoders don't understand Symulcrypt transmissions (nor do I, so don't ask!).

Telephone Blues

Occasionally I get phone calls from dealers who think I run a free technical help line. Well I do, but only for people who buy spares from me, send me a lot of repairs, or give help in return. Otherwise the free advice is by e-mail only.

There are two reasons for this: first I can answer the e-mail in the evening, when I'm less busy, and secondly it leaves the telephone free for my genuine customers.

At present I get roughly ten telephone calls a day and fifteen e-mail queries. That's about 125 enquiries a week. At an average of ten minutes each, this works out at twenty hours of charity work a week – not counting the replies to letters, which are very time consuming.

Oh, and for those of you who found the number, I reply to faxes only if you enclose a five pound note!

Ferguson SRD4

This receiver is wedge-shaped which, I tell my customers, makes it ideal for use as a door stop. But it seems that people become attached to their equipment. Certainly the lady with the wedge-shaped face insisted that she would pay me lots of money to fix her receiver. Faced with an offer like this, how could I refuse? The symptoms were familiar: two vertical white bars and the message "no video signal".

The LNB supply was present, and a German Astra 1D station would from time to time appear. This was a valuable clue. A few measurements confirmed that the tuning was stuck at the lowest possible frequency. Replacing the SDA3202 surface-mounted chip beneath the tuner did the trick.

Another problem then occurred, a

Davenham Satellites

Readers who have dealt with Davenham Satellites will be sorry to hear that David Poole has had to close the business because of ill health. Martin Pickering will continue the satellite spares mail order and repair business however. He can be contacted at:

SatCure, PO Box 12, Sandbach, Cheshire CW11 1XA.
Telephone 01270 753 311.
Fax 01270 761 928.

screen request for the PIN number! Not knowing this, I made a 'forced entry' by pressing 9A69 on the remote control unit, which I had bought from Sendz Components for the princely sum of £2. This got me into the menu, and I was able to change the PIN. But the machine continued to request the PIN number every time I applied mains power. The Ferguson instructions on this are not clear, to me at any rate. If anyone knows the exact sequence of button presses required to disable this feature, I'd be pleased to hear from him/her. In fact I might even send a free copy of my book to the writer of the first correct answer!

As the power supply whistled in standby, I replaced the 220µF capacitor and the two 3.9V zener diodes near the power input socket. The only remaining problem after this was lines and 'streaky pictures'. Replacing every electrolytic capacitor on the secondary side of the power supply, using 105°C types, cured the lines. The streakiness finally disappeared when I'd replaced all the electrolytics that sit to the left of the tuner. Phew.

The lady with the wedge-faced face hasn't been back to collect the

receiver yet. Still, it's only six months – and I know she'll pay me lots of money!

Bush IRD155

This receiver doesn't appear to be a clone of anything else. But when a dead one arrived by post the other day I was surprised to find that the power supply is very similar to that in the Amstrad Model SRD500. Fitting parts from an SRD500 power supply kit cured the fault, which had destroyed several items including the mains rectifier D501, the 10Ω resistor R504, and the MJE18004 chopper transistor Q501. A Bush kit is available from Economic Devices.

Pace PRD800

A local shopkeeper supplies satellite TV equipment. While he concentrates on sales and installation, my main business is repairs and spares. So he brings me receivers for repair, and I pass most of my installation enquires to him.

Since we are only five minutes apart, he expects me to repair his receivers while he waits. This is fine for the easy ones, but last week he brought me a tricky one. It was a Pace PRD800 that produced an

Jack Armstrong is willing to try to sort out readers' satellite TV receiver problems via e-mail. You can reach him via the Internet at:

jackarm@netcentral.co.uk

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

excellent picture via the scart sockets but nothing via the RF modulator. As the terrestrial signal looped through perfectly, there was obviously no break in the connection. The clue was that I could see, on UHF ch. 69, a faint ghost of a picture from the satellite receiver. My impression was that the modulator's output was on ch. 70. This clue was all I required. A few measurements confirmed that one side of the Nicky 2 chip wasn't working. A new chip cured the fault and my friend went on his way, pleased that he'd seen me sweat for a change.

Test Case 414

For many years Ferguson VCRs were wholly based on JVC designs. They were excellent machines. There was subsequently a period when 'hybrid' designs were used, with JVC decks and Ferguson electronics. The two companies then parted company, when Thomson took over at Ferguson. This story concerns a Ferguson FV32L. It has a familiar JVC deck, and European electronics that are not so well known to us.

The symptom was failure to lace the tape fully. A cassette would be accepted happily enough, and the machine would wind and rewind the tape and eject the cassette when asked. If play was requested however the loading arms would advance about half way, then the machine would shut down. At switch on, the loading mechanism would sometimes retract fully, sometimes partially, followed once more by shut down. An usual fault.

We checked that the mechanism wasn't sticking or jamming, then replaced the mode switch – you have to remove the tape deck to do this. The vital shakeproof washer was added nearby, to earth the print on the underside of the board. As this didn't make the slightest difference, attention was turned to the control system. We soon discovered that the loading motor's operating voltage disappeared at shut down, because the microcontroller chip reset the power supply to standby. Why?

At this point, as is so often the case with such problems, the loading fault disappeared: the machine pulled the tape out fully and entered the play mode. This revealed another fault, apparently in the servo section, as the picture kept breaking into lines and mistracking bars. In fact the head drum's rotation was erratic. So we seemed to have two obscure faults – and the repair price had been agreed on the assumption that a replacement

mode switch plus clean and lubrication was all that was required. Such is life in the servicing business.

A fresh start was made by carefully checking all the output voltages from the power supply. They were all present, correct and ripple free. So the possibility that the problem could be resolved by replacing electrolytic capacitors in the power supply was discounted. The possibility of chasing the drum servo fault disappeared when the machine shut down in the middle of play, reverting to the original symptom – failure to complete tape loading. Once more the loading arms advanced to about the halfway point, then stopped. The front panel display reverted to standby, and the drum ran down to a standstill with the tape partially wrapped around it. When the machine was switched on again the tape unlaced most or all the way, after which the machine went back to sleep.

Plainly the microcontroller chip was orchestrating all this, but was it faulty or was there some good reason for its actions? VCR microcontroller chips rarely fail. But the feedback from the mode switch was correct, and the supplies were correct without any signs of distress. We proved that the tape-loading department was able to do its stuff, electrically and mechanically, by using an external 6V supply with the motor isolated from its drive chip.

Everything was shouting to go (including the technician!), but the microcontroller was saying no. Could the two faults be connected, or stem from a common cause? It was hard to think of a link between the drum servo section and the tape threading operation, even though the servo and syscon departments were both embedded in one big chip, IT01. Could it have been this chip, or should the culprit have been sought elsewhere? For the solution, turn to page 602.

What a Life!

A day's collection of TV (mainly) repairs and the characters who brought them along. Donald Bullock recounts his experiences

When I saw the car draw up outside and its driver start to pester a passer-by I should have nipped across to the door and locked it. I know that now, but I didn't then. I was curious, and as we know curiosity killed the cat.

The driver was a burly, ambling fellow who looked as though he lived on roast beef and cheap port wine. His wife hung about behind him. After a bit of a flurry, the passer-by hauled his TV set from the back seat and struggled towards our counter with it. He put it down and held the counter for support. He was quite an old man.

"Thanks mate" said the driver. "Oney I've got this bad back, see. On the sick I am. Pensioner akchewly."

As the passer-by staggered out I drew up a job card. "Name?" I asked.

"Swigger, mate" he boomed. "Me set's dead an' I can't do without 'im. What was on when he failed, Nell?"



"Thanks mate. Oney I've got this bad back, see."

Yes it was that prat who kept prancin' about, Julian something. Well blow 'im. Oney the telly's our oney pleasure. Well I mean you gotta 'ave a telly, aint you? An you enna goin' t' charge us anythin' much, I 'ope. Oney we're pensioners. see."

The Bush 2002

When he'd departed we put his set, a Bush 2002, on the bench. We switched it on and found that there was a blank screen, with no brightness or sound. Steven stared at me and, declining to mark the position of the first anode preset, upped the voltage. This showed that the cause of the problem was field collapse.

"We'll need a 12V, 1W zener diode" he said, "because ZD401 will be gone. Also it's 5-6Ω, 3W feed resistor R419."

"You'd better check the HT voltage first" I commented.

"Know that too" he replied, spinning his meter knobs. "Up at 135V. Should be 115V. That means C909 and C911, both 47μF, 50V, in the chopper circuit. You'll find they test all right on the bridge, but replacements will produce the correct HT voltage."

He took them out and tested them. They read right. He slung them in the bin and fitted replacements. When we switched the set on and checked the HT voltage it was spot-on at 115V. Then he replaced the zener diode and resistor. Up came the field scanning.

"Gosh, such cleverness" I said.

"S'nuthin'" he replied, wobbling his head from side to side.

Another OAP

Just then Mr Whiner came in with a Solavox 142TT. "Where's Mr Bullock?" he asked.

"I often wonder myself" I said. Steven appeared, grinning.

"Can't be much" Whiner said. "Right as rain a second before 'e went. Must be a loose wire or sum-

mat. Only I'm a pensioner, see."

The set was dead apart from the channel indicator. The mains bridge rectifier was doing its stuff, and there was HT at both sides of the chopper transformer's primary winding. But nothing much else seemed to be happening. As I didn't have a circuit diagram I was rather at a loss. Maybe the line output transistor was duff? When tested it was OK, but I decided to fit another one anyway. This didn't help.

Time to look at the power supply more carefully. It's based on an STR5412 chip, which incorporates the chopper chip and its associated circuitry. Pin 2, which is connected to the chopper transistor's base, receives bias via R807 and R808, feedback from a secondary winding on the chopper transformer, and pulses from the line output stage. I decided to check the resistors connected to this pin, and found that the feedback resistor R809 (180Ω, 0.5W) had gone high in value. A replacement restored normal operation, with a nice picture and sound.

Mrs Sad's Video

Mrs Sad slid in with a tiny, slim VCR. As I was filling in a job card a huge teardrop plopped on to it. Then another huge tear came rolling down her face.

"Died" she croaked. "Just like that. All right at breakfast, singing and everything, then" - another huge tear - "he just dropped dead."

I find this situation difficult. I bit my lip and stood still. Time passed by.

"Oh Mr Bullock, I'm going to miss him awfully. He was such a lovely canary" she said.

"I understand" I said. "Can you tell me what's wrong with your VCR?"

"It whirrs a bit. Otherwise it's dead" she said.

It was a Sony SBF30UB Betamax machine. There was no clock display, but the drum motor was rotating. A

fault in the 12V or the 5V supply seemed likely. We checked them both, at pin 3 of CN103 and pin 4 of CN101 respectively. Both were missing. We soon found that the cause of the trouble was a 47 μ F, 25V electrolytic, C115.

"D'you think we ought to offer to take a look at her canary?" I asked Steven.

Another Bush 2002

Mr Epongo's head is a bit bigger than normal. He was extra polite. The Bush 2002 TV receiver he brought in was identical to the one we'd done earlier, and the symptoms were the same. As we booked it in he leaned forward.

"I've got a musical jug" he said.

"Er... oh, right" I said and returned to my writing.

He touched my shoulder. "It plays Widdicombe Fair" he said.

"Good" I replied, giving him his half of the ticket.

Then off he went, gently ting-ting his musical jug's tune.

Steven took the back off the set, plugged it in, looked at me brazenly and upped the setting of the first anode control without marking it. Field collapse. "Ah" he said, "one more 12V zener diode and one more 5-6 Ω safety resistor."

"Okay, okay" I said, going over to the cupboard, "and here's your meter and two 47 μ F electrolytics. I reckon you're using customers with doctored sets to prove how smart you are."

He fitted the diode, the safety resistor and the two capacitors, blew on his knuckles, and switched on. There was an almighty bang, and acid-laced capacitor flocks peppered our faces. C909 had exploded.

After spending a long time searching for the reason, he noticed that the capacitors I'd given him were of a different make. It's common for the negative leadout wire of an electrolytic capacitor to be identified by a black line down the side of the case. These capacitors had the usual black line, but set into it there was a tiny plus sign, indicating that the leadout wire was the positive connection.

He looked at me as though I was responsible, cleaned off his face and the panel, then fitted replacement capacitors the right way round. When the set was switched on again a perfect picture appeared.

A Brace of Fidelities

The phone rang. It was Mr Prism, wondering how his 20in. Fidelity C1M2000T was coming along. The answer was that it wasn't. It was in

danger of taking root. As neither Steven nor I was anxious to hump it on to the bench, it was busily collecting dust in the middle of the floor.

"We'll face up to it together" I said. "You put it on your side of the bench, and I'll help." He did. There was sound but no brightness. As he reached for the meter, I slipped off to make the tea.

As I returned Lucy Lovebody came in. I like Lucy.

"My naughty TV's gone grouchy on me, Donnie" she breathed.

"Bring it in and we'll look at it, we sure will" I replied.

She wiggled off and fetched it from her car, wrote her telephone number on the screen with lipstick, winked and wiggled off.

The set was a Fidelity Super 14 portable, which uses the ZX2000 chassis. Its picture was all right, but the sound was distorted. There were no circuit reference numbers printed on the panel. I considered developing a protective migraine attack, but decided to plug in another speaker first. It made no difference. As I reconnected the original speaker however I accidentally brushed my hand against a tall coil next to the socket. The sound came right. I cleaned and reset the coil, then tried again. The fault had been cured.

Meanwhile Steven was battling with the other Fidelity set. The tube's heaters were aglow, and there was EHT. This time upping the first anode control's setting had no effect. A check at the tube's base to see whether the 370V first anode supply was present showed that it was missing. Steven looked into the cause and found that the metal tag to which the lead is soldered had corroded from the print. When it was cleaned off and resoldered there was a good picture.

An Irate Customer

Mr. Wallop didn't look too pleased as he struggled in with a Ferguson TX10 TV set.

"If ever a chap asked for a backhand it's that tall, thin fellow at Snoddy's" he bellowed. "This set lost its brightness. They kept it for two months, charged me fifty quid, and it went for just ten minutes. When I took it back he waved me out. Said I was mad expecting to get such an old set mended. Got an answer for everything, he has. But I could give him an 'ammering he wouldn't laugh off."

When he'd gone we put the set on the bench and switched it on. It was tripping. We looked at the power supply and noticed that D702 had recently been replaced. But a BY228

had been fitted in place of the original BYX55-600. It had failed of course. When the correct type had been fitted a good picture appeared. We decided to give the set a soak test and, if it passed this (it did), to charge Wallop £15.

A Toshiba V209

Angela Mainwairing popped in with a Toshiba V209 video which was dead. We've had these machines in before with the same symptoms, and headed straight for the power supply. Sure enough the STK7753 chip IC811 and C811 (100pF) were faulty. Replacing these items brought the VCR back to life.

Squashed up Picture

Rita Ruff brought in a Hitachi CPT2478 TV set (G6P chassis). "The picture's all squashed up" she said, "and very bright at the top. Has been for months. But my husband didn't bother to bring it in. So why should I I thought? But here it is. Better late than never they says, don't 'em?"

The cause of the field cramping was C682 (100 μ F, 50V) in the fly-back booster circuit. A replacement cured the fault, but the excessive brightness had etched into the phosphor. The tube was irreversibly damaged.

Tuning Trouble

The day had worn on when Egbert came in. He's forty, doesn't work, draws his strength from his bible and his living from his parents. He brought in their Hitachi C2118T TV set because it no longer tuned in programmes.

We decided to look at it while he waited. Then it would be time to pack up. So we opened the set up, confirmed the fault, and found that there was no tuning voltage at the tuner as the bar traversed the screen. The tuning voltage supply is derived from the HT line via R044 (12k Ω , 0.5W) and R144 (10k Ω , 0.5W). R044 was open-circuit.

"I had an identical set with tuning trouble the other day" Steven commented, "but in that one only channels 1-4 would tune - and they were right up at the wrong end of the scale and overlapped. There was also sound and vision interference. It was the same resistor, but it had risen to about 35k Ω instead of going open-circuit."

We boxed up Egbert's set and put it on the counter for him.

"Egbert" I said, the day endeth, and we're nackered. Give us this day fifteen pounds, and take the set back to your parents."

The Cable and Satellite Show

George Cole on the new equipment and systems presented at the 1997 show, which pointed firmly towards a digital future

This year's Cable and Satellite Show was held at Earls Court on April 21-23rd. The most obvious development was the growing number of companies demonstrating equipment designed for the reception of digital transmissions.

Digital and Multimedia

Digital TV via satellite has already started in several European countries, including France, Germany, Italy and Scandinavian states. Consumer response has been mixed: the new format has been readily taken up in France, but in Germany and Italy the sale of digital equipment has been disappointing. Present proposals will bring digital TV to the UK towards the end of the year, when BSkyB is expected to launch a 200-channel service. Several cable companies have announced plans to introduce digital services later this year or early next year. In mid-1998 Digital Terrestrial TV

(DTT) should also arrive in the UK.

Even an initial brief walk around the show made clear that digital broadcasting will offer more than just a greater number of channels, with new services such as near-video-on-demand (NVOD): interactive services, for example home shopping, home banking and access to the Internet, will all play a major role in the digital mix offered to consumers.

One of the biggest pieces of news was the announcement that Pace Micro Technology is to manufacture digital set-top boxes for the US company WebTV Networks Inc., the world leader in Internet-TV technology, and that there is to be a WebTV trial in the UK this autumn. WebTV was showing its set-top box at the show. It plugs into a TV set and a telephone socket and is operated by a remote control handset or an optional wireless keyboard – it has been designed to be as consumer-friendly as possible. Users pay a monthly subscription for Internet access, and can send and receive e-mail and explore the Internet via their TV screens.

In the USA the WebTV boxes are made by Sony and Philips. They cost about \$250 (some £170) each – prices are expected to fall to around \$200 (£133) by Christmas. Fujitsu supports the format in Japan. The latest versions of the box have a printer port to enable viewers to download text and graphics from the Internet and print them out.

WebTV is now owned by the computer software giant Microsoft, which bought it for \$425m (£285m). Will this prove to have been a good investment? To date, consumer reaction to WebTV in the USA has not been enthusiastic. Will TV viewers really want to explore the Internet? Supporters of WebTV point out that there are already many Net sites for entertainment (films, soaps and music for example), and that these are ideal for TV watching.

Nokia's stand was virtually an all-digital affair. During a presentation given by the company it was announced that in March Nokia produced more digital than analogue satellite receivers. But Helmut Stein, vice-president of Nokia's Technology and New Business division, added that analogue receiver sales continue to be strong and that there is still plenty of life in analogue operation.

Most digital TV reception equipment in Europe conforms to two standards, MPEG-2 digital video and the

The Grundig STR100 MicroSAT is one of the smallest satellite TV receivers in the world. You can hang it on the back of the TV set. The accompanying Sat Mouse receiver for remote control is shown at bottom left.



Digital Video Broadcasting (DVB) specification. There are DVB standards for digital cable, satellite and terrestrial systems. Different organisations can use different conditional-access systems however, though DVB recommends that digital decoders should be designed to be 'open', i.e. able to work with different CA systems. This will enable consumers to use the same decoder for different services.

Nokia dislikes the term 'set-top box', since it implies that the box simply links to a TV set. The company points out that home digital TV equipment will be designed to link to a service provider (for TV programmes or Internet access), to the public telephone network (for Internet access and ordering services) and to the home network (home PC or stereo system). It prefers the term 'Multimedia Network Terminal'. I suspect that most of us will stick to set-top box!

Nokia displayed many interesting products, including the Mediamaster DVB9200S, a free-to-air digital satellite receiver that has just been launched in the UK. It can receive channels from both Ku- and C-band satellites and includes a Motorola 68340 processor, 1Mbyte of RAM, 1Mbyte of flash memory and an MPEG-2 audio and video decoder. It has scart, RGB and CVBS video connections, phono hi-fi sockets, an RS232 port for fax and data and can also be linked to a CD audio, CD-ROM and Video CD player.

The DVB9200S is aimed at ethnic groups and expatriate communities who may wish to watch Continental European channels. Nokia says that there are at present around twenty-thirty free-to-air (unscrambled) channels, many of them broadcast from Italy. At switch on the DVB9200S automatically scans the satellite channels and arranges them to form an on-screen electronic programme guide (EPG). Users can then select the channel they want. The receiver can produce subtitles, but scrambled programmes are of course unwatchable. Nokia has no plans to offer an optional CA system with the DVB9200S, which has a suggested retail price of £530.

Nokia's Mediamaster DVB9600CI receiver includes a common interface which has been developed by France Telecom and others. This separates the receiver from the conditional access and descrambling system, enabling users to receive services from operators that use different CA systems. There was also an opportunity to see the d-box satellite receiver, which is currently used in Germany for DF-1 and in Italy for Telepiu. The d-box includes an EPG, a built-in modem and data connectors.

Nokia and Siemens are developing an integrated circuit for terrestrial digital video broadcasting (DVB-T) transmissions. It will cope with both the 8k and 2k coded orthogonal frequency division multiplex (COFDM) standards that are being adopted across Europe. Continental Europe will use the 8k system while the UK will use the 2k standard. The chip is being designed for a new generation of digital receivers, and will also be used in Nokia's 9T DTT terminal. Helmut Stein pointed out that as many consumers will not want to throw away perfectly good analogue TV receivers there will be a healthy market for digital set-top boxes.

Multimedia Services

Nokia is enthusiastic about the Internet, predicting that 140m people will be linked to this vast computer network by the year 2001. The company had on show what it claims is the world's first multimedia terminal with an Internet browser. One idea is to offer users a 'Sky Browser', which would transmit Internet home pages on



The Astra-Net logo. This new multimedia service is being launched by European Satellite Multimedia (ESM), which has been formed by SES and Intel and can transmit a wide range of information via the Astra satellites to PCs across Europe.

a rotational basis, rather like the teletext system. The difference is that hundreds of thousands of Internet pages could be made available, each having an access time of no more than ten seconds. As each digital receiver would be individually addressable, a home browser could deliver specific Internet services to individual viewers. The system could also offer a service called Impulse Pay-per-view, enabling the viewer to pay for a film or other programme on the spot – you can be certain that this will be popular with digital TV operators!

The satellite companies are also pushing new multimedia services. European Satellite Multimedia Services (ESM) has been set up as a joint venture by SES, the owner of the Astra series of satellites, and chip giant Intel. They have developed a technical system called Astra-Net, which transmits data via satellite to PCs with a built-in card and a dish connection. ESM is negotiating with PC card manufacturers, and hopes that modules which cost around \$200 (£133) will be available when the service starts.

Rival satellite operator Eutelsat hopes to launch a multimedia service called DVB Internet at the end of the year – it will transmit data and DVB-compliant broadcasts via satellite. According to Eutelsat, PC modules should cost around \$300 each. Eutelsat adds that a number of multimedia services are already on offer via its satellites. They include DirecPC, Net On Air, Tenfore and HS-Cast.

Pace showed a satellite PC plug-in module it has developed with Hitachi Europe for multimedia operation. It is working with the Swiss company The Fantastic Corporation to promote the card. The companies will integrate Fantastic's data broadcast software with the PC module, which could then be used for pre-packaged or bundled Internet services, financial and multimedia services. Fantastic's software prepares any material, including Internet web sites, films and computer games, for broadcasting to PCs. The content is distributed in real time via satellite, cable or terrestrial routes. A full commercial launch of the system is expected early next year.

The Open TV system, developed by Thomson Multimedia and Sun Microsystems, had a fairly high profile at the show. It's designed for interactive TV services such as pay-per-view movies, ticket sales and reservations, and home shopping. Users select options from on-screen menus.

The UK company Cabot Software was promoting its interactive home shopping system called Nexus. This uses a remote-control handset and a Fasttext-like display.

A small DTT demonstration by the BBC was being

conducted at the side of the Pace stand. One suspects that it will have a much higher profile at next year's show!

Electronic Delivery

Shows like Cable and Satellite are often used by companies to promote future products and services. An example was the Amsterdam-based company EMC³ (Entertainment Made Convenient - convenience, control and choice) which plans to launch an electronic digital delivery (EDD) service next year. Videos, music and games will be delivered at high speed to specially adapted VCRs, PCs and Network Computers. A two-hour video programme could for example be downloaded in around ten minutes. EDD uses a powerful compression system and is designed for use with cable, satellite, wireless and broadband systems.

A number of electronics companies support EMC³, including JVC, Mitsubishi, Sony, Hitachi, Pioneer and Samsung. EMC³ announced that Akai and Aiwa are the latest companies to join the list. It plans to have a prototype EDD in operation at this year's Berlin International Electronics Fair in August.

Analogue

This year's show wasn't all digital however!

Astra announced that Channel 5 will be available via transponder number 63 in PAL form (at 10.92075GHz, with horizontal polarisation and audio carriers at 7.02 and 7.2MHz). As it's a free-to-air channel, it will be soft-encrypted. Thus only a VideoCrypt 1 IRD will be required for reception. The satellite service will bring Channel 5 to around 2.9m homes.

Pace featured new MSS300 series receivers with built-in ADR (Astra Digital Radio) and/or DMX (Digital Music Express) facilities.

Pace also introduced new international analogue satellite TV models. The ASR30G is an 'entry-level' receiver with 250 TV and radio channel capacity. The MSS137G adds DiSEqC (digital satellite equipment control).

This Eutelsat-devised system enables users to receive channels from more than one satellite via a single feed to the receiver. It adds a data burst to 22kHz tone switching, to control LNBs and accessories. DiSEqC switch units were included in the latest Global Communications range.

Grundig's amazing STR100 and STR110 are called MicroSAT receivers: they are small enough to hang at the back of a TV set, using a special clip which comes with them. They also have a Sat Mouse IR receiver, which is placed in line-of-sight with the remote control unit. They certainly stop the shelf under the TV set from becoming cluttered with boxes! Both receivers include 199-channel capacity, three scart connectors and Wegener Panda stereo sound capability.

Nokia's SATscan 1800, designed for multi-satellite viewing, includes an internal positioner with a 31-satellite location memory, DiSEqC, PDC and VideoPlus - at a suggested price of £350 with 60cm dish. The Nokia SAT 780 is an entry-level model with 120 preset channels, tuner lock and Wegener Panda stereo at a suggested price of £100. For £220 you can get the Sat 800S, which includes DiSEqC switching for control of up to four LNBs, 199 TV channels, 121 radio channels, Wegener-compatible stereo and three scart sockets.

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Grundig

Satellite Receivers

In this new series **Steve Beeching** takes a look at the technology used in the Grundig E and Omnisat chassis. This month's article also deals with practicalities such as installation and getting at the innards

This series of articles deals with the Grundig E and Omnisat satellite TV receiver chassis. There are many variants of the two chassis. These variations relate to brand name, cabinet type and display options. Some models have a digital display while others have simple red and green LEDs.

Early versions of the E chassis, e.g. the Grundig Model GRD150, have two scart sockets. Later versions, including the GRD250, have an additional scart socket for use with an external decoder. All versions were manufactured at Grundig's Llantrisant plant in South Wales. You will find them in various ranges, including Philips and JVC. The Omnisat chassis is used in many Matsui receivers.

Installation Notes

Before we take a look at the circuitry used, here are some installation notes. The receivers come pretuned and, as with most modern consumer electronic equipment, installation and setting up are menu-driven. Use the remote control unit's left/right keys to step through the menus and the up/down or +/- keys to alter setting values.

Ensure that the LNB's output is connected to socket LNB1A (the GRD250 has socket LNB2A for a second LNB input). Follow the menu sequence from the main menu to the install menu then the LNB install menu. Select the 9.750GHz LNB local oscillator frequency (or 10GHz if an existing or earlier type of LNB is used). This involves typing in 09750. Note that interference from Astra 1D transmissions may be present if a 10GHz LNB is used. Thus precautions such as double-screened RF leads must be taken.

When the remote control unit's display key is operated, the menu background will change from black to a received picture. This is useful for tuning and LNB offset adjustment. If the receiver brings up CNN instead of Sky News on programme channel 2, the customer's LNB is a 10GHz type.

If there are black or white sparklies because the LNB's local oscillator frequency is out of tolerance, the LNB offset can be changed. Select the install then



the LNB install menu. Use the display button to mix the menu with the picture. You can then optimise the LNB frequency by using the up/down or +/- keys. Black sparklies mean that the value is too high, white sparklies that it's too low. For best results, carry out this operation on one of the weaker channels.

Problems

If menu selection is possible but there is no reception on any channel, check that the LNB frequency is correctly set. With a 9.750GHz LNB, ensure that 09750 has been entered.

If an individual channel cannot be decoded, go to the install menu and select decoder. Check that the external decoder is set to off, or auto in the tuning menu for the channel concerned. This applies only to receivers that have external decoder facilities of course.

If there is no reception of a specific channel, check that the correct channel polarisation and LNB are specified in the tuning menu for that channel.

If there is no audio, or it's in a different language or a radio channel is present, check and set the audio tuning. This means going to the channel set-up menu then selecting audio.

If radio only or radio plus mute has been selected, the on-screen display speaker symbol will change and move around the screen. This is done deliberately, to prevent the symbol burning the TV screen's phosphors.

PI Number

If the consumer or his/her children have entered an unknown PI number, the default number printed on the guarantee card can be used as a reset. First, select reset PIN in the access control menu, then select yes. The PI number then becomes that printed on the card, and access can be gained by using this number. If the guarantee card has been lost, try 2355.

If the owner has tried to retune the receiver, or tuning has been lost, an Astra reset can be carried out. Select the install menu, then Astra reset. Enter PI number 2601. This will restore the Astra tuning frequencies to their allocated programme numbers. It will erase other user settings such as programme names and special audio and decoder settings however. Remember that it takes longer to rename all the channels than to tune in a few misaligned ones.

Dismantling Notes

To remove the case top, take out the three rear case screws. Note that the centre screw may be a tamper-resistant type. It can be replaced with a standard self-tapping screw.

To remove the front panel, take out one screw at each side of the case. Note that the front panel may fall away once the screws have been removed, so support it.

To remove the VideoCrypt decoder, release the three PCB securing lugs. Lift the decoder carefully from the interboard connector PL2, avoiding damage to the LED display.

To remove the main PCB, take out four screws from the rear panel, two self-tapping screws from the mains and audio connectors, and two threaded screws from the tuner and RF modulator. Remove two expansion clips from the main PCB, at either side towards the front. Release the two PCB mounting lugs situated left and right of board centre. The PCB can then be lifted upwards and forwards. Don't lose the spacer mounted on the LNB connector.

Reassembling the Receiver

Reverse the procedure just described. There are some points to watch, as follows.

Ensure that the VideoCrypt decoder is accurately positioned and that the insulator mounted on it is present and not damaged.

Ensure that component leads do not protrude more than 3mm below the PCB.

Ensure that the card reader's sliders align with the socket, and that components don't block the reader.

Ensure that the spacer is fitted to the LNB connector on the satellite tuner. If the tuner has twin LNB inputs, a spacer is fitted on the upper connector only.

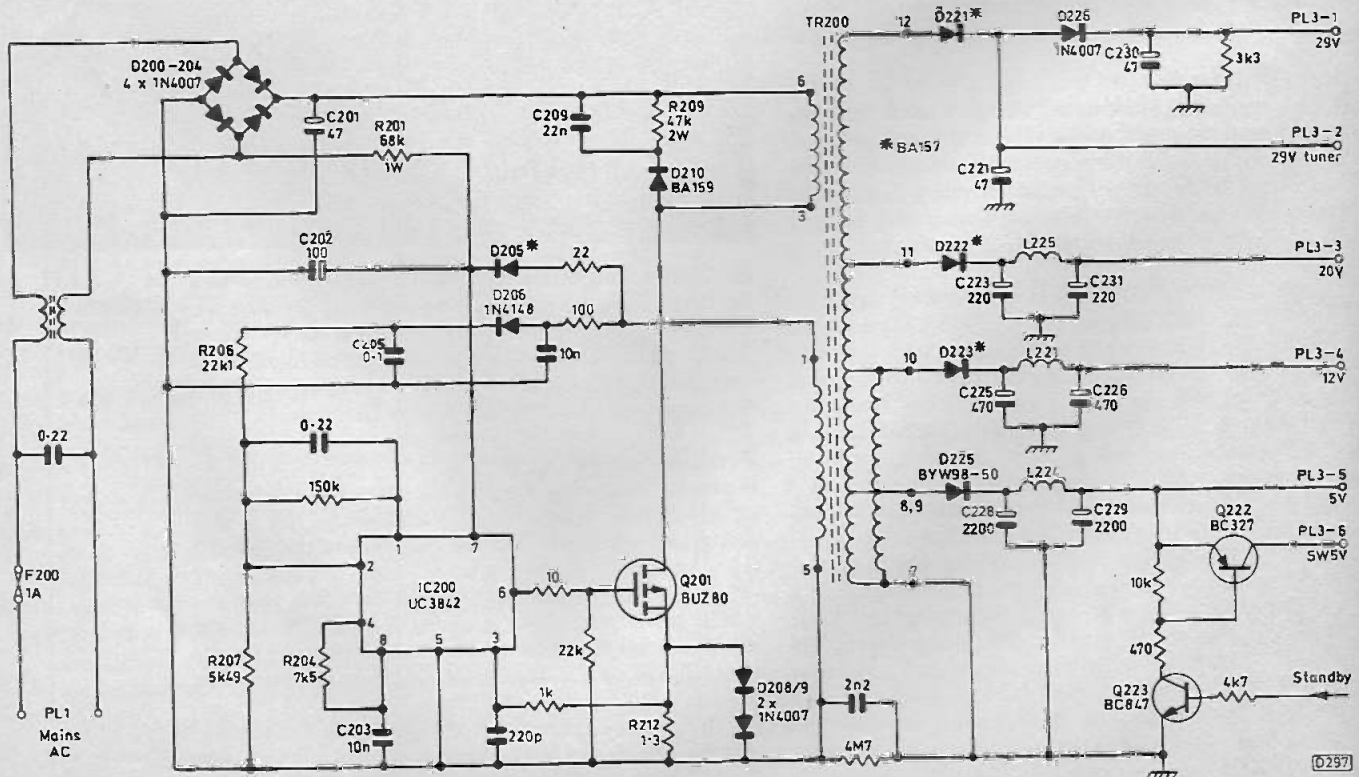
A Warning

This warning applies to all products that use MOS ICs. You should not attempt to service such products in a home environment with synthetic fibre carpets and dogs and children around.

MOS components require special handling to avoid damage caused by static charges. Such charges build up when insulated plastics or clothes made from synthetic fibres are present. The protective circuits incorporated at the inputs and outputs of MOS devices provide only limited protection. Observe the following precautions.

(1) Keep replacement MOS devices in their conductive packaging until the time when they are fitted to the

Fig. 1: The power supply circuit.



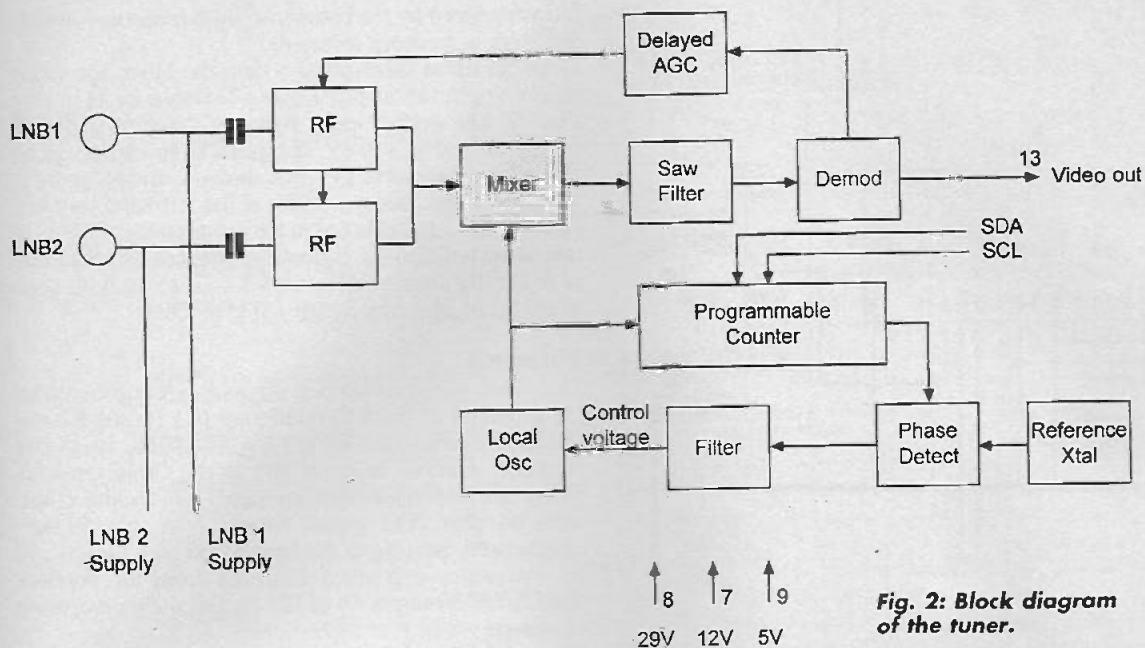


Fig. 2: Block diagram of the tuner.

PCB. Do not repackage such devices in plastic or insulated containers.

(2) Anyone handling MOS devices must discharge personal static charges and wear an earthed, conductive wrist strap at all times until component replacement has been completed.

(3) Do not walk across a room with a synthetic carpet then pick up MOS devices or a PCB containing them. Always discharge yourself by touching the chassis earth or a static-safe work station.

(4) When removing or fitting MOS devices, do so at a static-safe workstation using static-safe soldering and desoldering equipment.

(5) Use only earthed or static-safe test and measuring equipment when carrying out circuit checks.

(6) Take care to avoid short-circuits to adjacent pins when applying test probes to MOS devices. Always use alternative test points, such as a resistor or a capacitor with a larger connection area. For example, waveform TP4 is better checked at pin 12 of connector PL2 rather than pin 55 of IC1, as a short to pin 56 will destroy the output port.

The Power Supply

Fig. 1 shows the power supply circuit used in these receivers. The design is based on a BUZ80 power MOSFET chopper transistor (Q201) and a UC3842 control chip (IC200). R201 is the start-up resistor, which supplies minimal power to pin 7 of IC200. Once the power supply is running, D205 rectifies the waveform at pin 1 of the chopper transformer's control winding, charging its reservoir capacitor C202.

R204 and C203 set the frequency of the pulse-width modulated waveform at pin 6 of the chip. This is used to drive the chopper transistor's gate. For stabilisation, D206 and C205 produce a feedback voltage which is compared with a fixed voltage generated within the

chip. A small decrease in the feedback voltage, caused by increased loading, will lengthen the width of the pulses that drive Q201. As a result, Q201 conducts for a longer period, providing additional energy in the transformer to compensate for the loading effect.

R212 monitors the current flowing via Q201. If this is excessive, because of a heavy load on the secondary side of the circuit, the voltage at pin 3 of IC200 will increase to the point where the chip shuts down the chopper drive. D208 and D209 are included to protect the chip against failure of Q201.

The potential divider R206/R207 sets the voltages generated on the secondary side of the circuit. Both are close-tolerance resistors, and no voltage set-up control is required.

In the standby mode the microcontroller chip sets the voltage at the base of Q223 low. As a result, Q223 and Q222 are turned off and there is no switched 5V supply.

The plug reference numbers shown (PL3-1 etc.) are not for connections to the power supply. They are test points available at a plug (PL3) near the front of the receiver - it's behind the LED display unit.

Because of the high-quality components used, we have experienced very few power supply faults. The electrolytic capacitors are likely to fail with heat and age however. Early production receivers were fitted with a 500mA mains fuse (F200). If you come across one, uprate it to 1A.

The Tuner

Fig. 2 shows the tuner, which incorporates the IF strip, in block diagram form. A frequency-synthesis tuning system is used. The tuning range is 950-2,050MHz (2,150MHz in later models), the IF bandwidth being 27MHz. Pins 7, 8 and 9 of the tuner receive 12V, 29V and 5V supplies respectively. Some models have two LNB inputs, others one.

The local oscillator's frequency is determined by the programmable counter (divider), which forms part of a phase-locked loop. Channel selection is carried out by the microcontroller chip via the serial data (SDA) and

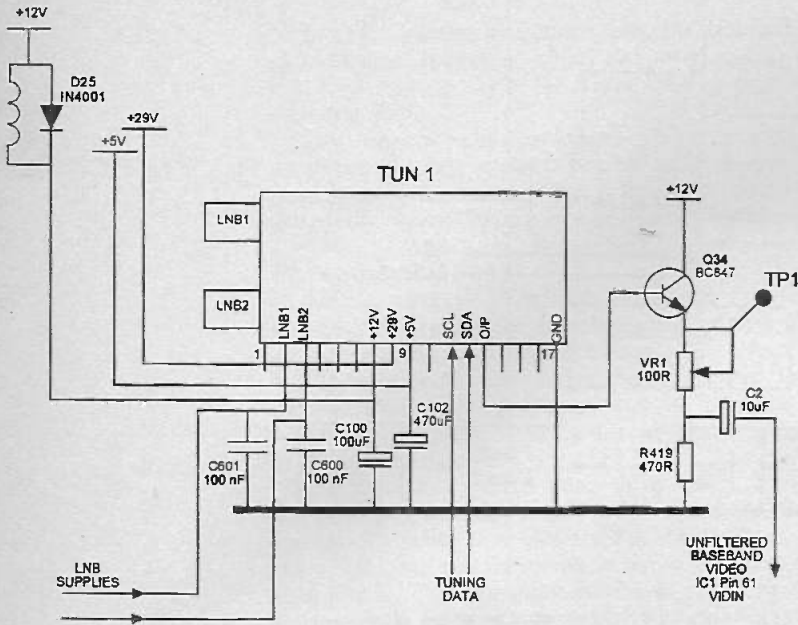


Fig. 3:
The tuner's external arrangements.

clock (SCL) lines, by adjusting the programmable counter's division ratio.

We'll briefly outline the operation of the phase-locked loop. The crystal-controlled reference oscillator runs at a lower frequency than the local oscillator. Its output is one input to the phase detector. The output from the local oscillator is fed to the mixer and also to the programmable counter, whose division ratio is set so that its output, which is the other input to the phase detector, is at the same frequency as the reference oscillator. In this state the phase-control loop is locked: in effect the local oscillator is crystal-controlled by the reference oscillator. Should the phase or frequency of the local oscillator deviate, it will be brought back into lock by the action of the phase detector.

When the counter's division ratio is altered to change channel, the local oscillator will initially be running at the wrong frequency. It's pulled back into lock at the frequency required for the newly-selected channel, set by the new division ratio, by the phase detector. In this way the local oscillator frequency can be set to obtain

any channel within the tuning range. The division ratios required by the counter/divider are stored in digital form in memory locations.

Demodulation takes place within the tuner, the video output appearing at pin 13. It's buffered by Q34 (see Fig. 3). The peak-to-peak signal at the emitter of this transistor is at 0.5V-0.6V. It appears to be very noisy, as a check on waveform TP1 will show. A suitable point at which to check this waveform is the left-hand terminal of VR1. It's advisable not to alter the setting of VR1, as this is critical for the VideoCrypt decoder's operation. If you really must twiddle, set VR1 for 2V peak-to-peak at pin 12 of PL3 (the positive side of C404).

Filtering

The video signal developed across R419 is coupled by C2 to pin 61 of the STV0020 chip IC1 (in the E2 and Omnisat chassis this IC is type STV0030, its circuit reference number being IC400 in the Omni chassis). These are dedicated satellite signal processing chips, with 64 pins. The signal returns from pin 59, de-emphasised, passing to the base of Q2 (see Figs. 4 and 5). Frequency-dependent feedback from the network R4/5/6/7/C7/8 to pin 60 of IC1 shapes the de-emphasis response.

The components between the emitter of Q2 and the base of Q35 form a filter to remove the audio carriers from the video signal. C6 and a clamp within IC1 remove the triangular energy-dispersal signal from the video waveform.

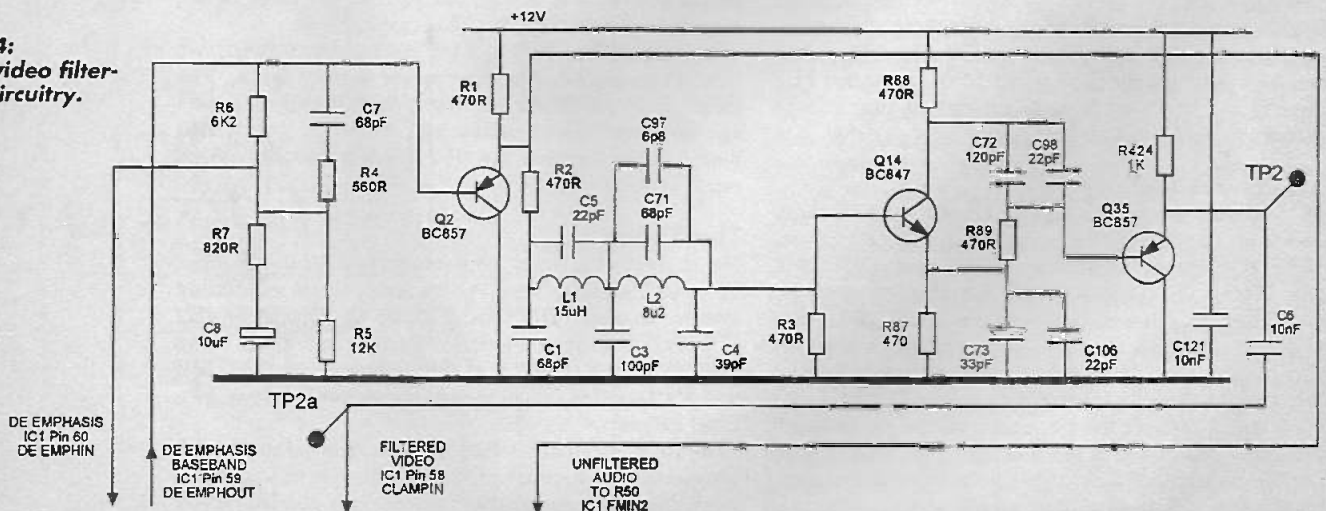
A de-emphasised signal is taken from the emitter of Q2 to pin 24 of IC1 via a filter which extracts the audio component for demodulation within IC1.

Video Switching Matrix

The video switching matrix arrangement within IC1 is shown in Fig. 5. in block diagram form. The video input at pin 61 is passed to a buffer amplifier and is then split two ways. Baseband video is applied to the switching matrix and also to a second amplifier which, with the previously mentioned frequency-dependent feedback network, provides de-emphasis. De-emphasised video is fed to the matrix via another amplifier. In addition, the de-emphasised video at pin 59 passes via the audio and energy-dispersal filtering arrangements just described to become another input ('clamped normal video') to the matrix.

Other inputs to the switching matrix come from the

Fig. 4:
The video filtering circuitry.



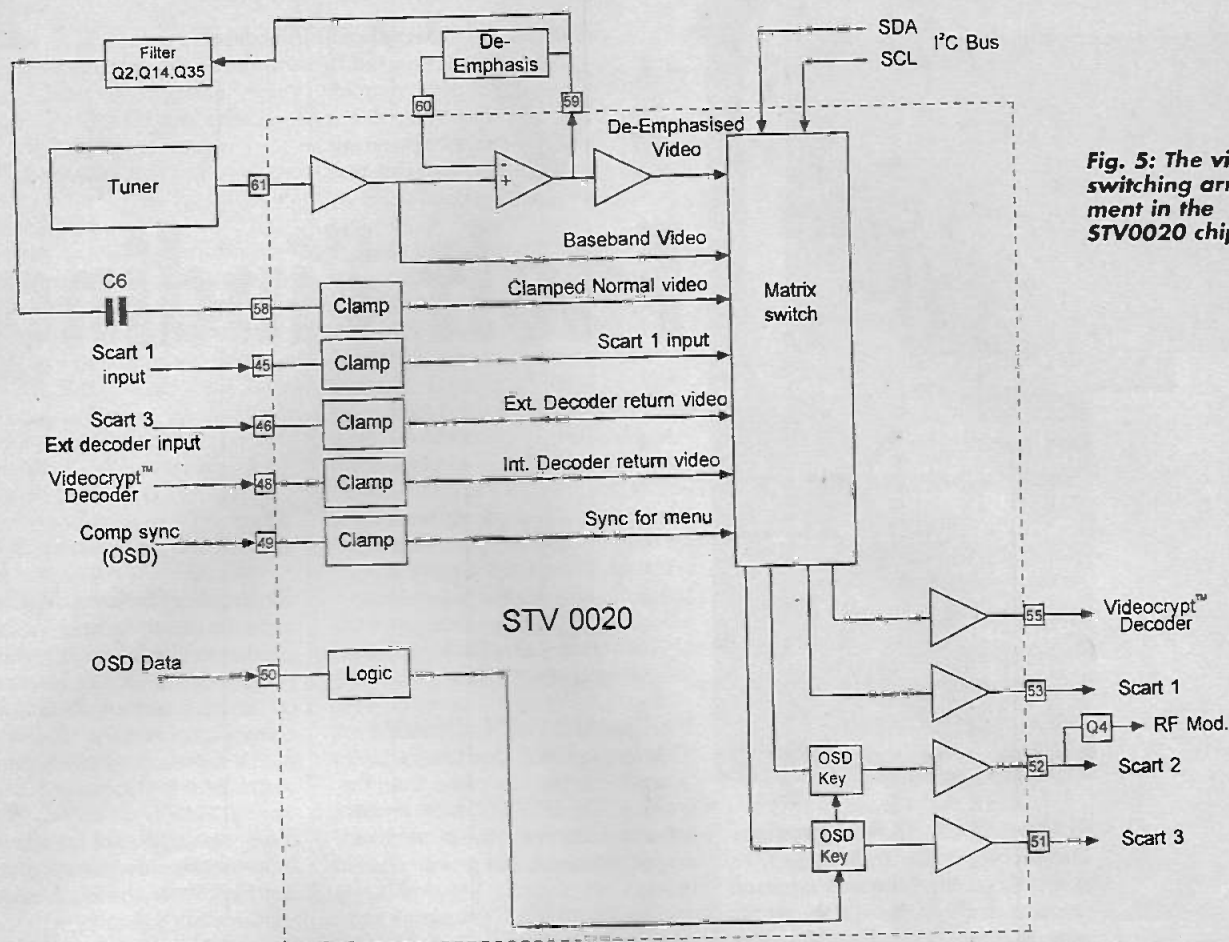


Fig. 5: The video switching arrangement in the STV0020 chip IC1.

scart 1 connector (VCR input), the scart 3 connector (return video from an external decoder) and from the VideoCrypt decoder (there is no return signal from the TV scart connector).

Pins 49 and 50 of IC1 are concerned with on-screen displays. The composite sync input at pin 49, from the VideoCrypt decoder via Q27/26/8, is used for the menu displays, synchronising the data fed in at pin 50. This gives menus on a black background. If the remote control unit's display button is operated, normal video is substituted for the composite sync. This gives a menu display with a picture background.

Switching between the various matrix inputs and outputs is determined by the microcontroller chip via the I2C bus (the SDA and SCL lines).

The output to the VideoCrypt decoder, at pin 55, is obtained from the clamped normal video input. The VCR record (scart 1) output at pin 53 is selected from either the VideoCrypt return, the external decoder return or the clamped normal video input depending on the mode of operation. The TV output (scart 2) at pin 52 is selected from the same sources as the VCR output. This output is also fed via a buffer stage (Q4) to the RF modulator. The external decoder output (scart 3) at pin 51 is selected from baseband video, de-emphasised video or clamped normal video, depending on the decoder's requirements. The menus are available at only the TV and the external decoder outputs.

Next Month

In Part 2 we will be looking at the audio and microcontroller arrangements used in these receivers.

Component reference numbers in Part 1 relate to the E1 chassis.

GOT A SPARES PROBLEM?

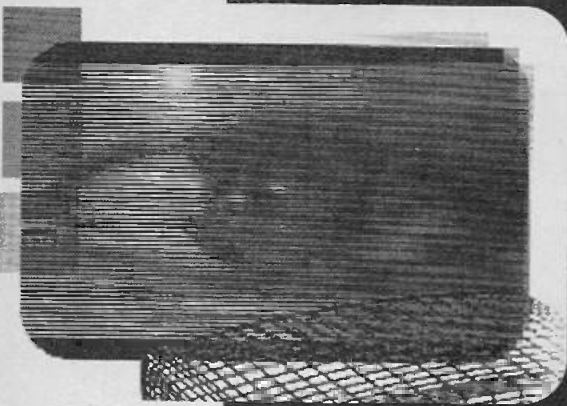
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Philips GR2.2AA Chassis

This set was dead. Resistance checks in the line output stage soon revealed that one of the EW modulator diodes (D6546, BY228) was short-circuit and that the EW fuse F1534 had blown. When these two items had been replaced the set worked, but the width was excessive and vertical lines were bowed. Transistor Tr7533 (2SA1359) on the tube base PCB was short-circuit. After replacing this transistor the width was low, and couldn't be increased enough using the width control. Driver transistor Tr7530 (BC848) had also failed. P.B.

Sanyo CBP2876-00 (ED028 Chassis)

The picture was perfect – even the teletext worked – but it was constantly moving from left to right. Fortunately there's a good circuit description in the manual. So I was able to build up a list of what was needed for the circuit to synchronise. There was digital video at the DPU2553 chip (IC400), also pulses from the line output transformer. So the picture should have been locked. A new DPU2553 solved the problem. P.B.

Ferguson U739 Tuning System

The Ch. 5 tuning operation has revealed the sets with tuning problems. This set (Model 20C3, TX100 chassis) would start to

TV Fault Finding

search tune when asked, but carried on searching when the button was released. The switch wasn't leaky, but the search up line was being held low. Replacing the four 1N4148 diodes D2026-9 restored normal operation. P.B.

Philips GR1-AX Chassis

This set was dead apart from a humming noise that came from the speaker. The 95V HT supply was present at the collector of the line output transistor, but it was without drive.

The TDA8305 IF/timebase generator chip IC7220 has a rather unusual start-up arrangement. A capacitor (C2058) that charges from the HT line supplies a pulse which is fed in at the volume control pin (11) to start the line oscillator! The pulse was present, and a line oscillator waveform was present for a second or so at the line drive output pin 26, but the drive output from this pin didn't get going and the 2-6V normally present here was missing. The 12V feed coil L5524, which is by the line output transformer, was open-circuit. Its part no. is 4822 156 21293. P.B.

Nokia SP63D1.6355UK (SFN Chassis)

This set had a distinctive field non-linearity symptom – the picture appeared to have horizontal black bands and areas where the scan lines were too far apart. A scope check on the field output to the scan coils showed a ramp that was 'filled in' with an HF signal. RS11 (220Ω) was open-circuit. It's connected across the field scan coil socket, on the mother board. P.B.

Hitachi C2564TN

Field collapse was the fault with this set. The TDA8178 field output chip was blameless: replacing the

100μF, 63V flyback boost capacitor C604 restored the raster. M.M.

Finlandia/Salora M Chassis

I got the call to this one from another dealer. He said it was badged JVC with a Granada sticker on the back and a Finlandia remote control unit! Anyway it was dead, with a short-circuit line output transistor. So a replacement S2000AF was fitted. When I switched on there were squeals from the power supply, a slightly narrow picture and field flyback lines. Various electrolytics had to be replaced to restore normal operation: C523 (470μF, 25V); C571 (100μF, 40V); C622 and C624 (both 220μF, 25V). It's prudent to replace these four capacitors whenever one of these sets comes in for service. M.M.

Ferguson ICC9 Chassis

If the problem is no/intermittent sound you will probably have to look no farther than socket BA05 at the back of the main panel. It's quite a tall socket which tends to 'wobble' when the PCB or chassis is moved. As a result there is a tendency for dry-joints or cracked print where the socket is connected to the PCB. S.H.

Panasonic Z4 Chassis

When this set was first switched on there was a bright green screen. After a few seconds a normal picture would appear, but once or twice a day the picture would cut out entirely. The cause of the trouble turned out to be capacitor C350 on the tube base panel. Our thanks to Panasonic Technical for assistance with this one. S.H.

Samsung C13312Z

No sound was the reported fault with one of these sets. The speaker and the audio output chip appeared to be in order, as were the DC sup-

plies to the audio section. But the ident level (approximately 0.5V) at pin 29 of RIC01 was missing because R709 (27k Ω) was open-circuit. A replacement resistor restored the sound. S.H.

Matsui 1436

The standby switching worked but there was no sound or picture. Checks in the line timebase showed that while line drive was present at the primary winding of the driver transformer T751 it didn't reach the base of the line output transistor. A replacement driver transformer cured the fault – the original one had shorted turns. S.H.

Goodmans 2875

This set would work all right for several days then go completely dead for a few minutes before coming back on in the standby mode. The cure was to resolder all the connections to the chopper transformer T1, though no dry-joints were visible. S.H.

Philips G90AE Chassis

No sound or picture it said on the job sheet. The 95V HT supply was missing because of a hairline crack in the print at the edge of the main PCB, where it slots into the cabinet. An insulated link put matters right. S.H.

Sanyo CBP2865 (E3-A28 Chassis)

The sound and picture would intermittently disappear, leaving a bright white raster of reduced height. Normal operation would sometimes be resumed almost as soon as the fault occurred. At other times there would be field collapse followed by the standby mode. The cause of the trouble was the SI3122V 12V regulator IC780, which shorted internally when warm. It's mounted on a large heatsink on the power supply board: use plenty of heatsink compound when fitting the replacement. J.E.

Grundig TVR3700

This combined TV/VCR unit had no line timebase operation, the symptom being sound but no picture. Checks showed that the 14V supply to the line driver transformer was missing because the fusible resistor R3584 was open-circuit. This resistor is connected to the collector of the pnp standby switching transistor Tr7582, whose emitter is connected to the 14V supply from the chopper circuit. J.E.

Philips CP90 Chassis

This set produced a nice picture but intermittently, maybe once every few hours, the picture would turn to white with flyback lines, as if the first anode control had been turned up too far. When this occurred the picture was just visible in the background. I envisaged a long soak test, but fortunately spotted a tell-tale dark ring around the chassis pin of the line output transformer, indicating the start of a dry-joint forming. Slight movement of the pin while watching the screen, using insulated pliers, proved that the symptoms could be made to come and go at will. The set worked all right after resoldering all the transformer's pins.

A word of warning. When you've replaced the back cover after a repair and find that the picture is dark and dull, you've broken the rear-mounted 5k Ω contrast preset R3944 – its shaft protrudes through a small hole in the back cover. Guess how I found out! J.E.

Hitachi CPT2080

Intermittent field collapse, lasting for only a few seconds to about a minute, would occur perhaps once or twice during a four-hour period. It was caused by base-emitter leakage in one of the field output transistors, Q651 (2SD401A). For good measure I also replaced its partner Q652 (same type). J.E.

Aiwa VXT1010K

This combined TV/VCR originally suffered from intermittent switch-on problems. Sometimes it would, sometimes it wouldn't. Now it just wouldn't.

The very nice man at Aiwa suggested that I replace the STK73907 regulator, C514 (0.082 μ F pulse capacitor), Q501 (2SK212) and Q510 (2SC1815). Then if necessary change the value of R520 to 68k Ω and C524 to 220 μ F. I did and the set worked.

If only all manufactures would follow this example! J.E.

Bush 2512T

Whenever this set was switched on from cold some or all of the stations would be slightly off tune. The cause was transistor Q608 (BSX20), which is part of the integrating circuit between the micro-controller chip and the tuner's VT pin. The only difference noted between the old and the replacement transistor was a slightly distorted collector-to-emitter waveform shown by a scope component

tester display. The faulty transistor produced normal readings when checked with a meter. J.E.

Matsui 209T

We've had three of these sets in all with the same problem, flyback lines at the top of the picture, also the six RGB test lines for the auto grey-scale correction visible. Replacing C301 (100 μ F, 50V) and C303 (4.7 μ F, 160V) cured the problem in each case. Both capacitors are in the field output stage. M.Dr.

Philips G110 Chassis

This set was dead although the power supply was OK when tested with a dummy load. So over to the line output stage, where we found that the BU508A output transistor was leaky. The root cause was C2546 (8.2nF, 2kV) in the EW diode modulator circuit – it had a large hole burnt in the side.

After replacing these two items we confidently switched on. But there was nothing, still a dead set. As further checks failed to reveal anything amiss we disconnected the electronic trip (Tr7656/7655) by removing R3660. This time the set sprang to life when it was switched on, but there was no EW correction. The culprit turned out to be the 315mA Wickman fuse T1534, which is in series with the collector of the EW modulator driver transistor Tr7533. The voltage build up here is monitored by zener diode D6561, which provides one of the feeds to the electronic trip. M.Dr.

Amstrad CTV1410 and Clones

If the 2SD1545 chopper transistor has blown, always check/replace Q902 (2SB774) and the 9.1V zener diode ZD902 as these are usually damaged as well.

If you have a dead set with the -30V and 16V supplies OK but the 112V HT supply appears to be missing, check relay RLY901 first for open-circuit contacts. Since the reservoir capacitor comes after the relay, no voltage can be measured at the cathode of the HT rectifier D904 when the relay's contacts are open-circuit. M.Dr.

Tatung 160 Chassis

One of these sets suffered from slight ghosting, as if there was an aerial fault. After checking the aerial system, which was OK, we replaced the tuner. This didn't make any difference. A replace-

ment SAW filter (Z101) cured the problem. **M.Dr.**

Philips CP110 Chassis

"Takes five minutes to come on from cold" was the complaint with one of these sets. The well-known cure is to replace the 22 μ F HT reservoir and smoothing capacitors C2670 and C2621. I changed them as one measured 18 μ F on the meter, but this only improved the start-up time to two minutes. The cure this time was to replace the 100 μ F, 50V electrolytic capacitor mounted on a small PCB between the chopper transformer and C2656. **C.W.**

Panasonic Euro 1 Chassis

This digital receiver had a Nicam sound problem: the stereo sound was low and distant, and sometimes came from one channel only. The FM sound was good however, from both channels. Unfortunately the Nicam chip proved to be innocent. My next stab in the dark was successful. I replaced the AMU2481 multi-sound processor chip IC1431. **B.S.**

Panasonic Z5 Chassis

Lack of height with some foldover at the top was the symptom with this set. We soon discovered that the 30V supply, which is derived from the line output transformer, was low at 20V. The feed resistor R521 had risen in value from 8-2 Ω to about 20 Ω . **B.S.**

Panasonic Euro 1 Chassis

There were teletext and on-screen graphics problems: after a few minutes black lines would develop across the text screen or the on-screen graphics boxes, then increase until black eventually predominated. Obvious guesses like the text processor IC and text memory chip proved to be incorrect. The culprit turned out to be the DPU2553 deflection processor chip IC1501. **B.S.**

Panasonic Euro 2 Chassis

The problem with this second-generation digital receiver was field foldover at the top of the screen, bringing the CRT current sampling lines down into the display area. The cause of the fault was traced to D456, a 16V zener diode (type MA2160) in the field output stage. **B.S.**

Panasonic Euro 1 Chassis

Very intermittently this digital TV receiver would develop large picture geometry errors, leading to failure of the line output transistor. When it had been on soak test for

several hours I noticed that the height and width had increased dramatically. Fearing for the safety of the line output transistor, I switched off and resorted to guesswork. I suspected the DPU2553 deflection processor chip IC1501, and replaced it. But later that day the fault returned. Eventually, after many hours of uninspired guesswork, I discovered that the cause of the fault was the MCU2600 master oscillator chip IC651. **B.S.**

Sony KVD2912U (AE1A Chassis)

The picture was cramped approximately a third of the way from the top of the screen and there was foldover at the bottom. The cause was traced to the field scan coupling capacitor C531 (680 μ F, 25V) which had fallen in value to 330 μ F. **D.F.**

Goodmans 1410

Line tearing accompanied by a squeak from the chopper transformer would develop when this set had been in operation for about half an hour. The cause was eventually traced to CP90 (22 μ F, 50V) in the power supply circuit. **D.F.**

Philips CP110 Chassis

When this set was first switched on the verticals were ragged, the fault clearing after about fifteen minutes. The cause was traced to C2633 (100 μ F, 25V), which decouples the supply to the line driver transistor Tr7630. **D.F.**

ITT Digi 3 110° Chassis

There was no sound or raster. I disconnected the scan coil plug and used a 100W bulb across C795 as a dummy load for the power supply. This proved that the power supply was OK. The line output transistor and transformer, which are the most usual causes of the fault, were then replaced. But no luck. Disconnecting in turn the rectifier diodes fed from the line output transformer brought me to D547 in the 13V supply. It was short-circuit. The TDA2170 field timebase chip IC401 was also short-circuit. **D.F.**

Hitachi C14-P218

It was just possible to see a dim raster when this set was first brought in. The contrast, brightness and colour can be adjusted only with the remote control unit: because there was an open-circuit print land within this unit, the picture control action could be reduced using the minus button but the plus button had no effect. Repairing the

RC unit and carrying out adjustments restored normal operation. Don't ask me why the controls had been turned down in the first place.

Three weeks later the set came back to us, this time with no sound or raster. The cause was traced to one of the 82k Ω start-up/bias resistors (R902/3) for the BUT11AF chopper transistor Q903 being open-circuit. **D.F.**

Toshiba C2226

This set would spring to life only after being left in standby for about an hour. The cause was traced to the 1,000 μ F, 25V electrolytic capacitor C932 on the sub-panel next to the teletext PCB. Its value had fallen to 400 μ F. This is the first power supply fault I've had with these sets - nearly all previous faults have been field cramping of some sort. **C.N.**

Mitsubishi CT2525TX

This set's audio sounded like a special effect from Dr Who! There was a low, whooping noise that increased in pitch. The cause of the fault was dry-joints around the AN5265 audio chip IC361. To be on the safe side I replaced it. **C.N.**

ITT Monoprint B Chassis

Dead set the report said. The internal mains fuse had blown and the BU908 chopper transistor T701 was short-circuit. Replacing these two components produced a repeat performance. The cause of this was C701 (4-7 μ F, 400V) which was open-circuit. It's part of the mains filter. When this item had been replaced the fuse blowing stopped but the set still refused to start. So I connected a 60W bulb across the power supply output and turned to the line output stage. Big mistake!

After wasting time and finding no answer here I returned to the primary side of the power supply. To cut a long story short, replacing the TEA2165 chopper drive chip IC701 cured the fault. For some reason it would drive the power supply with a 60W bulb as the load but not in normal circumstances. **C.N.**

Grundig CUC220 Chassis

This set was OK when cold. Once it had warmed up however it would shut down with a jumbled LED display. Voltage checks showed that the 5V supply was low at 3-1V. The culprit was D671 (SKE4F). **C.N.**

Sharp DV3760H

This set was dead. Resistance checks in the line output stage pro-

duced a short-circuit reading across the line output transistor, but when it was removed for checking out of circuit the readings were OK. "Line output transformer" a voice in my head said. Good job I ignored it! Further checks revealed that D601 (1N4937, rated at 600V, 1A) had gone short-circuit.

These sets have a very forgiving power supply. So it's best to check the line output stage first. If there are any problems here the power supply simply stops working. C.N.

Philips GR1-AX Chassis

This set was dead with the 2SC3795 line output transistor Tr7528 short-circuit. A replacement restored the set to life, but there was a faint, fuzzy vertical line at the right-hand side of the picture, about 0.5cm from the edge. The cause of this was C2523 (6.8µF, 63V) which was open-circuit. It smooths the supply to the line driver stage and could well have been responsible for the line output transistor failure. C.N.

Toshiba 255R7B

The colour was missing. After wasting much time on peripheral

components the TDA3565 colour decoder chip Q501 proved to be the culprit. I'm always reluctant to condemn ICs as so often the cause is elsewhere. C.N.

Ferguson TX9 Chassis

This portable set was immaculate for its age – it had been left in the loft for years after the fault occurred. There was no sound because the 10Ω safety resistor R156 was open-circuit. It's in the feed to the audio output stage. C.N.

Hitachi G7P Chassis

The customer complained that this set wouldn't store stations. As I'd had the fault before I was able to cure it straight away. D706 and R723 in the line output stage are the cause. They were only dry-jointed this time, but it's best to replace them. C.N.

Ferguson TX100 Chassis

When I say that this set was blowing its BU508A chopper transistor TR6 I mean physically blowing it apart. The TDA4600-2 chopper control chip IC7 failed as well. The cause of the trouble was the chopper transistor's base drive coupling

capacitor C117 (100µF, 16V). C.N.

Nikkai TLG2000

This set was used for karaoke only, so the input was via the video and audio phono sockets. The problem was a black, horizontal line that drifted down the screen. When the tuner was used the picture was OK. The cause of the problem was the JC501P transistor Q220 which was short-circuit. It is on the small PCB attached to the set's rear cover. A BC546 was found to be compatible and cured the fault. C.N.

Ferguson ICC6 Chassis

This set would power up briefly, with the TV LED going from red to green – then out! Line drive was found to be present for a second, after which it disappeared. Resistance checks on the various supply lines produced a reading of 68Ω across the line output stage derived 13V supply. Isolation checks brought me to the TDA1771 field timebase chip IF01, which was virtually short-circuit between pins 1 (field scan output) and 5 (chassis). A new chip restored normal operation. The resistance reading should have been about 15MΩ. C.N.

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VT9300	6861482: PLAY
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HS348/337	5228020020: REEL
NEC	PT. NO.
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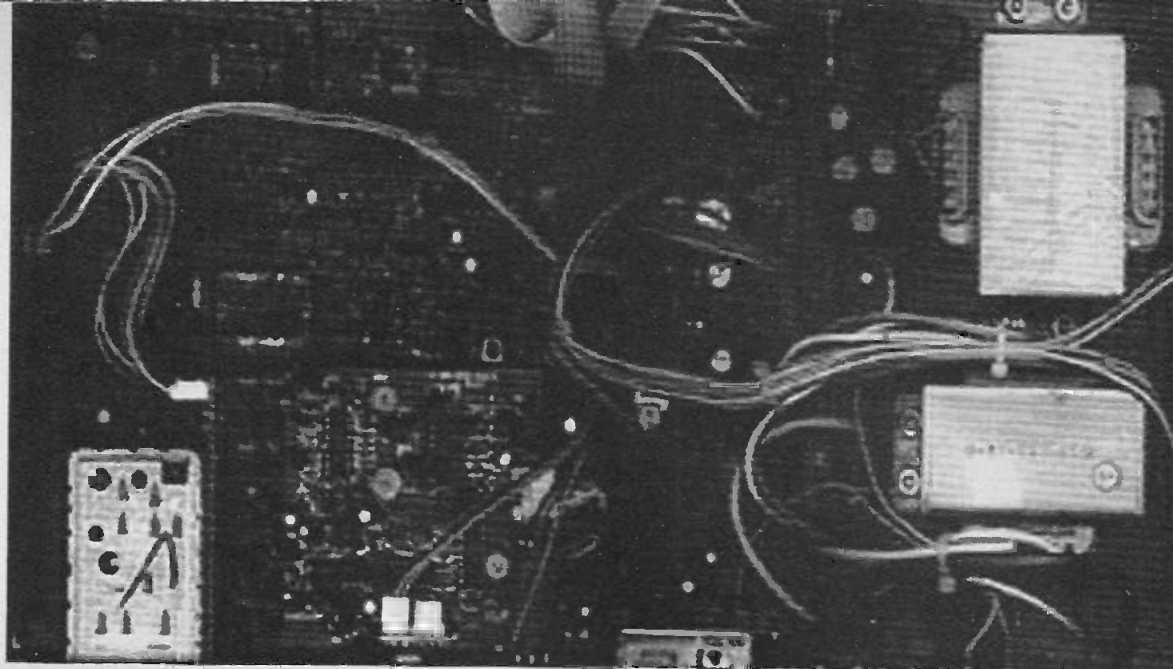
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NV300	VXP 0401: FF/REW
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NV600	VXP 0515: FF/REW
NV600	VXP 0488: PLAY
NV730	VXP 0581: FF/REW
NV2000	VXP 0331: PLAY
NV2000	VXP 0329: FF/REW
NV7000	VXP 0344: FF/REW
NV7000	VXP 0343: PLAY
NV8600	VXP 0245: REWIND
NV8600	VXP 0243: PLAY
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Satellite Notebook

Reports from
 Hugh Cocks
 Michael Dranfield
 Alfred Pearce
 Christopher Nunn and
 Steven Leatherbarrow

Digital Problem

We've just come across our first faulty digital LNB, a Grundig universal twin type bought by a Dutch customer in Holland. For several weeks it performed faultlessly in conjunction with a Pace DVR501 satellite receiver, showing the Dutch Nethold package (RTL4, SBS6 etc.).

The symptom was that the receiver would stop producing pictures, though it continued to produce the digital channel identification at the bottom of the screen when the channel was changed. The tuning menu indicated that drive was present from the LNB, but only intermittent satellite network identification was shown - normally "Satellite Nethold" should be seen.

Stable results were obtained when a Cambridge universal single-output LNB was tried. The customer has now returned to Holland with the faulty LNB to obtain a replacement. It's the only universal twin type I've come across so far. Any combination of vertical/horizontal, analogue/digital signals is available at either F output socket. Our customer also has an analogue receiver, and both receivers may be in use simultaneously by his household. Hence the more complex LNB required. I hope that this isn't a sign of things to come. H.C.

French Digital Reception

Three rival French digital programme packages are currently available, Canal Plus, TPS and AB. One of our French customers subscribes to both Canal Plus via Astra

and TPS via Eutelsat. For good measure he has a Pace analogue receiver connected to both dishes. Use of more than one receiver at a time is not required, but there are nevertheless complications. The total number of channels available from this system (see Fig. 1) is mind-boggling, though personally give me BBC Radio any day!

Each dish has a single-output universal LNB, and each digital receiver has priority over the analogue receiver. A 22kHz tone from each digital receiver to the relevant LNB selects the digital band. When a digital receiver is put into the standby mode, its 22kHz tone output ceases and the LNB concerned changes over to the analogue band. The Canal Plus digital receiver has an IF loophole to the analogue receiver. Since there is no such loophole with the TPS receiver, an external IF splitter is required here.

The TPS digital receiver was new to me. It's of similar size to the Canal Plus one, and likewise has no conditional access module at the rear. It is confusing that the receiver doesn't supply power to the LNB when it comes from the factory: you have to switch the power on by going into the menu. TPS and AB both use the Viaccess MPEG coding system. The TPS receiver, like the Canal Plus one, has no UHF modulator.

The Pace analogue receiver is linked to each dish via a tone (22kHz) changeover switch. There's potential trouble here. The arrangement works well provided the 22kHz tone from the Pace

receiver to change over to Eutelsat reception doesn't reach the universal LNB at the Eutelsat dish, thus changing it to the digital band. If this should happen the Pace receiver is left with little to do other than produce a display of snow. And this is of course what happened!

The French branded 22kHz tone switch required modification to attenuate the tone output at the socket connected to the IF splitter. Fortunately this was a reasonably simple matter and could be done on site. A 47µF, 35V electrolytic capacitor soldered across the terminals of the F socket performed the task admirably.

Some inductance was added in series with the electrolytic's leadout wires by forming a turn with the shaft of a small screwdriver prior to soldering to the socket. I was concerned that without this inductance there could be some IF signal loss. But my worries proved groundless. Analogue reception from Eutelsat was excellent, with the attenuated 22kHz tone having no effect on the LNB's band switching. Astra analogue reception isn't affected in this way, because in this mode the Pace receiver doesn't produce a 22kHz switching output. H.C.

Lightning Trouble

Lightning caused quite a lot of LNB failures here last winter. There are various possible symptoms. The LNB will often continue to work with signals of both polarisation, but with increased noise. Sometimes the LNB will work well, but with signals of only one polarisation. Alternatively the LNB

may be completely dead.

The strangest case I came across involved a Cambridge LNB used with a Pace MSS200 receiver. We had installed the equipment about nine months previously. The complaint was "no pictures", and the on-screen symptoms did suggest LNB failure – there were only very sparkly pictures on the strongest channels available. A storm was brewing when I went out to the house, and while I was inside there was a very strong lightning strike about 400m away. Suddenly the LNB came back to life, producing good pictures considering the intensity of the rain. I had no intention of going on to the roof while the storm continued, so I arranged to return on a dryer day – I assumed that the LNB would pack up soon after. The rain continued for several days. When I eventually phoned I was told that the LNB was still working all right. Fingers crossed – we'll shortly be out of the guarantee period! H.C.

The Pace MSS100

We've sold quite a lot of these receivers during the past year. In the main, their reliability has been good.

About once a month we get one with a blown mains fuse. To start with I would suspect the TOP202 chopper device U1, but in all recent cases it has been blameless. The cause has always been one of the 1N4007 bridge rectifier diodes D1-D4 going short-circuit. Check that the reservoir capacitor C3 has survived. If it goes open-circuit, the TOP202 device won't last long. C3 is shown as 47µF on the circuit diagram, but seems to be 68µF in most receivers.

One receiver that came in recently produced no sound or vision, though the menus were OK. This suggested LNB power or tuner trouble. The LNB voltage/current supply was normal however, and raw video from the tuner was present at pin 20 of the 56-pin STV0056 chip U500, which carries out all the video and audio processing operations. Application of pressure around U500 restored normal results, but further pressure in a slightly different position produced unclamped, smeary video. Thoughts of a nasty track continuity/tiny dry-joint problem sprang to mind. When the PCB had been removed from the plastic case however no amount of bending or twisting would instigate the fault, which reappeared as soon as the PCB had

been clipped back in the case!

The culprits turned out to be some electrolytic capacitor legs around U500. Being a little on the long side, they had pierced the edge of the screening material immediately below the chip – the screen extends back to the modulator. Amazingly, this had taken almost a year to come about. It was obvious visually which legs were too long, and puncture marks could be seen at the edge of the screen. I shortened the offending legs and covered the edge with insulating tape. After this no amount of pressure would bring the fault back. I hope this isn't an indication of problems to come. H.C.

Amstrad SRD510

This receiver's power supply was tripping. In fact the power supply was running at such a low frequency that the tripping produced an audible chirp from the chopper transformer. In view of this I checked R613, C616 (10nF) and C615 (1nF) – these components set the switch-mode running frequency. Depending on the chip manufacturer, R613 may be 27kΩ as in this machine or 24kΩ. It was open-circuit. M.Dr.

Pace PRD Series

Failure of Q105 (BC846B) is one of the most common faults we've had with these receivers. The symptoms are no picture via the modulator but OK via the scart connector. Excessive power dissipation is the cause of the problem – the giveaway is discoloured print around the transistor. Pace has issued an official modification to reduce Q105's power dissipation. Simply remove one of its emitter load resistors – R559. Only PCBs with a part no. ending 204-214-224 are affected. M.Dr.

Amstrad SRD510

Lack of contrast, a slow-to-show picture on channel change, or no picture, sound OK can be caused by the decoder module. Scope the video level at its output. It should be at the same level as the video input. If it's lower, replace the BC856 surface-mounted video amplifier transistor in the decoder. You'll find it next to the TDA8703 chip. M.Dr.

Grundig GIRD2000

When one of these receivers was switched from a channel with vertical to one with horizontal polarisation it would sometimes go into the

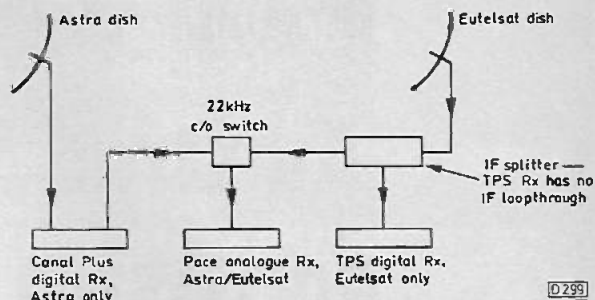


Fig. 1: Digital complications: an installation with two dishes, two digital receivers and one analogue receiver. The arrows show the direction of the input signals from the dishes. Each digital receiver produces a 22kHz tone output to switch the relevant LNB to the digital band. The Pace analogue receiver produces an on/off 22kHz output to operate the tone switch: when the receiver's 22kHz output is off, reception is from the Astra dish; when it's on, reception is from the Eutelsat dish.

standby mode. When it had been unplugged, it might not power up. Replacing C9 (1µF, 16V) in the power supply cured both problems. It couples the drive to the base of the chopper transistor Q1. This receiver-decoder is basically the Pace SS9200. A.P.

Amstrad SRD510

This receiver refused to power up. Checks showed that there were no short- or open-circuits. The culprit was found to be C611 (1µF, 50V) which couples the drive to the base of the chopper transistor TR600. It had gone slightly low in value. C.N.

Pace PRD800

The cause of very noisy signals, with no on-screen messages apart from the menu, was traced to the TCE-PTV2 chip U25. When TST2 at the rear centre of the board was earthed, the VideoCrypt decoder would accept signals and the on-screen messages returned, though the signals were still very noisy. The fault affected only the 'pay' channels, the others remaining clear at all times. S.L.

Amstrad SRD510

A blank raster with the sound OK were the symptoms with one of these receivers. We found that there was no video input at pin 1 of the RF modulator. Tracing the source back, we came via TR27 to TR20 (2SC945), where there was plenty of activity at its base but nothing at its emitter. Because R83 (22kΩ) was open-circuit, there was precious little DC at the base of TR20. S.L.

Amstrad SRD600 Modification for Astra 1D Reception

Martin Pickering, B.Eng., describes a simply-implemented modification that provides automatic channel-expander switching for Astra 1D reception with the SRD600

The Amstrad SRD600 satellite receiver has 99 channels and includes a VideoCrypt and a D2MAC decoder. Because of these features, it is one of the most sought-after satellite receivers. But very few appear on the second-hand market. Its most notable limitations are restricted tuning range (950-1,750MHz) and lack of an integral dish positioner. The latter problem is easy to overcome by using one of the many external positioners currently available.

Use of a Channel Expander

With the introduction of the Global Communications ADX-plus channel expander, even the tuning limitation has been removed. You can now use the receiver to watch programmes from the Astra 1D satellite along with the best, since the ADX can shift the entire frequency band involved 500MHz higher. But the ADX is designed for manual selection when you want to do this, which is a drawback for couch potatoes like me. There is no switching operation that can be stored on a per-channel basis. The ideal solution would be to allocate a specific number of channels to Astra 1D services, and arrange for the ADX unit to switch on automatically when one of these channels is selected.

In a previous article (April 1997 issue, page 408) I explained how this could be achieved with Model SRD400. The same basic arrangement can be used with the SRD600.

Automatic Switching

My initial thought was that it would be a simple matter to select a display number segment that lit up for only a specific range of channels. This time the top right segment of display number three was chosen, because it goes out for channels 50 to 69 inclusive (see Fig. 1).

The LED segments are multiplexed however – they are actually pulsed directly by the microcontroller chip. In addition, the common anode section of each seven-segment display number is strobed. There is no steady DC voltage available for the purpose, nor are there usable pulses with respect to a zero voltage reference.

As with the SRD400 however, an optocoupler hooked across the relevant LED segment will provide a pulse output that can be smoothed and used to control the ADX unit.

Modification Details

Connect the optocoupler (I used a CNY17-2) between link J18 on the front panel and the centre leg (collector) of the npn strobe transistor Q152, see Fig. 2. With the emitter of the transistor in the optocoupler connected to chassis and a 1kΩ load resistor connected between its collector and the 12V line, the goal is achieved. The pulse output from the optocoupler is fed via a 10kΩ resistor to a pnp transistor (I used a BC557B but almost any pnp type will do), with a 220µF capacitor for smoothing. The BC557B is connected to a second one that provides inversion, because we want to get a 12V output when the LED segment selected for the purpose is off.

The few components required cost very little, and can be easily assembled on a piece of Veroboard or similar strip board. There is plenty of space in which to accommodate it within the SRD600.

The 12V supply required is obtained from a copper track that leads from a connector marked '12V'. A suitable point at chassis potential can be found close to the front of the panel, where there are several wide tracks at 0V.

A minor drawback is that the chosen segment will go out while you are tuning the receiver. To overcome this nuisance, disconnect the wire and switch the ADX unit on manually whilst tuning. Once the channels have been tuned in and stored, switch the ADX unit off. Reconnect the control wire and it will then be switched on automatically for channels 50-69 only.

Since the circuit provides a 12V output, it can be used to operate a 22kHz tone inserter instead of an ADX.

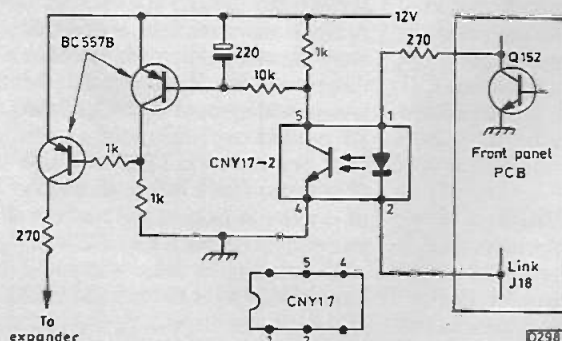
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Fig. 1: The display segment used to obtain the control action.



Fig. 2: The optocoupler/switching circuit, which provides an 0/12V output to control the ADX plus channel expander.



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BC108	8p	BD435	31p	BU128	125p	BV48C	260p	MJ11012	300p	RECTIFIER DIODES			AN203	210p	AN6341	200p	BA338	80p	BA7021	200p
BC109	8p	BD436	30p	BU133	125p	BV48D	260p	MJ11015	250p	AN210	160p	AN6342	325p	AN6343	44p	BA340	75p	BA7022	360p	
BC109C	10p	BD437	28p	BU137	150p	BV61	1000p	MJ11016	300p	AN211	150p	AN6344	44p	AN6345	400p	BA336	170p	BA7025	100p	
BC140	20p	BD438	30p	BU180	100p	BV70	200p	MJ11032	800p	AN214Q	170p	AN6346	150p	AN6347	150p	BA401	60p	BA7107	475p	
BC142	20p	BD439	40p	BU184	100p	BV90	175p	MJ11033	800p	AN217P	95p	AN6350	610p	AN6352	450p	BA402	50p	BA7125	200p	
BC143	20p	BD440	40p	BU204	65p	BV93	375p	MJ15003	250p	AN228	280p	AN6352	450p	AN6353	300p	BA403	50p	BA7125S	160p	
BC147	8p	BD441	40p	BU205	70p	BV11A	30p	MJ15004	300p	AN252	150p	AN6354	300p	AN6355	500p	BA404	100p	BA7125S	160p	
BC149	8p	BD533	30p	BU206	100p	BV11AF	225p	MJ15015	250p	AN259	250p	AN6359	500p	AN6360	320p	BA405	150p	BA7151S	150p	
BC189	8p	BD534	38p	BU207	150p	BW12	125p	MJ15016	350p	AN282	140p	AN6360	320p	AN6362	450p	BA406	100p	BA7155	150p	
BC190	8p	BD535	38p	BU208	70p	BW12A	150p	MJ15022	250p	AN284	11p	AN6362	450p	AN6363	375p	BA407	100p	BA7155	150p	
BC171	10p	BD536	38p	BU208A	75p	BW12F	250p	MJ15023	400p	AN287	20p	AN6364	250p	AN6367NK	400p	BA408	240p	BA7767AS	150p	
BC172	10p	BD537	40p	BU208AT	200p	BW13A	250p	MJ15024	400p	AN288	28p	AN6368	275p	AN6369	275p	BA409	240p	BA8504	35p	
BC177	14p	BD538	40p	BU208B	200p	BW13B	250p	MJ15025	700p	AN289	18p	AN6370	480p	AN6371	480p	BA410	220p	BA15218	60p	
BC178	14p	BD643	50p	BU208D	130p	BW13C	500p	MJ15025	700p	AN292	65p	AN6371	350p	AN6372	480p	BA411	220p	CA3140E	38p	
BC179	14p	BD644	50p	BU209	90p	BW13D	500p	MJ15025	700p	AN293	18p	AN6372	480p	AN6373	480p	BA412	220p	CX859A	80p	
BC182L	7p	BD647	50p	BU225	120p	BW14	550p	MJE350	400p	AN302	65p	AN6373	480p	AN6374	480p	BA413	220p	CX859B	80p	
BC183	7p	BD649	50p	BU226	120p	BW15A	150p	MJE350T	65p	AN303	250p	AN6374	480p	AN6375	480p	BA414	220p	CX859C	80p	
BC183L	7p	BD675	40p	BU312	90p	BW15B	150p	MJE3055T	66p	AN304	250p	AN6375	480p	AN6376	480p	BA415	220p	CX859D	80p	
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BC184L	7p	BD684	38p	BU326H	75p	BW15K	75p	MJE13012	100p	AN313	320p	AN6384	480p	AN6385	480p	BA424	220p	CX859M	80p	
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BC184L	7p	BD705	38p	BU327C	75p	BW15AF	75p	MJE13033	100p	AN334	320p	AN6405	480p	AN6406	480p	BA445	220p	CX860H	80p	
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BC184L	7p	BD713	38p	BU327K	75p	BW15AN	75p	MJE13041	100p	AN342	320p	AN6413	480p	AN6414	480p	BA453	220p	CX860P	80p	
BC184L	7p	BD714	38p	BU327L	75p	BW15AO	75p	MJE13042	100p	AN343	320p	AN6414	480p	AN6415	480p	BA454	220p	CX860Q	80p	
BC184L	7p	BD715	38p	BU327M	75p	BW15AP	75p	MJE13043	100p	AN344	320p	AN6415	480p	AN6416	480p	BA455	220p	CX860R	80p	
BC184L	7p	BD716	38p	BU327N	75p	BW15AQ	75p	MJE13044	100p	AN345	320p	AN6416	480p	AN6417	480p	BA456	220p	CX860S	80p	
BC184L	7p	BD717	38p	BU327O	75p	BW15AR	75p	MJE13045	100p	AN346	320p	AN6417	480p	AN6418	480p	BA457	220p	CX860T	80p	
BC184L	7p	BD718	38p	BU327P	75p	BW15AS	75p	MJE13046	100p	AN347	320p	AN6418	480p	AN6419	480p	BA458	220p	CX860U	80p	
BC184L	7p	BD719	38p	BU327Q	75p	BW15AT	75p	MJE13047	100p	AN348	320p	AN6419	480p	AN6420	480p	BA459	220p	CX860V	80p	
BC184L	7p	BD720	38p	BU327R	75p	BW15AU	75p	MJE13048	100p	AN349	320p	AN6420	480p	AN6421	480p	BA460	220p	CX860W	80p	
BC184L	7p	BD721	38p	BU327S	75p	BW15AV	75p	MJE13049	100p	AN350	320p	AN6421	480p	AN6422	480p	BA461	220p	CX860X	80p	
BC184L																				

JAPANESE TRANSISTORS

Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price	Part	Price
2SC1675	90p	2SC2258	30p	2SC2710	50p	2SC3244	45p	2SC3781	150p	2SD287	250p	2SD879	60p	2SD1311	65p	2SD1756	275p	2SK240	140p		
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	2SD293	25p	2SD882	25p	2SD1326	200p	2SD1760	80p	2SK246	30p		
2SC1684	30p	2SC2267	80p	2SC2716	50p	2SC3260	220p	2SC3787	100p	2SD315	75p	2SD889	35p	2SD1327	150p	2SD1761	60p	2SK300	25p		
2SC1685	30p	2SC2270	60p	2SC2719	25p	2SC3261	230p	2SC3788	60p	2SD325	30p	2SD892A	75p	2SD1328	60p	2SD1762	60p	2SK301	40p		
2SC1729	900p	2SC2271	25p	2SC2721	120p	2SC3262	280p	2SC3789	75p	2SD330	65p	2SD894	35p	2SD1330	50p	2SD1763A	60p	2SK303	40p		
2SC1730	10p	2SC2274	15p	2SC2724	15p	2SC3263	280p	2SC3790	120p	2SD348	30p	2SD895	100p	2SD1347	70p	2SD1764	70p	2SK304	25p		
2SC1735	70p	2SC2275	50p	2SC2738	300p	2SC3264	390p	2SC3795	140p	2SD360	320p	2SD896	200p	2SD1348	65p	2SD1765	70p	2SK312	750p		
2SC1740	10p	2SC2278	70p	2SC2749	200p	2SC3269	50p	2SC3798	220p	2SD367	40p	2SD898B	225p	2SD1350	150p	2SD1769	110p	2SK315	70p		
2SC1741	35p	2SC2283	700p	2SC2750	300p	2SC3270	50p	2SC3807	120p	2SD368	40p	2SD900	400p	2SD1376	60p	2SD1773	160p	2SK320	120p		
2SC1755	90p	2SC2290	1800p	2SC2751	270p	2SC3271	75p	2SC3808	70p	2SD369	50p	2SD905	450p	2SD1378	60p	2SD1776	70p	2SK323	130p		
2SC1758	35p	2SC2291	40p	2SC2752	75p	2SC3272	280p	2SC3811	80p	2SD361	100p	2SD916	130p	2SD1379	100p	2SD1783	100p	2SK332	175p		
2SC1759	30p	2SC2298	35p	2SC2767	30p	2SC3279	30p	2SC3831	250p	2SD362	100p	2SD917	300p	2SD1380	100p	2SD1785	160p	2SK359	40p		
2SC1760	70p	2SC2307	300p	2SC2769	400p	2SC3280	200p	2SC3832	135p	2SD371	240p	2SD921	320p	2SD1382	60p	2SD1789	210p	2SK363	50p		
2SC1775	10p	2SC2308	10p	2SC2773	700p	2SC3281	200p	2SC3833	250p	2SD380	650p	2SD923	360p	2SD1384	60p	2SD1796	180p	2SK384	40p		
2SC1781	20p	2SC2312	300p	2SC2774	500p	2SC3284	600p	2SC3861	100p	2SD381	50p	2SD946	120p	2SD1390	350p	2SD1802	75p	2SK367	40p		
2SC1789	100p	2SC2314	70p	2SC2785	40p	2SC3293	85p	2SC3852	80p	2SD382	75p	2SD947	100p	2SD1391	250p	2SD1805	75p	2SK369	30p		
2SC1809	40p	2SC2316	150p	2SC2786	20p	2SC3298	50p	2SC3853	220p	2SD386	70p	2SD950	300p	2SD1392	85p	2SD1812	60p	2SK373	40p		
2SC1810	250p	2SC2320	10p	2SC2787	10p	2SC3299	120p	2SC3855	50p	2SD388	150p	2SD951	200p	2SD1395	80p	2SD1815	100p	2SK374	45p		
2SC1815	10p	2SC2324	120p	2SC2789	500p	2SC3300	400p	2SC3857	500p	2SD389	60p	2SD955A	520p	2SD1396	120p	2SD1825	60p	2SK386	600p		
2SC1819	70p	2SC2328A	50p	2SC2792	220p	2SC3303	100p	2SC3866	270p	2SD401	14p	2SD958	60p	2SD1397	100p	2SD1827	120p	2SK388	115p		
2SC1826	60p	2SC2310	25p	2SC2793	70p	2SC3306	130p	2SC3868	270p	2SD402	50p	2SD965	35p	2SD1398	120p	2SD1843	100p	2SK400	70p		
2SC1827	60p	2SC2315	175p	2SC2808	40p	2SC3307	600p	2SC3869	100p	2SD414	120p	2SD970	170p	2SD1399	300p	2SD1846	350p	2SK405	450p		
2SC1829	500p	2SC2329	480p	2SC2810	360p	2SC3309	150p	2SC3870	200p	2SD414	45p	2SD972	40p	2SD1400	280p	2SD1847	350p	2SK414	550p		
2SC1833	27p	2SC2330	300p	2SC2812	40p	2SC3310	125p	2SC3883	210p	2SD415	55p	2SD973	60p	2SD1402	120p	2SD1848	280p	2SK415	500p		
2SC1834	50p	2SC2331	50p	2SC2814	40p	2SC3316	280p	2SC3884A	200p	2SD424	350p	2SD973A	70p	2SD1403	225p	2SD1850	325p	2SK415	500p		
2SC1841	12p	2SC2333	200p	2SC2824	75p	2SC3317	360p	2SC3895	250p	2SD426	150p	2SD985	90p	2SD1405	225p	2SD1853	40p	2SK423	75p		
2SC1844	50p	2SC2334	800p	2SC2825	90p	2SC3326	50p	2SC3895A	290p	2SD427	350p	2SD985	120p	2SD1406	60p	2SD1856	40p	2SK427	50p		
2SC1845	15p	2SC2335	55p	2SC2826	200p	2SC3327	60p	2SC3896	330p	2SD438	35p	2SD986	120p	2SD1407	125p	2SD1859	40p	2SK430	200p		
2SC1846	35p	2SC2336A	125p	2SC2827	130p	2SC3328	50p	2SC3890	150p	2SD467	15p	2SD988	70p	2SD1408	170p	2SD1863	35p	2SK431	450p		
2SC1847	45p	2SC2344	150p	2SC2832	30p	2SC3330	200p	2SC3892A	50p	2SD468	15p	2SD1010	40p	2SD1409	170p	2SD1864	15p	2SK432	450p		
2SC1855	86p	2SC2347	35p	2SC2834	200p	2SC3331	25p	2SC3893	225p	2SD471	20p	2SD1012	40p	2SD1411	85p	2SD1877	160p	2SK433	300p		
2SC1856	25p	2SC2353	120p	2SC2837	250p	2SC3333	120p	2SC3895	400p	2SD476	100p	2SD1020	40p	2SD1412	85p	2SD1877	160p	2SK434	300p		
2SC1855	700p	2SC2360	120p	2SC2839	40p	2SC3345	100p	2SC3896	400p	2SD525	50p	2SD1021	120p	2SD1413	60p	2SD1878	160p	2SK435	350p		
2SC1870	700p	2SC2361	160p	2SC2853	70p	2SC3346	130p	2SC3897	400p	2SD526	70p	2SD1022	250p	2SD1415	190p	2SD1879	275p	2SK437	700p		
2SC1871	425p	2SC2362	50p	2SC2873	60p	2SC3352	200p	2SC3907	250p	2SD545	18p	2SD1024	850p	2SD1417	126p	2SD1880	380p	2SK438	350p		
2SC1875	220p	2SC2365	280p	2SC2877	120p	2SC3353	280p	2SC3927	250p	2SD549	120p	2SD1027	850p	2SD1425	260p	2SD1881	350p	2SK439	1100p		
2SC1881	70p	2SC2369	100p	2SC2878	20p	2SC3355	50p	2SC3940	40p	2SD561	300p	2SD1030	75p	2SD1426	135p	2SD1884	300p	2SK444	30p		
2SC1890	15p	2SC2371	25p	2SC2879	3200p	2SC3356	120p	2SC3943	75p	2SD565	225p	2SD1031	70p	2SD1427	160p	2SD1886	450p	2SK452	250p		
2SC1895	500p	2SC2373	210p	2SC2882	60p	2SC3358	50p	2SC3944	80p	2SD565	500p	2SD1036	600p	2SD1428	180p	2SD1897	300p	2SK453	225p		
2SC1904	12p	2SC2383	60p	2SC2883	60p	2SC3376	300p	2SC3950	120p	2SD566	225p	2SD1046	200p	2SD1430	280p	2SD1899	300p	2SK454	300p		
2SC1906	15p	2SC2389	45p	2SC2898	200p	2SC3377	50p	2SC3953	60p	2SD568	200p	2SD1047	180p	2SD1431	200p	2SD1899	300p	2SK455	225p		
2SC1907	20p	2SC2407	110p	2SC2899	50p	2SC3378	120p	2SC3955	70p	2SD566	50p	2SD1051	130p	2SD1432	400p	2SD1910	280p	2SK456	500p		
2SC1909	25p	2SC2408	120p	2SC2909	60p	2SC3379	1200p	2SC3964	100p	2SD571	20p	2SD1055	60p	2SD1433	400p	2SD1911	300p	2SK457	400p		
2SC1913	90p	2SC2412K	20p	2SC2910	25p	2SC3381	130p	2SC3972	250p	2SD575	530p	2SD1060	130p	2SD1438	100p	2SD1913	50p	2SK459	600p		
2SC1914	30p	2SC2440	200p	2SC2911	80p	2SC3383	80p	2SC3973	210p	2SD592	25p	2SD1062	150p	2SD1439	165p	2SD1929	50p	2SK460	580p		
2SC1921	15p	2SC2458	10p	2SC2912	120p	2SC3383	80p	2SC3975	210p	2SD596	26p	2SD1063	200p	2SD1441	220p	2SD1930	50p	2SK461	475p		
2SC1922	175p	2SC2459	50p	2SC2921	850p	2SC3397	20p	2SC3987	220p	2SD600	30p	2SD1064	250p	2SD1442	80p	2SD1933	75p	2SK462	70p		
2SC1923	10p	2SC2466	55p	2SC2922	480p	2SC3399	50p	2SC3996	60p	2SD601	40p	2SD1065	160p	2SD1445	200p	2SD1939	75p	2SK463	80p		
2SC1929	180p	2SC2486	275p	2SC2923	480p	2SC3400	35p	2SC3997	1400p	2SD602	80p	2SD1069	150p	2SD1446	300p	2SD1941	500p	2SK464	950p		
2SC1940	110p	2SC2492	50p	2SC2928	560p	2SC3401	50p	2SC3998	1000p	2SD612	50p	2SD1073	350p	2SD1450	60p	2SD1944	50p	2SK465	1160p		
2SC1941	27p	2SC2470	85p	2SC2929	280p	2SC3402	40p	2SC4006	50p	2SD613	70p	2SD1088	150p	2SD1451	200p	2SD1958	80p	2SK469	100p		
2SC1942	35p	2SC2481	120p	2SC2934	75p	2SC3405	130p	2SC4020	280p	2SD617	300p	2SD1094	375p	2SD1452	275p	2SD1959	210p	2SK471	300p		
2SC1944	35p	2SC2482	20p	2SC2937	250p	2SC3409	40p	2SC4023	325p	2SD633	70p	2SD1110	225p	2SD1453	140p	2SD1978	50p	2SK472	500p		
2SC1945	35p	2SC2483	120p	2SC2939	400p	2SC3416	30p	2SC4029	350p	2SD636	10p	2SD1111	20p	2SD1455	250p	2SD1984	450p	2SK475	550p		
2SC1946	1500p	2SC2484	186p	2SC2944	300p	2SC3417	90p	2SC4043	45p	2SD637	15p	2SD1113	225p	2SD1457	165p	2SD1991	60p	2SK476	425p		
2SC1947	450p	2SC2485	400p	2SC2958	50p	2SC3419	120p	2SC4046	40p	2SD638	15p	2SD1128	200p	2SD1458	50p	2SD1994	300p	2SK477	475p		
2SC1953	45p	2SC2491	200p	2SC2962	80p	2SC3420	40p	2SC4056	350p	2SD639	20p	2SD1133	65p	2SD1459	80p	2SD1996	45p	2SK479	400p		
2SC1957	70p	2SC2498	50p	2SC2979	160p	2SC3421	45p	2SC4059	550p	2SD640	350p	2SD1135	75p	2SD1468	40p	2SD2006	75p	2SK480	30		

REPLACEMENT VIDEO HEADS

Model	Price	Model	Price	Model	Price	Model	Price	Model	Price
AKAI		VHSAN3	800p	HRD250, HRD257	2300p	NVFS 100	5000p	TL51100	3100p
VS105, 112, 115, 116, 120, 125, 126, 201, 202, 205, 220, 240, 244, 245, 247, 248, 250, 301, 303, 304, VSP8, VSP82	1000p	VHSAY3	1200p	3V32, 8942, HR7855	2200p	NVFS1	4850p	VHR1120, 130, 14, 141, 143G, 145P, 151, 15, 18, 171, 220, 23, 244, 274, VHR310, 330, 410, 420, 4105, 4200, 430, 4300, 4400, 4500, 5080, 5100, VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VPT100, VS9300, VS9500	1200p	VHSBH1, VHSCH1	2100p	HRD180, 190, 230, 610, 3V58, FV121	2500p	N.E.C.		VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VPT200, VS9700, VS9800	1250p	VHSBP1	2600p	FV208, 26, 30, 32, 33, VC141L	2050p	NS9011, 9012, 9013E, 9014E, 9014AG, 9015, 9016, 901A, 902A, 9033, N9034, 9040, 9053, 9054, 9055, 9056, 9063, 9065, 9066, 906, 9077, N9096, DX1000, 1600, PX1200	1180p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VS1	1250p	VHSB73	1600p	HRD370, HRD430, HRD470, 3V58, FV13H	2300p	9040, 9053, 9054, 9055, 9056, 9063, 9065, 9066, 906, 9077, N9096, DX1000, 1600, PX1200	1180p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VS2	1200p	VHSB75	1400p	HRD530, HRD700, HRD840, HRD870, HRD910, FV14T, FV57H	3100p	9040, 9053, 9054, 9055, 9056, 9063, 9065, 9066, 906, 9077, N9096, DX1000, 1600, PX1200	1180p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VS3	1350p	VHSF51, VHSF52	1300p	GRG1, GRG2, 3V41	2800p	N911A, 914C, 915A, 916A, 917, 9110	2400p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VS10	1350p	VHSF52, VHSFG4, VHSF63	1300p	BRW, HRD330, 337, 440, 441, 637, 641, 650, 670, 720, 730, 740, 820	2100p	FV3200, 2400, 740, 754, 763E, 764, FV7300, 2400, 760, 794, 770, 774	1650p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VS33.35, 37, 38, 38EOG, MKII, 53, 55, 66, 765, 766, 787, 768, 865, 867, VSF30, 33, 4, 400, 410, 420, 430, 440, 441, 450, 455, 480, 490, 497, VSG51, 54, 55, VXS450	2250p	VHSJ1, VHSJ2, VHSJ3, VHSWJ3, VHSYJ2, VHSYJ3	700p	HRF100, SR3300MS, FV44L	2100p	N380, N381, N830, N831, N832, N833, N834, N835, N836	700p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS470	2250p	VHSV4, VHSWH1, VHSXH1	1600p	HRD950, HRD980, HRD980, HRD980, FV45	6000p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS512, VS515, VS516	2250p	VHSYH2	1600p	VRS5000, HRS5800, 5800, 9000, FV395, BR5600, SR3368E	5550p	N855	3100p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS62, 467, 467EOG, VSF12, 15EK, 15E30, 300, 301, 310, VSF320, 330, 340, 350, VSG30, 33, 34, 35	2300p	VHSWJ1, VHSXJ3	700p	FV21	1400p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS65, 50	3600p	GRUNDIG		FV42	2600p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS66, 58	2300p	VS410, 415, 435, 450, 456, 460, 500, 517, 510, 520, 521, 530, 545	1600p	VRT82LV, VR202LV	1950p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS67, 485, VSF10, 11, 180, 190, 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	2400p	VS480, 620, VS550, 620, 630, 640, 790, 930, 940	4200p	FV67HV, FV87TX, FV77	3800p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS68, 88K, 8111, VSP9, VSR100, 100EDG, 100EM, 110, V SX400	1250p	VS120	2400p	R2000 SERIES	4000p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS69, 109, VS603, VS606, VS607	1300p	VSV20	2400p	FV67LV, FV62LV, FV67HV	4000p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS70, 110, 88, VSR100, 110, V SX400	1950p	VSV70	4400p	VP160L, VR172L	1950p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS71, VSA77	3500p	VS170	4600p	VRJ200, HRJ205	3300p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
VXS72, VSF1000, VSF1010, VSF1030	5800p	MVS660, S66160, VERONA, V5660, V56690	3500p	HRJ600EG, HRJ600EK, HRJ605EG, HRJ605EK, HRJ610EK	7100p	N9052, N9530, DX2000	3000p	VHR5200, 5600, 6850, 7100, 7200, 7250, 7300, 8070, 8100, 8101, 8200, VHR7800, 7810, 8000SP, 8801SP, VHR8400, 4410, 4500, 4500, 4500, VLR2500, 6700, 4800	3100p
ALBA		GRUNDIG		HRJ390, HRJ305, HRJ315, HRJ315G, HRJ318E, HRJ315, HRJ415, HRJ415E, HRJ407MS, HRJ41, OEK, HRJ415, HRJ416	5850p	MATSUI		SONY	
VDR3000, VCR4000, VCR5000, VCR6000	1650p	MVS710, 720, 910, SE7120, 9120, VSF10, 716, 720, 800, 810, 910, 920, VSG21, 9291, GV210, 211, 220, 2282, MV2105, 2115, SE2120	1200p	VX500E, 800A, 810A, 820, 80A, 770B, 773B	1450p	VX500E, 800A, 810A, 820, 80A, 770B, 773B	1450p	DSR-19R FOR SLT-9ME	3100p
VTV10	1000p	HINARI		VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	DSR-21 R FOR SLC-B-C9	2800p
VCR7000, 7800, 8000, 8800	1100p	VXL2, 3, 4, 20, 25, 35	1000p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	DSR-35R FOR C20, C30, C40, SLF10E, SLF12 PIN, SLZ2APS, 33E, 34, 44PS, SLF71, 30PF, 35, 60PS, SLK85, SLF20ME, 30ME, SLV100	1500p
AMSTRAD		VXL5, VZ0H	1050p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	DSR-43R FOR SLC7 RANGE, SL5000, SL5100, SL3000, 1 PIN, SLC6E, SL36ES, SL37E	1300p
VCR4500, VCR5200, VCR9000, TVR1	900p	VXL6	1200p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SL5000, SL8000, SL8080, SLC35E	1600p
VCR7000	1000p	VXL7	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SL7100B	2000p
VCR1000, 2000, 6000, 81000, 62000, 8600, 8602, 8700, 9005, DD3900, DD8904, TVR4	1100p	VXL8	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV201, SLV202	2000p
TVR2, TVR3, VCR4600, VCR4600 MKII, VCR8800, VCR8804, VCR9340	2100p	VXL9	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV203, SLV204	2000p
VCR8603, VCR8604, VCR8704, VCR8714	1300p	VXL10	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV205, SLV206	2000p
VCR9140, VCR9142	2500p	VXL11	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV207, SLV208	2000p
VCR9340	3500p	VXL12	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV209, SLV210	2000p
VCR9244	3450p	VXL13	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV211, SLV212	2000p
UF020, 22, VCR3000, 3002, 8500	1750p	VXL14	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV213, SLV214	2000p
FISHER		VXL15	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV215, SLV216	2000p
FVHP420, 510, 520, 530, 615, 618, 620, 622, 710, 711, 715, 716, 720, FVHP721, 722, 730, 830, 905, 906, 907, 908, 910, 911, 915, 916, 918, FVHP5000, 5001, 5005, 5050, 5075	1100p	VXL16	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV217, SLV218	2000p
VBS3500, 7100, 7500, 7600, 9900, VRB300	1800p	VXL17	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV219, SLV220	2000p
VBS7000, VBS7100, VBS9000	2000p	VXL18	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV221, SLV222	2000p
FVHP800, 711, 715, 721, 722, 730, 830, 5100, FVHD720	1100p	VXL19	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV223, SLV224	2000p
FVHP725, FVHP830, FVHP980	2500p	VXL20	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV225, SLV226	2000p
FVHP990	2400p	VXL21	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV227, SLV228	2000p
FVHP975	2400p	VXL22	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV229, SLV230	2000p
FVHD470, FVHD140, FVHP1, FVHP10, FVHP20	1150p	VXL23	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV231, SLV232	2000p
FVHD230, FVHP1100, 1200, 130, 134E, 1410, 2000, 200, 210, 300, FVHP110, 410, 420, 430, FVHP1500, FVHP250	2700p	VXL24	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV233, SLV234	2000p
FVHP132, 1400, 1440, 320, 440, 445	3550p	VXL25	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV235, SLV236	2000p
FVHP470S, FVHP475HV	4800p	VXL26	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV237, SLV238	2000p
FVHP1250, FVHP430S	1950p	VXL27	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV239, SLV240	2000p
GOLSTAR		VXL28	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV241, SLV242	2000p
8900 SHS58D, GHV121, RQ2011, 2031, 2051	1900p	VXL29	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV243, SLV244	2000p
GHV51, GHV122, VCP4000, VCP4100, VCP4200	1100p	VXL30	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV245, SLV246	2000p
GHV1232, 1233, 1241, 1242, 1243, 1244, 1245, 1246, 1246, 1290, 1291	1100p	VXL31	1300p	VX735, VX735, VX980	1500p	VX735, VX735, VX980	1500p	SLV247, SLV248	2000p
GHV1295, 1296, 1891, 8210, 8215, 1221, 1240, 1241, 1247, 1248, 2145, VCP400, VCP4130, 4300, 4301, 4305, 4306, 4310, 4311, 4315, 4316	1100p	VXL32	1300						

PINCH ROLLERS/VCR BELT KITS

Model	Price	Model	Price	Model	Price	Model	Price	Model	Price
AKAI VS10, VS3300, VS9500, VS9700, VS9800, VP7100, VP77	165p	FVHP20	165p	PINCH ROLLER ASSEMBLY PART NO: 948D002010	165p	VHR2700, 3330, MVR220	165p	SL100, 200, SLC20, 30, 33, 34, 40, 44, 80, 88, 9, SLF1, 20, 25, 30, 35, 45, SLF60, 65, 73, 90, SLHF100, 150, 956, SLK85, 95, SLO1700, SL5550, SLD70, 90, 50	300p
VS1, VS2, VS3, VS4, VS5, VS6, VS8, VS9, VS12, VS15	165p	FVHD40, 40, 55, FVHP1, 10, 25, 30, 40, 4000, FVHS10, 30	1360p	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, 62, HSM100, 110, 120, 150, HSM16, 170, 180, 190, 210, 23, 25, 250, 27, 30, 33, 34, 35, 36, 37, 38, HSM380, 40, 45, 49, 50, 54, 55, 55, 57, 58, 59, 60, 68, HSM52, 9, HSMX1, 18, 19, 2, HSS11, 12, 14, 15, 17, 19, 21, 25, 5000, HVF125, HVF150, 303, 85, SV8900, 8930	165p	VHR3100, 3300, 3310, 3400, 3500, 3700, 3800, VHRD500, 700	165p	VCR BELT KITS	
VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, 240, 244, 245, VS247, 248, 250, 512, VS515, 516, VSX9	185p	GOLDSTAR GHV51, 1221, 1232, 1233, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 185p GHV1247, 1249, 1250, 1266, 1290, 1291, 1295, 1296, 1297, 1303		HS200, HS300, HS301, HS302, HS303, HS304, HS310, HS320, HS330, HS360, HS700	165p	VCR3000, VCR3500, VCR4000, VCR4500, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	AKAI VP7100, VS9300, VS9500, VS9700, VS9800 120p	
VS201, 301, 303, 304, 603, 606, 607, VSP8, VSP82, VPS8, VPS82	165p	HITACHI VT7, 11, 14, 16, 17, 18, 19, 33, 34, 35, 350, 38, 39, 38, 390, 650, 4200, VT5000, 5030, 5500, 6500, 6800, 7000, 8000, 8300, 8500, 8700, 930, VT9500, 9700, 9900, VM600	165p	HS306, HS307, HS318, HS319, HS337, HS338, HS347, HS349, HS400, HS410, HS411, HS412, HS421, HS480, HS710, HS8 10, HS820, 30, HSE 10, 20, 30, 70	165p	VS1, VS2, VS3, VS5, VS12, VS15, VP88100p VS10	86p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
VS125, VS155, VS165, VS220, VS240, VS250, VS512	165p	VT8, 52, 57, 61, 62, 63, 64, 65, 65, 86, 88, 100, 110, 111, 113, 115, 118, VT120, 122, 125, 128, 130, 135, 138, 145, 160, 168, 170, 175, 220, 225, VT250, 255, 258, 260, 400, 405, 410, 413, 414, 415, 416, 418, 420, 425	165p	NATIONAL PANASONIC NV100, 1050, 1050, 320P, 332, 333, 340, 366, 600, 688, 777, 788, 331, AG610, 6015, 6100, 6200, 6400, 6800, 7450	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
VS22, 23, 25, 35, 37, 38, 53, 66, 75, 422, 425, 426, 427, 462, 465, 467, VS465, 765, 767, 768, 865, 867, 965, 967, VS477, VS4560	165p	VT130, 1000, 2000, VTL500, VTM588, 620, 622, 625, 626, 630, 635 VTM536, 640, 645, 648, 720, 722, 725, 726, 727, 729, 730, 731, 735	165p	AG100, 1050, 1200, 1500, 2100, 2200, 6500, 6810, 7500, 7510, NVH70	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
VS220, 221, 22, 23, 24, 25, 30, 33, 34, 35, 51, 54, 55, 60, 64, 65, 70, 73, 74, 75, VSP110, VSK560, VSK580	165p	VTM735, 740, 745, 746, 748, 753, 754, 820, 821, 822, 825, 830, 831, VTM835, 838, 840, 841, 845, 920, 921, 922, 925, 930, 931, 935, VTS80, 85, 890, 895, VM200, 2300, 2380, 3200, 3280, 500, VMS7200	165p	AG150, 250, 570, 602A, NVDS8, 48, 80, NVF95, 65, 70, 75, 77, NVF95, 100, 200, 88, 90, NVG 19, 20, 21, 22, 25, 28, 30, 33, 40, 45, 46, NVG50, NVG65, 75, 77, NVJ30, 33, 35, 37, 42, 42, 45, 47, NVL20, NVL25, 28, NVV1	350p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
VS220, 221, 22, 23, 24, 25, 28, 27, 35, 37, 38, 53, 55, VS477	775p	VTM230, 231, 235, 286, VTS390	165p	N.E.C. N830, 321, 322, 833, 895	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
VS220, 221, 22, 23, 24, 25, 30, 33, 34, 35, 51, 54, 55, 60, 64, 65, 70, 73, 74, 75, VSP110, VSK560, VSK580	165p	HINARI V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	N830, 321, 322, 833, 895	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
VS17, 20, 22, 23, 24, 25, 28, 27, 35, 37, 38, 53, 55, VS477	775p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
PINCH ROLLER ASSEMBLY VS422, 425, 428, 427, 462, 465, 467, 465, 498, 765, 767, 768, 865, 867, 965, 967, VSA650, VSF10, 11, 12, 14, 15, 180, 190, 200, 210, 220, 221, 222, 320, 340, 300, 301, 310, 320, 33, 330, 4, 500, 510, 600, 600, VSR110, VSR100, 400, 450, 470	800p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
PINCH ROLLER ASSEMBLY VSS99	185p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
ALBA VCR3000X, VCR4000 VCR5000, VCR6000 VCR161, VCR222 VCR7000, VCR7800, VCR8000, VCR8300 VTV10	185p 185p 185p 165p 165p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
AMSTRAD VCR1000, 2000, 4500, 4600, 4700, 5200, 6000, 6100, 6200, 8600, VCR8602, 8603, 8604, 8700, 8704, 8714, 8800, 8804, 9040, 9300, 9400, VCR9244, 9340, DD8900, 8904, VCR7000	165p 165p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
DD8900, DD8904, VCR6000, 6100, 6200, 8600, 8602, 8603, 8604, VCR8700, 8800, 9000-9, 9140, 9244, 9340	700p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
PINCH ROLLER ASSEMBLY PART NO: 153148 VCR3650, VCR3700, VCR3800, VCR3900, VCR4000, VCR4500 VCR9500 VCR9500 VCR9500	300p 300p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
PINCH ROLLER ASSEMBLY PART NO: 2554966 DD9900, 9804, TX3650, UF20, 22, 24, VCR3000, 3002, 9500 VS1004, VS1104	165p 750p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
FERGUSON 3V00, 3V01, 3V16, 3V22, 3V23, 3V24, 3292, 8900, 8901, 8902, 8903, 8904, 8906, 8909, 8911, 8922, 8923, 8924, 8925, 8929, 8931, 3V29, 3V30, 3V31, 3V32, 3V35, 3V52, 8930, 8931, 8933, 8940, 8941, 8942	165p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
3V35, 3V36, 3V38, 3V39, 3V42, 3V43, 3V44, 3V45, 3V48, 3V49, 3V53, 3V54, 3V55, 3V56, 3V57, 3V58, 3V59, 3V65, V10, V11, V12, V14, 8943, 8944, 8945, 8947, 8948	185p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
3V52 8950, 8951, V10B, 11R, 13H, 14T, 20B, 21R, 22L, 26D, 31R, 32L, V33M, 39S, 41R, 42L, 808, 51R, 52L, VC141L	165p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
VF37H, V44L, V46T, V43H, V57H	165p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
3V25, 3V36, 3V38, 3V39, 3V49, 8943, 8944	1100p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
PINCH ROLLER ASSEMBLY 3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V56, 3V57, 8945, 8947, 8948	1360p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
PINCH ROLLER ASSEMBLY V37, V57, V58 V37R V41L, V42L V37H, V44L, V46T, V43H, V57H	350p 165p 825p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
PINCH ROLLER ASSEMBLY 3V59, 3V59, 3V64, 3V65, V10, 11, 13, 14, 20, 21, 22, 26, 30, 32, 33 V39, VC141L	875p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
PINCH ROLLER ASSEMBLY V43H, V44L, V45X, V46T V37H, V44L, V46T, V43H, V57H, V62, V67, V68, V70, V71, V72, V74, V77	775p	V20H, VXL5, VXL6, VXL7, 8, 9, 10, 11, 19, 90, H13V, V7V100, 200	165p	PCV3200, 320, 740, 744, 746, 750, 764, 766	165p	VCR4000, VCR5000, VCR6000, VCR7000, VCR8000, VCR9000	165p	VS105, VS105, 112, 115, 116, 120, 125, 126, 155, 165, 205, 220, VS24, 244, 245, 247, 248, 250, 512, 515, 516	300p
PINCH ROLLER ASSEMBLY V37H, V44L, V46T, V43H, V57H	165p	V20H							

VIDEO SERVICE KITS

AMSTRAD VCR700 Contents BELT SET, PINCH ROLLER, REEL IDLER, VIDEO LAMP Order Code: SK41					
FERGUSON & JVC 3V42/43 HRD455/HRD725 Contents BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND Order Code: SK37	Economy Kit Contents BELT SET, PINCH ROLLER, SUPPLY CLUTCH, TAKE UP CLUTCH				
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					
3V29/3V30 HR7200/7300/7350 Contents BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK05					
3V35/36, 38/39/48 HRD110/111/120/225 Contents BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK04					
3V31/3V42 HR7600/7610/7650/7655 Contents BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP Order Code: SK33	Economy Kit Contents BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRE, T/U CLUTCH				
3V35/36/38/39/49 HRD110/111/120/121/225 Contents BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER, REEL IDLER, TENSION BAND Order Code: SK35	Economy Kit Contents BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER TYRE, REEL IDLER TYRE				
3V29/3V30 HRD7200/7300/7350 Contents BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP Order Code: SK31	Economy Kit Contents BELT SET, T/U REEL IDLER TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRE, T/U CLUTCH				
3V44/45/48/53/54/55/57 HRP50/HRD140/150/158/160 HRD250/257/565/566/755 Contents BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND Order Code: SK39	Economy Kit Contents BELT SET, PINCH ROLLER				
FISHER FVHP305/306/307/308/910/911/916/918 Contents BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND Order Code: SK57	Economy Kit Contents BELT SET, PINCH ROLLER, IDLER TYRE				
FVHP615/618/620/622/710/711/715/716/720/721/722/725/730/830/840 Contents BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND Order Code: SK68	Economy Kit Contents BELT SET, PINCH ROLLER, IDLER TYRE				
HITACHI VT11/VT33 Contents BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK08					

UNIVERSAL TRIPLER
Price: £5.00 each

AMSTRAD MODE KIT
Price: £2.75 each

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ON PAGE 586**

VIDEO SERVICE KITS (Cont.)

VT11/VT33 Contents BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, FF/REW IDLER, CLUTCH PLATE, TENSION BAND Order Code: SK45	Economy Kit Contents BELT SET, PINCH ROLLER, FF/REW IDLER TYRE, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE				
VT52/61/62/63/64/65/85/86/640 Contents BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND Order Code: SK49	Economy Kit Contents BELT SET, PINCH ROLLER, FF/REW IDLER				
VT400/405/410/13/14/15/18/420/25/26/28/430/31/35/48/450/498/510/520/257/267/330/35/36/540/545/46/48/570/75/576/580/85/88 Contents TIMING BELT, PINCH ROLLER, FF/REW ARM, CLUTCH BASE, TENSION BAND Order Code: SK52	Economy Kit Contents BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND Order Code: SK51				
PANASONIC NV2000/NV2010 Contents BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK03	Economy Kit Contents BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK02				
NV300/NV330/NV333/NV340/NV366 Contents BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRE Order Code: SK01	Economy Kit Contents BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK14				
NV2000/NV2010 Contents BELT SET, PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP Order Code: SK13	Economy Kit Contents BELT SET, PINCH ROLLER, IDLER TYRE, PULLEY TYRE Order Code: SK14				
NV7000/NV7200/NV7800 Contents BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND Order Code: SK11	Economy Kit Contents BELT SET, PINCH ROLLER, IDLER TYRE, CLUTCH TYRE Order Code: SK12				
NV300/NV330/NV333/NV340/NV366 Contents BELT SET, PINCH ROLLER, IDLER UNIT, PLAY IDLER, TENSION BAND Order Code: SK15	Economy Kit Contents BELT SET, PINCH ROLLER, IDLER TYRE, PLAY IDLER Order Code: SK16				
NVG7/NVG9/NVG10/NVG11/NVG12/NVG14/NVG15/NVG18/NVG18/NVG30/NVG120/NVG130/NVG400/NVH65 (PX/AC)/AG1810 (PK) Contents LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER, TENSION BAND Order Code: SK27	Economy Kit Contents LOADING BELT, CAPSTAN BELT, PINCH ROLLER, IDLER TYRE Order Code: SK28				
NV332 Contents BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND, FF/REW TYRE Order Code: SK29	Economy Kit Contents BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE Order Code: SK30				
NV230/250/260/280/430/450/460/470/650/810/890/AG1200PK/AG1500PK Contents BELT SET, PINCH ROLLER, IDLER, TENSION BAND Order Code: SK23	Economy Kit Contents BELT SET, PINCH ROLLER, IDLER TYRE Order Code: SK24				
NV600/NV688 Contents BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND Order Code: SK25	Economy Kit Contents BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE Order Code: SK26				
NV730/NV770 Contents SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND Order Code: SK19	Economy Kit Contents SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER TYRE Order Code: SK20				
NV370/NV380/480/630/780/830/850/AG2100PK/AG2200PK Contents BELT SET, PINCH ROLLER, IDLER, TENSION BAND Order Code: SK21	Economy Kit Contents BELT SET, PINCH ROLLER, IDLER TYRE Order Code: SK22				
NV777/NV788 Contents BELT SET, PINCH ROLLER, IDLER UNIT, TENSION BAND Order Code: SK17	Economy Kit Contents BELT SET, PINCH ROLLER, IDLER TYRE Order Code: SK18				

VIDEO SERVICE KITS (Cont.)

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

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

BACKUP BATTERIES

REPLACEMENT PHILIPS NI-CAD BACKUP BATTERIES Replaces Ferguson Part No: 00E6-067-001, used on TX10, L2V Replaces Philips Part Nos: 138-10138, 138-10313, 1.2V - 90mAh Replaces Philips Part Nos: 138-1229, 2.4V - 90mAh		90p	75p	£1.35
REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES Replaces Ferguson Part Nos: 00E6-068-001, 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 FM02188	1600p	LOT19
NORMENDE 5255	1600p	LOT20
ITT CVC 1150/7	1500p	LOT21
ITT COMPACT 30	1500p	LOT22
FE TX100 GREEN	1400p	LOT23
HINARI CT45 5113	1500p	LOT24
SELECO 6320410	1600p	LOT25
BLAUPUNKT 8667	1600p	LOT26
ITT COMPACT B1	1450p	LOT27
ITT CT3326 MIUL	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	1300p	LOT36
HITACHI 2432981 CP	1600p	LOT37
FERGUSON 0003-508-002	1650p	LOT38
Fits Chassis TX99 41cm + 51cm Used On: 51K2, 51J8, 51J7, 41H3, 41H3, 41H2, 51K3 PANASONIC TLF14567F Used On: TC2043, TC2243, TX300 PANASONIC TLF14568F Used On: TX2231, TX2244 PANASONIC TLF14584 Used On: TC2210, TC2160, TX1752, TX2112, TX2112, TXC22 PANASONIC TLF14586F TC1651, TC2051, TC2061, TC2253, TC2263, TX5500 HINARI Used On: CT15 HITACHI 2434274 CPT2174, CPT2176, CPT2178, 2434274	1850p	LOT39
	£15.00	LOT40
	2000p	LOT41
	£18.00	LOT42
	1600p	LOT43
	1250p	LOT44

We stock line output transformers for over 100 different models. Please ring 0181-900 2329 for more information.

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
PAGE PRD800, PRD900	SATPSU1	850p
PAGE SR9000, 9200, 9010, 9210, 9220	SATPSU2	850p
AMSTRAD SRD510, SRD520	SATPSU3	650p
AMSTRAD SRD500	SATPSU4	650p
AMSTRAD SRX340, SRX345, SRX350	SATPSU5	650p
PAGE DT100/150	SATPSU6	650p
CHURCHILL D2MAC	SATPSU7	650p
PAGE MSS100	SATPSU8	730p
PAGE MSS200/300 APPDLL	SATPSU9	900p
PAGE MS SR9000	SATPSU10	1230p
FERGUSON SRD4	SATPSU11	835p
ECHOSTAR SR5500	SATPSU12	1735p
ECHOSTAR 6500/7700/8700	SATPSU13	3125p
AMSTRAD SRD800	SATPSU14	3125p
MIMTEC (Surrenson)	SATPSU15	775p
AMSTRAD SRD700/SR950/SRX100/301 SRX50/1002/2001/SRD2000	SATPSU16	730p

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

SATELLITE TUNERS

PAGE PRD800/MSS200 2Ghz
Order Code: TUNER 01 Price: 1650p + VAT
PAGE 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 TVR 1, 2, 3, VCR4600, 4600MKII, 4700, FUNAI VS2, VCR4600, 4800, 5200, 5800, 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, VCR2604, 8700, 8704, 8714, 8800, 9005, 8244
Also fits: ANTECH, BONDSTEC, CASIO, CROWN, FIDELITY, GOLD-HAND, GRANADA, HINARI, MARQUANT, OMEGA, PROFEX, SCHNEIDER, SEG, SENTRA, SHINTOM, TASHIKO, TATUNG, TOWADA, UNIVERSUM
ORDER CODE: AH02 PRICE: 1450p

Replacement Audio Control Video Sound Head for National Panasonic

PART NUMBER	MODELS	PRICE
VBR0091	NV67 etc	875p
VBR0050	NV300, NV340 etc	875p
VBR0061	NV777 etc	875p
VBR0103A	NV250, NV490 etc	625p
VBR0125		625p

8 way Preprogrammed Universal Remote Control

A single remote control to operate Televisions, Videos and Satellite Receivers. Plus Auxiliary Options!

- Replaces up to 8 remotes with one - Simple 4 digit setup routine
- Controls 1000s of models - Teletext functions with Fastext
- Clear (large key) layout - Code Search Facility
- Stylish and easy to operate - Replace broken or lost remotes
- Original remote not required

Order Code: 8 WAY PRICE: 14.50p + VAT

Cassette DC Motors

MOTOR TYPE	PRICE
5V MOTOR	170p
3V MOTOR	170p
12V CCW MOTOR	170p
12V CCW MOTOR	170p
13.2 CCW MOTOR	290p

Replacement Video Cassette Housings

NAME	MODELS	CODE	PRICE
AKAI	VS36, VS53, VS56, VS56, VS75	CH18	3200p
GRANADA	VHSDP1	CH05	1100p
	VH5YJ2	CH01	2800p
GOLDSTAR	GHV1290P, 1291P, 1295P, 9400, 7340, 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, GHV9000, 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, 3V83, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD 140, 141, 150, 157, 158, 160, 250, HRD257, 455, 585, 566, 725, 755	CH02	2800p
	8948, 8950, FV10B, 12L, 13H, 14T, 208, 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, 850, 910, 960, HRD970, HRD920, FERGUSON FV97H	CH27	2400p
LEE	VR3605, VR3905	CH01	2800p
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2800p
	VR3916, 3926, 3946, 3948, 3976, 3986, 3995, 3997, 6948	CH02	2800p
NATIONAL/PANASONIC	NV370	CH06	4300p
N.E.C.	N830EG, N831EG, N831EE, N832, N832EG	CH01	2800p
	N895	CH02	2800p
PHILIPS	CASSETTE LIFT ASSEMBLY (65120366) DV186, 190, 286, 471, 562, 761, VR6180, 6182, 6185, 6285, VR6290, 6291, 6293, 6362, 6367, 6393, 6467, 6468, 6470, VR6561, 6670, 6760, 6761, 6870, 6970	CH05	1100p
	VR6443	CH22	2900p
	VR6448	CH23	2500p
	49586	CH24	2500p
SHARP	VCA100, VCH851, VCH852	CH22	2900p
	VCA103, 103GV, 106, 106GVM, 254GVM	CH23	2500p
	VCS211, 244, 5055, 606, VCB230, VCD8066, 8106, VCT712, 310, 4165, 510	CH24	2500p
TELEFUNKEN	VR2970	CH02	2800p
THOMSON	V220, 321, 323, 326, 4200, 4300	CH01	2800p
	V342, 343, 352, 353, 360, 364, 368, 4210, 4230, 4250, 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	SP06	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 & pack-
age 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	116p
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
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Listing more than 31,600 Semiconductors with
suitable alternative complete with descriptions
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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.
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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

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VIDEO RECORDER POWER SUPPLY REPAIR KITS

PHILIPS

For ES7047 Chassis: CP110

Order Code: **VCRPSU1** Price: **675p**

PANASONIC

For ES 7054 Chassis: MSM

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, NVF5100, NVF5200, NVF588, NVF590

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 lower side 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 impedance : 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 2k Ω /20k Ω /200k Ω /2M Ω
- 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 200 Ω /2k Ω /20k Ω /200k Ω /2m Ω
- 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 2k Ω /20k Ω /200k Ω /2M Ω

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: 320 μ A/3200 μ A/32mA/320mA/10A
- AC Current A: 320 μ A/3200 μ A/32mA/320mA/10A
- Resistance: 320 Ω /3.2k Ω /32k Ω /320k Ω /3.2M Ω /32M Ω

Order Code: **CM2700** Price: **4050p**

CM3230 DIGITAL CAPACITANCE METER

Features:

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

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

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
Hitachi	VT680, 6500, 6800, 9300, 9500VT9700, 9900	Play Idler 6861482 6861481
Order Code: IDL02		Price: 180p
Blaupunkt	RTV301, 306, 307, 309, 311, 312, 315, 316, 317, 319, 320, 404, 414, 424, 434, 444, 478, 707	Description
Goldstar	GHV1221, 1232, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, GHV1248, 8000, 8200, 8210, 8215, GHP51, 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, VR6460, VR6520, VR6920	Idler Arm VXP 0521
Philips		Idler Arm 40340162
Order Code: IDL08		Price: 100p
Amstrad	VCR7000	Description
Sharp	VC200, 381, 383, 384, 385, 386, VC388, 390, 393, 3300, 8381, 9100, 9300, 9500, 9700	Idler 150280
Order Code: IDL10		Idler NIDL0005GEZZ
Philips	VR6540	Description
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
Order Code: IDL11		NIDL0008GEZZ
Order Code: IDL12		Price: 100p
Make	Models	Description
Akai	VS10	Reel Idler
Ferguson	3V23, 3V29, 3V30, 3V31, 3V32, 3V33, 3V35, 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, 3V35, 3V36, 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, 3V35, 3V36, 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 NPLVV0107GEZZ
Order Code: IDL88		Price: 615p
Make	Models	Description
Philips	VR6843, 6943, 44S99, VR44S8920, 44S8922, 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, VCA502, 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, 53580, 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, 8681, 63SB7, 68SB4, 71SB4, 71SB5, 72SB8, 72SB8, 92SB31, 20DV1, 20DV2, 20RW7, 21DV1, 21DV2, 25B01, 25B02, 25B11, 25B12, 30DV2, 31DV1, 31DV2, 31DV, 33SB02, 33SB03, 33SB05, 33B11, 33B12, 33B13	
Toshiba	V91, V95 Pressure Roller Assembly - PS403-40205	
Order Code: PR232		Price: 300p

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 \pm 0.5%
- AC Voltage: 200mV/2V/20V/200V/700V
- DC Current A: 200 μ A/20mA/200mA/2A/20A
- AC Current A: 200 μ A/20mA/200mA/2A/20A
- Resistance Ω : 200 Ω /2k Ω /20k Ω /2M Ω /20M Ω /200M Ω

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 \pm 0.5%
- AC Voltage: 200mV/2V/20V/200V/700V
- DC Current A: 2mA/20mA/200mA/20A
- AC Current A: 200mA/20A
- Resistance Ω : 200 Ω /2k Ω /20k Ω /2M Ω /20M Ω /200M Ω
- Capacitance: 2nF/20nF/200nF/2 μ F/20 μ F

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

REMOTE CONTROLS

Description	Code	Price	Description	Code	Price	Description	Code	Price
AKAI			ITT			SALORA		
RC-V10A	RC876	750p	IFB13, 14, 15	RC143	800p	SERIES L	RC190	750p
RCV 37 B	RC891	750p	FS4	RC148	750p	86173	RC882	750p
V25A	RC896	750p	RG305	RC305	675p	SANYO		
DECCA			RG306	RC306	750p	RC218, RC222, RC228, RC238	RC140	700p
RC70	RC894	750p	FS9/1-10/1	RC307	750p	JXGE	RC878	800p
FISHER			VS5 RUK	RC308	750p	JXDE	RC884	750p
RC905B	RC879	750p	VS4-1	RC308	750p	VHR2300	RC890	750p
GRANADA			MULTICONTROL (17C20)	RC311	750p	RC628	RC865	750p
UNIVERSAL TEXT	RC309	750p	LOEWE			SHARP		
MK4 TEXT, 70155G, 70115G, 70133G	RC880	750p	DC11	RC146	800p	G0121CESA, 123CESA, 204, 251	RC140	700p
95288E	RC882	750p	MATSUI			SONY		
94490D	RC884	750p	010270601	RC889	750p	RM604, RM605, RM606	RC140	700p
GRUNDIG			VX770	RC892	750p	32 CHANNEL	RC140	700p
TP160E	RC107	900p	NOKIA			RM613	RC141	750p
TP200, TP300	RC380	750p	SATELLITE	RC550	750p	RM632, RM636	RC160	675p
TP400	RC401	675p	ORION			TATUNG		
TP590-600	RC600	750p	RC53	RC892	750p	FXA	RC877	750p
TP390, TP610	RC610	750p	PANASONIC			RC70	RC883	750p
TP621	RC612	800p	EUR51200	RC200	800p	FX70 FASTTEXT	RC894	750p
TP630, TP650	RC650	750p	TC2200	RC204	750p	TELEFUNKEN		
TP666	RC660	750p	VS00357/NV730	RC202	750p	FB632	RC632ST	750p
TP661	RC661	750p	TNQ1621	RC203	750p	FB639	RC639	750p
HITACHI			PHILIPS			THORN/FERGUSON		
CLE800-CLE830	RC140	700p	RC5002.5154	RC134	750p	3V35-42	RC342	650p
A617402/655602	RC1920	800p	KT3 NON TEXT	RC135	750p	3V31-32	RC344	750p
A512120/230	RC900	750p	69117032	RC178	800p	3V57-58	RC628	750p
A514790	RC901	750p	69117194	RC180	750p	TX10 TEXT	RC732	575p
A5088470	RC902	800p	RC5991-UNIV	RC300	580p	TX10 STEREO TEXT	RC738	575p
A518612	RC903	750p	RC38	RC301	750p	TC9-90-100	RC740	675p
SCL002	RC904	750p	KT3 TEXT	RC5301	750p	3V55, FV11	RC783	750p
C2096	RC905	800p	RC5352	RC5352	750p	TX100 FASTTEXT	RC789	650p
A511940	RC906	750p	RC5375	RC5375	750p	TX100 ST. FASTTEXT	RC789	650p
655602H	RC1920	800p	RC5 STANDARD	RC300	580p	PROFESSIONAL	RC790	650p
			RC5903	RC5903	700p	TOSHIBA		
						CT937	RC950	750p
						CT9117	RC951	750p

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SPECIAL OFFERS FROM 15/05/97 TO 15/06/97

ORDER CODE	WAS	NOW	ORDER CODE	WAS	NOW
RC140	700p	600p	RC738	575p	540p
RC160	675p	600p	RC740	675p	600p
RC300	580p	540p	RC789	650p	600p
RC732	575p	540p			

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- REPLACES 2 REMOTES (TV SATELLITE RECEIVER)
- SET-UP BY LIBRARY REVIEW
- SIMPLE KEY ARRANGEMENT
- IDEAL REPLACEMENT FOR LOST/BROKEN REMOTES

ORDER CODE : 2 WAY PRICE: 925p

VCR ALIGNMENT KIT

CONTAINS:	SET OF 7 HEAD & TAPE PATH ALIGNERS	SET OF 8 ALLEN KEYS
3 REVERSIBLE SCREWDRIVERS		• 0.77mm
SPRING HOOK		• 0.90mm
VCR HEAD EXTRACTOR		• 1.27mm
		• 1.50mm
		• 1.60mm
		• 2.00mm
		• 2.40mm
		• 3.00mm
	CIRCLIP PLIERS	
	MICRO SCREWDRIVER	

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REPLACEMENT NATIONAL PANASONIC SIDEPLATE (VXA 3015)

FITS THE FOLLOWING MODELS:

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NVD80, NVFS1, NVG18, NVG20, NVG21, NVG22, NVG220, NVG25, NVG28, NVG300, NVG50, NVH65, NVH75

BLAUPUNKT
RTV640, RTV740, RTV910, RTV920

Order Code: VXA3015 Price: 1000p

I.C. PROTECTOR

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

Price: Only 30p each

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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: EHT rectifier (two wires) for the Thorn/Ferguson 8000 chassis. G.E. Chester, Chesley, 6 St. Aidan's Close, Hominglow, Burton Upon Trent, Staffs DE13 0LQ. 01283 563 948.

Wanted: Service manual for the Tektronix 465 scope with DM40 digital multimeter fitted, photocopy OK. Steve Russell, 30 Bridgefarm Lane, Clifton, Nottingham NG11 8DL. 01159 749 192.

Wanted: RF modulator (part no. ENC17302), or equivalent, for the Panasonic Model NV8600B VCR. New or used OK. Seamus Lannon, 28 Brannock Heights, Dublin Road, Newry, Co. Down, N. Ireland BT35 8DH. 0169 366 698.

Wanted: Service manuals and/or circuit diagrams for the Susumu Model FX20R and the Ssangyong Model MTE9014R - photocopies OK. Iain McCallum, 7 Forth Street, Clydebank, Dunbartonshire G81 1HN. 01419 511 669.

Wanted: Z759/CV5060 valve for the Solartron CD814-2 Solascope. Ian G. Jeffery, 275 Monks Road, Lincoln LN2 5JY. Phone/fax 01522 540 521.

For disposal: The following are free to anyone who can collect. ITT 20in. colour set (CVC5 chassis) in perfect working order with excellent tube; Bush TV62 (Bakelite cabinet), in excellent condition and working up to the end of 405-line transmissions; one working Philips V2000 VCR plus two spares and many tapes. Steve Ball, 16 Scott Close, Stanground, Peterborough. 01733 347 678.

Wanted: An RF modulator and interconnecting lead and a power supply board for the Sanyo VTC-NX100 Betamax VCR, also a service manual. An adaptor plate for the Sony AG7 Betamax auto-changer (part no. 2-290-027-00. Does anyone know of a Betamax users club or similar to help keeping these old machines going? Doug Brown, 145 Barn Mead, Harlow, Essex CM18 6SR. 0171 230 3023.

Wanted: Service information and spares for the Sherwood XQ1102 in-car graphic equaliser. Photocopy

would do or advice on source. K.J. Woolley, 42 Townend Avenue, Low Ackworth, Pontefract, W. Yorkshire WF7 7HE. 01977 618 583.

Wanted: Service manager program - alternative considered. Graeme Duggan, 31 Cresswell Drive, Red House Farm, Gosforth, Newcastle upon Tyne NE3 2SY. 01912 846 471.

Wanted: Circuit diagrams/service manual for the Samsung Series 7 VI710 VCR. Alan Stubbings, 7 Church Road, Saxilby, Lincoln LN1 2HH. 01522 702 601 (evenings).

Wanted: Circuit diagram (photocopy OK) for the Goodmans Quadro Model 901, or help with clearing a no line scan problem (vertical line down centre of tube). J. Firth, 8 Nina Drive, Moston, Manchester M40 5SD. 01616 815 841.

Wanted: VCR with VHF/UHF/hyperband tuner, mechanism not important. Circuit diagram for the Bush Model 2720 (photocopy OK). Text board for the Sony Model KV2752UB. H. Foyne, 7 Ennerdale, Tanhouse, Skelmersdale, Lancs WN8 6AG. 01695 557 079.

Wanted: Sufficient technical data (photocopy OK) to restore an Avo all-wave oscillator. No model no., but contains two L63 valves supplied by a stick rectifier. Also can someone repair an accidentally damaged Precision Gold M810 multimeter? Eric Kempshall, 109A Portland Road, Hove, East Sussex BN3 5DP. 01273 382 001.

Wanted: Front sliding controls for the Bush Model BC6004 and a Thorn dual-standard colour set fitted with the 2000 series chassis. Does anyone have any information on the Sweda 350/2550/2810 electronic cash register made by Omron, and the BBC trade TV test colour information films on video (VHS/Beta/N1500)? S. Nicholson, 77 Deerlands Avenue, Parson Cross, Sheffield S5 7WS. 01142 577 163.

Wanted: Schematics for the Transfone duplex cordless telephone Model SX0012. I have tried for years to

obtain technical information on this interesting item. Bjorn Nilsson, Villa Marina, Carretera de Mijas, E-29650 Mijas, Spain. Tel/fax 34 5248 5182.

Wanted: Spare PCBs for the ITT VR3916 or VR3906 VCR - or a complete machine. Does anyone have the bits to convert a VR3906 to remote control? C. Raynor, 39 Northway, Lymm, Cheshire WA13 9AT. 01925 822 673.

Wanted: Circuit diagrams for an IR remote control transmitter and receiver. Specific model doesn't matter, but must be averse to bright light. Andy Harrington, 19 Baldwin Close, Middleton-on-Sea, W. Sussex. PO22 6RQ. 01243 587 266 (evenings), 01273 463 311 (day).

Wanted: Service manual for Panasonic VCR Models NV333/ NV366. Wired remote-control unit for the NV366. Battery lid and aerial for the Casio Mini LCD TVI400. D. Lee, 16 Devonshire Place, Claughton, Birkenhead, Merseyside L43 1TU16.

Wanted: Power supply PCB, heatsink and mounting bracket for the Sharp VCA105 VCR (mains transformer not required). Also a handset (working or not) for the Grundig VS500GB. S.J. Ralph, 63 Belle Green Lane, Higher Ince, Wigan, Lancashire WN2 2EP. 01942 744 452.

Wanted: Complete mechanism for the Mutsubishi HS27B VCR. Also a main PCB (non-remote version) for the Ferguson TX90 chassis, preferably working. Alan Dobey, 4 Cypress Avenue, Bridge of Don, Aberdeen AB23 8LA. 01224 823 995.

Wanted: Service information for the Amstrad PCW8256 - making a spare drive A into a drive B. Peter Howard, 12 Meadow Way, Westergate, Chichester, Sussex PO20 6QT. 01243 543 399.

Wanted: Help in restoring a Ferranti Model 14T4 (circa 1953), a 625-405 line downconverter, and any 405-line test equipment. Brian Bowman, 59 Masfield Avenue, Borehamwood, Herts. 0181 953 6617, fax 0181 207 6841.

Servicing

the Sony SLV757UB

John Coombes on the things to check when faults are encountered with these VCRs

This is a two-speed HQ machine with Nicam sound facilities. Features include a picture-in-picture function that enables a small TV picture to be displayed during tape playback and vice versa.

In this article I'll summarise the various fault symptoms we've experienced and list what to check. Some faults have an electronic and others a mechanical cause, while some can be caused by either mechanical or electronic failure. For convenience, I'll list faults under these headings, with separate sections on the power supply (see Fig. 1), cassette housing and remote control unit.

If the keys don't work, observation is required to gain as much information as possible on what is and what isn't working. If there is no display, there could be a timer/display problem or a power supply fault. Does the VCR load when a cassette is inserted? If so, does the tape thread up? Is the system control functioning, or the mode switch faulty? If there's a power supply fault, the VCR will usually be completely dead. This is not always the case however - only one LT supply may be missing.

In many cases a check on the CXP80116 servo/syscon microcontroller chip IC501 on board MA29 is required. Check the DC conditions very carefully, as replacement of this 80-pin chip is not recommended unless it is essential. If necessary, remove it very carefully - otherwise the print may be ruined. It is possible to cut IC501 out, but the best way of removing it is to use a gas-operated soldering iron. With practice this will enable you to desolder all the pins together and melt the glue that holds the chip to the PCB.

Power Supply Faults

Blown mains fuse (F101): If the 2AT mains fuse F101 has blown check whether the 0.22 μ F mains filter capacitor C101, the S1WBA60 bridge rectifier D101 or the protection capacitor C104 (3 x 4,700pF) is short-circuit. Less likely is that the MA2830 hybrid chopper chip HIC101 has shorted internally. Check it by replacement if necessary.

No outputs: Check whether the 4.7 Ω , 3W surge limiter resistor R101 is open-circuit. If so, HIC101 could be faulty. If necessary check the chopper transformer T101 which could have an open-circuit primary winding.

No 12V motor supply: Check for 13.6V at pin 5 of the SI3120CA 12V regulator chip IC201. If this voltage is missing, D201 (S3LA20) is probably open-circuit. There should be 12V at pin 3 of IC201. Check IC201 by replacement if this voltage is missing.

12V motor supply low: Check IC201 (SI3120CA) by replacement. Alternatively C202 (100 μ F, 25V) could be open-circuit.

No switched 12V supply: Check for 13.6V at pin 5 of the SI3120CA 12V regulator chip IC202. If this voltage is missing, D205 (S3LA20) is likely to be open-circuit. Also check C204 (1,000 μ F, 16V) which could be short-circuit. If there is no 12V output at pin 3 of IC202, check this device by replacement.

No 35V supply: This line supplies the servo/system control PCB. Check whether the 56 Ω , 0.5W resistor R201 is open-circuit or zener diode D203 (RD51FB) is short-circuit. These are safety components. If R201 is open-circuit, C216 (100 μ F, 50V) and/or zener diode D209 (RD39FB) may be short-circuit. Alternatively D202 (D1NL20) could be open-circuit.

No -29V supply: Check whether zener diode D210 (RD30FB) is short-circuit. Also check D207 (D1NL20) and R203 (22 Ω) which could be open-circuit.

No 5V Supply: Check for 5.9V at pin 5 of the SI3050CA 5V regulator chip IC204. If this voltage is missing, rectifier D206 (S3S4M) is likely to be open-circuit. If it's present, check for 5.3V at pin 3 of IC204. Should this voltage be missing, check IC204 by replacement then, if necessary, C207 (100 μ F, 10V) which could be short-circuit.

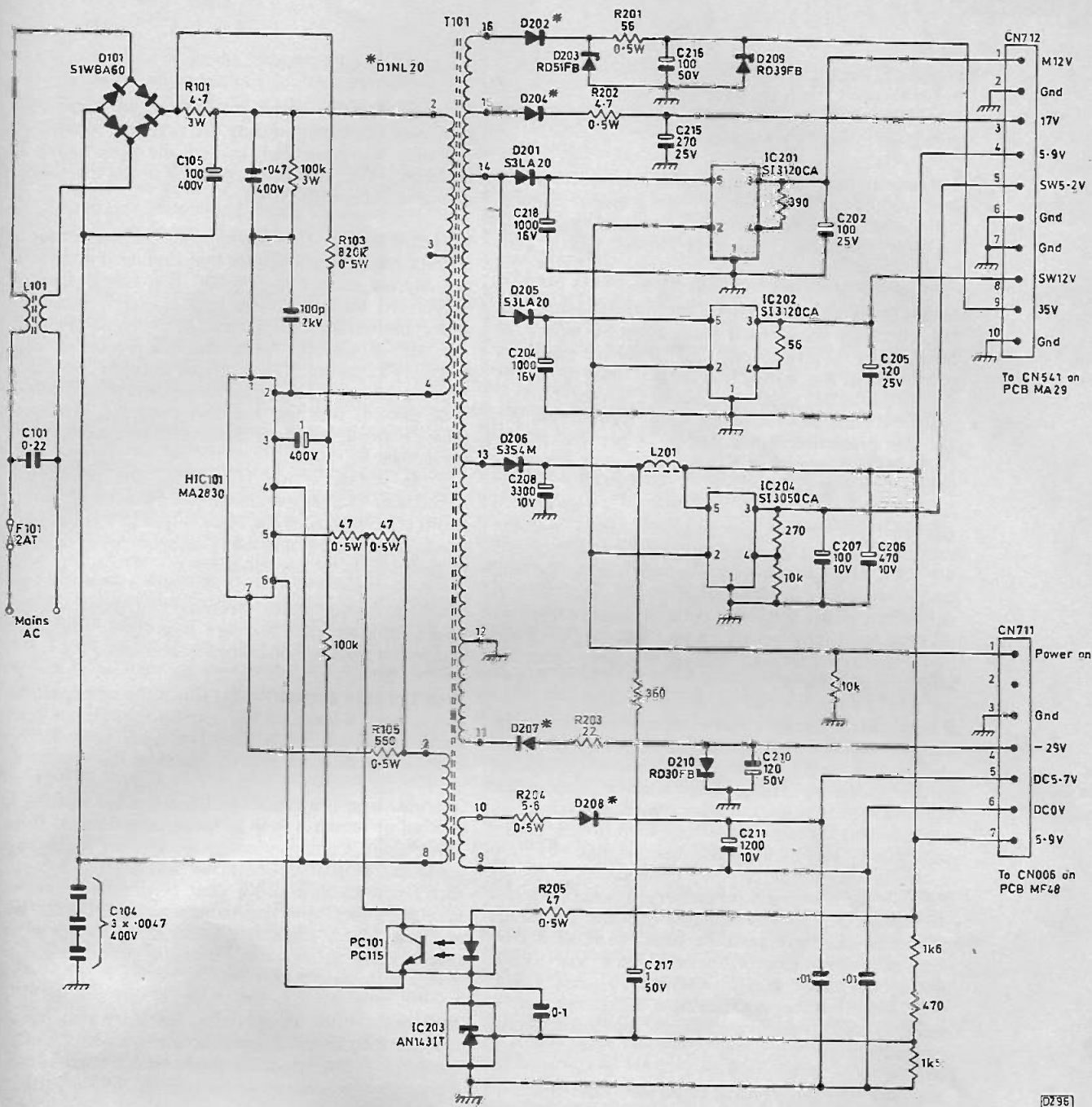


Fig. 1: The power supply circuitry used in the Sony Model SLV757UB.

Switching: Note that IC201, IC202 and IC204 are switched on/off at pin 2. In the on condition, the voltage at these pins (from board MF48) should be 5V.

No results: Apart from open-circuits on the primary side of the power supply and missing LT lines (see previous sections), other possibilities are the PC115 optocoupler PC101 going open-circuit or the reference voltage detector IC203 (AN1431T) being short-circuit.

If the cassette loads but is then immediately ejected, check that the cassette up/down switch is operating correctly. Replace this item if necessary.

If a tape will load but will not record and its safety tab hasn't been removed, check the erase prevention switch by replacement.

If the front loading door will not open or close, check whether the open/close arm assembly is broken. The usual problem here is broken or chewed teeth because someone has forced a cassette into the machine.

Cassette Housing Faults

The reason for failure to load a cassette could be a faulty front-loading motor. Before fitting a replacement, ensure that there is LT at its terminals. If not, trace back to source. Alternatively the cause of the trouble could be a faulty worm wheel and/or worm gear. Check that these are complete and not cracked or broken.

Electronic/Mechanical Faults

Records in part only – part of a previous recording is left: Check the erase heads and their supplies – an intermittent supply is likely to be caused by a dry-joint.

Machine won't play – drum and capstan motors keep

rotating: Check the mode switch by replacement. If this fails to correct the fault, trace back to the CXP80116 syscon chip IC501. Check the DC conditions at its pins, then if necessary by replacement.

Threads up but won't run, possibly intermittent: The front loading unit may be faulty – check that threading is completed. The mode switch is the next suspect. If necessary trace back to the CXP80116 syscon chip IC501.

Drum rotates too fast: If the drum motor inputs are OK, check the drum motor. Ensure that FG pulses are produced by the pick-up coil. They should be present at pins 19/20 of the TA8424F chip IC001 on the motor drive PCB (MD22), emerging at pin 17. After this they pass to board MA29, where they are fed via the 1SS119 protection diode D503 to pin 61 of the CXP80116 syscon chip IC501. D503 may be open-circuit or IC501 faulty.

All functions missing, power supply OK: Check the capstan motor and all motor inputs. Check the belt and the rack and gear system. Finally check the DC conditions around the CXP80116 syscon chip IC501. A defect in this chip can result in the absence of many or all deck functions, or faulty deck functions, while the clock display remains all right. If necessary check the chip by replacement.

Tape speeds up erratically: Clean and check the capstan motor. Check that the capstan FG pulses are present and correct at pin 62 of IC501 (CXP80116). IC501 could be faulty. Alternatively suspect the MJM45560 FG pulse amplifier chip IC404 (check by replacement) or the following DTA144ES digital transistor Q410 which could be open-circuit.

Periodic noise appears on the screen: Check whether the capstan FG and playback control pulses are present at pins 62 and 59 respectively of IC501 (CXP80116). The playback control pulses pass via IC401 (MC14066BCP), IC402 (M52435P) and Q412 (DTC144ES). If they are missing at IC501, check these items. If IC501 is receiving its pulse inputs, check it by replacement.

Machine will not record, otherwise OK: Since all other operations are OK, a stop or pause signal must be interrupting the record program. The mode switch could be faulty and IC501 (CXP80116) is suspect. Check the conditions at the relevant pins of IC501, then by replacement if necessary.

No timer recordings: Assuming that a cassette with the end tab knocked out is not being used, the operation of the MB89793B timer control chip IC001 (board MF48) is suspect. Check its working conditions. Also that the VCR is correctly loaded and IC501 (CXP80116) is operating correctly. The mode switch is another possibility.

Machine switches itself off: There can be many causes from loss of a power supply to an incorrectly operating CXP80116 microcontroller chip (IC501). First, ensure that the cassette housing operates correctly. If this is OK, check that the cam motor is working correctly. If the cam motor and the mode switch are all right, check the

conditions around IC501.

Machine switches to record during playback: This fault may occur only during the first few seconds of operation. The most likely cause is the mode switch. If this item is OK, check the operation of the CXP80116 microcontroller chip IC501.

Search is faulty: This occurs when the cam motor is operating incorrectly. Check that loading is complete, and that the mode switch is OK. If so, check that the CXP80116 microcontroller chip IC501 is receiving correct information. If it is, check IC501 by replacement.

If still in trouble, check that the pendulum arm assembly is operating correctly. It could be broken or there could be missing teeth. Ensure that the pendulum slide plate is free and operates correctly. Hardened grease between the plates and chassis will prevent free movement.

If the search is too fast, check the points just mentioned. The capstan motor control could be faulty. IC501 (CXP80116) is the usual culprit in this case, but check for dry-joints and faulty components in the path from this IC to the capstan motor.

Machine goes into rewind without being asked/rewinds when any key is pressed: Check the end-sensor phototransistor by replacement

Won't rewind automatically: Check the supplies to the end sensors. If these are OK, replace them. If not, trace back to source. IC501 (CXP80116) could be faulty, but check for open-circuit or dry-joints along the sensor line.

Machine won't rewind to end, has trouble starting to rewind or leaves a loop of loose tape when it stops rewinding: Worn or misaligned belts are a common cause of this trouble. Check the belts and belt tension, then check the clutches for wear. If necessary check as specified under "won't rewind automatically" (previous section). Check that the capstan motor is operating correctly, and not incorrectly operating the cam motor to give a false loading position.

Will not rewind and/or wind fast forward: Check that the cam motor rotates the mode selector switch correctly. If not, check the mode switch alignment. If the mechanical side is OK, check the DC conditions around the CXP80116 microcontroller chip IC501. If necessary, check as described under "won't rewind automatically".

Any single function not working: Check the mode switch, by replacement if necessary. Alternatively the CXP80116 microcontroller chip IC501 is suspect. Check it by replacement.

Mechanical Faults

Tape threads then sticks or fails to unlace: Failure of the drum to rotate or a faulty mode select switch are the likely causes.

Machine keeps tangling or damaging tapes: Check whether the pinch roller is worn, showing signs of being very shiny. If this item is OK, check the elevator cam which could be incorrectly positioned or cracked. Check

the tape path, clean the heads and tape path. Check tape path adjustments and pressures. Look for parts that don't move freely. Check that the mode select switch is operating correctly.

Shaky sound: Check mechanical parts – belts, takeups, clutches etc. – for wear. If replacement of any worn items fails to cure the problem, check the capstan motor drive and, if necessary, the capstan motor itself by replacement.

Picture pulling at top: Check and reset the back tension. If this doesn't resolve the problem, check/replace the band assembly (tension regulator) before suspecting faulty video heads. Incorrect back tension can lead to premature head failure.

Poor recordings/fuzzy picture: This suggests worn heads. Check for visual signs, or better still by replacement. If there is interference on the picture rather than overall poor quality, the cause is more likely to be dirt on the drum or somewhere along the tape path. A fuzzy picture indicates a worn head.

Interference on picture: If the input signal and the TV set being used as the monitor are OK, the cause of interference is likely to be dust, dirt or faulty/worn video heads. Clean the heads and tape path. Check that the threading is correct. If necessary replace the video head drum.

Sound and picture out-of-sync: There is a fault in the tape path between the two heads. The usual cause is a damaged loading arm. If the path is shortened the sound precedes the picture, and vice versa.

Irregular noise bars on picture: If this is a tracking fault, realign the tape path. The cause could however be dirt on the heads or along the tape path.

Squeaks: There are many possible causes. You'll find that mechanical parts are rubbing. Check that items like the head spring are centred properly and not touching the sides. Check the flywheels and tape-operation mechanisms. A little grease on the finger tip can sometimes work wonders! Check for rubbing plastic and moving parts that stick.

Electronic Faults

No record/playback colour: Check the conditions around the HA118016NT chroma processing chip IC801 on board YC65, particularly the chroma in and out. Bandpass filter FL801 could be open-circuit. Dry-joints are a possibility, especially if the fault is intermittent. Check all connections along the chroma path.

No playback colour: There should be a chroma input at pin 5 of the HA118016NT chip IC801 on board YC65, and a chroma output at pin 25. Buffer transistor Q805 (2SA812), comb filter DL801 or bandpass filter FL801 could be open-circuit. If necessary check IC801 by replacement.

No record colour: Check the conditions around the HA118016NT chroma processing chip IC801 on board YC65. If necessary, check it by replacement. Other

possibilities are bandpass filter FL801 which could be open-circuit, or buffer transistor Q801 (2SC1623) which could be open-circuit or dry-jointed. Further testing is best done with an oscilloscope to check through the record colour signal path.

Poor record and/or playback colour: Check the conditions around the HA118016NT chip IC801 on board YC65. If a known good recording of a colour-bar signal plays back correctly, the AFC section will be confirmed as OK. If the colour image isn't normal, the fault will lie in the APC section.

Poor playback colour: This is again a matter of checking around IC801 on board YC65, as above, and the chroma path. IC801 (HA118016NT) is the main suspect. When the fault is in playback only, the picture may break up.

Tuning problems: The symptoms when there is tuning drift are usually no sound and no colour with a timed recording. Retune. If trouble is experienced with tuning these machines, check the AFT output at pin 6 of the IF unit IF001. If this is OK, check the MB89793B microcontroller chip IC001 on board MF48 – the DC conditions here then, if necessary, the chip by replacement.

Luminance faults: When a luminance fault is present the first step is to check the conditions at the pins of the AN3231K luminance processing chip IC701 on board YC65. If this chip has to be replaced, alignment will be required. This calls for an oscilloscope, a frequency counter, a DC power supply and the full service manual.

No sound or picture, all mechanical functions working: Check for damaged aerial and TV sockets. Then check whether the tuner is receiving signals and power. If the inputs and supplies are OK, the tuner unit (TU001) is suspect. Check the IF path from pin 1 of the tuner to pin 2 of the IF unit IF001. Possibilities here are open-circuit components, dry-joints and broken print or connections.

No playback picture: This assumes that the machine will record tapes that can be played back on another machine, but will not play back its own recordings or prerecorded tapes. An open-circuit is obviously present in the video playback circuit. Check the DC conditions around the AN3231K luminance processing chip IC701 on board YC65, and the chip itself by replacement if necessary. Check all LPF and bandpass filters, and for open-circuits in and around IC701. If this doesn't solve the problem, check back from the output socket.

Records blank screen, sound OK: Either the drum is faulty or there's an open-circuit in the video record signal path. Establish whether the signal is reaching the heads by checking at plug/socket CN801 then at the head terminals. Replace the drum if it's receiving signal inputs. If there is no signal at CN801, suspect the HA118019NT record/playback amplifier chip IC801 on board RP63. Check the DC conditions at its pins, or just check it by replacement.

Records visual gibberish in colour: Check the DC conditions around the HA118016NT chroma processing chip IC801 on board YC65. Check this IC by

replacement if necessary. If this chip is OK, check that the LA7213 sync separator chip IC802 on board YC65 is providing a composite sync output at 2 and that the following DTA144EK buffer transistor Q810 is OK. If these checks fail to detect the cause of the fault, check whether bandpass filter FL801 (on board YC65) is open-circuit. Also ensure that the skew-on input to board YC65 from the syscon board, at pin 4 of connector CN703, turns on at the correct point – when the line sync goes low during a high peak.

Check that the erase heads are OK, and trace their input back to source if this is missing.

Picture or colour shakes from side to side: Check around the drum or capstan servo section of the CXP80116 microcontroller chip IC501. The capstan speed error output can be checked at pin 65, the drum speed error output at pin 66. If IC501 is OK, check and clean the motors. Replacement may be required.

Regular noise bar on the picture: Check the DC conditions around the CXP80116 microcontroller chip IC501. Ensure that the drum FG pulses are arriving at pin 61. If so, IC501 could be faulty.

TV display has no line sync or excessive horizontal sway: Faults of this type are usually caused by the CXP80116 servo/syscon chip IC501 or an associated peripheral component. Check the DC conditions around the chip. Then check any suspect peripheral components. Finally replace IC501 if necessary.

Hum bar on E-E picture: Check the DC conditions on the tuner/IF panel TU01, particularly the 30V tuning voltage supply at pin 11 of the tuner. This voltage is smoothed by C031 (4.7 μ F, 50V) and comes from the 30V regulator which consists of Q016 (2SD774-3) and the RD33EB2 zener diode D003. If all these items are OK, check back to the supply source.

No E-E sound: Check the conditions at the IF module IF001, which may have to be replaced. Check for dry-joints and continuity of the E-E sound path.

No playback sound: Trace the playback audio path via IC002 (AN3932S) and IC001 (AN3972FC) on panel HF9. The inputs to IC002 are at pins 19 and 21. Pins 5 and 28 supply the outputs to IC001. If the DC conditions at either chip are incorrect, check the chip by replacement. Look for dry-joints, which can easily cause loss of sound.

Interference on E-E sound: Attempt to remove interference by adjusting the vision detector circuit in the IF module (IF001 on board TU01). If this has some effect but doesn't remove the interference, check relevant capacitors in the IF circuitry. The IF output is at pin 9.

A faint buzz may be the best that can be achieved. Even fitting an attenuator or carefully adjusting the vision detector circuit seldom completely eliminates a faint buzz.

Machine won't change channels: Check that the tuner is receiving serial clock and data inputs at pins 16 and 17 respectively, also an enable input at pin 18. Check that the tuner's LT supplies are correct and not too low – 30V (tuning) at pin 11, 12V at pin 3 and 5V at pin 12. The tuner itself could be faulty. This fault can be intermittent.

Any single channel will not tune in: Check the operation of the MB89793B tuner/timer control chip IC001 on panel MF48, and that it's supplying the correct serial data. Ensure

that the AFT system is operating correctly – the AFT control voltage comes from pin 6 of the IF module IF001 on panel TU01, via buffer transistor Q007.

TV cannot be received via the VCR, possibly on one channel only: Check the aerial socket and the switching in this area. If only one channel is affected, the likely cause is the MB89793B microcontroller chip IC001 (panel MF48) which might need to be replaced because of incorrect serial data. Check for open-circuit or dry joints throughout the channel data path. If all channels are affected, it's almost certain that the machine has been moved around and as a result the aerial socket has been damaged.

Drum doesn't rotate: Check whether power is reaching the drum motor. If not, trace back to the TA8424F chip IC001 on the motor drive board MD22. DC checks on this IC will normally sort out the problem – the chip itself is the most likely component to fail. Also check whether R009 (0.47 Ω) is open-circuit.

A full check in this area requires the use of an oscilloscope. Check the coil waveforms and the outputs from the Hall elements. If there is a substantial difference in these, i.e. one output is much lower than the others, replace the lower drum assembly and realign the tape path.

If two coils are not correctly phased the drum won't rotate. This is most likely to be because of failure of IC001, but check the associated components as well. Check all connections and continuity to and from IC001.

Clock faults: First check for dry-joints in the clock circuit on board MF48. Check that only the clock, not other functions, is affected. This will prove that the cause is in the timer/display circuit.

If there is no clock display, check the DC conditions around the BA6800AF display driver chip IC007 or check it by replacement. If IC007 is OK, check the clock crystals X001 (32kHz) and X002 (8MHz). They may be dry-jointed or have broken connections to the PCB. If these are OK, check the DC conditions around the MB89793B tuner/timer chip IC001. This chip may have to be checked by replacement.

An incorrect IC pin reading should lead to the cause of the fault without difficulty. Note that the tuner/timer chip can be affected by weather conditions, see below.

If the clock is losing or gaining time, check crystals X001 and X002 for dry-joints/faulty connections and the DC conditions around IC001. Make sure that all inputs and outputs are correct before replacing it.

Clock plus other functions inoperative: Check the DC conditions around IC007 (BA6800AF) and IC001 (MB89793B). If necessary check these ICs by replacement. Before contemplating replacement of IC001, note that this type of chip can produce fault symptoms because of external influences, e.g. lightning and some electronic equipment. Thus before assuming the worst, it's advisable to check whether the clock can be started by switching off at the mains then starting again from scratch.

Remote Control Unit Faults

Battery contacts can be a problem. They can be corroded, broken or dry-jointed at the PCB. Check the spring tension – if this is poor operation may be intermittent.

Check for dry-joints or broken legs at the crystals, also for dry-jointed or open-circuit LEDs.

The other common problem is a faulty rubber sheet. Replacement is the only way of dealing with this.

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Amstrad PCW Disc Drives

The 3in. disc drives in Models PCW8256, PCW8512 and PCW9512 can cause trouble as they age and wear. A routine service may be all that's required. D.F. Wheatley on how to go about it



Just over ten years ago specialist suppliers were asking between £2,500-£4,000 for a relatively simple word-processor. Then Alan Sugar launched the Amstrad PCW8256 at less than £400, at a stroke confounding the trade and delighting hacks everywhere. Santa Claus delivered mine. Having seen the horrors in the current Amstrad TV chassis, I immediately took the back off the monitor and looked inside. To my surprise and delight, I found that its layout and construction were excellent.

Soon afterwards the same basic machine, with a larger memory and a second disc drive, appeared as the PCW8512. It cost little more than the PCW8256. Later the PCW9512, which used a high-quality daisywheel printer, appeared. The public approved and rushed to buy. Amstrad wordprocessors were rapidly acknowledged as being very high-quality machines at an almost unbelievable price. Magazines devoted to them soon appeared, and manufacturers everywhere designed software specially for them.

As the years ticked by there were further models. But they lacked the magic of the original ones. A recent survey has shown that 8256s and 8512s remain the most popular models amongst wordprocessing devotees, followed by the bulkier PCW9512.

Reliability

Though these models are old by today's standards, they work well and in most respects remain as reliable as ever. We've had occasional field collapse, which has always been cured by fitting a replacement LA1385 field timebase chip. Apart from one or two power supply failures, there has been little else. But the disc drives are now beginning to give trouble. Their users may be confronted with dreaded signs such as "Disc Address Mark Missing". Some have started to gobble up text.

Discs

Because the 3in. floppy discs for which these machines were designed are expensive and becoming difficult to get, many users consider it wise to fit the now standard 3.5in. disc drive in their machines when the original drive starts to

give trouble. There is no doubt that this can be good advice. But in many cases it may not be such a good move. Suitable 3.5in. drives are expensive, and changing to one makes your 3in. discs obsolete. In addition some of the 3.5in. drives on offer do not lend themselves to routine copying of the user's 3in. discs, many of which may contain valuable data. Although the discs can be copied, it means extra bother and extra expense – for each one.

There's another reason why it may be unwise to spend out on a new drive prematurely: your existing drive could well be easy to repair. While some will be worn out, many will simply need a service. This article is intended to ensure that even a novice will find it easy to do.

Disc Drive Service

Each drive uses a single rubber belt, which will probably have led a hard life over the years. Harrison Electronics offer replacements at £1.75 including VAT each. We've also used belts from J.J. Components. These come in packs of five, at £1.60 per pack – the reference code is BF072.

Belt replacement is easy. It is worthwhile cleaning and oiling the drive when you do so. Here's how.

Models PCW8256 and PCW8512

We'll start with the PCW8256 and PCW8512. You'll need a long-bladed Phillips screwdriver, a small electrical screwdriver, a long-nosed pair of pliers, a piece of wire with a small crocodile clip at each end, some thin machine oil, some non-oily cleaning fluid such as Thawpitt or alcohol – and somewhere to work.

Disconnect the machine. Unplug and stow away the keyboard and the printer. Lay the machine face down, then remove the four back screws. Note that the top ones are longer. Draw the cabinet upwards and off. Stow that away as well.

The 8256 has one disc drive, the 8512 two. Each is held in place by four 2in. Phillips screws which are sunk into plastic bosses. Two sockets on flexible leads connect each drive electrically.

We'll start with the upper drive. Disconnect the sockets.

then undo the four securing screws in sequence while gently lifting the drive. As the last screw is undone, the drive and screws can be lifted out. Put the screws away safely. Put the cat out, and settle to dismantling the drive.

Remove the two screws at each side of the drive, then slide off its box case to expose the works. With the back towards you, the drive motor is to the right. The head housing projects to its left, and to the left again is the worm-shafted stepper motor that runs the magnetic head across the disc as it rotates. A tiny, green PCB that carries the index sensor is centrally placed towards the front. More on these items later.

With the printed side upwards, remove the two white sockets that are plugged into each side of the panel. Both are about an inch from the end. The pretty loom of twisted wires that runs past mates with a captive plug at the far end, and is supported by a pair of wire clips at the edge of the panel. Slip the loom from the clips and ease the plug and socket apart.

Three screws secure the panel to the casting. Remove the tiny one. Then note that the other two are identical except that one has an earthing grip washer. The grip washer can short to and earth the adjacent print if fitted in the wrong position. After removing them, the board can be lifted sufficiently to fit the new belt.

Before you do so, note the presence of the tiny write-protect sensing shaft. It looks like a little half-inch long brass nail without a point. You'll see its shiny head protruding from a hole near the edge of the framework casting, about an inch from the motor drive pulley. Unless you enjoy half-hour long hands-and-knees sessions on the floor, remove it now and keep it safely.

Ease off the tired old belt. If it's the original one, it will retain its stiff oval shape even when free. Transfer a minute trace of thin machine oil from the blade of the fine screwdriver to the drive-motor shaft, beneath the belt pulley,

before cleaning the pulley and the disc capstan rim with the Thawpitt or alcohol.

Fit the new belt, rehook the wire loom into position, lay the drive printed-side up and replace the write-protect pin. Reclip the pretty loom, replace the PCB (remember the previous grip washer warning) and refit the plugs and sockets.

Turn the drive over, to the motor side. The head is on the underside of the black shaft between the motors. Gently clean it with spirit, then apply a minute trace of oil to the stepper-motor bearing and its extended worm shaft, and another trace to the precision-machined rod along which the head assembly glides.

This completes the service. All that remains to be done is to recase the drive and refit it in the cabinet.

Extra Drive

If the machine has a second (B) drive, the following applies.

Clean the extra head opposite the one you've already cleaned. Note that whereas the A drive has one wire loom that trails past the four-pin socket, the B drive has two looms. Their sockets are identical. To prevent confusion between them, the looms have plastic sleeving collars at the socket ends. The plug and socket nearest the board edge has the white collar, the other one the black collar. They must be replaced correctly. Apart from this, proceed as with the A drive.

Model PCW9512

The A drive in the PCW9512 is similar to the B drive in the PCW8256 (this doesn't mean that they are interchangeable however). It should be serviced similarly. Access is more involved, but is just as simple if the correct procedure is followed. Here it is.

You'll see a plastic bung on each side of the plinth, near the front. Remove them both, and the Phillips screws

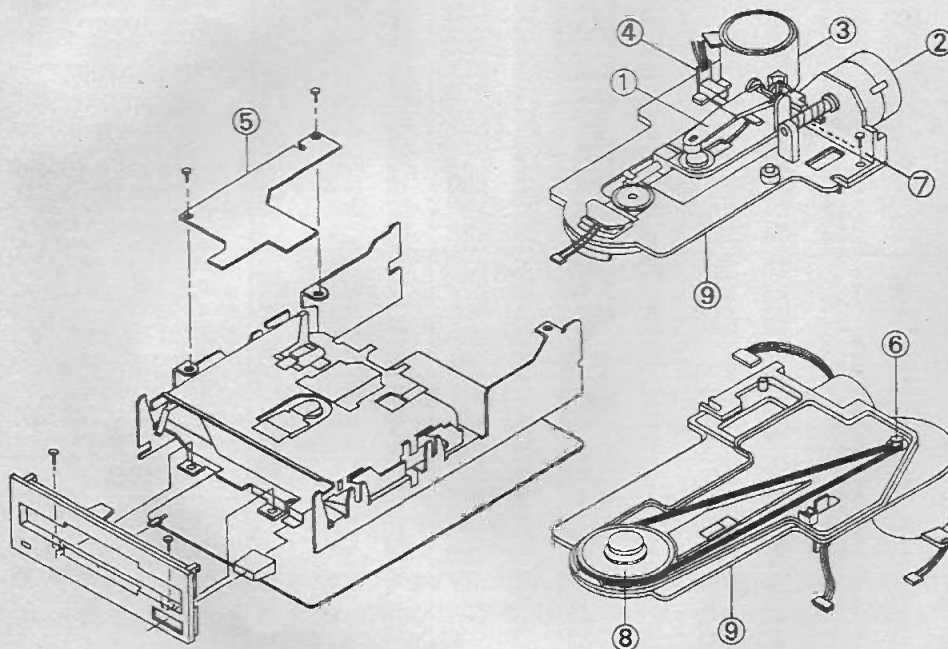


Fig. 1: The disc drive mechanism used in Amstrad PCW series word-processors. 1 Head bracket assembly; 2 stepper motor; 3 spindle motor; 4 track 00 sensor; 5 read/write protect, index, LED PCB; 6 pulley; 7 stepper motor shaft; 8 flywheel; 9 loading unit.

beneath them. Also pull off the protruding brightness and contrast control knobs near the right-hand bung. Note (for refitting) that they are keyed. Then remove the two back screws immediately behind the screen area, and the two that really are in the back - in the lower outer edges of the cabinet back. The cabinet shell can now be eased off - gently. Lift it high over the tube neck, unless you enjoy the devastating hiss of a tube's swansong.

As you look into the back of the machine, you'll see a pair of horizontally-mounted PCBs, one above the other. The upper one slips into runners. The lower one is screwed to four rising bosses. The disc drive hides at the front right, under the tube's bowl. It all looks rather intimidating, but isn't if you know what to do. There's no need for diagrams.

First, discharge the tube's final anode. Remove the anode cap, and clip the socket to the Aquadag earthing strap to hold it at chassis potential.

Remove the tube's base panel, and unplug its earthing lead. Then unplug the scan coils. Follow the five wires that run from the front left of the top panel to a plug at the centre, right edge of the lower one. Unplug them at their lower-panel end.

You'll see that a plastic securing block on the mains lead is pushed into a retaining slot at the back of the cabinet floor. Lift it out, remove the screw that secures the rear, right corner of the lower panel to its boss, and free the mains lead from under the lower panel. Disconnect the blue plug at the rear, left side of the lower panel. The upper panel can now be lifted out and put away safely.

Note that the top panel's black plastic runners are fixed to a pair of upright metal plates, each of which is angled and secured to the cabinet floor with two large black Phillips

screws. Remove both front screws and loosen the rear ones. Then, while gently supporting the top of the front panel, remove the other two.

The front panel, complete with the tube, can now be 'folded' outwards and downwards and lifted away, leaving ample access to disc drive A and, where fitted, drive B. It or they will be secured to the cabinet floor with four long Phillips screws and their bosses. If there are two drives, remove and replace them one at a time.

Disconnect the A drive's two plugs and its black earthing wire, remove the four Phillips screws that secure it, then carry out the service as described previously. Replace and reconnect the A drive before removing the B drive if fitted.

Afterwards, reassemble the unit in the reverse order. When refitting the cabinet front, hold it with the tube's face towards you and note that its base flange fits into a locating trough in the front centre of the cabinet floor. Tilt the front's top towards you, locate the flange, then bring it upright. Secure the back screws first, then the front ones.

In Conclusion

If the machine works well again after this - it probably will - you will have avoided the need to buy a new drive until you are ready to do so. If it still gives trouble at least you'll know for sure, as you shell out for the replacement, that it's really necessary.

And if, despite the suggestions in this article, you've decided to move to a 3.5-in. drive anyway, here's a plea. If you have an old 3in. drive for disposal, please get in touch with me via the magazine. My own A drive is well and truly worn out mechanically, and I have much valued information on the discs.

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2020, RO29	CUC2800	£18.00	4515-05	P.O.A.			22T19	£14.00
2070, 154-125A	CUC3600, 29201-019.10	£24.00	DQ-4	P.O.A.			22T19	£14.00
2114T, 2321T	CUC3600, 29201-019.05/06	£18.00	1.0EWE				22T19	£14.00
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Long-distance Television

DX and satellite TV news and reception and some history from the pre- and immediate post-war period. **Roger Bunney** reports

April brought warmer weather and, hopefully, by the time this is read the new Sporadic E season will be with us. If the conditions in Bands I and II are good, it's worth checking the lower Band III channels – though Band III SpE rarely happens.

The first aeriels went up at my new house over Easter. Band I and satellite aeriels should follow shortly. It's all a matter of time – lack of it.

There was very settled weather over Easter, with high pressure over Western Europe. This is the classic condition for tropospheric signal propagation. Checks with the domestic aerial system revealed that the nearer French UHF transmissions were present and visible. In fact the local station suffered from a degree of line pairing as a result of co-channel interference from France.

The only DX reception reported during March was an excellent

tropospheric opening early in the month. Cyril Willis (King's Lynn) received TVE ch. E5 on the 7th, his first catch from Spain in Band III. The signals peaked over 2045-2300, at strong levels. They were from the Ares site in Northern Spain – transmitter power is 46/226kW ERP (directional aerial). This was an excellent catch so far north. Along with various French Band III and UHF signals, it was the only Spanish signal received. This suggests that the propagation could have included a degree of selective ducting. The good conditions continued through to the 11th, with RTL (Luxembourg) ch. E7 and numerous Band III and UHF signals from Germany, France and the Benelux countries received.

Peter Schubert (Rainham, Essex) also reported good tropospheric conditions, with reception of French and Benelux stations over the 9-12th. SpE activity was virtually non-existent during the month.

A letter from Wenlock Burton (Victoria) indicates that the recent SpE season in Australia wasn't too bad, with reception of ch. 1 signals from New Zealand lasting for up to nine hours. The Australian season occurs during our winter of course. This suggests that we could be in for a better season following 1996, which is perhaps best forgotten.

Satellite Sightings

There's been a delay in the delivery of the satellite system I ordered – the dish manufacturer is still awaiting a modified ground post. But I expect to have at least something working by next month.

John Locker reports a "pretty

strong" solar outage on March 2-8th, wiping out Astra's CNN feed via Intelsat 601 at 27.5°E. An outage occurs when the sun tracks across the sky directly behind the geostationary satellite belt. Thus dishes also pick up solar radiation.

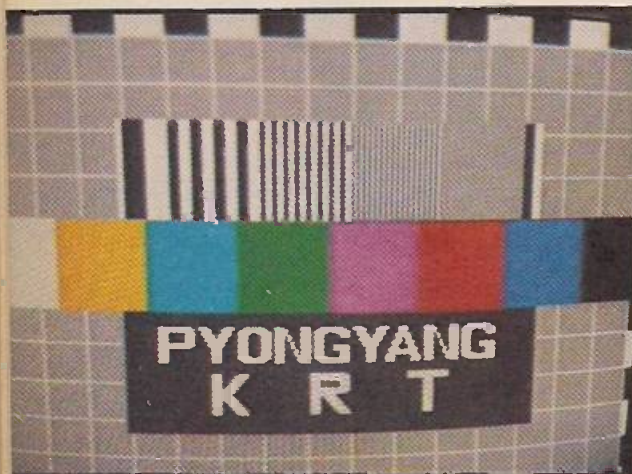
On February 18th John heard the Shuttle crew (STS82 mission – Hubble telescope repair) commenting about "lights passing outside" and some in front of the Shuttle itself. Reuters subsequently confirmed the comments, from Intelsat K recordings. NASA has suggested that the cause may have been reflections from the telescope.

On March 5th, during mid-evening, Roy Carmen (Sandown) received a report from BBC Frankfurt via Orion 1 (37.5°W) on the German economic crisis. This was followed by a similar offering to Canada, preceded by an identification caption which indicated that American distribution would be downlinked via Anik E2.

There was extensive coverage of the Albanian crisis during March. News came initially from various Italian uplinks via Eutelsat craft, also Orion 1 at 12.585GHz horizontal (Starbird). Intelsat 705 (18°W) was also employed for uplinks from Brindisi, using the ITA 41 SNG vehicle. As the month progressed, the news feeds via 705 increased. US as well as European news units were in operation at Brindisi – there were numerous NTSC signals. Eutelsat II F2 (10°E) and II F4 (7°E) were used to provide additional capacity.

The March 11th fog crash on the M42 was reported live from a bridge over the M40 to GMTV at

A rare visitor: the North Korean test pattern seen via Eutelsat II F4 at 7°E. Photo from John Locker.



0630 via Intelsat K (21.5°W, 11.496GHz horizontal). Another live feed later in the same programme came from the UKI 79 truck on the M42, via Intelsat K's 11.529GHz horizontal transponder.

The meeting between presidents Clinton and Yeltsin was reported via Eutelsat II F4 (7°E) on March 21st at 2100, using the 11.078GHz vertical transponder.

Terrestrial News

Czech Republic: TV Primera has been renamed TV Prima. A 12kW ERP ch. 58 transmitter has been brought into service at Zlin/Tlustra Hora. There's to be a 10kW ch. R7 transmitter at Prague (this offers good TV-DXing potential), also numerous UHF transmitters with unlisted or very low power.

Belgium: All RTBF Tele 21 transmitters are now called Eurosport 21. The video is scrambled but the sound is clear. First reception here was from Tournai (ch. E63).

The Netherlands: Three UHF transmitters carrying TV OOST (TV East) are expected to enter service this year. Increased ERPs are planned for the Omrop Tryslan regional TV service in Friesland.

Australia: A new ch. A0 (46.25MHz vision) transmitter is apparently on air. This is good news for the next F2 layer season. Polarisation is vertical and the location is NW Victoria. The Australian Broadcasting Authority is seeking government funding for community TV services. Without it, the proposed sixth channel may be dropped. Such funding is unlikely however: finance for ABC has already been reduced.

India: Doordarshan has dropped its plan for a satellite channel. A new terrestrial channel, DD4, is to be opened instead. A new broadcasting bill with strong controls on programme content – to reduce violence and obscenity – is to be introduced.

Phone Frequencies

Phones that use both the 900MHz and the 1,800MHz band will soon be available. Orange expects to introduce a Motorola dual-band phone by early summer, and within the next twelve months the 'roaming' phone is expected to be available in some fifty countries. There is concern that 1,800MHz transmissions could cause interference with satellite TV systems, because of IF breakthrough.

Mobile radio manufacturers and users are lobbying for more spectrum space to be made available: the proposal is to introduce a new generation of portable equipment, called the Universal Mobile Telecommunications System (UMTS), by the year 2002. It would use the 2GHz band.

Satellite TV News

The launch timetable for the new Hot Bird satellites at 13°E looks like being as follows: Hot Bird 3 this summer, 4 this autumn and 5 next spring. In addition Eutelsat is to start launching W series satellites to replace the II series. W2 is planned for autumn 1998, W3 for spring 1999.

The NASA TV transmissions that were downlinked from Spacenet-2 at 69°W, just above the UK horizon, have been transferred to GE-2 at 85°W. The frequency is 3.88GHz (audio at 6.8MHz). This will give improved coverage across North America, but Western Europe loses the C-band signal. This information was passed on by Alan Davidge via the Florida Today Internet bulletin (www.flatoday.com).

More channels have been added to the French CanalSatellite Numerique (CSN) digital TV package. They include Euronews, La Chaine Info, Bloomberg and the Disney Channel. CSN hopes to have half a million subscribers by the end of the year, and is undercutting the rates charged by rival Television Par Satellite by nearly 25 per cent. In addition Canal Plus is seeking permission to include France 2 and 3 in its digital package, arguing that these public channels are carried by TPS, which is backed by TFI and France TV.

Industry Canada, the government's satellite regulatory body, is threatening to prosecute citizens who watch US satellite programmes. Many Canadians subscribe, illegally, to US services such as HBO and Discovery. It seems that retailers and users of equipment could be charged with a criminal offence. Attempts to start Canadian DTH services have foundered. Telsat Canada has dropped plans for a DBS satellite at 91°W, leaving Canadians with the only option of viewing lower-power signals from Anik craft.

SkyNet's Telstar 405 satellite has died an early death – it was only three years old. The vintage Telstar 302 is being moved to its 97°W location. Telstar 5, now under



An unknown uplink control room, seen via Eutelsat II F4 at 7°E. Photo from John Locker.

construction, is likely to take up position there.

PanAmSat's PAS-6 and -5, due for launch later this year (in that order), are both to be positioned at 43°W. They are expected to have 24 Ku and 24 C band transponders each. Sky is taking twelve transponders for programme feeds to South America. Hispasat plans to launch a third satellite at 30°W.

Intelsat 801 is now in operation at 64°E, just above the horizon in the UK. It has 46 transponders.

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(Left) Just prior to the launch of the Hubble repair Shuttle mission, seen via Intelsat K at 21.5°W.

(Right) Proof that Hot Bird 2 was actually tested at Eutelsat's 29°E allocation.

Photos from John Locker.



operating in both the Ku and C bands.

AsiaSat-3 is to be launched next December, replacing AsiaSat-1 at 105.5°E. This is good news for Australian readers who will be able to receive 35dBW signals. They will be available in New Zealand at some 2dBW lower.

SatFACTS (NZ) reports that the BBC's MPEG service via PAS-2 suffers from a lip sync problem. It's cause has been traced to lack of

audio delay while the incoming PAL video is being converted to NTSC. It seems that delay was included in audio channel 1 but not channel 2, resulting in an 'odd' delay with this channel. Hugh Cocks reports from Portugal that the MPEG-2 BBC Prime service via Intelsat 707 at 1°W also suffers from a lip sync problem, but this seems to be a function of the digital processing.

Some History

The generally accepted story is that the BBC Television Service closure on Friday September 1st, 1939 came during a Mickey Mouse cartoon, at 12.10 – without even an announcement. This is discussed in the latest issue (33) of Andrew Emmerson's publication *405 Alive*, and it seems that events were not quite as believed. The transmission log for the day shows 12.05.05 Mickey Mouse cartoon, Mickey's Gala Premiere; 12.13.00 vision tuning signal and tone; 12.35.00 close, i.e. the carrier ceased.

The Radiolympia show was being held that day, and instead of the usual trade films a live OB. Come and be Televised, was transmitted from 11.00-12.00. Knowing that the closure was imminent, engineers Pat Hilliard, Bruce Norman and John Gliss agreed to run one of two standby cartoon films. The final live transmission was from Elizabeth Cowell, trailing the afternoon's Mantovani concert and a Galsworthy play in the evening. Circumstances overtook those programmes.

Incidentally the BBC Television Service opened twice on November 2nd, 1936. The first opening was announced at 15.00 by Leslie Mitchell, using the 240-line Baird mechanical system (15.00-15.34). The second opening was at 16.00.06, with the Marconi-EMI 405-line electronic system. The Baird system was officially dropped in February 1937.

The BBC Television Service reopened at 15.00 on June 13th, 1946, to an estimated 15,000 viewers – there had been some 23,000 licence holders in 1939. George Gaskin has sent in a resume of this, based on *Daily Mail* cuttings. McDonald Hobley formally opened the service, accompanied with Eric Coates's Television March. The first programme, of musical offerings, started at 15.02, followed by Picture Page from Studio B at 15.30.

The same issue of *405 Alive* includes a repro advertisement for the Dale Parabolic Band III aerial. This was the company's Mark 1 aerial, the subsequent Mark 2 using the corner reflector principle. Both were manufactured in the early Sixties. They were popular in areas where the signal was weak and scattered because of screening hills.

I remember the situation at Ventnor, Isle of Wight, where St. Boniface Down shielded the town from the Chillerton Down ch. 11 ITA transmitter some four miles to the NW. Problems caused by wave/sea scatter and tidal variations also make this unique resort an aerial rigger's nightmare. There were double 11s for Band III, elevated by up to 50°, Dale Parabolic aerials and, for Band I (ch. 3), up to double 4s. The ever-present ORTF signal from Caen on ch. F2 would swamp the BBC signal at the slightest lift. The last surviving in-situ Dale Parabolic aerial I saw was in 1995 on an outbuilding at Corfe, Purbeck, another heavily-screened village.

All part of the UK's rich TV history! My thanks to Andrew Emmerson for permission to use his information. The annual subscription for *405 Alive* is £16 (in the UK). It's published by *The Radiophile*, Larkhill, Newport Road, Woodseaves, Stafford ST20 0NP (01785 284 696, 10.00-17.00 weekdays).

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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.

Channel 5 Reception

Ian Martin's letter (May) highlights yet another reason why Channel 5's population coverage has turned out to be so much less than the 70 per cent originally forecast. In Ian's area the diplexers commonly used reject the ch. 37 signal. He asks whether anyone makes a bandpass filter for this channel. Well yes, and as always *Television* was first with the news! In his article in the April issue Keith Cummins mentioned a Triax diplexer that passes one channel on one input, and the whole band less that channel on the other. My own articles in the November/December 1996 issues went into channel-pass filters, notch filters and single-channel combiners in some detail.

We have a similar problem in this area (South Yorkshire). Belmont transmits Ch. 5 at very low power, so most viewers receive it from Emley Moor. Although it is theoretically possible to combine the Belmont chs. 22, 25, 28 and 32 with ch. 37 using a diplexer, in practice the signal loss on chs. 32 and 37 is not acceptable. I've completed about a dozen installations to date using Taylor TCFL1-1CH filters, which function in the same way as the previously mentioned Triax diplexer and seem to solve the problem perfectly.

It's unfortunate that ch. 37 is nine channels above ch. 28 and five channels above ch. 32, since the image-frequency effects inherent in superhet receiver design mean that there is a risk of patterning. In this respect I've been lucky so far: only one problem to date, with an elderly Hitachi receiver that the customer was prepared to dump.

An aerial designed for the reception of

only one or two channels rather than a full channel group has greater gain and directivity. This is exactly what we need here when adding ch. 37 from Emley Moor, especially as the signal is likely to be poor. Sunfen Ltd. (01603 628 625) has brought out a range of narrowband aerials for most of the channels being used by Ch. 5. There are three basic types, which provide roughly equivalent performance to a standard cheap 10-element, a good-quality 15-element and a good-quality, centre-mounted 18-element array.

I've been using the last two, and I must say that I'm impressed with the results. In South Yorkshire we use Belmont when the Emley Moor signals are affected by ghosting. Using these aerials, I've been able to obtain acceptable ch. 37 reception in places previously regarded as no-go areas for Emley Moor transmissions. The 18-element Sunfen aerial for ch. 67 knocks spots off a standard group C/D array.

*Bill Wright,
Roitherham, S. Yorkshire.*

The Ch. 5 reception problem in S. Wales, described by Ian Martin (Letters, May), is the same up here in Cheshire. We receive good pictures from Moel-y-Parc in North Wales. So I have one aerial for Moel-y-Parc and one for Winter Hill. They feed a combining unit, the signals then going via the VCR to the TV set. The powers that be put Ch. 5 on ch. 48 from Winter Hill however. So in passing through my combining unit it finds itself next door to HTV Wales from Moel-y-Parc on ch. 49. The resulting mess on both channels has to be seen to be believed.

If anyone has a solution that doesn't require unplugging or relay switching, I would be very pleased to hear about it.
*M.J. Powell,
Knutsford, Cheshire.*

With reference to Ian Martin's letter about Ch. 5 reception, I can offer a possible low-cost solution. A not dissimilar situation is present in my part of Aberaeron town where Blaenplwf (chs. 21-31), just eleven miles away, is useless because of horrendous ghosting. So we rely on Arfon (N. Wales, chs. 41-51). But Ch. 5 is at present available only from Blaenplwf, on ch. 56. Taking advantage of the screening provided by a side wall of my house, I am able to get an almost ghost-free but weakish Ch. 5 signal using

a small group C/D aerial. What I didn't want was that the other rubbish which comes from this aerial gets into my distribution system.

The answer to the problem, no diplexer being to hand, was to fit a group C/D masthead amplifier to increase the signal so that it swamps the tiny signal picked up by the group B (Arfon) aerial, then pass it through a narrowband filter. For this purpose I modified a mechanical tuner of the type used in monochrome portables. The local oscillator was disabled, and a suitable take-off loop was fitted in place of the mixer input. The unit requires a few mA at 12V, and has a bandwidth of about 20MHz. Its output is fed into the system via a Y combiner.

A similar filter/amplifier combination enables me to feed in Telefis na Gaelige (ch. 23) from Ireland. In the past I have similarly filtered transverted RTE1/Network 2 signals to remove transverter spurious outputs that would otherwise have bedevilled my system.

It seems to me that Ian Martin might be able to use the group B signal from Mendip in a similar way. If his Wenvoe signals are strong enough, a quarter-wave coaxial stub might notch out the unwanted pickup on ch. 37. This didn't work for me, because my ch. 51 (Arfon) signal is the weakest of the four and the skirts of the ch. 56 notch were too wide. Hence the 'swamping out' solution.

I have a stock of some hundreds of brand-new tuners available and could probably offer them for sale at about £4 each, carriage paid and conversion data included, if anyone is interested. I can be reached on 01545 570 550.

*Philip Lane,
Aberaeron, Dyfed.*

Tatung Spares

There were some inaccuracies in the Spares Guide (April issue) with regard to Tatung. At the moment there are only two appointed outlets for Tatung spares. These are:

Appointed distributor	Wizard
Appointed stockist	Willow Vale

Furthermore Tatung does not "deal with the trade", only with Tatung dealers. All other trade enquiries are referred to Wizard.
*Paul F. Goldring, Eng. Tech., TMIEIE, MISM,
Spares & Service General Manager,
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REPRINTS

Reprints of articles from TELEVISION back to 1986 are also available: ordering information is provided with the index, or can be obtained from the address below. Hard copy indexes of TELEVISION are available for Volumes 38 to 46 at £3.50 each.

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Answer to Test Case 414

- see page 557 -

There was in fact a single cause of both the fault symptoms with the Ferguson FV32L VCR, and it wasn't the servo/syscon chip which was just doing its job. One of the many safety features incorporated in this – and other – system control designs is the prevention of tape lacing unless the drum is rotating. Feedback from the drum motor, in the form of pulses from the drum pick-up, is used to check on this. The pulses enter the mighty servo/control chip at pin 8.

An oscilloscope check here (at the drum speed test point BK02) showed that the pulses were erratic and sporadic in the second or so between keying play and the machine's reversion to standby, incriminating the drum motor assembly. When the confused micro chip did occasionally permit complete threading, the defective feedback resulted in the motor's speed wandering about, hence the picture fault. The standard cure would have been to replace the motor assembly. This would have done the trick, at some expense and trouble.

Though our service data provided no circuit details, we were sufficiently curious (and mean!) to take a look at the motor, whose drive and control circuit is readily accessible below the deck. Disturbing a small tubular surface-mounted capacitor, C6, made the fault – and the feedback – come and go. A replacement capacitor (3.3µF, 50V) restored the machine to perfect working order.

NEXT MONTH IN TELEVISION

Servicing the Panasonic Alpha 2 Chassis

John Coombes provides a fault-diagnosis guide for these popular sets.

A Mains-buffering Trip

It can sometimes be difficult to establish the cause of a shattered mains fuse. Expensive as well when there are repeat performances. Faced with this problem, Ian Rees devised a novel but very effective mains-buffering trip. It's based on a halogen lamp, an LDR and a thyristor-controlled relay. You can use it instead of your variac, or to provide additional protection.

Astra 1D Reception with the Amstrad SRD500/510

In the concluding article in his current series, Martin Pickering, B.Eng., shows how to implement automatic channel-expander switching for Astra 1D reception with the Amstrad SRD500 and SRD510 satellite receivers.

Toshiba Service Briefs

More know-how from Toshiba technical.

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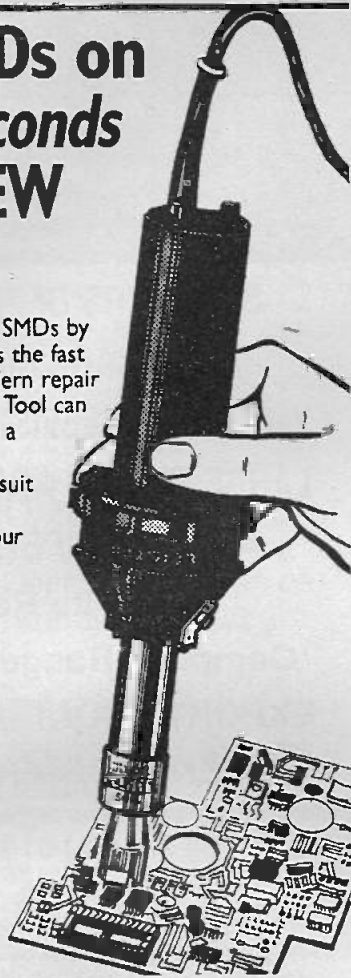
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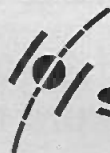
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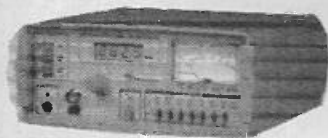
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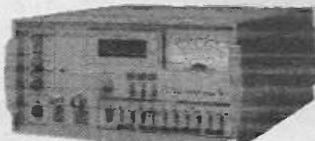
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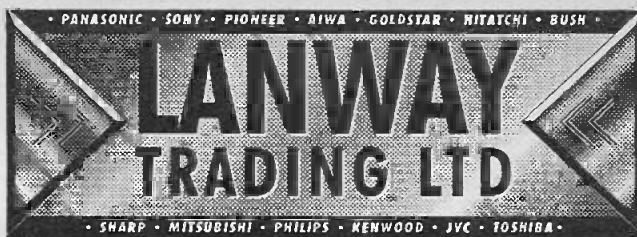
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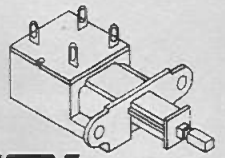
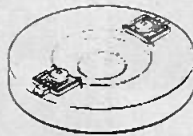
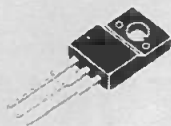
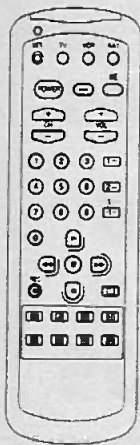
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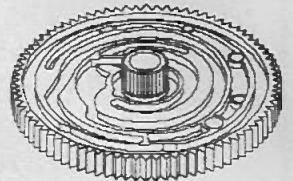
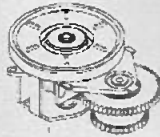
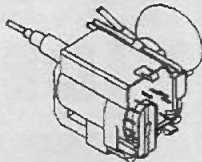
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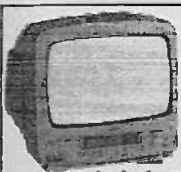
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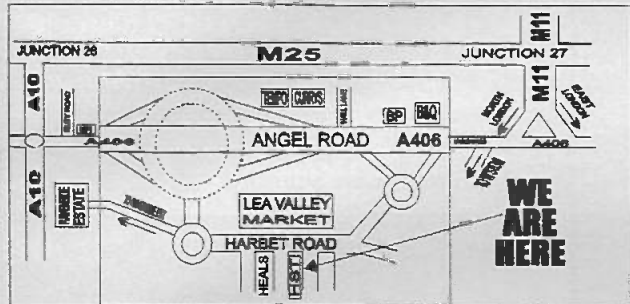
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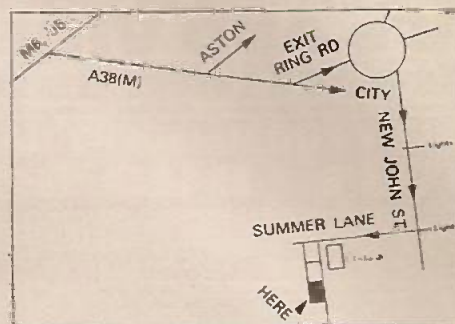
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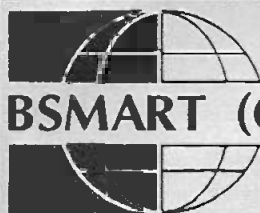
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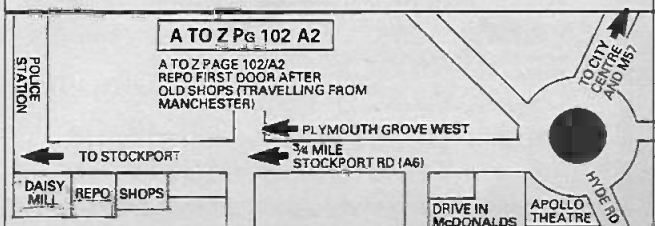
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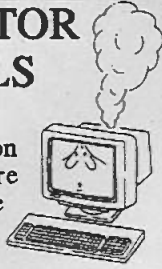


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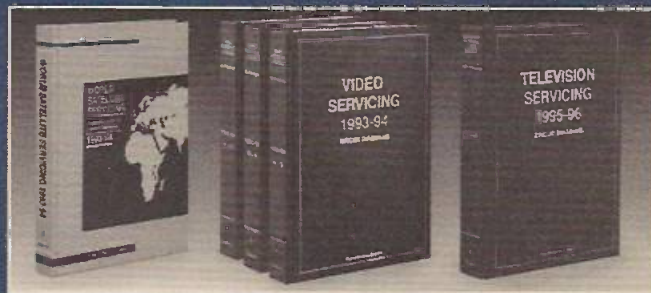
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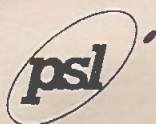


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