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

Kick-start for DTT

Applications for franchises to run digital terrestrial TV (DTT) services in the UK had to be received by the ITC by January 31st. Up to that point the whole idea of DTT had a rather lacklustre air about it. Why start digital broadcasting from terrestrial transmitters with a limitation of about thirty channels when satellite and cable distribution of signals can provide a couple of hundred or more channels? But we were in for a shock. The main applicant (there were only two) was British Digital Broadcasting (BDB), in which Carlton UK Television, Granada Television Ltd. and BSkyB have equal shares. They had, in addition, come to an agreement with the BBC which has promised to contribute up to five subscription channels to the proposed service. So on January 31st we suddenly found that the leading ITV and satellite TV broadcasters were anxious to take up the right to provide us with DTT broadcasting.

All of a sudden, DTT had become a hot proposition, likely to become the main way in which TV is received in the UK within a relatively short time (transmissions are due to start in mid 1998). Why the 'main' way, when satellite and cable can still offer greater scope? Simply because all you need do is to pop into your local dealer to obtain a digital TV decoder. No need to stick up an unsightly dish or get connected to the cable, just plug in your decoder. It will be that simple, and simplicity always pays when it comes to getting the public interested in taking up something new.

The decoder is likely to cost around £400

initially, but once production builds up the price should fall to less than £200. There is of course the extra cost of subscription channels and pay TV programming – but you don't have to have these. One small snag technically is that it might not prove to be quite so simple for many people. Though digital signals have proved to be robust, there is always the prospect of corruption when an inadequate aerial system delivers a poor signal. So many viewers may have to install a proper array instead of relying on a simple set-top aerial. About time too, you might say! The reward for viewers will be not only be extra channels but better quality pictures. The reward for the trade will be in extra aerial work as well as decoder and subscription sales.

Sets with built-in decoders should become available quite quickly – the technology is all there. Suddenly, 16:9 displays and high resolution make sense. It looks as if the days of analogue TV are numbered. This of course was the intention all along, but was unlikely to occur quickly unless someone was prepared to make a go of DTT. The government had, after all, allocated one multiplex to the BBC and one to ITV + Ch. 4 (there are six DTT multiplexes in all, each of which is capable of providing three-six channels depending on the complexity of the transmission – in the digital world, mug-shot displays require less spectrum space than all-action programmes). So it now looks as if the planned move from analogue to digital terrestrial TV will be a smooth one.

Viewers can of course take advantage of DTT and satellite or cable TV as well.

Whatever suits. The thing is that thirty or so channels should be ample for most ordinary viewing requirements. Those 200 satellite/cable channels were beginning to look as if they would be used largely for service duplication to provide 'near video on demand'. Those with more specialised viewing interests can rely on cassettes or discs, which are probably better suited to the purpose.

One has to admire the decisive way in which the BDB partners have stepped in and taken advantage of the situation. There is much in it for all of them. Carlton and Granada would get a foothold in digital and subscription TV. The BBC's position would also be enhanced: as a programme provider, it can look forward to an improved income flow. As for Rupert Murdoch, he would plant his feet firmly in the one area of TV from which, in the UK, he has to date been precluded. He has everything to gain and nothing to lose. Those who, like me, looked at the early advertisements for Sky Television and thought the man was off his head have been proved utterly wrong. Murdoch has extended his TV interests world wide to take up just about every opportunity available.

The immediate stock market reaction was to conclude that the cable TV companies will be in for a tough time. This need not be so. They still have the advantage of being able to provide telephony services and links to that growth area, the Internet. In fact we are being spoilt for choice. It seems a long way from 2LO and the girl who made the telephone connections and got all the local gossip!

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INDEXES AND BINDERS

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

BACK NUMBERS

Some back issues are available at £2.75 each. For further details see box on page 332.

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 Airmail Europe £43.00 per year
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TELETOPICS

Interactive TV Services Start

Interactive TV is being launched in the Birmingham area on March 1st. The service is being run by Two Way TV, in conjunction with the BBC, Channel 4 and the ITV broadcasters. It enables users to obtain additional information, such as an actor's biographical details or a horse's form and pedigree, or

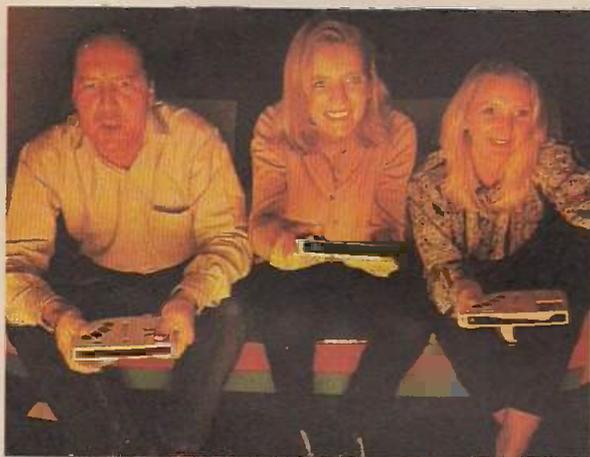
poses text and graphics over the transmitted TV picture. Initially, viewers will be able to choose from around 100 hours of programming a week. There will also be a 24-hour electronic programme guide and a helpline. The broadcasters will supply tapes of programmes in advance, to enable Two Way TV to prepare relevant information for transmission. There is provision for cash prizes with quiz programmes and placing bets up to £10. At the end of a quiz, the set-top decoder will send the score to Two Way TV's operational centre in London for checking.

Two Way TV hopes that its system will become the general standard for interactive TV. The service has been tested in 500 homes in the Birmingham area since late 1995. Broadcasters are pleased since a survey showed that the service boosts some programme ratings by up to thirty per cent. Two Way TV has invested some £20 million on setting up the service, and estimates that break-even point will be reached with 400,000 subscribers. The basic box and handset costs about £100, the charge for a month's subscription being £7. A de luxe package with Nicam stereo sound and four handsets, so that up to four people can play games simultaneously, costs £150. The equipment and subscriptions are being handled by radio/TV dealers. For trade marketing enquiries phone 0171 242 0087.

A somewhat different approach has been adopted by Videotron for cable TV viewers in the London area. Videotron's TVinteractive channel can link TV programmes to the Internet, enabling viewers to visit Web sites that are relevant to the TV programme and watch commentary, via the internet's 'chat' software Internet Relay Chat, on issues raised in a programme. The system's design builds on pioneering work done by TVinteractive to combine WWW technology with TV production.

Interactivity is achieved by using four video channels simultaneously: the different video signals are synchronised with software embedded in the basic transmission. This tells the subscriber's Videoway converter box what he can do at any time. Interactive decisions are carried out by pressing a coloured button on the special remote control unit. There is then seamless switching from one video stream to another, the software keeping track.

TVinteractive is available exclusively via the Videotron Cable TV network, which serves over 110,000 homes in south and west London. There is no extra cost to subscribers. The Videoway box is about the same size as a VCR: it incorporates the memory and software required, as well as the basic cable technology that gives viewers access to the various channels carried by the network.



Interactive TV has come to the Birmingham area.

participate in quiz programmes. Extra information is transmitted, teletext style, during the field 'blanking period, while viewer's responses are sent via a modem and telephone line, using a freephone number. A set-top decoder box with a built-in modem is required. The viewer uses a special IR remote control handset to move a cursor and operate buttons for various selections/functions.

The Two Way system superim-

Cable TV Goes Digital

Major UK cable television companies are expected to decide within the next two months to commit several hundred million pounds to the development of digital cable TV services. The aim is to expand network capacity to up to 200 channels in order to compete effectively with satellite TV services. The investment is considerable because subscribers would need new

set-top boxes - there are now over 2.3m cable TV subscribers in the UK.

Later this year Time Warner is to start adding digital technology to its cable networks in the USA to provide extra channels and services, with video-on-demand and high-speed Internet access. The company has placed orders approaching \$500m for equipment, including a million digital set-top boxes. Time Warner has been running an experimental network, which it now considers to have been a

success, in Orlando, Florida.

Following the completion of successful field trials with Italian cable operator Stream, Pace has started to deliver set-top boxes for what will be the world's first digital cable network. The system is DVB compatible, using MPEG-2 video. Pace has been conducting trials with 2,000 DVC200 units in six Italian cities. Stream hopes to convert a large proportion of its 500,000 subscribers to digital operation by the end of the year.

Transmission News

DTT (Digital Terrestrial TV) is now expected to start in the UK in July 1998. The ITC hopes to be able to grant transmission multiplex licences by this summer, but the need for international frequency clearance and agreement on a common standard and conditional access could introduce further delays – an autumn launch was the original aim. Work is understood to have been completed on IC and set-top box development. SGS-Thomson and Motorola both expect to have chip sets available to manufacturers by March/April. Small-scale DTT test transmissions are being carried out across the UK.

NTL has completed a major investment programme that enables ITV, Channel 4 and S4C viewers throughout the UK to receive Nicam digital stereo sound. The engineering work has included modification to or complete replacement of transmitters at over fifty main sites. The final installation was at Skriaig, Isle of Sky on December 6th.

The largest Channel 5 test transmission to date, in London, produced fewer complaints about interference than had been expected. Only 45,000 calls were received from viewers, with 13,000 mentioning interference – up to 175,000 calls were anticipated from homes where retuning had not been carried out.

The BBC has announced that a consortium led by Castle Tower Communications of Houston, Texas is the 'preferred bidder' for its UK transmitter network, which is to be privatised in a deal that should bring in about £250. The consortium came up with a higher bid than NTL, which had been expected to take over the network. The BBC intends to use the money to help fund its transition to digital broadcasting technology.

The FCC has approved the standard for the next generation of TV in the USA – digital HDTV. A second channel is now being assigned to every TV station so that digital transmissions can be run alongside the current analogue transmissions, which are expected to continue for about fifteen years. The first digital TV receivers are expected to go on sale early next year.



Bull Electrical has introduced a new full-colour security camera at just £119. The Japanese made camera is fully cased and has a 4mm f2.8 lens fitted as standard. Its 500 x 582 element picture makes it well suited to computer-based on-line security systems. The camera provides a standard 1V p-p composite PAL output and requires a 12V DC 200mA supply. For further details phone Bull Electrical on 01273 203 500.

SEME and Willow Vale Electronics have also recently added video security equipment to their stock lines.

TV/Video Equipment

Mitsubishi has added a new "flagship" receiver, Model CT32CW1BD, to its TV range. The set offers several viewing modes, including 4:3, 14:9, 16:9, 4:3 (semi-wide), Cinema wide, Panorama 1 and Panorama 2. Other features include a twin-tuner picture-in-picture system, a three- or nine-picture channel scan facility, a superflat tube, Megatext, a 100Hz field and line flicker free display, a full-screen digital memory for quality freeze-frame viewing, the capability to zoom in by up to two times magnification at any part of the picture and Dolby Pro Logic

Surround sound. The suggested price is £1,800.

Sony has launched the first superflat Trinitron widescreen TV receiver in Japan. It's claimed to be the world's first vertically and horizontally flat CRT. The 28in. set uses a number of new techniques to achieve this flat display, including high-level vibration control, a colour differentiation structure and a high-focus gun. Focusing is improved by up to twenty per cent by increasing the beam crossover angle: this gives greater uniformity over the entire screen.

Panasonic is at present handling the

licensing of the DVD scrambling/encryption technology known as CSS. The service includes the delivery of the various coding keys to manufacturers. Panasonic is also developing a DVD Internet Linking system, which is designed to produce MPEG-2 video within an Internet web page using a DVD-ROM drive. Panasonic expects to launch a DVD player, Model DVDA100, in the UK this summer. It will play DVD Video, Video CD and audio CD discs and cost around £600. Hitachi, Akai, Aiwa and Sony have also announced plans to launch DVD players.

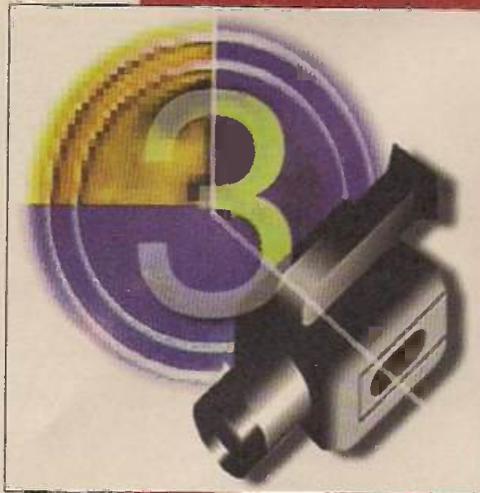
Trade News

Philips has announced that it is to sever its managerial links with and commitments to its loss-making partner Grundig. Philips will continue as a "passive shareholder", with a 32 per cent stake in Grundig, while Grundig is to seek a new parent company. Philips' aim worldwide is to move production to lower cost countries and concentrate on a single brand.

CPC of Preston continues to increase the range of products it stocks. Over 1,500 items have been added from the H.R. Diemen transformer range, making CPC a single source for virtually all LOPT requirements. Transformers are to be listed in two ways. First by brand and model number, with the relevant H.R. Diemen replacement. The second listing is more comprehensive, with man-

ufacturers' original part numbers cross-referenced to the equivalent H.R. number. CPC's ranges of video spares and accessories and semiconductor devices have also been increased substantially. Over 190 new replacement heads have been added, including drums for camcorders, time-lapse and duplicating machines as well as domestic VCRs. With over 4,500 new semiconductor devices added, CPC's range of such items now exceeds 20,000.

Newark Video Services, which is run by Steve Beeching, I.Eng., has been appointed by JVC (UK) Ltd. as an authorised service centre for the DVI digital camcorder – one of only two or three around the country. Steve remains at the forefront of state of the art video technology.



Reports from
David C. Woodnott
Simon Bodgett and
David Corcoran

Canon UCX1HiE

All functions worked but the customer said that the colour viewfinder picture had 'bits missing'. In fact several areas of the LCD failed to operate correctly, giving the missing pixels effect. Inspection revealed that the mask which surrounds the LCD was pit-marked in several places. This indicated that the problem had been caused by the sun's rays being focused on to the LCD and its mask, probably while the camcorder was being transported. A new LCD was required. We warned the owner to take care when out on sunny days. The rays also affect monochrome CRT viewfinders, but the only damage is usually to the CRT mask, which will show this tell-tale pitting. **D.C.W.**

Ferguson FC54

The reported fault was no operation. There was a tape stuck in the mechanism, which made removal of the deck section difficult. Fortunately the loading motor's contacts are accessible, and after removing the connections to the drive circuits power could be applied to get the cassette out.

With the deck removed, an inspection revealed that the main cam gear was damaged. We replaced this along with the mode switch, which is usually the cause of such problems with these mechanisms. The switch fails to tell the mechacon to stop driving the

Camcorner

loading motor when the fully laced condition is reached. Hence the damage to the cam gear etc. It's best to check all the plastic gears for damage while you have the unit dismantled. Retiming is straightforward.

The deck was still inoperative when we'd reassembled and reconnected it, because CP1 (N20) on the main PCB had failed. Replacing this item restored the unit to active service. **D.C.W.**

Hitachi VME21E

This and other Hitachi models seem to appear, often with various clone badges, on a fairly regular basis. The reported fault with this one was that the AV socket was faulty. In fact the socket was OK, but the pins in the miniconnector were severely bent. Once we'd overcome this problem, a quick check on the camcorder's operation revealed two previously unmentioned faults.

There was no autofocus operation, because the lens was completely jammed. And there was a noise band at the bottom of the playback picture.

The lens problem was resolved by dismantling the unit then reassembling it correctly. This is not easy, as the sections are glued together – the unit is not designed to be repaired. Fortunately there was no damage to the unit's parts. The noise band problem was cured by refitting the take-up tape guide assembly to the coaster base. It's common for this guide to become loose, or even detached, with this mechanism. Once refitted the guide needs to be secured with a suitable adhesive. **D.C.W.**

JVC GRC1

This camcorder would record only if the record button was pressed in quick succession. No, I didn't understand the fault report either! The capstan flywheel FG signal was missing, and there was intermittent slow rewind. A dark cloud of gloom spread overhead, as is usual with this sort of fault. Anyway, we discovered that there was a break in

the 8V supply to the capstan motor, at connector CN11. Replacing IC4 and C24 in the servo department stabilised the operation of the capstan, restoring order. **S.B.**

JVC GRAX5

This camcorder's viewfinder had poor focusing. The cause was a defective EHT transformer. Note that if the EVF tube is broken it's cheaper to order the complete viewfinder. The tube tends to be more expensive. **S.B.**

JVC GRAX40

"Films in black and white" the report said. Checks showed that there was no chroma in the E-E signal. It was a camera head fault of course. The chroma encoder is IC801, whose subcarrier feed was missing. This comes from the EHD-GA1451 hybrid subcarrier oscillator chip, which was faulty. **S.B.**

JVC GRS505

This camcorder had come from Mastercare, so it was going to be a difficult fault. There was no playback colour, and the Mastercare engineer had noted that there was no E-E colour though the burst was present. A quick vectorscope check showed that the subcarrier frequency was incorrect. The main subcarrier oscillator is in IC110, type MC8181D. Replacing this item restored the colour. An updated IC is now available, type EHD-GA1389A. **S.B.**

JVC GR45

The cause of intermittent camera pictures is often dry-joints on the bit of flexiprint (horizontal drive pulse circuit) over the CCD imager, particularly at diode D2. **S.B.**

Panasonic NVMS4 and NVM40

No power when used with the battery but OK with the AC adaptor seems to be a common fault with these models. The cause is open-circuit print on the AV jack (B) PCB, between pin 1 of P1604 and pin 4 of P1602. **D.C.**

VCR BELT KITS/VIDEO LAMPS & SWITCHES

Model	Price	Model	Price	Model	Price	Model	Price			
GRANADA		323, 535, VR20DV1, 20DV2, 20RV7, 21DV1, 21DV2, 21D, V3, 25801, 25802, 11, 12, 302, 303, 305, 31DV1, 31DV2, 31D, V3, 35B11, 35B12, 35B13, 725B8, VR30DV2, 35B02, 35B03, 635B7, 71584, 71585, 71588, VR65B2, 915B2, 925B2, VR6180, 6182, 6185, 6285, 6290VR6291, VR6293, 6362, 6367, VR6390, 6391, 6393, 6467, 6468, 6470, 6561, 6570, 6581, 6670, VR6676, 6710, 6760, 6761, 6762, 6870, 6970, 6975, VR685B4, 865B1, 925B3 85p		Models & Description		Order Code	Price	Price	Model	Price
VHS0P1, VHSFV2 80p		VR44589, VR4458920, VR4458922, VR6443, 6543, 6843, VR6943 100p		UNIVERSAL VIDEO LAMP 9V 80mV (310mm WIRES)	VL01	25p				
VHSTJ1, VHSJ2 150p		VR3260, 6349, 6648, 6449, 6548, 6648, 4958620, 6448895, 49586 110p		PANASONIC VIDEO LAMPS	VL02	30p				
VHSTJ3 65p		VKR6850, VKR6855 70p		SHARP VIDEO LAMPS	VL02	30p				
VHSMJ1, VHSJW2 120p		VR501 110p		HITACHI 5381682 (VT63, VT64) VIDEO LAMPS	VL04	135p				
VHSMJ3 85p		VKR6800, VKR6810, VKR6820 70p		AIWA, AKAI, ALBA, AMSTRAD, VL05		100p				
VHSTJ2 85p		SE4014, VR231, 2310, 2319, 231, 232, 2329, 237, 23, 241, 2410, 2419, 242, 243, 245, 2469, 247, 2473, 251, 252, 256, 257, 258, 33, 18, 332, 3329, 333, 337, 339, 3419, 342, 343, 3469, 347, 3479, 35, 1, 352, 357, 358, 422, 4229, 432, 437, 442, 4229, 432, 437, 442, 44, 5, 4468, 447, 4479, 451, 452, 457, 458, 459, 512, 522, 5229, 6379, 642, 647, 722, 7229, 723, 7379, 747, 3369, 948, 9489 70p		BLAUPUNKT, FERGUSON, FIDELITY FISHER, FUJITSU, FUNAI, G.E.C., GOLDSTAR, GRANADA, GRUNDIG, HINARI, HITACHI, ITT, JVC (HRD SERIES), MATSUI, MITSUBISHI, NEC, ORION, NATIONAL, PHILIPS, SAISHO, SALORA, SAMSUNG, SANYO, SHARP, SIEMEN, SONY, TELEFUNKEN, THOMSON, TOSHIBA						
VHSP1, VHSFS2 130p		SAISHO		AKAI, GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)	VL01	25p				
VHSPG1, VHSFG2, VHSFG3, VHSFG4, VHSF63 180p		VR2000, VHL3 90p		BLAUPUNKT, ORION (VH1, 2A), NATIONAL (NV200, 2010, 3000, 7000, 8150, 8200, 8400, 8600, 8610, 8620), SHARP (VC2300, 6000, 6200, 6300, 7300, 7700, 8300)	VL02	30p				
GRUNDIG		VR3800, 3200, 3300, 3500, 3600, 3650, VR54400, 5000 75p		AKAI (VS10), GRANADA (VHXSJ3), TT (VR3993, 3994), JVC (HR2650, 7600, 7610, 7650, 7655), TELEFUNKEN (VR530, 535, 539, 550, 630, 650), THOMSON (V309, 316, 357, 3963), JVC (HT7200, 7300, 7350, 7700) TELEFUNKEN (VR450, 520, 529, 540, 549, 620, 640, 920, 1920), THOMSON (V4100, VK308, 309, 312, 410), FERGUSON (3V23, 29, 30, 8923, 8924, 8929, 8930, 8931, 8940)		45p				
MVS400, 440, VS400, 410, 415, 435, 440, 441, 450, 458, 460 95p		VR3400 100p		GRANADA (VHSAY3), SHARP (VC200, 381, 384, 385, 386, 388, 390, 393, 9300, 9500, 9700)						
MVS180, 200, 220, 226, 262, 265, 267, 2X40800, 0850, 0880, 1600, 2000, 2080, 2200, 2280, MVS200RC 90p		SAMSUNG		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
MVS150 160p		SV716, 717, V1616, V-621, V1626, VX616, VX617, VX619, X626, VX627, VX629, VX714 85p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VS310, 311, 315, 320, 326, 340, 345, 380, 385, 445 85p		VB520, 510, 610, 616, 617, 619, 620, 526, 627, 629, V1510, 520, V1611, 616, 621, 626, VXS10, 511, 520, VT320, 5600 100p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VS150 75p		VB900, VB910, V1900, V1910 110p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
LC290N, LC295SN, SVS 180, VS 170 70p		PX900, 981, 982, SE9001, SV9001, SVX307, 319, 322, VB750, 770, 8220, 8225, V1770, 780, 8220, 8225, VPX31, VXX750, VX770, 790, 790, 8220, 8225, SE9000, 9001 90p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VS 160, BARCELONA, FLORENZ, GV4000, 4000, 4001, GV4002, 403, 401, 4010, 402, 403, 404, 405, 406, 407, 4082, 410, GV411, 412, 414, 415, 416, 417, 4192, 4200, 420, 430, 434, 435, GV437, 440, 450, 4582, 460, 464, 470, 500, 501, 5050, 5095, GV5105, 511, 530, 5395, 540, 560, 5695, MV4005, 4108, SE4100, 4104, 4120, 5102, 5104, 5106, TVR37001 70p		SVX3001, 303, 305, SXX301, VB710, 971, V1770, 730, 750, 970, VX710, 712, 720, 730, 970, 971, 972 100p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
HINARI		SVX9880 100p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VXL2 80p		SX7121 95p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VXL7, VXL8, VXL9, VXL10, VXL11, VXL15, VXL90, VCR34, VTV 100, 200 180p		SANYO		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VXL4, VXL35, VTV300 70p		VT5000, 5150, 6000, 6500, VTCM10, 11, 20, 21, 30, 31, 50 75p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VXL5, VXL8 160p		VTC5300, VTC5350, VTC5400, VPR5800 80p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VXL3, VXL20 90p		VTC5500 70p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
HITACHI		VTC9100, VTC9300 140p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VT11, 14, 16, 17, 19, 33, 330, 34, 35, 350, 38, 35, 98, 165, 5030 125p		VTC1100, 1300, 1500, VHR1100, 1110, 1150, 1200, 1300, VHR1500, 2370, MVR220, VHR2100, VHR2300, VHR2500, VHR2700 90p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VT5000, VT5500, VT18 80p		VHR3100, 3110, 3150, 3300, 3310, 3400, 3500, 3700, 3800, VHRD500, 700, TLS1000, TLS1001 100p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VT7000, VT8000, VT8030, VT8040, VT8300, VT8500, 8790 60p		TLR1001 80p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VT680, VT6500, VT6800, VT9300, VT9500, VT9700, 9800 75p		VHR120, 130, 14, 141, 143, 14, 150, 151, 153, 154, 15, 16, 171, VHR194, 220, 23, 235, 240, 244, 250, 251, 274, 297, 310, 330, VHR335, 390, 4100, 4105, 4150, 4200, 4300, 4300, 4350, 474, VHR4770, 5080, 5100, 5200, 5300, 5350, 7400, 6850, 7100, VHR7200, 7250, 7280, 7300, 7400, 7500, 7520, 7530, 7530, VHR7540, 7700, 774, 7800, 7810, 8000, 8100, 8200, 8250, 8500, VHR8800, 8801, VHRD4400, 4410, 4500, 4600, VHRD4610, 4710, 4890, 670075p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VT52, VT57, VT61, VT62, VT63, 64, 65, 86, 640 90p		VMD66, VMD68P 80p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VT3000 120p		VTR1000 70p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VT100, 110, 111, 113, 115, 118, 120, 125, 128, 130, 135, 138 130p		VTC6010 75p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VT145, 150, 168, 170, 175, 220, 225, 250, 255, 258, 260, VTL30 90p		SHARP		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
VMS00, VML80 80p		VC200, 381, 384, 385, 386, 388, 390, 393, 338, 9100, 9301, 9500, VCS700 100p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
J.V.C.		VC7300, VC7700, VC7750, VC7800, VC8000 110p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
HR3300, HR3330, HR3360, HR3660, HR4100 130p		VC8300 115p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
HR7200, HR7300 70p		VC9000, 387, 471, 473, 481, 482, 483, 486, 488, 496, 846 80p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
HR7350, HR7600, HR7610, HR7650, HR7655 75p		VC402, 500, 571, 573, 581, 582, 583, 584, 585, VCSF3, VCS581 80p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
HR7700 75p		VC108, 405, 408, 550, 600, 651, 674, 681, 682, 682, 684, 685, 693 70p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						
HRD110, 111, 120, 121, 220, 225, BPS5000 90p		VC700, 750, 783, VC6F3, VC6V3 70p		GRANADA (VHSTJ2), HITACHI (VT3000), ITT (VR3912, VRP3833), JVC (HR2200, 3300, 3330, 3660), MITSUBISHI (HS200), TELEFUNKEN (VR510, 519, 610), THOMSON (VK300, 305, 306, 3301), FERGUSON (3V00, 16, 22, 24, 3292, 8900, 8901, 8902, 8903, 8909, 5912, 8922, 8925)						

VIDEO SERVICE KITS

AMSTRAD VCR700 <i>Contents</i> BELT SET, PINCH ROLLER, REEL IDLER, VIDEO LAMP Order Code: SK41					
FERGUSON & JVC 3V42/43 HRD455/HRD725 <i>Contents</i> BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND Order Code: SK37	<i>Economy Kit Contents</i> BELT SET, PINCH ROLLER, SUPPLY CLUTCH, TAKE UP CLUTCH Order Code: SK38				
3V58/59/64/65 HRD170/180/210/230/300/320/370/400/430/530/700/750 HR5000 <i>Contents</i> BELT SET, PINCH ROLLER, IDLER ARM, TENSION BAND Order Code: SK44					
3V29/3V30 HR7200/7300/7350 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK05					
3V35/36, 38/39/49 HRD110/111/120/225 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK04					
3V51/3V42 HR7500/7510/7650/7655 <i>Contents</i> BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER, T/U CLUTCH, T/U IDLER, TENSION BAND, VIDEO LAMP Order Code: SK33	<i>Economy Kit Contents</i> BELT SET, T/U REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRE, T/U CLUTCH Order Code: SK34				
3V25/3V30/39/49 HRD110/111/120/121/225 <i>Contents</i> 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	<i>Economy Kit Contents</i> BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, T/U CLUTCH, T/U IDLER TYRE, REEL IDLER TYRE Order Code: SK36				
3V29/3V30 HRD7200/7300/7350 <i>Contents</i> 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	<i>Economy Kit Contents</i> BELT SET, T/U REEL TABLE TYRE, SUPPLY REEL TABLE TYRE, PINCH ROLLER, REEL IDLER TYRE, T/U IDLER TYRE, T/U CLUTCH Order Code: SK32				
3V44/45/48/53/54/55/57 HRP50/HRD140/150/158/160 HRD250/257/565/566/755 <i>Contents</i> BELT SET, PINCH ROLLER, CLUTCH MECHANISM, TENSION BAND Order Code: SK39	<i>Economy Kit Contents</i> BELT SET, PINCH ROLLER Order Code: SK40				
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FVHP615/618/620/622/710/711/715/716/720/721/722/725 730/830/840 <i>Contents</i> BELT SET, PINCH ROLLER, IDLER, GEAR IDLER UNIT, TENSION BAND Order Code: SK68	<i>Economy Kit Contents</i> BELT SET, PINCH ROLLER, IDLER TYRE Order Code: SK69				
HITACHI VT11/VT33 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK06					

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VT100/110/111/113/115/118/120/125/128/130/135/138/145/150/175/220/225/250/255/258/260/2730 <i>Contents</i> BELT SET, PINCH ROLLER, FF/REW ARM, CLUTCH PLATE, TENSION BAND Order Code: SK51					
PANASONIC NV2000/NV2010 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK03	<i>Economy Kit Contents</i> NV7000/NV7200/NV7800 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRES Order Code: SK02				
NV300/NV330/NV333/NV340/NV366 <i>Contents</i> BELT SET, PINCH ROLLER, TENSION BAND, IDLER TYRE Order Code: SK01					
NV2000/NV2010 <i>Contents</i> BELT SET, PINCH ROLLER, FF IDLER, PLAY IDLER, TENSION BAND, VIDEO LAMP Order Code: SK13	<i>Economy Kit Contents</i> BELT SET, PINCH ROLLER, IDLER TYRE, PULLEY TYRE Order Code: SK14				
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NV230/250/260/260/430/450/460/470/650/810/890/AG1200/PK/AG1500/PK <i>Contents</i> BELT SET, PINCH ROLLER, IDLER, TENSION BAND Order Code: SK23	<i>Economy Kit Contents</i> BELT SET, PINCH ROLLER, IDLER TYRE Order Code: SK24				
NV600/NV688 <i>Contents</i> BELT SET, PINCH ROLLER, PLAY IDLER, FF/REW IDLER, TENSION BAND Order Code: SK25	<i>Economy Kit Contents</i> BELT SET, PINCH ROLLER, PLAY IDLER TYRE, FF/REW IDLER TYRE Order Code: SK26				
NV730/NV770 <i>Contents</i> SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER UNIT, TENSION BAND Order Code: SK19	<i>Economy Kit Contents</i> SLOT IN BELT, LOADING BELT, PINCH ROLLER, IDLER TYRE Order Code: SK20				
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VC681/VC682/VC684/VC685/VC693/VC699/VC6F3/VC700 <i>Contents</i> BELT SET, PINCH ROLLER, REEL DRIVE UNIT, TENSION BAND Order Code: SK62	<i>Economy Kit Contents</i> BELT SET, PINCH ROLLER, REEL DRIVE UNIT TYRE Order Code: SK63				

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Replaces Philips Part Nos: 138-10138, 138-10313, 1.2V - 90mAh	75p
Replaces Philips Part Nos: 138-1229, 2.4V - 90mAh	£1.35
REPLACEMENT FERGUSON NI-CAD BACKUP BATTERIES Replaces Ferguson Part Nos: 00E6-066-001, 2.4V Used on: 3V35, 3V56, 3V58, 3V65	150p

REPLACEMENT LINE OUTPUT TRANSFORMERS

Description	Price	Order Code
HITACHI 2433752	1500p	LOT01
ORION 3714002	1500p	LOT02
FIDELITY ZX300	1500p	LOT03
FE TX100 90 DEG	1500p	LOT04
SABA 490007182	1500p	LOT05
FE TX90 WHITE	1650p	LOT06
ITT D307/37 EQ	1600p	LOT07
BLAUPUNKT 210	1600p	LOT08
GRUNDIG 2922010	1600p	LOT09
ITT CVC800/13	1500p	LOT10
ITTD218/37 EQ	1600p	LOT11
NORMENDE 5255	1600p	LOT12
SABA 81000 200	1500p	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 1150/1	1500p	LOT21
ITT COMPACT 80	1500p	LOT22
FE TX100 GREEN	1400p	LOT23
HINARI CT45 5113	1500p	LOT24
SELECO 6320410	1800p	LOT25
BLAUPUNKT 8667	1600p	LOT26
ITT COMPACT 171	1450p	LOT27
ITT CT3326 MUL	1500p	LOT28
ITT D066/37 EQ	1600p	LOT29
ITT 3548 EQ	1500p	LOT30
LUXOR 5810110	1600p	LOT31
SABA 849380920	1600p	LOT32
HITACHI 2434141 CP	1200p	LOT33
FE TX100 110 D	1500p	LOT34
HANTAREX 28021	1600p	LOT35
SHARP C3700 EQ	1600p	LOT36
HITACHI 2432981 CP	1300p	LOT37
FERGUSON 00D3-508-002	1650p	LOT38
Frs Chassis TX99 41cm + 51cm Used On: 51K2, 51J8, 51J7, 41H3, 41H3, 41H2, 51K3	1850p	LOT39
PANASONIC TLF14567F Used On: TC2043, TC2243, TX300	£15.00	LOT40
PANASONIC TLF14568F Used On: TX2231, TX2244	2000p	LOT41
PANASONIC TLF14584 Used On: TC2210, TC2160, TX1752, TX2112	£18.00	LOT42
PANASONIC TLF14586F Used On: TX2112, TX2162, TXC22	1600p	LOT43
PANASONIC TLF14586F Used On: TC1651, TC2051, TC2061, TC2253, TC2263, TX5500	1250p	LOT44
HINARI Used On: CT15		
HITACHI 2434274		
CPT2174, CPT2176, CPT2178, 2434274		

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
PACE PRD800, PRD900	SATPSU1	850p
PACE SS900, 9200, 9010, 9210, 9220	SATPSU2	650p
AMSTRAD SRD510, SRD520	SATPSU3	650p
AMSTRAD SRD500	SATPSU4	850p
AMSTRAD SRX340, SRX345, SRX350	SATPSU5	850p
PACE D100/150	SATPSU6	650p
CHURCHILL D2MAC	SATPSU7	850p
PACE MSS100	SATPSU8	730p
PACE MSS200/300 APPOLL	SATPSU9	650p
PACE MSS500/1000	SATPSU10	1230p
FERGUSON SRD4	SATPSU11	835p
ECHOSTAR SR950	SATPSU12	1735p
ECHOSTAR 6500/7700/7700	SATPSU13	3125p
AMSTRAD SRD600	SATPSU14	3125p
MIMTEC (Sorensen)	SATPSU15	775p
AMSTRAD SRD700/SR950/SRX100/30		
SRX501/1002/2001/SRD2600 SAT250	SATPSU16	730p

PACE 9000 SWITCH MODE TRANSFORMER
ORDER CODE: PACE9000 PRICE 800p

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

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

Audio Control Head

AMSTRAD ORIGINAL NO: 150751
Used on: AMSTRAD TVR1, 2, 3, VCR4600, 4800MKII, 4700, FUNAI VS2, VCR4800, 4800, 5200, 5600, 6600, VIP3000, 5000
Also fits: FIDELITY, FUNAI, HINARI, PROLINE, SCHNEIDER, TOWADA, UNIVERSUM
ORDER CODE: AH01 PRICE: 1350p

AMSTRAD ORIGINAL NO: 151314
Used on: AMSTRAD DD8900, 8904, VCR2000, 6000, 6100, 8600, 8602, 8603, VCR4604, 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, NV240 etc	875p
VBR0081	NV777 etc	875p
VBR0103A	NV250, NV450 etc	625p
VBR0125		625p

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- Stylish and easy to operate - Replace broken or lost remotes
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Order Code: 8 WAY PRICE: 14.50p + VAT

Cassette DC Motors

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

Replacement Video Cassette Housings

NAME	MODELS	CODE	PRICE
AKAI	VS35, VS53, VS55, VS56, VS75	CH18	3200p
GRANADA	VHSDP1	CH05	1100p
	VHSYJ2	CH01	2800p
GOLDSTAR	GHV1290P, 1291P, 1295P, 9400, 73401, GSE1295P, GSE1891P, 20001Q, 20051Q, VCPA200, 4300, 4301, 4305, VCPA306, 4311, 4315, 4316, 4320, 4321, 4325	CH25	2000p
	6HV51, 1221, 1232, 1240, 1241, 1242, 1244, 1246, 1248, GHV8000, 8200	CH26	2900p
FERGUSON & J.V.C.	3V38, 3V39, 8943, 8944, 8951, 3V35, 3V36, 3V49, HRD 110, 111, 120, 121, 225	CH01	2800p
	3V42, 3V43, 3V44, 3V45, 3V48, 3V53, 3V54, 3V55, 3V57, 8945, 8947, 8948, HRD 140, 141, 150, 157, 158, 160, 250, HRD257, 455, 565, 565, 725, 755	CH02	2800p
	8948, 8950, FV108, 12L, 13M, 14T, 208, 21R, 22L, 26, 395, HRD230, 430, 530	CH03	2800p
	3V58, 3V59, 3V64, 3V65, FV11R, 8950, 8951, HRD170, HRD180, HRD370	CH04	2900p
	FV31R	CH19	4300p
	HRD515, 520, 527, 540, 550, 580, 600, 610, 620, 660, 670, HRD830, 840, 850, 860, 4050, 6600, FV37H	CH20	2200p
	HRD540, 580, 830, 860, 910, 960, HRD970, HRD X20, FERGUSON FV57H	CH27	2400p
L.T.T.	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	NV730	CH06	4300p
N.E.C.	N830EG, N831EG, N831EG, N832, N833EG	CH01	2900p
	N835	CH02	2900p
PHILIPS	CASSETTE LIFT ASSEMBLY 1891233661 DV186, 190, 286, 471, 562, 761, VR8180, 6182, 6185, 6285, VR6290, 6291, 6293, 6362, 6367, 6383, 6467, 6468, 6470, VR6561, 6670, 6760, 6761, 6870, 6970	CH05	1100p
	VR6445	CH22	2900p
	VR6448	CH23	2500p
	4SSB5	CH24	2500p
SHARP	VCA100, VCH851, VCH852	CH22	2900p
	VCA103, 103GV, 106, 1066VM, 2548VM	CH23	2500p
	VCS211, 244, 5085, 605, VCB230, VCB8065, 3106, VCT212, 310, 4106, 610	CH24	2500p
TELEFUNKEN	VR2970	CH02	2800p
THOMSON	V320, 321, 323, 326, 4200, 4300	CH01	2800p
	V342, 343, 351, 353, 360, 364, 368, 4210, 4230, 4260, 4400, V5500, 6000, 8540	CH02	2800p
TOSHIBA	V55, V57	CH01	2800p
	V65, V66	CH02	2800p

Service Aids

DESCRIPTION	VOLUME	CODE	PRICE
VIDEO HEAD CLEANER	75ML	SP01	160p
SWITCH CLEANER	175ML	SP02	170p
SILICONE GREASE	200ML	SP03	210p
FREEZE IT	170ML	SP04	310p
FREEZE IT	400ML	SP16	600p
FOAM CLEANER	400ML	SP05	180p
ANTI-STATIC	150ML	SP06	130p
AEROKLEAN	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

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Fits most Sony, Akai & J.V.C. Portable Hi-Fi and Midi Systems
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USED ON MODELS:
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CFD68, 750, 755, 760, 765, 770, 775, 440S, W100, 100S 2200p

Cassette Tape Heads

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

Soldering Accessories

DESCRIPTION	CODE	PRICE
ANTEX SOLDERING IRONS		
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15 WATT 240 VAC (X515W 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
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REMOTE CONTROLS

Description	Order Code	Price
GRUNDIG		
TP160E	RC 107	900p
TP200, TP300	RC 380	750p
TP400	RC 401	675p
TP590-600	RC 600	750p
TP390, TP610	RC 610	750p
TP621	RC 621	800p
TP630, TP650	RC 650	750p
TP660	RC 660	750p
TP661	RC 661	750p
HITACHI		
CLE800-CLE830	RC 140M	700p
A617402/655602	RC 192	800p
A512120/230	RC 900	750p
A514790	RC 901	750p
A5088470	RC 902	800p
A518612	RC 903	750p
SCL002	RC 904	750p
C2096	RC 905	800p
A511940	RC 906	750p
655602H	RC 907	800p
ITT		
IFB13, 14, 15	RC 143	800p
FS4	RC 148	750p
RG305	RC 305	675p
RG306	RC 306	750p
FS971-10/1	RC 307	750p
VSS RUK	RC 308	750p
VS4-1	RC 310	750p
MULTICONTROL (17C20)	RC 311	750p
KORTING		
18279, 18396, 18460, 18521 SE	RC 108	750p
40540 VTS	RC 108	750p
LOEWE		
DC11	RC 146	800p
MATSUI		
010270601	RC 889	750p
VX770	RC 892	750p
METZ		
JAVA COLOR (6890)	RC 166	800p
COLOR (7156)	RC 183	800p
JAVA (7180)	RC 184	800p
MITSUBISHI		
939P/03607, 939P/03609	RC 140M	850p
NOKIA		
SATELLITE	RC 558	750p
NORDMENDÉ		
TC2336	RC 357M	750p
CMC1, TC3519	RC 358	800p
OCEANIC		
390C9500	RC 328	750p
ORION		
RC53	RC 892	750p
PANASONIC		
EUR51200	RC 208	800p
TC2200	RC 201	850p
VS00357/NV730	RC 202	750p
TN01621	RC 203	750p
PHILCO		
CARVEL, CONCORDE	RC 108	750p
TELESTAR		
TC10	RC 152	800p
PHILIPS		
RC5002,5154	RC 134	750p
KT3 NON TEXT	RC 135	750p
69117032	RC 178	800p
69117194	RC 188	750p
RC5991-UNIV	RC 300	580p

Description	Order Code	Price
PHILIPS (continued)		
RC38	RC 301	750p
KT3 TEXT	RC 5301	750p
RC5352	RC 5352	750p
RC5375	RC 5375	750p
RC5 STANDARD	RC 5534	850p
RC5901	RC 5901	850p
RC5903	RC 5903	700p
SABA		
T6772	RC149	900p
TC319-320	RC 328	800p
TC356	RC 356	800p
TC358	RC358	800p
TC360	RC 360	750p
TC365	RC 365	750p
SALORA		
SERIES L	RC 190	750p
86173	RC 882	750p
SANYO		
RC218, RC222, RC228, RC238	RC 140M	700p
JXGE	RC 878	800p
JXDE	RC 884	750p
VHR2300	RC 890	750p
RC628	RC 865	900p
SHARP		
G0121CESA, 123CESA, 204, 251	RC 140M	850p
SIEMENS		
FC616	RC 130	850p
FC631	RC 132	750p
FC742	RC 164	750p
SONY		
RM604, RM605, RM606	RC 140	700p
32 CHANNEL	RC 140M	700p
RM613	RC 141	750p
RM632, RM636	RC 160	675p
TATUNG		
FXA	RC 877	750p
RC70	RC 883	750p
FX70 FASTTEXT	RC 894	750p
TELEFUNKEN		
FB632	RC 632 ST	750p
FB 639	RC 639 ST	750p
THÖRN/FERGUSON		
3V35-42	RC 342	650p
3V31-32	RC 344	750p
3V57-58	RC 628	750p
TX10 TEXT	RC 732	575p
TX10 STEREO TEXT	RC 738	575p
TX9-90-100	RC 740	675p
3V55, FV11	RC 783	750p
TX100 FASTTEXT	RC 785	650p
TX100 STEREO FASTTEXT	RC 789	650p
PROFESSIONAL	RC 790	650p
TOSHIBA		
CT937	RC 950	750p
CT9117	RC 951	750p
201R4B	RC 952	750p

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FUSES

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315mA	FUSE 03	75p	FUSE 19	60p
400mA	FUSE 04	75p	FUSE 20	60p
500mA	FUSE 05	75p	FUSE 21	60p
630mA	FUSE 06	75p	FUSE 22	60p
800mA	FUSE 07	60p	FUSE 23	60p
1A	FUSE 08	60p	FUSE 24	60p
1.25A	FUSE 09	60p	FUSE 25	60p
1.6A	FUSE 10	60p	FUSE 26	60p
2A	FUSE 11	50p	FUSE 27	60p
2.5A	FUSE 12	50p	FUSE 28	60p
3.15A	FUSE 13	55p	FUSE 29	50p
4A	FUSE 14	55p	FUSE 30	50p
5A	FUSE 15	60p	FUSE 31	50p
6.3A	FUSE 16	60p	FUSE 32	50p

FUSES

CURRENT RATING	ORDER CODE	PRICE
CERAMIC PLUG TOP		
3A	FUSE 33	100p
5A	FUSE 34	100p
13A	FUSE 35	100p
20mm CERAMIC TIME LAG		
3.15A	FUSE 41	100p
4A	FUSE 42	100p
5A	FUSE 43	100p
6.3A	FUSE 38	100p
8A	FUSE 39	100p
10A	FUSE 40	100p
32mm CERAMIC SLOW BLOW		
8A	FUSE 44	210p
10A	FUSE 45	210p
15A	FUSE 46	210p
20A	FUSE 47	210p
38mm CERAMIC SLOW BLOW		
10A	FUSE 48	875p

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- ICPF15 ICPF50 ICPN15 ICPN50
- ICPF20 ICPF75 ICPN20 ICPN75
- ICPF25 ICPN5 ICPN25

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Satellite WORKSHOP



Jack Armstrong

The Pace Prima

I had my first look at a Prima when a local installer brought one in for repair. "It's dead" he announced, then scarpred. I did wonder why he hadn't simply returned it to Pace under warranty, but it was too late to ask. I soon found out why: several cracks radiated outwards from the PCB mounting pillar, close to the power supply.

Fortunately none of the cracks had reached the live side of the circuit. So I decided that a safe repair was feasible. I didn't attempt to solder fine wire directly to the damaged

tracks, but instead soldered Kynar wire (Teflon-insulated, single-strand) across the solder pads nearest to the breaks. I used blobs of glue to secure the wires to the board (Tak-Pack is best). This is essential from the safety aspect, because a loose wire might conceivably touch part of the live circuit.

When the installer returned he seemed to be surprised that the receiver was now working. "Spaghetti junction beneath" he commented, "wires everywhere. Will it be reliable?"

Since I had reinforced the board with epoxy resin, cured with the aid of a hairdryer, and I was happy with my neatly soldered "spaghetti" I assured him that it would be perfect. I spoke too soon however.

Within half an hour he burst into the workshop angrily and slapped the receiver down on the bench. "Won't respond to the remote!" he shouted.

I connected the receiver and tested it with my own handset. No problem. When I questioned him he admitted that he was using an MSS200 handset. Though this is similar in appearance it uses a different code set. The Prima's handset (see photo) can be distinguished by the designation 'RC-10' at the bottom right corner of the keypad.

Handset Repair

Remote control handsets have many uses: apart from dislodging the cat, stirring tea and throwing at the spouse, they are often used for channel changing. The small, uncomfortable-looking man who trailed into the workshop after a large and domineering lady clearly fell into the 'spouse' category.

"E it it wi' 'is 'ead" the lady said, demonstrating the point by clunking the unit on the poor fellow's head. "It's now gone dead. We'll be back for it in an hour, shall we?" She gave the impression that this was an order rather than a question.

I decided that the job was urgent and pushed aside a FilmNet decoder to make room on the bench. It was a handset for the Pace PRD range. A check on the batteries, in series,

produced a reading of a little over 3V, but there was no infra-red output when the buttons were pressed.

Now Pace handsets are not the easiest to take apart, and many people either wreck them or give up. My method is to warm the unit with a hairdryer, which makes the plastic less brittle. After that I twist the casing with both hands until I can see the split line start to open. Then I insert a blunt penknife blade and ease it along gently, unclipping the two plastic shells as I move it. Don't be afraid to twist the handset hard: the PCB won't suffer, and the plastic won't break if you have made it nice and hot. This method also works with Amstrad handsets.

The usual problem is that the 455kHz ceramic resonator's legs have snapped. Simply solder two wires into the board and solder the legs of a new resonator to the wires. Glue the resonator down - unless you like repeat business! Occasionally the LED fails instead. I test the LED by connecting 12V across it via a 1kΩ resistor. An IR sensitive key fob is all that is required to see whether it's working.

The lady returned after 59 minutes, snatched the handset from the counter and demanded a fiver from the small man. "Ow much?" she demanded.

"Er... a fiver will do nicely" I stammered. Not too appear too downtrodden, I added "special discount, of course".

Another One

No sooner had she gone than the milkman appeared, with another handset. It was for an Amstrad SRD510 and was extremely sticky to touch.

"Dropped it in the milk, did you?" I asked.

"Coke, actually" he replied, waving a bottle of the well-known fizzy drink in front of my face. "Spilt half the bottle, low-sugar too."

I dismantled the handset, using my hairdryer to soften the plastic. The inside was full of brown goo. I used a toothbrush and isopropanol to clean the silicone rubber keypad and the conductive contacts on the PCB.

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.

Then I scrubbed the plastic housing shells with warm water and detergent. The hairdryer quickly removed the moisture from all parts, and when I reassembled the handset it worked perfectly.

"Just a tenner" I told the milkman when he returned. He's smaller than I am – and he got some of it back at Christmas.

UPGRADES

A lot of my e-mail comes from people asking about upgrades. Here's a brief list of what is possible and what isn't.

Pace Receivers

500 channels with an MSS500 or MSS1000 (as in the latest versions with an internal positioner): Such a kit is not available and is unlikely to become available because of the large number of model variants. Pace may however be able to upgrade your receiver at the factory if it's a very recent model. If you enquire, be sure to be able to quote the complete serial number and model number.

Internal positioner for an MSS500 or MSS1000: Not available as a kit, but you can send your receiver to Pace for an upgrade. The cost should be less than £100.

Internal polariser board for MSS models: Not available.

Internal 22kHz tone generator: Not available.

VideoCrypt and Eurocrypt/D2 MAC decoders inside one receiver: Not available.

199 channels and a favourite channel menu: A kit is available from SatCure (01270 753 311) to upgrade the PRD800. It is not Pace approved.

J17 de-emphasis with wideband audio: A kit, not Pace approved, is available from SatCure (01270 753 311) to reduce audio distortion with foreign channels. It comes with comprehensive instructions, but the J17 kit is not easy to fit – because of the number of fiddly surface-mounted components involved.

Enhanced menu options: This SatCure (01270 753 311) kit is Pace approved. It includes a new microcontroller chip to provide a choice of LNB local oscillator frequencies. Most tuners will cope, but you might need to buy a 2GHz tuner if you want the maximum tuning range.

External switch controlled by satellite number: A unit that apparently works with any Pace model from the SS9000 onwards is available from SFM Engineering (01407 742 436). You select a satellite position

number in each channel menu and the switch selects one of five outputs. Some or all outputs can be used to control an LNB switch, a 22kHz tone generator, Christmas tree lights or whatever!

Computer interface to control Pace receivers: Not possible. An interface with Windows software is available from Kesh Electronics (01365 631 449) however. It enables you to download the channel information to your PC, rearrange it as required, then upload it back to the receiver. This could be useful to a dealer who wants customised programming for a batch of receivers, but at £199 it's rather expensive for the home user.

Amstrad Receivers

Internal ADX frequency converter for the SRD510/520: Contact Mildenhall Satellites (01638 711 220),

199 channels with SIS menu for the SRD510/520: A low-cost kit is available from SatCure (01270 753 311).

199 channels, enhanced, twin input, 22kHz for the SRD510/520: This kit from SatCure (01270 753 311) virtually converts to an SRD550, but at £60 its price might put you off! The cost reflects the need for a new tuner, microcontroller chip, EEPROM and transformer.

Test Case 411

Spasmodic and intermittent faults are the bane of workshop life. At any one time it's not unusual to find five or six assorted VCRs and TV sets on the go in the Test Case workshop, being run continuously in the hope that the faults of which they are accused will eventually show up. Some really do have intermittent faults; some never fail because the trouble lies with domestic circumstances (dodgy aerials, duff tapes or whatever); and some have absolutely nothing wrong with them!

Typical of these soak-testers was an Hitachi VTM410 VCR we had in recently. It was accused of shutting down after about half an hour's playing time – it could not be ascertained from the user whether this also happened in the record mode. To test this machine we played a prerecorded tape for a little over an hour at a time, with ten-minute rests between playings. After five days of this the machine had not once stopped or shown any signs of doing so.

The take-up torque was checked and found to be OK. The machine was shaken, tapped, bashed, heated and cooled, all to no effect. The possibility of extraneous light falling on one of the end sensors was eliminated. The drive electronics and the wiring to the drum and capstan motors were checked carefully and pronounced to be OK, likewise the power supply. What do you do in this situation? Run the machine for ever? Return it to the customer and risk a bounce or (in this case) termination of a rental contract? We were assured that the loan VCR was working satisfactorily. It was an earlier Hitachi model.

In fact there was nothing wrong with the VCR, the cause of the problem being a combination of quirky design and an understandable 'pilot error'. We discovered this during a conversation with another dealer, who rents out Hitachi products

in large numbers. The machine has now, with no repair or modification, been reunited with its user. He now, most of the time anyway, gets to see the whole of his programme without the machine shutting down. So what was the trouble?

The Hitachi VCR's place on the test bench was taken over by a JVC HRD660, whose very obscure and elusive fault was described as erratic counter operation. After several attempts to reach the owner by phone we eventually discovered the real symptom: during fast wind the counter would sometimes fail to decrement all the way to zero, the point where playback had begun.

Again the machine was tested with a prerecorded tape. This time the VCR was set to play and left to hit the end then auto-rewind. For several days and dozens of playings the counter returned to zero when auto-stop was instigated at the end of rewind. Then we found that plus 37 minutes and 20 seconds was still showing at the fully rewound position. So there was a fault, but how to find its cause?

We used the video monitoring jig featured in the May 1993 issue of *Television*. This showed us, during the next failure two days later, that the decrementing count would 'freeze' intermittently when the fault was present. Because it's a real-time counter, whose operation is based on the control track pulses, this sort of thing can occur when there are breaks in the recording on the tape. The recording was a continuous one however, so the count should have stopped only between the end of the recording and the end of the tape, in both the play and fast rewind modes.

Careful observation of the VCR in the fast-rewind mode produced the answer to this puzzle. It was not too difficult to find and cure. For the solution to this and the Hitachi conundrum, see page 367.

NVQS

A Nightmare

What should have been a relatively simple matter of laying down and assessing technical competence standards could end up being a nightmare of paperwork. Those involved in putting NVQs in the consumer electronics industry into practice have a difficult task ahead. **Steve Beeching** sums up – as best he can

In the early days those entering the radio servicing trade didn't need to have a technical background. They all had enthusiasm, and a few had passed a theoretical exam. Either enabled them to make a start in the corner of a workshop, repairing radio receivers, record players and TV sets. From their early trials and tribulations they learnt how to apply theoretical knowledge to practical diagnosis. More importantly, they learnt by experience which resistor in which TV chassis caused a particular fault, and could build up a knowledge of common failures that produced various common symptoms.

Servicing is today no longer this simple. A fault symptom may be produced by a defect in what seems to

To establish an industry standard of competence for all service engineers, as a sort of industrial benchmark, is a good idea – but not at the expense of proper technical training.

be a totally unrelated section of the equipment. For example, while a TV set that fails to turn on could have a faulty switch, the cause could also be a Nicam stereo decoder chip that is corrupting a data line and thus preventing the main microcontroller chip from enabling the power supply.

To learn the basics of modern, state-of-the-art domestic technology, from radio reception to satellite TV and digital camcorders, takes years. Without the first three years plus a further optional year of video offered by the City and Guilds

course 224, the odds on becoming a competent service engineer are very long indeed.

Enter the NVQ

A case for change can always be made, and is valid if the change is for the better. To establish an industry standard of competence for all service engineers, as a sort of industrial benchmark, is a good idea – but not at the expense of proper technical training.

At last, after nearly three years, the Electrical and Electronic Servicing Lead Body has produced National Vocational Qualifications (NVQs) and Standards for the servicing industry. The NVQs lay down standards of competence for servicing white and brown goods. They are basic servicing qualifications that can be applied to a

wide range of consumer products. In the introduction to the NVQs, a section called Sources of Evidence lists the product ranges in which candidates can specialise – from gas to camcorders.

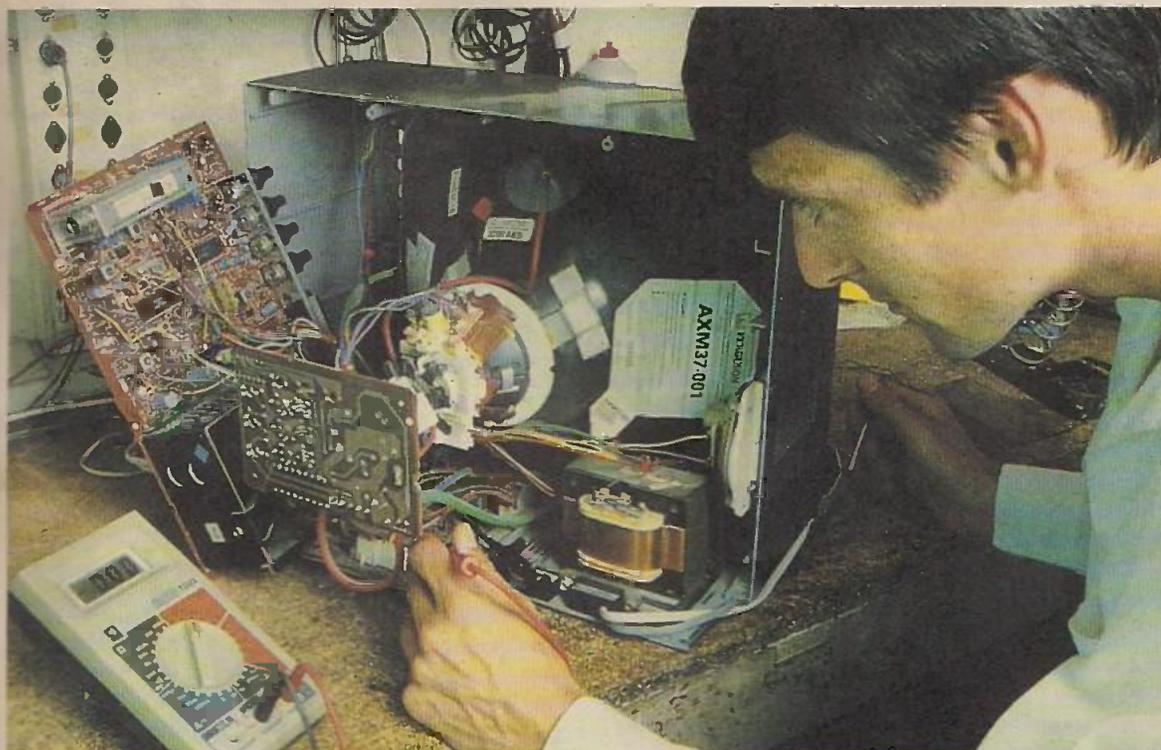
These NVQs do not however take into consideration the many years of learning about basic electronics and technical theory required for knowledgeable, skilled fault diagnosis to be possible. Nor do they pay attention to how this learning can be attained. What they do is to enable candidates to accumulate a portfolio of evidence to show that they are competent in carrying out various servicing operations at specified levels. They are aimed at those currently in the industry, particularly those who can operate as service technicians but do not have paper qualifications.

NVQs can be gained by experience – there is no set time period to achieve a certain standard of competence. They have been designed to meet our industry's occupational requirements at two levels. Level 2 is for service engineers who can carry out moderately difficult repairs, mainly related to replacing parts (modules). Level 3 is for field or workshop engineers who can diagnose and repair faults down to component level. There is no Level 1.

Courses

Training courses teach the student basic electronics, starting with Ohm's Law, resistor colour codes, safety components etc. A training course is where the student learns about the technology and how it's used in consumer electronic equipment. City and Guilds 224 provides such training, though it's a little out of date with the latest technology.

If a student is to learn how to repair modern domestic electronic equipment, he/she has to be taught radio and TV theory, VCR theory, audio and CD theory and camcorder theory. This will take at least three years at day release, so the student is likely to be working as a trainee (modern apprentice) in a workshop that deals with domestic consumer electronics products. The student can thus gain experience under the guidance of practicing service engineers while learning the technical theory at



college. This can be regarded as the 'underpinning knowledge' required for the NVQ. Such knowledge can also be gained by experience, learning as you go.

What an NVQ Represents

It's important to appreciate that an NVQ is not a training course. It is a standard of achievement which tells prospective employers or, indeed, customers "I may not have had formal training or passed relevant exams, but I can do the job".

Who does it suit? Mainly people who have worked in the industry for many years and have learnt their trade by hard work. Also those who have learnt their trade in the services or abroad. It's a transitory qualification that enables someone to go to an employer with a portfolio of written and assessed evidence to confirm that he/she can meet trade requirements. It gives the NVQ holder evidence of competence to do the job. This includes ability to communicate with customers, to carry out installations and repairs and to collect payments.

The intention is that NVQs are obtained at the workplace, the candidates being assessed by competent industry personnel. As a result, an NVQ will give an employer confidence that a prospective employee has attained a certain practical competence level. It is laid down that "evidence must be collected from a real working environment, whether it be the workshop or customers' premises".

To be a candidate, the NVQ applicant must have a working knowledge of the specified products. This implies that the person is already in the industry and seeks proof of his/her ability. Younger students who have passed the City and Guilds exams in recent years should take the NVQ to obtain practical evidence of their competence to repair equipment.

Colleges

In practice the educational establishments could undermine the intended validity of NVQs by allowing anyone who can wave a soldering iron in the air to take an NVQ, thus churning out cowboys with NVQs. How could this happen? Because City and Guilds, the Electronic

Examination Board and colleges will treat an NVQ as the equivalent of a training course and simply teach candidates how to pass with the minimum of technical theory. Put another way, only the amount of knowledge required to complete an 'element' (see later) will be imparted.

Thus we have to ask whether employers will have confidence in educational NVQs (college-based NVQs are usually called GNVQs)? Those manufacturers who have expressed an opinion have said "no" in a loud voice.

The NVQ Structure

The Electrical and Electronics Service National Vocation Qualification has 59 'elements'. These elements are assembled into 'units of competence', some of which are mandatory while others are optional. Units are specified as Level 2 or Level 3. Some units occur at both levels – in this case success at one level counts at the other. Each element is based on performance criteria, range statements, knowledge specifications and recommended evidence. Typical "sources of evidence" are audio and hi-fi systems; cooking appliances; gas appliances; home laundry appliances; microwave ovens; refrigerators, TV/VCR/satellite systems; and camcorders. One or more of these can be chosen by the candidate as his/her specialism.

We'll look in turn at the components of an element.

Performance criteria: These describe the main outcomes of an activity or task but do not describe how the outcome is to be achieved. Performance criteria indicate the standard used to judge that an activity has been carried out correctly. In other words, the criteria describe what a candidate should achieve when carrying out a specific activity or task. This section of the element specification lays down the activities that comprise an element.

Element 1.1 for example lays down that a candidate must be able to "establish working relationships with customers". The performance criteria used to judge this

In practice the educational establishments could undermine the intended validity of NVQs by allowing anyone who can wave a soldering iron in the air to take an NVQ, thus churning out cowboys with NVQs.

are given as: "relating to the customer in the domestic situation, offering advice, giving technical information at a suitably understandable level, dealing with disagreements, informing the customer how to contact the company for service, gathering information from the customer and recognising potential difficulties with customers". We all know the familiar "you repaired it a year ago and it's not been right since then!"

Examples of performance criteria in other elements are: identify the location of faults in products and services; prepare products for installation; replace parts in products; implement preventative servicing procedures.

At Level 2 the performance criteria are more more complex. Examples: "exchange information on work activities with colleagues"; and "evaluate the effectiveness of servicing options".

Range statements: These describe the scope of an activity. Candidates must prove that they are competent across an entire range. They consist of specifying the type of customer, the domestic situation, methods of making contact and information on appointments, location and customer requirements. For example, the ability to assess whether a customer is technically aware or not and describe the type of repair – replacement of components, addition of components, re-routing connections etc.

Knowledge specification: This section of each element lists the things that a candidate must know to complete the element. Listed examples are: "health and safety legislation and regulations; technical information to support a servicing activity; principles of customer service; diagnostic techniques and procedures for products".

Recommended evidence: This is the type of evidence a candidate has to accumulate for his NVQ, including customer contact records, customer correspondence and

servicing records. It is the specified evidence that a candidate must accumulate in his/her collection of evidence to prove ability, competence and experience.

An Example

To give you an example of what a complete NVQ element involves, the following example is for the repair of a product.

Performance criteria: A part is identified as requiring repair and the type of repair needed to restore operation to approved quality standards is understood. The repair is then carried out in accordance with agreed time scales, resources, techniques and equipment. Any variations from normal repair procedures should be approved by the appropriate authorities. Other parts should not be adversely affected by the repair, and Health and Safety legislation should be complied with.

Range Statements: Parts required are mechanical/electrical/electronic; the repair consists of replacement of components or fitting additional components. Faults may relate to safety, performance or appearance, and may be intermittent, permanent, electrical or mechanical.

Resources are people, time, equipment, parts, cost involved.

Knowledge specification: Must know about relevant Health and Safety legislation, about handling parts/components, about appropriate diagnostic and repair techniques, and be able to understand technical information required for servicing. Must know how to confirm that a part needs repair, what types of repair are suitable for various types of fault, and which quality standards are relevant to the repair. Must know what resources are required for carrying out repairs, and how to check whether other parts or components have been affected.

Recommended evidence: Parts repaired, products restored to correct operation, servicing records kept, waste materials removed.

What Does It All Mean?

To cut through all the tangled jargon and unnecessarily complex ways of specifying requirements is not easy. The whole thing looks as though it was put together by a huge committee that couldn't agree on anything and ended up with a long series of compromises aimed at achieving some sort of consensus. Be that as it may, we have to live with it. Let's try to see what it will involve in practice.

A lot of evidence on ancillary tasks such as consumer relations and talking to others has to be collected, but evidence on actual repairs is a bit thin. An element that specifies "diagnostic techniques" aims to sum up at least four years of learning about domestic product technology and a further couple of years of experience with it. Rather a lot to be taken into account by a simple knowledge specification!

Parts of the NVQ evidence required are of a purely trade nature: customer, servicing and stock control records, site plans and drawings, sale agreements and so on. A full-time candidate at a college would have no access to such data, and thus cannot produce such material as evidence. Except that certain parts of an NVQ can be simulated, provided the assessor is satisfied that the simulation is realistic. Thus a college running an NVQ "course" can simulate customer relations by using college staff and students as customers. It is less clear how such simulations can be put into effect for "requisitions of spares", "site visits and site installation", "stock control records" etc., or the evidence of the internal workings of a busy service department.

The original standard in the consumer electronics servicing industry is the City and Guilds 224 Radio and Television Servicing course. After three-four years of 224 candidates will be ready to embark on the Electrical and Electronics Servicing NVQ, taking as long as necessary to complete the performance criteria and collect the evidence required. Unfortunately it seems that the Department of Further Education is to withdraw funding for City and Guilds 224 once the NVQ is in place. So where will that leave us?

Who is going to teach newcomers Ohm's Law and basic electronic theory? Manufacturing industry perhaps, or busy service organisations? That seems to be unrealistic. But courses to provide this basic knowledge will surely have to be set up to meet the demand once the NVQs are in place.

Meanwhile the NVQ is the answer to the problem many service people ask: "I know that I can do the job, but how can I prove it?" The answer is to go for the NVQ and get assessed. ■

The official NVQ document lists 59 elements as follows:

- 13 on product repair.
- 2 on transportation.
- 6 on installation and waste removal.
- 21 on customer relations.
- 4 on relationships with colleagues.
- 11 on developing work activities and organisation.
- 2 on obtaining payment.

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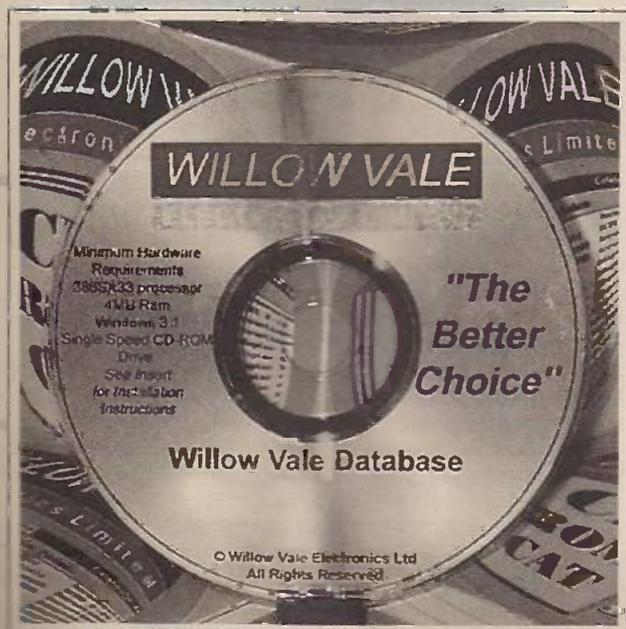
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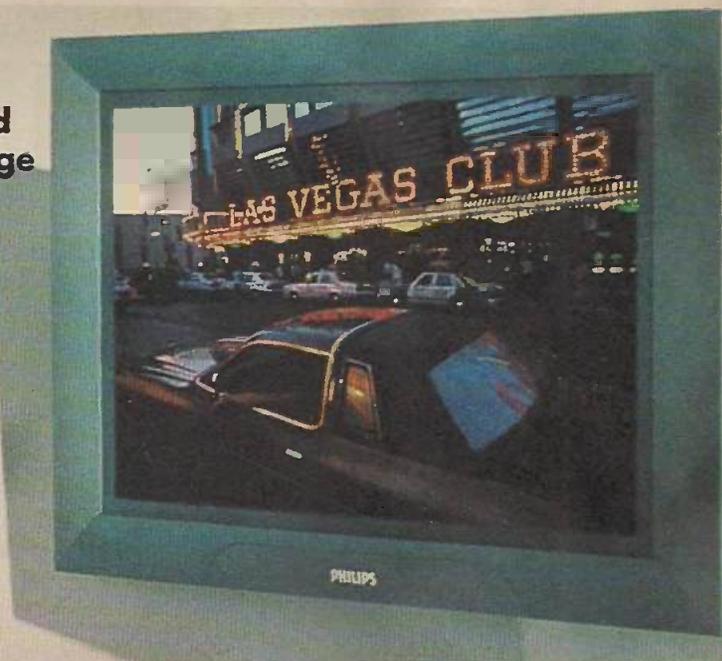
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CES Las Vegas is one of the world's leading consumer electronics exhibitions, where new products and ideas are often first presented. George Cole reports on the winter '97 show



At CES Las Vegas

This year's winter US Consumer Electronics Show (CES) was held at Las Vegas on January 9-12th. It was dominated by DVD and the Internet, with the first DVD players to be seen in the USA on show along with a number of TV models and set-top boxes designed for exploring the Internet.

DVD Players

After a series of false starts, the DVD finally appeared. Virtually all the major consumer electronics companies had DVD players on display. Last year the US consumer electronics industry was in the doldrums: the hope is that the DVD will revive its fortunes. The first players conform to the DVD Video standard, i.e. they are designed for playing movies and music videos in disc form. Several companies, including Sony and Toshiba, also showed DVD-ROM drives for PC applications. These are expected to become available later in the year.

The range of players and prices was interesting. At the higher end of the range, the Sony DVP-S7000 was priced at the equivalent of £670. It has a ten-bit digital-to-analogue converter, a 32-bit RISC processor and a system called Smooth Scan. This is claimed to offer improved picture quality in both the forward and reverse directions. According to Sony the feature is particularly useful when operating in the high-speed, slow-motion or frame-by-frame modes. The player has a dual discrete optical pickup, with a 650nm red laser for DVD discs and a 780nm infra-red laser for CDs. Video output is in component form.

Sony's player is to be released in the USA this April. Most of the other players were priced at the equivalent of about £400. Sony is starting off at the top end of the market because the company feels that DVD will be bought initially by 'early adopters' who are prepared to pay a premium price. Many at CES felt that the 'street price' will turn out to be somewhat lower.

The Philips Magnavox DVD400AT is to be launched during the second quarter-at around £400. It should arrive

in Europe during the IFA Electronics Show, which is to be held in Berlin this August.

Panasonic showed two players, Models DVD-A100 and DVD-A300. The former has a Dolby Digital output that enables it to be linked to an external decoder for Surround-sound effects. It also has composite and S-video outputs. The DVD-A300 incorporates a Dolby Digital decoder and a karaoke feature. No launch date or prices were suggested.

RCA, which is part of Thomson, also showed two DVD players, Models RC5200P and RC5500P. The main difference is in the connections provided: both have composite and S-video outputs, but the RC5500P also has an optical audio output socket and a Dolby Digital output socket. Again there were no price details.

Pioneer's dual LaserDisc/DVD player, Model DVD700, was priced at the equivalent of £670. The company says that retailers have been demanding a dual-format player, not least because DVD software will be in relatively short supply during the initial launch phase. The company points out that around 10,000 LaserDisc titles are available in the USA, 125 of them with Dolby Digital sound tracks. The DVD700 has a holographic lens that can read LaserDiscs and CD and DVD discs, a nine-bit video digital-to-analogue converter and a 20-bit, 96kHz audio DAC. It offers both-sides play and a digital field memory to enable CLV LaserDiscs to be played in the trick-play mode.

Pioneer also demonstrated some of the features that DVD discs can provide. For example there's an eight-level parental control system that can be used to block certain scenes or discs. There was a movie disc that could be switched between English and French sound tracks and between three different language subtitles. Pioneer mentioned a pop music video disc that enables the viewer-listener to select four different camera angles: this is available only in Japan so far.

DVD can certainly offer some clever features, but the feeling was that the first batch of offerings would consist of movies with little by way of such extras.

Toshiba had a massive DVD stand, with both players and DVD-ROM drives on show. The company plans to launch two players in the USA initially, Models SD2006 and SD3006. The former will be priced at the equivalent of some £400 while the latter, with component video output, will cost an additional £60.

Other companies with DVD players on show included Samsung, Akai, Zenith, JVC, Denon and Kenwood.

DVD Prospects

Everyone agrees that the success of DVD will depend on the support provided by the Hollywood studios. Film companies that are to release titles include PolyGram, Columbia Tristar, MGM, Sony Pictures and Warner Home Video. Some fifty titles will be available at DVD's launch, ranging from oldies such as *Gone with the Wind* to the latest blockbusters like *Twister*. Some films will have simultaneous VHS and DVD releases. But the DVD packaging doesn't inspire confidence: it looks like an old games software box, long and thin with a colour picture on the front. In fact quite drab. Hopefully, European releases will use a CD jewel box or something similar. DVD disc prices will range from about £13 to £20 a time.

There was a very interesting debate on DVD, entitled "DVD: the new Messiah?" Representatives from Sony, Philips, Toshiba, Thomson and Warner were present. Warren Lieberfarb, president of Warner Home Video, was bullish about the prospects. He predicted that if all conditions (such as Hollywood support) were met DVD player sales could reach 2.8m in the first year. But many felt that this was over optimistic.

Doug Dunn, chairman of Philips Consumer Electronics, stated at a press conference that DVD would be a great but slow-growing market. This view has many supporters. Warren Lieberfarb didn't consider that a record facility would be necessary for the success of DVD. In support of this view, he pointed to the vast quantities of prerecorded tapes that were bought.

But if DVD is to challenge VHS as the standard home video system it will eventually have to offer recordability as well as playback. The PC industry is also pressing for DVD recordability.

The DVD demonstrations were certainly very impressive, with great MPEG-2 pictures and amazing Dolby Digital Surround sound. Time will tell whether the system becomes another VHS or a LaserDisc.

The Internet

There was plenty of evidence at CES that the computer and consumer electronics worlds are on a convergence course. The Internet service WebTV is specially designed for TV viewers. Sony and Philips both launched WebTV set-top boxes to sell at around £220. In addition it costs £13 a month to subscribe to WebTV. The boxes are small and contain a 33.6kbit/sec modem. They plug into the TV set and telephone socket, and are operated by a remote control handset or an optional wireless keyboard. Philips also showed a prototype TV receiver with a built-in WebTV decoder.

The system has been designed to appeal to non-computer users. When you click on the relevant icon, the set-top box automatically calls up the nearest Internet connection and presents a home page. E-mail can be sent and received, and you can explore the Internet and build up a list of favourite Web sites. Computer graphics and text can look pretty ropey on a TV screen: WebTV images on the other hand look crisp and clear.

WebTV is to introduce a technology called VideoFlash later this year. It enables full-motion MPEG-1 video to be downloaded from the Internet in real time. Anyone who

has tried to download images of any sort from the Internet using current technology knows how painfully slow the process is.

WebTV is certainly user-friendly. There are, however, conflicting reports on how well it's doing. While Philips claims to be pleased with the response, some retailers have complained about a limited demand for the set-top boxes. It's certainly nicer to net surf with a TV set rather than a PC, but consumers are notoriously unpredictable when they are presented with a new concept.

Akai and Zenith had Network Computers (NCs) on display. These plug into a TV set and a telephone line, giving viewers access to the Internet. The difference between using an NC and Web TV is that the latter is run by a single service provider – you can buy an NC and choose your Internet service provider.

The NC contains a 33.6kbit/sec modem and 8Mbytes of RAM. Unlike a PC it has no hard disc: all programmes are downloaded from networks such as the Internet. Its advantage is low cost – around £250.

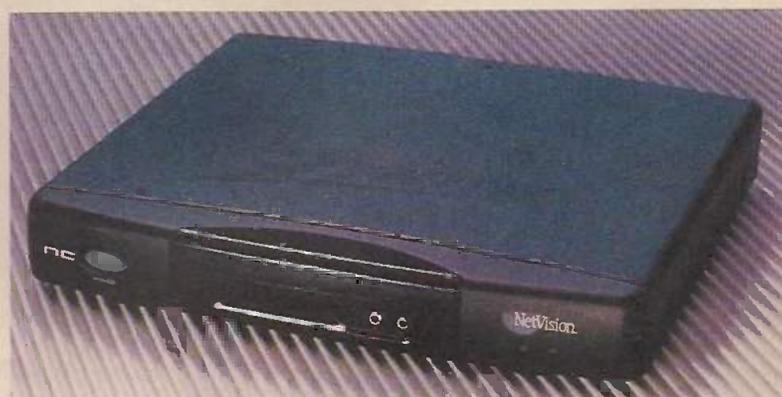
Sharp and Mitsubishi showed TV sets with built-in modems and Web browsers. Sharp's 32-PC1 has a 32in. 16:9 screen on which the user can view TV and Internet images side-by-side. Mitsubishi's DiamondWeb TV is available in 32, 36 and 40in. screen sizes. Prices start at around £1,500.

Digital Satellite TV

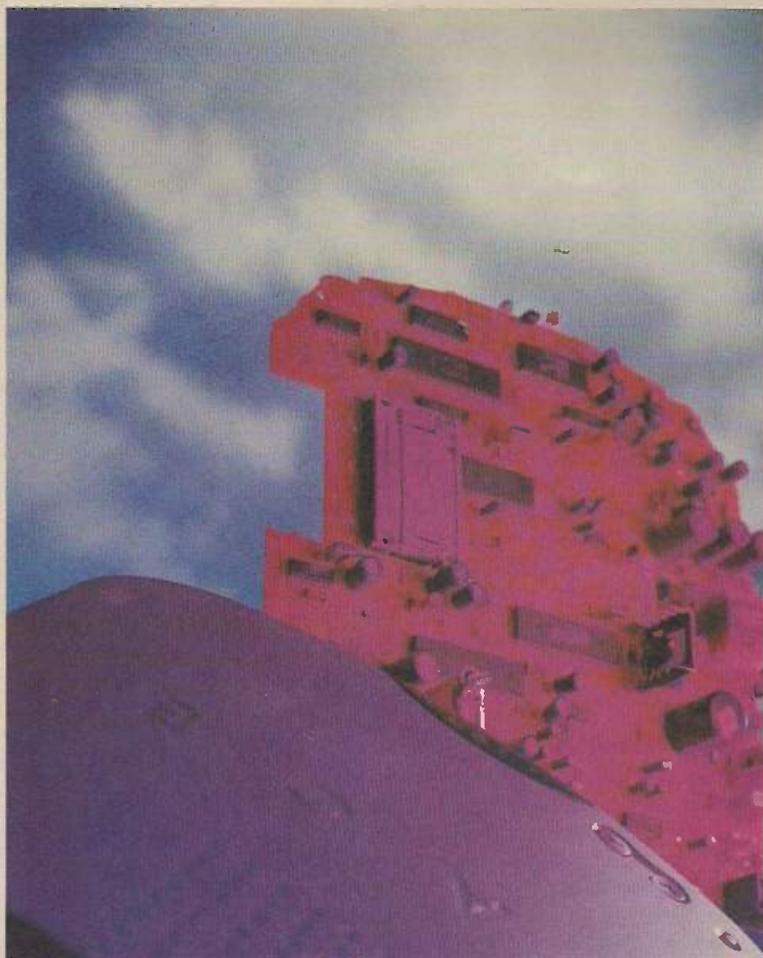
US viewers already have three digital satellite TV services, including Echostar which has around 450,000 subscribers and Primestar with around 1.7m. Primestar offers up to 95 channels which are transmitted via fourteen transponders aboard a medium-power satellite at 85°W. It rents the hardware required. Installation costs £100-£150, and the monthly subscription is £20-£36 depending on the package selected.

The largest digital satellite operator however is DirecTV, whose DSS (Digital Satellite System) offers viewers a choice of up to 175 channels. It has been one of the most successful consumer offerings since its start in 1994 – DirecTV claims to have over 2.3m subscribers. Programme packages range from £4 to £30 a month. Companies that market the equipment include Thomson, Sony, Toshiba, Samsung, Philips, Sanyo, Hitachi and Matsushita. A basic system, with 18in. dish, costs around

Turn to page 332



Zenith's NetVision network computer will, via a built-in 33.6kbit/sec modem, give TV viewers access to the Internet, enable them to send and receive e-mail, and provide various interactive services. It's due for release in mid-1997. The Zenith NetVision boxes and TV sets will incorporate a printer port and a smart-card slot for transactional services (banking, home shopping etc.). In addition an Ethernet port will enable a high-speed cable modem to be connected.



The Pace MSS100 sets high standards for a budget-price satellite receiver. J. LeJeune starts a two-part examination of the technology it uses

Pace's MSS100 Technology

Revolutionary is the best word to describe Pace's budget-price MSS100 series analogue satellite TV receiver. Much of the signal processing is carried out by a single LSI chip, and even the cabinet design is unusual, departing from the traditional rectangular box — one either loves or hates it! Fig. 2 on page 330 shows a simplified block diagram of the electronics used in the receiver. In this look at the technology involved, we'll stick to convention and start off with the power supply.

The Power Supply

A lot of flak was created by the power supply in PRD series receivers. The power supply used in the initial MSS series receivers has performed much more impressively. The MSS100 uses an entirely new type of power supply called TOPS — and the tops it is! Surprisingly simple and very rugged.

It's based on a new range of ICs dedicated to switch-mode power supply use, the TOP200 series. We have all become used to the STR series of chopper chips used in TV receiver power supplies. The TOPs chips go one better in having just three pins — one for the connection to the primary winding of the chopper transformer, one for regulation feedback and one for the chassis return path. The output device within the chip is a power MOSFET. Fig. 1 shows the power supply circuit. All the capacitors used are rated to work up to 105°C.

Filtering in the mains input circuit prevents switch-frequency hash being fed into the domestic electricity supply. A conventional bridge circuit then rectifies the mains input, the reservoir capacitor being C3 (47µF, 400V). It created some problems in early receivers by going low in value.

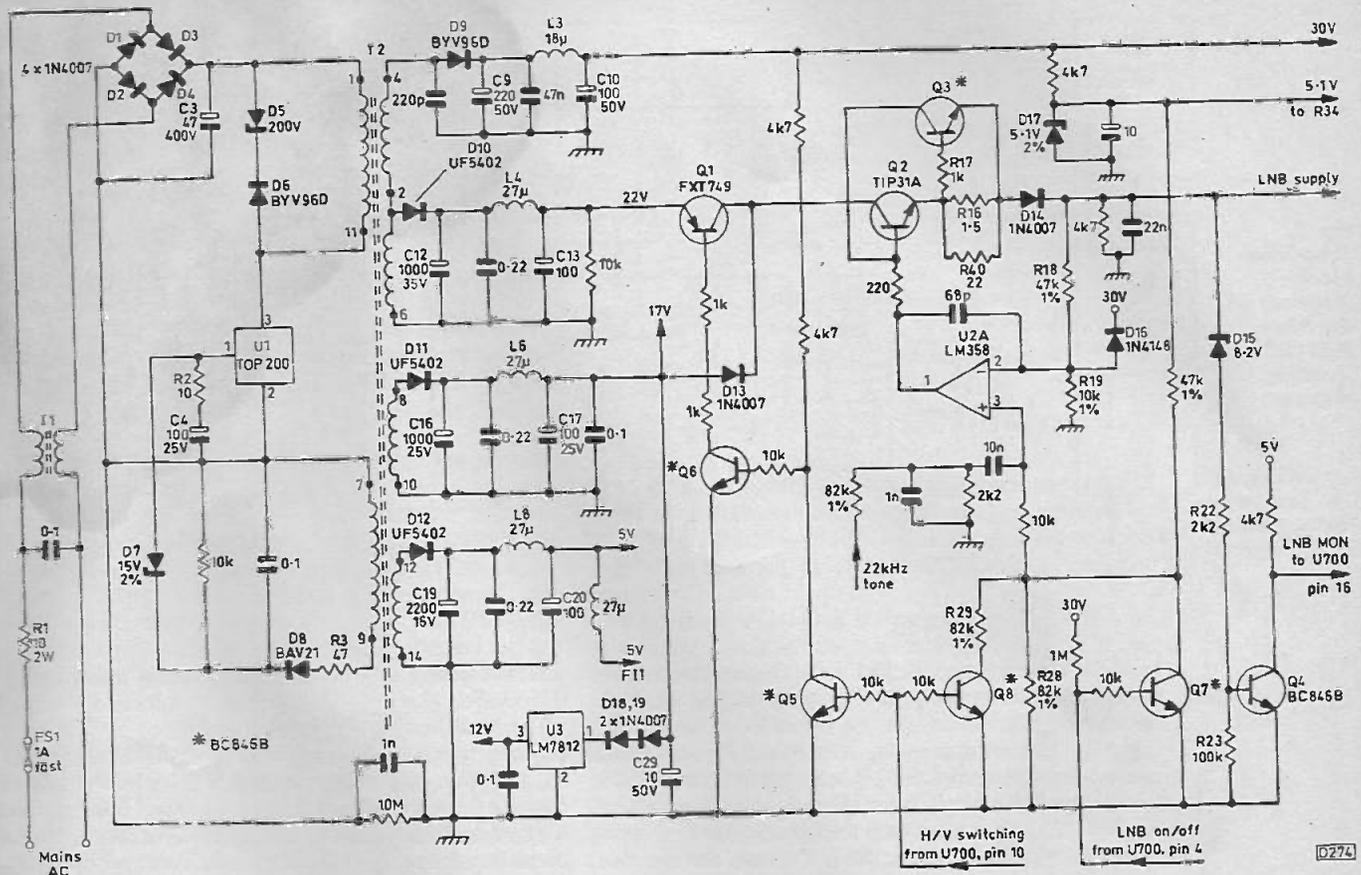
A supply of some 330V is generated across C3 for

application to pin 1 of the chopper transformer T2. Diodes D5 and D6 are incorporated to limit the back-EMF overswing when the power device in U1 switches off — they form a very simple snubber circuit.

When this 330V appears at pin 3 of U1 a small current is bled away internally to start up the chip. This current charges C4 via R2 and pin 1 of U1. When the voltage across C4 reaches 5.7V, an oscillator within U1 starts up, generating a waveform with a 65:35 duty cycle and a frequency of approximately 100kHz to drive the power device within the chip. The chopper action commences, and the voltages on the secondary side of the transformer rise rapidly.

The feedback winding on the transformer, connected between pins 7 and 9, supplies rectifier diode D8 which generates a low-current DC supply of about 20V. This is applied to pin 1 of U1 via the 15V zener diode D7. The feedback arrangement has been designed for optimum sensitivity. As the feedback winding delivers 20V, there will be a higher voltage change for a given percentage error than with a winding that delivers only about 6V, which is all that pin 1 of U1 requires. What D7 does is to provide a fixed voltage drop of 15V, so that almost the whole of any voltage variation is passed on to U1. The result is tighter control of the output voltages provided by the power supply.

Should the voltages at the secondary side of the circuit rise, there will also be an increase in the DC feedback at pin 1 of U1. This will adjust the mark-space ratio of the output device's drive waveform, reducing the on time for current flow in the transformer's primary winding. Thus the outputs will be reduced and the voltages stabilised. A fall in the voltages in the secondary side of the circuit will be accompanied by a corresponding fall in the feedback



voltage. This will increase the mark-space ratio of the drive waveform. The switching device's on time will thus be longer. The outputs will rise, providing the required stabilisation. C4 also adds inertia to the feedback, to prevent hunting and overshoot.

U1 incorporates effective safety features to prevent damage to itself and the power supply as a whole. Excess current protection is achieved by sensing the voltage developed across the output device's drain resistance. Should the voltage across this resistance exceed 10V, an internal trip circuit will be activated. This shuts the output device down and puts it through the start-up sequence every 1-2secs. The drain resistance of the MOSFET output device is very closely controlled during manufacture.

Another safety feature looks for voltage spikes on the mains supply. Should one occur, it will affect the voltages at pins 1 and 3 of U1 simultaneously. This will trigger an inhibit circuit within U1: drive to the output device is removed and the power supply shuts down. To restore normal operation you have to switch off the mains supply for a few seconds, allowing C3 to discharge.

The safety features are very effective and cater for all common fault conditions and more. Even a broken switch-mode transformer limb will not result in the destruction of U1 - the power supply simply goes into the trip mode.

The Achilles heel was C3. In early receivers it would fall in value. As a result, a negative voltage could be fed to U1! This is the only condition against which U1 is not protected. Later receivers are fitted with a different capacitor, which seems to have solved the problem.

There is no adjustment for the outputs provided by the power supply. The four outputs are:

- (1) 30V, produced by D9, C9, L3 and C10.
- (2) 22V, produced by D10, C12, L4 and C13.
- (3) 17V, produced by D11, C16, L6 and C17.
- (4) 5V, produced by D12, C19, L8 and C20.

(3) 17V, produced by D11, C16, L6 and C17.

(4) 5V, produced by D12, C19, L8 and C20.

The 30V supply is used primarily for the varicap tuner. It also provides a constant-current bias for the zener diode (D17) in the reset generator circuit, the H/V switching and the LNB on/off switching transistor.

The 22V line is used exclusively to supply the LNB: for vertical polarisation the 17V supply takes over. This supply is used extensively in the receiver and also feeds the LM7812 regulator U3 to provide the 12V line.

The LNB Supply

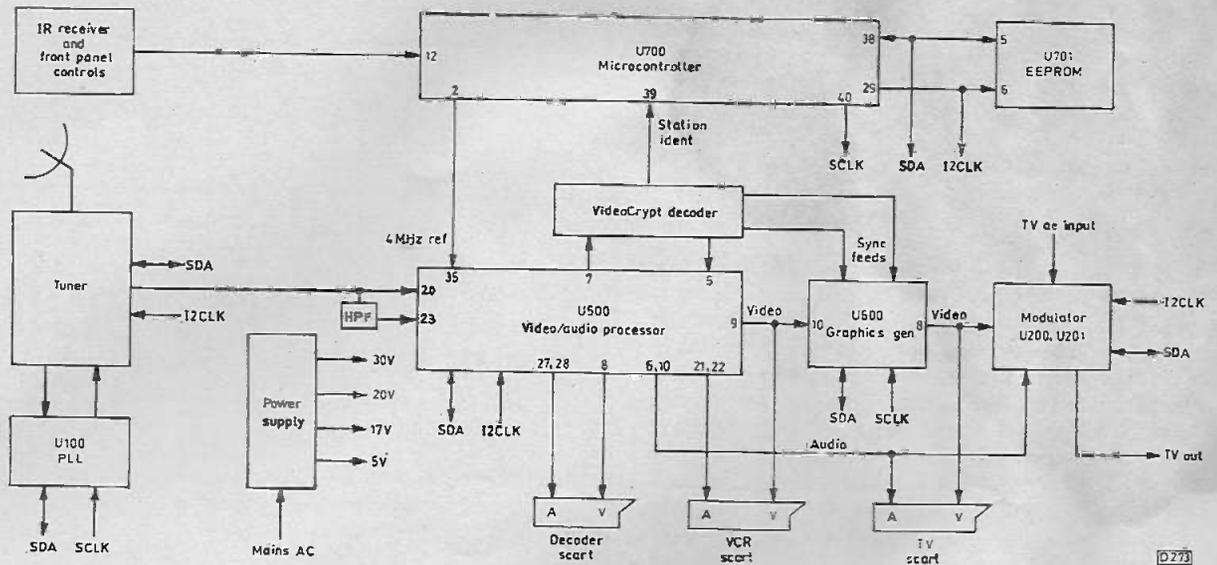
The UK version of the receiver has a single LNB input. There are dual LNB types for export markets, and the following description of the LNB supply switching takes this into account. With single LNB receivers the LNB supply is fed to pin 5 of the tuner, an 'LNB select' voltage being applied to pin 6. With dual LNB models the LNB supply can be switched, under software control, using the LNB select line from pin 21 of the microcontroller chip U700.

The H/V line from pin 10 of U700 provides two control actions. First, when it goes high the 22V supply is disconnected: this is done by switching Q5 on, with the result that Q6 and Q1 switch off. D13 is then forward biased, and the 17V supply arrives at the collector of Q2. Secondly, by switching Q8 on or off the bias applied to pin 3 of U2A is altered, thus altering the output from the LNB supply series voltage regulator transistor Q2.

This arrangement prevents excessive dissipation with a high LNB current load. Theoretically the chopper circuit could be used to provide the LNB with a regulated supply directly. But under a fault condition the operation of the microcontroller chip could be affected. Adding the series

Fig. 1: The power supply section of the Pace Model MSS100.

Fig. 2:
Simplified
block
diagram of
the Pace
MSS100
satellite
receiver.



regulator also improves the regulation characteristics, with foldback current limiting, 22kHz tone injection and high ripple rejection.

The TIP31A series regulator transistor Q2 is controlled by the operational amplifier U2A. Resistors R18 and R19 sample the LNB supply from Q2, providing feedback to pin 2 of U2A. Pin 3 is fed with a reference voltage derived from the 5.1V zener diode D17. To cater for the two different voltage levels required by the LNB (for horizontal or vertical polarisation), this reference voltage is adjusted by adding R29 in parallel with R28 or open-circuiting R29. When Q8 is switched on R29 is in circuit: with Q8 off, R29 is open-circuit. As we have seen, Q8 is controlled by the H/V line from pin 10 of U700.

Transistor Q7 can be switched on and off by the LNB on/off line from pin 4 of U700. With Q7 switched on, pin 3 of U2A is shorted to chassis and Q2 switches off, removing the LNB supply.

A 22kHz tone from pin 29 of the LSI chip U500 can be applied to pin 3 of U2A. This modulates the LNB supply, at 400-800mV peak-to-peak, to switch bands with a universal type LNB. The tone switching is under the control of the receiver software.

D15, R22, R23 and Q4 monitor the LNB supply. In the event of a short-circuit along the LNB cable or in the LNB itself, the supply will fall to a very low voltage because of the action of the foldback current-limiting circuit - Q3. R16, R17 and R40. R16 and R40 monitor the supply current. If this is excessive, the voltage developed across these resistors switches Q3 on, altering the drive to Q2. With the LNB voltage at a low level, D15 will cease to conduct and Q4 will switch off. This raises the level of the LNB MON line, which is connected to pin 16 of the microcontroller chip U700, to 5V. U700 then tells the graphics generator chip U600 to display a red screen with the flashing message "LNB SHORT" on it. Coincidentally, U700 attempts to reapply power to the LNB, testing for the short-circuit condition approximately once every half second.

The Tuner

The MSS100 is fitted with a Pace tuner - Fig. 3 shows the circuitry in this area. A single-input, 27MHz bandwidth version is used in UK receivers. The tuner's local oscillator runs at 479.5MHz above the required channel frequency. It's controlled by a phase-locked loop which is based on

a Sanyo LM7001 dedicated PLL tuning system chip (U100).

The local oscillator frequency is divided by 128 by a prescaler within the body of the tuner. This provides, at pin 18, a sample signal within the range 9-20MHz. The sample signal is fed via C106 and R101 to pin 11 of U100, where it's further divided down by a programmable divider whose division ratio is set, via the SDA serial data line, by U700. The final sample signal has a frequency in the low kHz region.

The 5.625MHz crystal X100 generates a reference frequency for the PLL system. U100 also divides this down. The programmable divider for the sample frequency is set by U700 to produce a final output at the same frequency as the reference frequency, the comparison between the sample and reference frequencies being made at this low kHz frequency. Any difference between the two frequencies produces an error signal that moves the tuner's local oscillator to the correct frequency and holds it there. Basically, the tuner's local oscillator becomes crystal controlled.

The tuning output at pin 14 of U100 is a pulse-width modulated signal with a peak-to-peak amplitude of 5V. This is insufficient to cover the required tuning range. So the PWM signal is fed to the MOSFET transistor Q100, which is connected as a Miller integrator operated from the 30V supply. This stage inverts and amplifies the tuning voltage, providing an output that's suited to the tuner's voltage/frequency characteristic. The output from Q100 is in the range 0-30V. It's fed to pin 15 of the tuner.

A further oscillator within another phase-locked loop runs at 479.5MHz, the second IF. This is used for demodulation. The signal FM, when applied to this phase-locked loop, generates an error signal which is a replica of the original modulating signal. This type of demodulator is not new - it has many similarities to the locked-oscillator discriminators used in many early FM receivers and valved 625-line TV sets.

An AFC signal from the demodulator PLL leaves the tuner at pin 10. It's fed to pin 35 of the microcontroller chip U700, which monitors the position of the signal within the IF passband and initiates any adjustment required to the tuning voltage to maintain the correct carrier position within the passband. U700 signals U100 via the serial data line (SDA), the latter chip carrying out any correction required to the local oscillator frequency. This system caters

for reasonable amounts of LNB local oscillator drift.

The tuner's video output, at pin 13, is a baseband signal, that is a video signal with energy dispersal still applied, plus several audio subcarriers. It's filtered to remove HF out-of-band noise and is then buffered by the emitter-follower Q101. From there it passes directly to pin 20 of the STV0056 LSI chip U500.

The STV0056 Chip

The STV0056 is a Thomson device dedicated to satellite TV signal processing. It uses BICMOS construction and is divided into three main sections, audio, video and supervisory. The supervisory section includes generation of the 22kHz switching tone, I2C bus control and a low-power consumption mode. The STV0056 is designed for receivers with three or even four scart sockets.

The video section of U500 includes the de-emphasis, clamping and energy-dispersal removal circuits required plus a switching matrix. The audio section has twin independent demodulators that can be used for stereo pairs or individual subcarriers with monophonic operation. Wegener Panda noise reduction is incorporated, and another switch matrix for source selection. The STV0056 eliminates much of the discrete component circuitry and the many smaller switching chips used in other models in the Pace range and the ranges from other manufacturers.

Video Processing

To clarify what goes on in the STV0056 chip we'll look at the video and audio sections separately. Fig. 4 shows, in simplified block diagram form, the video section.

Baseband video enters at pin 20, where it's fed to a programmed, gain-controlled amplifier. The software enables the gain of this stage to be set between 0-12.7dB in 63 steps. This is followed by inverted or non-inverted output selection. For C band operation the amplifier should be set to invert the video signal - C band satellites use video modulation of opposite sense to Ku band satellites.

The output from this amplifier is fed directly to the switching matrix as an unclamped baseband signal with all the audio subcarriers present. It's also passed to the PAL de-emphasis network. An active de-emphasis system is used, based on feedback around an operational amplifier connected between pins 15 and 18 of the chip. De-emphasised but still unclamped PAL is available to the internal switch matrix. The output at pin 15 is also filtered to remove signal components above 5.5MHz, the highest

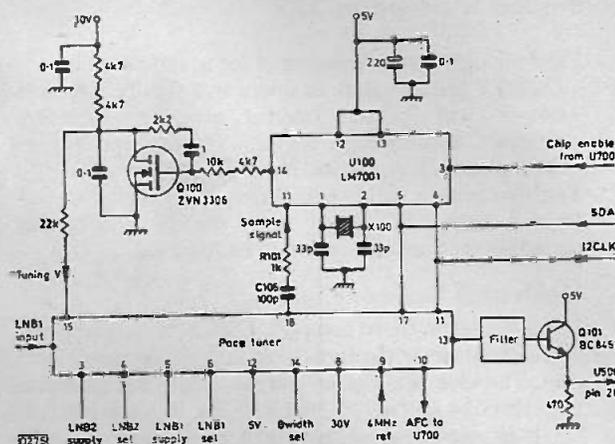


Fig. 3: The tuner and tuning control system.

video frequency, buffered, filtered to remove any residual amounts of audio subcarrier, and then again buffered by compound emitter-followers connected as a super-alpha pair before returning to U500 at pin 13 as a 1V peak-to-peak video signal.

Energy dispersal removal is then performed. This is done by a clamp which sets the sync tips at 1.2V DC. The de-emphasised and clamped PAL video at this point is a positive-going signal that's passed to the matrix. Other video inputs to the matrix are unscrambled video from the internal VideoCrypt decoder, entering at pin 5; video from a VCR at pin 11; and video from an external decoder at pin 4. As these last three inputs are AC coupled, DC restoration is applied before they reach the matrix.

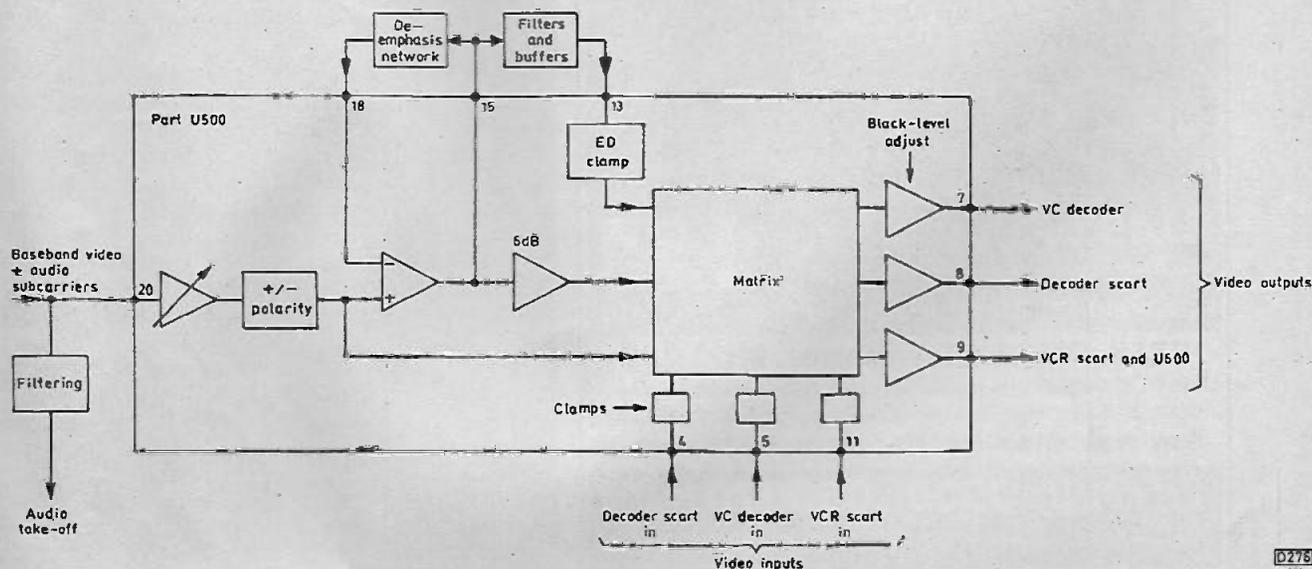
The switch matrix enables six inputs to be switched between three outputs. These are video to the internal VideoCrypt decoder at pin 7, to an external decoder at pin 8, and to a VCR and/or TV set at pin 9. The software incorporated prevents any invalid connections being made, for example VideoCrypt decoder input to VideoCrypt decoder output.

Although pin 9 carries the common feed to a VCR and TV set, further processing (in U600) adds on-screen messages and set-up menus to the TV feed only, leaving the VCR feed clean.

Next Month

In Part 2 next month we'll look at the audio processing, the colour graphics chip U600, the modulator and the microcontroller system.

Fig. 4: The video processing section of the STV0056 chip.



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continued from page 327

£130, though some are available for as little as £66.

DirecTV plans to start an interactive service later this year. It will include Internet access, multimedia magazines, data-enhanced TV (text and graphics relating to a programme), games and software. The service will be available using a multimedia PC equipped with a special board. IBM, Microsoft and several PC board manufacturers are understood to be involved.

Electronic Delivery

The Amsterdam-based company EMC3 announced plans to launch an electronic digital delivery (EDD) service next year. The idea is to deliver videos, music and games at high speed to specially adapted VCRs, PCs and NCs. A two-hour video programme could be downloaded in about ten minutes. EDD uses a powerful compression system and is designed to operate via cable, satellite, wireless and broadband systems. Companies that support EMC3 include JVC, Mitsubishi, Sharp, Sanyo, Sony, Hitachi, Pioneer and Samsung.

Video Developments

Philips demonstrated a digital HDTV set that produced excellent pictures. Its release is to be in late 1997/early 1998.

Flat-screen TVs of various types were on show, including Sharp's 40in. LCD set. Its pictures looked good. So too did those produced by Philips' 42in. wall-hanging set, which uses plasma-gas technology. It goes on sale in the second half of the year and is expected to cost the equivalent of around £6,700. Pioneer was also showing a 42in. plasma TV.

JVC demonstrated a number of products including its D-VHS recorder, which is to go on sale in the USA later this year, DVC camcorders and a 'video docking station' with a video capture board that puts shots straight into a PC. It will cost around £1,900. JVC also demonstrated a video printer priced at about £530.

Sharp showed an amazing camcorder that records up to 2,000 digital still images on a 140Mbyte MiniDisc. It can also record 365 images with 40 minutes of stereo sound (double this time with mono sound). Sharp's VC-LX3 hi-fi VCR has a built-in 3in. colour TFT LCD screen. This enables you to be sure that you are recording the required channel while you are watching something else on the TV set.

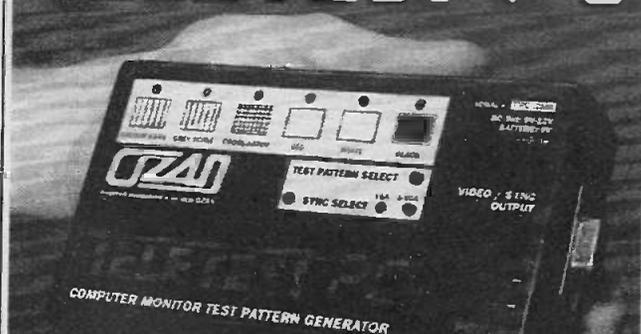
SoundView Technologies was demonstrating a V-chip converter box. To recap, the V-chip enables parents to censor TV programmes. A recent US law lays down that all new TV sets with screen sizes of 13in. or more must incorporate a V chip from February 1998 onwards. Programmes will have to be transmitted with electronic tags that provide ratings for language, violence and sexual content.

The V-chip converter is designed for use with the 200 million TV sets already in use in US homes. It measures 6 x 9in. and connects to the aerial socket and power line. Parents use a keypad to enter a PIN code and set the rating level. The converter then monitors the incoming TV signal: when an unwelcome broadcast is detected, the screen is blanked until an acceptable channel is selected. If a child tries to tamper with the box, the TV set's power supply is shut off. The converter is expected to sell for about £27. To date, the system has been rejected in Europe.

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Channel 5 and VideoPlus

As we have now had our first test transmission for Channel 5 in London, I set up my VCRs and TV sets to receive the new channel. I set the VCR to tuner position 5 to receive Channel 5 and, as seemed to be a logical thing to do, moved the satellite channel (Sky) from position 5 to position 6. Imagine my horror later that night when, having programmed the X Files with VideoPlus using the VCR's remote control unit, I noticed that as the VCR switched on it was recording tuner position 5. Speedy manual action saved the recording.

A check on the instructions for my Aiwa HVGX150K showed that the VideoPlus setting can be moved from 5 to 6.

I have seen nothing about this problem anywhere. What will happen when viewers set their VCRs as I did? Just how many complaints will there be that "VideoPlus isn't working"?

Francis Beach,
Cricklewood, London.

Editorial note: We understand that Channel 5 and Gemstar (which created the VideoPlus system) are, rather late in the day, having talks about the problem.

Samsung VIK310 Series

With reference to Mike Leach's article (February issue) on the Samsung VIK310 and associated

Letters

models I would, as a Samsung dealer who has sold and serviced many of these machines, like to add the following comments.

As Mike pointed out, the biggest problem with these machines is in the power supply, where C110 (100µF, 25V, 105°C) dries up with disastrous consequences. As it dries up, the power supply thinks that its output voltages are falling and attempts to push them back up again. Depending on how long this has been going on, you may have to replace the capstan motor, the drum motor, C113-C120 inclusive, IC101, R101, R107, ZD101, R113, D606, D701, D702, D157, D158, D604, IC602, R630, R631, IC601, R638 and R644. That's if you are lucky! In some cases D606 may have overheated so badly that the main PCB has burnt beyond repair and the machine has to be scrapped.

Samsung is well aware of the problem, and has produced a modification kit that contains most of the above components – but, sadly, not the drum or capstan motor. The modification kit is available to Samsung dealers free of charge on receipt of the model and serial number. Part no. of the kit is 6WINNER1MODKIT.

In an attempt to avoid further problems once the kit has been fitted, Samsung recommends adding a 27V zener diode across the 21V rail. The idea is that the diode will go short-circuit should its breakdown voltage be exceeded, presumably shutting down the power supply. However neither ZD101 nor ZD702, which are both connected across supply rails, seem to provide any protection. ZD702 simply burns up the PCB.

The course we adopt is to replace C110 with a special Philips type rated at 125°C. This is available from Farnell Electronic Components of Leeds (01132 636 311) as part no. 286-709. If a machine comes into the workshop with even a totally unrelated fault, replace C110 before you so much as plug it into the mains supply!

Michael Dranfield,
Buxton, Derbyshire.

I have just read Mike Leach's article on servicing the Samsung VIK310/320/350 series VCRs. As an authorised Samsung service centre, we would like to say that while Mike Leach's advice is sound the best and cheapest way to repair this power supply is to order the correct repair kit from Samsung or one of the company's parts suppliers – it includes detailed information on repair.

After repair the power supply should on no account be connected to the main panel before testing. Otherwise the result can be severe damage to the main panel and even the capstan motor. The correct procedure is to connect it to the mains supply first, then listen for any noise from the power supply. If everything seems to be normal, measure the voltage between pins 1 and 3 of CN101, using a digital voltmeter. The reading obtained should be between 15-17V. If so, the power supply can be refitted to the VCR. If the power supply fails either test, it should be discarded and a replacement fitted. The cost of not following this procedure can be high.
Dennis Cass, A-Z Radio,
Hull, North Humberside.

Can You Help?

I am researching the Onwa TV chassis used in Models C14ET and C21ET from JVC, with a view to preparing a service manual. It was also used in a number of other models under various different brand names, but there is very little information about this. If anyone can provide any information, will they please get in touch with me?
Steve Beeching, Newark, Notts,
Phone 01636 626 327,
fax 01636 626 767.

Price Differences

When I needed a new drum for a Matsui VX6000 a supplier quoted £86.40 + VAT. Then I recalled seeing an advertisement for Matsui VX3000 decks at £16 each on the back page of *Television*. I ordered one and received a brand new deck with heads and cassette housing. The

drum assembly enabled me to sort out the VX6000 problem, while the rest of the deck came in useful for repairing a Matsui VX1000 that had been brought in because of sluggish playback. I still have a spare new cassette housing should I need one. This must be one of the best deals around.

Incidentally, why do they design VCRs that wear themselves out by keeping the rotating heads in contact with the tape in all modes?

I've recently gone on the net and am looking for people who, like myself, are interested in helping each other with hints and advice on repairing VCRs and TV sets. You can reach me at:

BranchTV@aol.com
Edward Branch,
Northallerton, N. Yorkshire.

PCBs

Although I agree with many of the points mentioned by Pete Roberts in his letter (January issue) concerning the advantages of fibreglass over phenolic (SRPB) PCBs, there is one major reason why fibreglass panels are seldom used in mass-produced TV or satellite receivers.

A typical TV chassis will have a main

PCB with 600 to 1,000 holes in it, together with several slots for heatsinks and screening cans. The only way to form all these holes and slots quickly is to use a specially made die and a power press to punch through the board in one pass.

Phenolic paper boards are made with various 'punching' properties. Unfortunately fibreglass boards are too tough and abrasive to be punched successfully: they can only be drilled.

Prototype and low-volume production PCBs are usually made with NC controlled drilling machines, but it still takes between five and fifteen minutes to drill all the holes in an average size PCB. Further time is wasted if there are many different hole sizes, or if there are slots or irregularly shaped holes that have to be milled. Compare this with the die punching method, which can produce a completed board in a few seconds.

With modern auto-insertion machines and automated test equipment it makes sense to combine all the PCBs used in a receiver into one large biscuit, which is broken apart after component insertion and soldering. It's cheaper to throw away any unused areas of the biscuit, such as a SECAM decoder or Zweiton

sound board, than to set up separate production lines for each small board. A biscuit made from fibreglass is very difficult to break into individual boards, and leaves a ragged edge. The tendency of a phenolic board to crack easily is an advantage in producing clean edges.

In some cases a phenolic board does not have sufficient strength or adequate electrical properties but production requirements are such that punching is the only method that can be used. In these cases an epoxy-paper or epoxy-cellulose board is used: they can be punched easily after heating to soften the board (hot punching). This type of board is often used in UHF tuners or semiprofessional equipment. It has a matt white or pale amber appearance.

Multilayer PCBs, such as those used for computer motherboards, are in effect several thin PCBs glued together to form one complete board. Fibreglass is the only material that can be used for this purpose, because the epoxy resin used to make each layer must be compatible with the epoxy used to glue the layers together - the whole board is cured to form one solid mass.

J.R. Allison,
Bradford, W. Yorks.

I.C.H.E.



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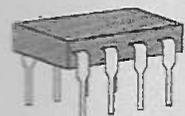
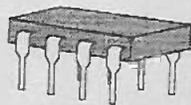
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B&C		154-125A/B	£16.50	CVC1150, 1175	£15.50	TLF14520F	£23.80	SHARP	
LC2200, 2800	£25.50	COMPUMANS		CVC1200, 1201, Mini 2	£16.00	TLF14521F	£23.80	KTRNF1783 BM22	£21.80
AT2077/81	£25.50	TV20RC	£15.00	CVC1204	£12.90	TLF14567F	£23.80	KTRNF2001 BM22	£28.80
M20	£15.80	2040R	£15.00	CVC1276/1215/17	£14.00	TLF14568F	£23.80	KTRNF2000 BM22	£21.80
MX2000	£15.80	GRUNDIG		Digi B/E	£21.00	TLF14584F	£23.80	SOLARON	
BEKO		CLC 70	£15.80	Digi 3/110"	£16.00	TLF14585F	£16.90	14R19	£15.50
CTV58	£15.00	CLC2201, 2401	£19.80	Digi 3 F31, 1X3446	£22.40	TLF14586F	£23.80	16R19	£15.50
BUSH		CLC3300, 3400	£19.80	4515-03	P.O.A.	TLF14592F	£24.00	20T19	£16.00
AT2079/10	£15.00	CUC2600, 29201-019.01/02	£18.00	4515-05	P.O.A.	TLF15505F	£37.00	22R19	£14.00
1500	£19.50	CUC2600, 29201-019.05/06	£18.00	DO-/-	P.O.A.	TLF15506F	£39.00	22S19	£14.00
2020, RO29	£16.90	CUC2800	£18.00	DOLEWE		ANUBIS A/AB	£19.00	22T09	£14.00
2020, 154-125A	£16.50	CLC3600, 29201-019.10	£24.00	ART 1, S24, S32, T21, T28	£16.80	CTX ES	£24.80	22T19	£14.00
2114T, 2321T	£17.90	CLC3600, 29201-019.05/06	£18.00	Classic M24, S127, S28	£16.90	CP90	£15.00	CML14RC	£15.00
2314T, 2520	£15.00	HINARI		Classic M124, M27	£18.50	CP110	£27.80	SONY	
2914	£18.00	CT4, 5	£15.00	Contour S124, S127, S128, S24, S28	£16.90	G90AE	£15.00	KV1161 UR	£18.00
3114	£15.00	CT17, 18	£17.50	Contour M27	£18.50	G110	£23.80	KV1882	£16.60
DECCA/TATUNG		HT10R	£19.80	Contour T28, T24	£16.80	K10	£15.00	KV2052/56	£16.50
145, 146, 147	£19.50	IT10R	£19.80	Prof 528	£16.90	KT4	£15.00	KV2060/62	£16.50
160, 161, 165, 166	£19.50	TV41	£15.00	Prof 728	£16.80	KT4, Komp	£28.80	KV2090/296	£18.00
85-3878-6	£19.50	51-14184-1	£17.50	Stadio S28, T24	P.O.A.	KT4, H.R.	£16.80	KV2100/2106	£16.50
85-9835-5	£19.50	51-13914-1	£15.00	LUXOR		K40, 140-10246	£16.90	KV2130MTV	£39.80
FERGUSON/THORN		HITACHI		5810110D1	£17.50	K40, 140-10269	£18.00	KV21XRTV	£16.60
TX85, 86, 89, 99	£16.50	CPT1455, 1456, 1476	£16.00	MA35U		2A	£15.90	KV2215/17	£16.50
2435121	£16.50	CPT1446, 1626	£16.00	1440A, 1480A	£15.00	3A	£16.50	KV2252/56 PE3	£18.00
DX89, 2435701	£23.50	CPT2074, 2078, 2274	£15.00	1420B, 1440B	£16.50	PIONEER		KV2252/56 RX	£18.00
TX90, 141, TX931, Red Spot	£15.80	CPT2154	£15.50	1422, 1450, 1485	£15.00	SV2801	£15.50	KV2252/56 PE3	£16.60
TX90, 20", TX944, White Spot	£14.50	CPT2174, 2176, 2178	£15.50	3714009	£16.50	SV2803	£16.50	1-439146-11	£39.80
TX100/110", T6033L, Green Spot	£13.50	CP2746, 2478	£16.50	3714009	£16.50	SD28 AV1	£17.80	TOSHIBA	
TX100/110", FST, T6045L	£15.80	2432961	£16.00	5908-05009A-AA	£15.00	SA35FD		150R6B	£14.50
TX100/90", 243892, Yellow Spot	£14.00	2433752	£16.50	MITSUBISHI		CT14R, CT141	£15.00	155R9B	£25.80
TX100/90", T6031, Blue Spot	£14.50	2434002	£16.50	CT121	£23.80	CT14B, CT142B	£16.50	155T9B	£25.80
AS1F	£17.90	2434141	£16.00	CT12145	£23.80	3714002	£15.00	175R9B	£23.50
51K5, 51K7, 59P7	£19.50	2434274	£15.50	CT12528	£16.80	3214009	£16.50	175R8B	£23.50
51P7	£15.80	2434494	£19.50	CT12529	£16.80	SALORA		215T9B	£23.50
59K5, 68K4	£15.50	2434593	£15.50	334P18505	£23.80	Chassis L	£55.00	1400RB	£15.00
59M5, 68M5	£17.50	ITT/NOKIA		334P18506	£18.00	Chassis M	£55.00	AT2079/09	£14.50
47235901	£15.50	Compact B2	£16.80	NIKKAI		Chassis N	£55.00	AT2079/15	£25.80
47319700	£19.50	Compact D/E 110"	£15.80	Baby 10	£19.80	Chassis S	£55.00	AT2079/17	£23.50
47328700	£16.50	Compact D/E, SQ	£19.80	NT14, 20	£15.00	FM504	£55.00	AT2079/23	£15.00
FIDELITY		Compact 80R/110"	£14.00	NORDMEDE		FM513	£55.00	TFB4048BD	£15.00
AVS1600, 2000	£14.50	Compact 80R/110" FST	£15.80	F11B	£15.80	4515-05-07	£22.00		
CTV140	£14.50	Compact 80R/90"	£17.90	F17	£15.50				
CTV1404	£14.50								
ZXC200	£15.50								

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AN5321	£3.80	M10481	£6.80	SL498	£4.80	STR1125	£4.80	TBA121	£5.80	TDA2009A	£2.80	TDA3541	£3.50	TDA4930	£1.60	TEA2031	£1.80
AN5603K	£6.80	M293B1	£21.80	SL499	£4.80	STR4090	£13.50	TBA1205	£6.80	TDA2030	£2.80	TDA3561A	£5.80	TDA5110	£12.50	TEA2164	£3.95
AN5900	£2.80	M490BB1	£18.80	SL499	£4.80	STR4211	£7.80	TBA1206	£6.80	TDA2030A	£2.80	TDA3562A	£4.00	TDA5550	£2.80	TEA2165A	£6.80
AN7158N	£5.80	M491BB1	£9.80	SL499	£4.80	STR4212	£4.95	TBA1207	£3.30	TDA2030B	£2.80	TDA3563A	£7.80	TDA5911	£3.80	TEA2261	£3.80
BA6209	£6.80	M494	£9.80	SL499	£4.80	STR6020	£7.80	TBA1208	£1.80	TDA2050	£4.80	TDA43665	£3.80	TDA6200	£22.50	TEA5101	£2.80
BA6219	£3.80	MDA2062	£13.80	SL499	£4.80	STR10006	£5.80	TCA270	£1.80	TDA2270	£3.90	TDA3566	£5.80	TDA7032	£2.50	TEA5115	£6.80
BA6229	£3.80	MN1230	£6.80	SL499	£4.80	STR4090B	£6.80	TDM616AP	£4.80	TDA2451	£2.80	TDA3576B	£18.25	TDA8118	£2.80	TLR2	£2.20
BA623A	£6.80	MN15425	£15.80	SL499	£4.80	STR4113	£5.80	TDA1011	£2.20	TDA2540	£2.20	TDA3578	£2.80	TDA8140	£2.20	TMS1000N21	£6.80
BA6239	£3.80	PCD8572P	£9.00	SL499	£4.80	STR50020	£6.80	TDA1013	£2.20	TDA2548	£5.80	TDA3650	£4.50	TDA8145	£1.60	TM947C432AP	
BA6435	£9.80	SA11024	£5.80	SL499	£4.80	STR50103	£4.80	TDA1015	£2.20	TDA2564	£5.80	TDA3661	£3.20	TDA8170	£3.00	TS159	£21.95
BA7244	£7.80	SA11061	£5.80	SL499	£4.80	STR50115	£14.50	TDA1015T	£6.80	TDA2577A	£3.20	TDA3653A	£3.20	TDA8172	£3.00	TM947C432AP	
CCUR607	£14.40	SA11150	£3.80	SL499	£4.80	STR50141	£6.80	TDA1014	£3.90	TDA2578A	£2.70	TDA3658	£3.20	TDA8174	£4.20	TM947C434N	£15.50
CNR50	£6.00	SA11251	£5.40	SL499	£4.80	STR50154	£10.50	TDA1060	£3.80	TDA2579A	£3.60	TDA3654	£1.80	TDA8175	£3.50	TM947C434N	
CNR50	£6.00	SA11297.03	£6.80	SL499	£4.80	STR50161	£5.80	TDA1082	£4.00	TDA2581	£3.40	TDA3810	£5.40	TDA8180 Kr	£7.50	3415	£14.90
CNR62	£4.00	SA11294.2	£2.00	SL499	£4.80	STR50192	£6.80	TDA11705	£1.80	TDA2582	£2.50	TDA4420	£2.20	TDA8190	£3.80	TM947C434N	£15.50
CNR83A	£4.80	SA11296	£11.00	SL499	£4.80	STR50241	£18.80	TDA1180	£2.20	TDA2593	£1.50	TDA4426	£3.20	TDA8196	£2.50	3555	£15.50
HA11211	£2.80	SA15000	£6.80	SL499	£4.80	STR50242	£11.80	TDA1185A	£3.20	TDA2594	£3.80	TDA4427	£3.20	TDA8218	£4.65	TM947C434N	
HA11223	£3.80	SA15010	£5.80	SL499	£4.80	STR50243	£11.80	TDA1190Z	£2.20	TDA2595	£4.80	TDA4442	£2.80	TDA8205	£12.90	3559	£14.90
HA11498	£9.80	SA15012	£5.80	SL499	£4.80	STR50244	£18.80	TDA1432P	£5.70	TDA2600	£4.80	TDA4443	£7.80	TDA8241	£6.20	TS45511	£4.00
KA2210	£3.80	SA15020	£5.80	SL499	£4.80	STR50245	£18.80	TDA1512	£3.20	TDA2611A	£1.90	TDA4500	£4.00	TDA8372A	£6.40	TU2000	£5.50
LA4270	£4.95	SA15050	£11.80	SL499	£4.80	STR50246	£18.80	TDA1512	£3.20	TDA2613A	£2.90	TDA4501	£5.00	TDA8380	£3.20	TU2829B	£6.50
LA4280	£5.80	SA15231	£7.80	SL499	£4.80	STR50247	£18.80	TDA1521	£2.50	TDA2654	£5.70	TDA4502A	£18.50	TDA8442	£2.50	UC3842	£2.20
LA4445	£1.00	SA15243	£17.80	SL499	£4.80	STR50248	£18.80	TDA1524	£6.80	TDA2670	£3.20	TDA4503	£7.80	TDA8493	£3.80	UC3844	£1.50
LA4520	£1.80	SAB3035	£9.80	SL499	£4.80	STR50249	£18.80	TDA1670A	£3.20	TDA2680	£3.80	TDA4505E	£5.00	TDA8503	£3.80	UCP1363C	£5.80
LA7320	£2.80	SAB3037	£5.80	SL499	£4.80	STR50250											

TV Fault Finding

Reports from
Philip Blundell, AMIEEIE
Richard Newman
Michael Dranfield
Chris Watton
Ian Rees and
Stephen Leatherbarrow

ITT Digi 3 110° Chassis

There was no sound or picture, with the standby light flashing on and off. Another faulty line output transformer? Not this time. Our Konig LOPT tester gave it a green light. But the set had all the symptoms of a short-circuit somewhere in the line output stage.

Tests on the supplies derived from the LOPT showed that the diodes were all OK and that there were no short-circuits to chassis. It was a different matter when I checked the resistance across the field output chip, which was short-circuit. Beware of chips that operate with split supplies!

I had a TDA2170 in stock, but Chas Hyde can supply an alternative. Replace the field flyback boost capacitor C402 as well. P.B.

Ferguson ICC7 Chassis

This set kept blowing its mains fuse. Four had blown at about six monthly intervals. The set was brought to us to see if we could cure the problem, as its fuse had blown again. When we checked the fuse's end caps, spark erosion could be seen. The fuse holder wasn't gripping the fuse tightly. To ensure a sound repair we fitted a new fuse holder. P.B.

Philips K35 Chassis

I've always liked these sets. This one had a really superb picture despite being some fourteen years old. It also had faint flyback lines that wouldn't go away however. In addition there seemed to be a strange shading effect at one side of the screen. I went straight for the 155V supply reservoir capacitor C583 (4.7 μ F, 250V) which can cause similar troubles, but not this time. A lot of time was spent replacing decoupling capacitors, all to no avail. Eventually, while carrying out scope checks in the line output stage, I found that the waveform at the anode of D586 (BY406A) was quite low and crushed. D586 is a clamp diode. It was leaky, a replacement curing the fault. R.N.

GoldStar CI20A50

Field collapse was the problem with this set. Although there were some dry-joints around the field chip, resoldering them didn't cure the fault. The cause turned out to be FR718 (3.3 Ω) which was open-circuit. A replacement restored the field scan, but the height and linearity were all wrong. This wasn't another fault – someone had had a twiddle. R.N.

Sony KV2000

This old-timer had given sterling service over the years but was now driving its owner mad because of a loud, high-pitched whistle. I noticed that there was considerable cogging on the picture, and that the noise and the cogging both decreased when the set had been on for about ten minutes. A squirt of freezer on a rather sad-looking capacitor (C612) made the fault appear. A replacement cleared the fault. R.N.

Philips Anubis Chassis

We've had loads of these sets in with dud line output transformers.

The new type LOPTs are black and shouldn't cause any more problems. R.N.

Philips G110 Chassis

Choke L5619 (3.9 μ H) in this chassis is now tending to fail, with the result that the power supply self-destructs when put into standby. It's in the BUT18AF chopper transistor's base drive circuit. The parallel 10 Ω chip resistor R3619 is also worth checking, as it can be damaged. The coil is not included in the basic power supply repair kit, though it is in the extra kit ES7059. As L5619 can also become intermittent, it makes sense to replace it as part of a power supply rebuild. R.N.

Sharp C2095

This set's owner complained that he couldn't tune in the signal from his VCR. When we tested the set on the bench we found that the tuning voltage rose to only 8V, then dropped to zero and started again. Fortunately we had the circuit diagram – there are ten ICs on the tuning panel. Extensive checks led us to the TC4081 quad two-input nand gate chip IC11012, which controls the on-screen display tuning bar. The fault cleared when this was removed, but there was no on-screen display of course. We found a replacement on a scrap panel. When this was fitted the tuning bar travelled right across the screen – it had previously moved only about two inches. This had been part of the clue. M.Dr.

Ferguson TX90 Chassis

This set was dead though the HT was OK. The cause of the problem was no line drive. In this chassis over-voltage protection is carried out by a couple of transistors that short out the line drive. One of them, TR110, was short-circuit collector-to-emitter. M.Dr.

Grundig CUC720 Chassis

Intermittently dead was the complaint with one of these sets. We tested it for several days before the fault showed up. Then, at switch on, the LED display flashed "88" briefly. After that it went off and the set remained dead. On investigation we found that in the fault condition the power supply was running but its outputs were all very low – the HT was only 75V instead of 152V.

Replacing several components seemed to cure the fault, but the set came bouncing back. Eventually we found that the culprit was the HT preset control R647. When we touched it with a screwdriver the HT rose to 200V. Its wiper was clearly making intermittent contact. M.Dr.

Orion 14ARX

This 14in. colour portable was dead with the standby light on. We didn't have a manual unfortunately. On investigation we found that there wasn't a standby transformer. Instead, the standby supply is derived directly from the mains, the circuit consisting of a half-wave rectifier, a reservoir capacitor and a couple of resistors. At the end of the resistor chain we obtained a reading of exactly 5V, which we assumed to be correct. Big mistake!

When we obtained a copy of the circuit diagram we found that the standby supply should be 13V. The 3.3 μ F, 250V reservoir capacitor had dried up. A replacement restored the correct voltage and the set came back to life. M.Dr.

Akura CX30

Although the EHT was present there was no sound or picture. When we connected the collector of one of the RGB output transistors to chassis via a 1k Ω resistor we obtained screen illumination and found that the cause of the problem was field collapse. This method of obtaining a display is better than disturbing the first anode control's setting. Further tests showed that the 12V supply was missing, because the 3.3 Ω resistor R418 was open-circuit. It's in series with the feed from the LOPT. M.Dr.

Amstrad TVR3

There was an odd fault with this set. Everything worked all right until it was switched off. When the operate button was pressed, the set switched to the VCR channel and stayed on. After some careful study we found that the contacts of the standby relay remained closed. They

remained closed with the voltage across its coil down to 1V. We assumed that the relay was magnetised, as a 24V relay shouldn't hold its contacts closed with only 1V across the coil. The collector of the transistor that controls the relay switching is also connected to the sound mute pin of the AN5265 chip, via a 22k Ω resistor (R155). We traced the source of the 1V to this chip. When we increased the value of R155 to 47k Ω the voltage across the coil fell to 0.7V and the relay dropped out when asked.

Another dealer we know has had this problem. A new relay would probably cure the fault, but this simple modification is cheaper. M.Dr.

Matsui 2091

This set would revert to standby about two seconds after being switched on. If the on/off switch was held in, the set would stay on but with a snowy raster and no on-screen display. The culprit turned out to be the microcontroller chip's 10MHz crystal. M.Dr.

Bush 4414

There was no tuning. A check showed that the voltage at the tuner's VT pin was 30V and wouldn't decrease. We found that R642 (22k Ω , 1/8W), which is connected between the microcontroller chip and the tuning voltage integrator, was open-circuit. M.Dr.

ITT Compact B2 Chassis

There was no vision or sound. Checks at pins 5 (UHF) and 14 (12V) of plug TZ showed that the tuner's supplies were OK. A scope check at pin 24 then produced a good composite signal display. In this situation the culprit is usually the TDA2014 video switch chip IC3601. This was no exception. C.W.

Toshiba 145R7B

This set worked all right until it was put into standby. The sound was then muted but the picture remained. We found that the standby switching transistors Q802 and Q803 weren't operating because R833 (120k Ω) was open-circuit. C.W.

Contec KT8135

This colour portable was dead. As there was 320V across the reservoir capacitor C501, the mains input and rectifier circuits were obviously

OK. As we didn't have a circuit diagram we carried out cold checks in the power supply and line output stages. The silicon all seemed to be OK, so we made a start on the resistors in the power supply. R501, R502 (both 330k Ω) and R503 (1M Ω) were all faulty. Replacing them restored normal operation. C.W.

Sony KVM2151U (BE2A Chassis)

There was no blue in the display. A check at the tube's blue cathode produced a near HT reading, so the blue gun was cut off. Our next check was at pin 1 of CNC72, the blue input to the CRT base panel from the TDA3505 RGB processor chip IC302. There was a low reading here in comparison to the green input at pin 2. A check at the chip's blue output pin 10 produced a reading that was slightly high in comparison to the other outputs. The 100 Ω chip resistor R312, which is in series with the feed from 10 of IC302, was open-circuit. A replacement restored the picture's blue content. C.W.

Ferguson TX100B

When this set was cold there was no colour. Once it had warmed up there were only bands of colour. We found that C48 (0.1 μ F, 63V), which is connected to pin 24 of the TDA3562A colour decoder chip IC3, was the culprit. C.W.

Sony KV2212

There was no picture. We found that the HT voltage was low at only 83V. C652 and C653 (both 33 μ F, 250V) in the power supply were both faulty. Replacements restored the picture. C.W.

Samsung P68 Chassis

This set was stuck in standby. Checks around the 2SC2331Y transistor Q803, which is used to switch the 16V supply, produced some incorrect voltage readings. In addition R819 (270 Ω , 2W) in Q803's collector circuit was cooking. Q803 was found to be leaky. C.W.

Finlux 1000 Series

There was no sound and the set would switch to standby. If there's no sync signal these sets switch to standby after about ten minutes – the main microcontroller chip starts a switch-off routine after nine minutes. When the sync signal is present, the voltage at pin 13 (transmission identification) of the

TDA2578A timebase generator chip ICh1 should be high. It was only 0.5V. A replacement chip restored the voltage, curing the faults. C.W.

Sony KV2766

When text was selected there was just a blank raster. When mix was tried a very weak text image was superimposed on the picture. A check at the output from the SAA5050 chip showed that there was a large amount of character data at full amplitude, but there was only a very low input at the video chip. RV3 (100Ω), which sets the text amplitude, was open-circuit. C.W.

Korting 41525 Orbiter

This set has an early digital tuning system that wouldn't go above channel 32 at the bottom of the band, while any signal we obtained couldn't be stored. Checks at the TRD (Tuning Remote Digital) panel showed that the 50V supply was at only 11.6V while the 30V tuning supply was at 6.8V. These supplies are derived from pin F of the line output transformer. A check at the anode of the relevant rectifier, D1039, showed that a nice 55V waveform was present. At the cathode there was only 11.6V however. The reservoir capacitor C1039 (47μF, 63V) was open-circuit. C.W.

B & O 8800

The power supply made a grunting sound about five times then the set went dead. When I looked at the circuit diagram I too grunted a few times. Fortunately I spotted the cause of the trouble without having to get too involved. The transformer's EHT outlet was illuminated when the set tried to start up. A new transformer and two yards of EHT cable restored the set to as good as new. C.W.

Sony KVX2552U

The cause of intermittent colour was traced to the TDA4510 decoder chip. The reference oscillator has to be set up after fitting a replacement. This is done by shorting pin 11 of the chip to chassis then adjusting C332 for nearly stationary colour. C.W.

ITT CVC1203 Chassis

This set was said to be dead. We found that the power supply was providing low outputs – the HT was just over 100V instead of 145V, and there was only 18V at the 24V output. A check showed that the HT adjustment didn't work. This is usually a sign that the line drive is

missing. An 8V start-up supply was present at pin 14 of the TDA1940F line generator chip IC601, but there was no supply at the collector of the line driver transistor T741. The 1kΩ feed resistor R744 was open-circuit. C.W.

Amstrad CTV12

There was little or no sound. Checks in the audio output stage suggested that there was something amiss with the biasing, though the supply was present. There was audio at the demodulator. After checking the transistors and ceramic capacitors I turned to the supply resistors. R151 (39kΩ) near the left edge of the PCB was open-circuit. I.R.

Bush 2057NTX

This dead set had been subjected to a mains surge. The 2SC2482 line driver transistor Q401 and its feed resistor R416 (2kΩ, 5W) were faulty; the cause of field collapse was simply failure of the TDA3653B field output chip IC401; while the cause of no sound or vision was the 12V, 1W zener diode ZD402 being short-circuit with its supply resistor R422 (3.3kΩ, 2W) open-circuit (these components are situated just to the right of the scart socket). Make sure that the HT voltage is 112V at TPB+ or you may lose all the work you've done. I.R.

Finlux 3624P

I look after banks of these scart only monitors (3024V, 3028H, 3029V chassis) at a local rock theme pub. Many of the problems are caused by crystallised joints in the line output stage, the result of poor ventilation. This one looked as if it should work – there was plenty of activity from the line output stage. But no raster with low EHT made me wonder about the tripler in the LOPT. A slight bulge on CZ19 (marked 390nF but was 470nF in this chassis) gave me a clue. When removed it was found to be open-circuit. I.R.

ITT Compact D2 FST Chassis

There was poor sync with no or chopped sound and hum bars. Having had similar symptoms in older ITT models I went straight to the screened module that contains the tuner. Sure enough C201 (4.7μF, 63V) was low in value. I replaced the other electrolytics inside the module for good measure. I.R.

Goodmans 2043T

This set was dead. Checks on the

small electrolytics in the chopper power supply revealed that C805P (100μF, 16V), which is mounted in front of the chopper transistor, had dried out. I.R.

Huanyu 37C-3

No luminance sent me scurrying for the oscilloscope. After some time spent carrying out checks in the luminance section a casual flip of the service switch on the PCB brought the picture back. Cleaning the switch cured the problem. I.R.

Sony KV2762

There was a minor tuning fault with this set: the tuning would alter by a very small amount, usually on a change of scene. The tuning supply was slightly low at 29V, and altered by 0.1V when the fault occurred. Its source is the 40V supply, which is derived from pin 3 of the chopper transformer via D652 and R651. The latter measured 60Ω, which is a bit high for a 1.2kΩ resistor! As a precaution we also replaced the 33μF, 50V reservoir capacitor C653. S.L.

B & O MX4500W

This set was dead, in the trip mode, with the line output transistor short-circuit. A replacement failed the following morning, which was a cold one. We eventually found that CL26 (2.2μF) was very low in value. This distorted the line drive waveform enough to overheat the 2SD1546 output transistor, hence its early demise. The chassis is actually a Thomson/Ferguson ICC type, though the exact equivalent eludes us. S.L.

Ferguson ICC7 Chassis

Red LED, green LED then the sound of EHT followed by silence and no lights were the symptoms with one of these sets. The cause was traced to transistor TP53 (BC557) which was leaky collector-to-emitter. It's the voltage error sensing transistor in the power supply. S.L.

Hitachi C25-P228 (G8Q Chassis)

This set suffered from what appeared to be intermittent corruption of the data stored in the ST24C02CP chip IC1502. All tuning information and analogue signal levels would be lost, with the set reverting to channel 0.

We found that the 5V supply to the text board, measured at PL1506, disappeared at random. It comes via IC001, whose 8V supply also went

missing when the fault occurred. This supply comes via a coil on the back of the print. A poor connection was present here: when the iron touched one end of the coil the solder fell away to reveal a blackened print pad. Cleaning, retinning and resoldering restored reliable operation. S.L.

GoldStar CIT2175X

There was very intermittent loss of the vision and sound. As this was more prevalent when the set was cold, and after several hours' use, we tackled the problem with freezer and a hairdryer. The IF/video section of the set is based on a TDA4502 chip. After checking in this area for an hour or so we traced the cause of the fault to L202, a green coil that's labelled 2K2. It was going open-circuit. S.L.

Toshiba 217D9B2

There was no sync because, we discovered, there was no 12V supply to the text board (at pin 16 of P805). This supply is produced by Q813 (BD945), which is a simple series regulator. Q813 itself was blameless, its very low base voltage being

caused by the 13V zener diode D827 (type 04A213X) which was virtually short-circuit. A replacement restored normal operation. S.L.

Goodmans 1410 (Thomson TX805 Chassis)

This portable was dead with a short-circuit S2000AF line output transistor (TP10). Checks showed that in addition RP28 (2.7 Ω , 5W) was open-circuit and DP11 (BA157) short-circuit. Fortunately the set continued to work during a long soak test after fitting the replacements. S.L.

Hinari VTV200

This TV/VCR combination produced normal sound with a blank raster – but only when cold. We've had this before, and wasted no time in replacing C629 (100 μ F, 25V), the reservoir capacitor in the supply to the 12V regulator IC604. C629 falls in value, the resultant low, noisy supply causing the symptoms mentioned. Freezer and a hairdryer will confirm its guilt. S.L.

Ferguson ICC7 Chassis

A common fault with this chassis

and similar ones is intermittent loss of signals. The usual effect is a blanked out screen – black, but with very regular white patterning. The cause is dry-joints within the IF unit, particularly at CS32 which is associated with the LA7550 chip IS10. S.L.

Akura CX25 and CX26

We've had a number of these sets in the workshop. Field faults, brightness faults, no sound, distorted sound, intermittently dead and clicking (very similar to Nicam noise) have all had one cause. In addition, a sort of RF patterning, no colour and tuning drift can be added to the list. The micro's EEPROM has always been responsible. It can be obtained direct from Akura, Cumbernauld. The part no. for Model CX25 is 13-ONVM30-60P25B/00294AA and for Model CX26 13-ONVM30-60PB/00294A. S.L.

Amstrad TVR3

For severe line corrugation from cold, go straight to C91 (22 μ F, 16V). We've recently had a run of these models with this fault. S.L.

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Servicing

the Mitsubishi CT2965STX

The Euro 8F chassis used in this model has an interesting master/slave control system in the power supply. John Coombes on fault finding in this and other sections of the receiver.

This smart 29in. model was released in late 1990. It's fitted with the Mitsubishi Euro 8F chassis. It superseded the CT2964STX, which is similar in appearance and general internal layout. There are however some significant differences between the two models. In particular they have totally different power supply circuits. Model CT2964STX is fitted with the Euro 4Z chassis. A note at the end of this article will mention some faults you can get with the CT2964STX. To start with we'll concentrate on the CT2965STX.

The Power Supply

Fig. 1 shows the power supply circuitry used in the Euro 8F chassis. It's a conventional chopper power supply, but output control is based on a pair of chips, IC901 (TEA2164) on the primary side of the circuit and IC950 (TEA5170) on the secondary side. IC950, which is called the master regulator, senses the HT voltage at pin 5. It contains an oscillator and a pulse-width modulator, whose output at pin 3 is transformer coupled by T902 to pin 6 of IC901. This chip, which is called the slave regulator, generates the drive for the 2SD1887 chopper transistor Q901 at pin 14. It contains excess voltage and current and low voltage protection circuitry, and an oscillator for start-up and standby operation.

Standby switching is controlled by the M50439-564SP microcontroller chip IC701 and switching transistors Q951 and Q950. When pin 10 of IC701 goes low Q951 and Q950 switch off, removing the supply to pin 2 of IC950. IC901 then has to rely on its internal oscillator. IC701 also switches off the 12V regulator chip IC953 – the control is at pin 2. Note that there are two 5V regulators. The main one, which provides the supply for IC701, is IC952. IC951 provides the 5V supply for the text panel. Both regulators are type μ PC78M05H.

If you are presented with a dead set, the first thing to do is to check the 2AT mains fuse F991. If it has simply gone open-circuit, the cause may be ageing or a power supply transient and a replacement should hold. If the fuse has blown, the cause could be an intermittent short-

circuit in the on/off switch S991. Alternatively check the BYW56 bridge rectifier diodes D901-4, their 2.2nF, 1kV protection capacitors C901-3 and the 2SD1887 chopper transistor Q901 for shorts. If these items are all OK, the TEA5170 master regulator chip IC950 could be faulty. Incorrect operation of this chip can result in high voltages and a blown mains fuse. If F991 has blown, Q901 is short-circuit, the 4-7 Ω , 10W surge limiter resistor R901 is open-circuit and zener diode D909 (type RD3.0FB2) is short-circuit, Mitsubishi advises fitting a 390k Ω , 0.25W resistor across pins 1 and 4 of IC950, on the copper side of the board, before replacing these components. Use hot-melt bonding material to secure the resistor.

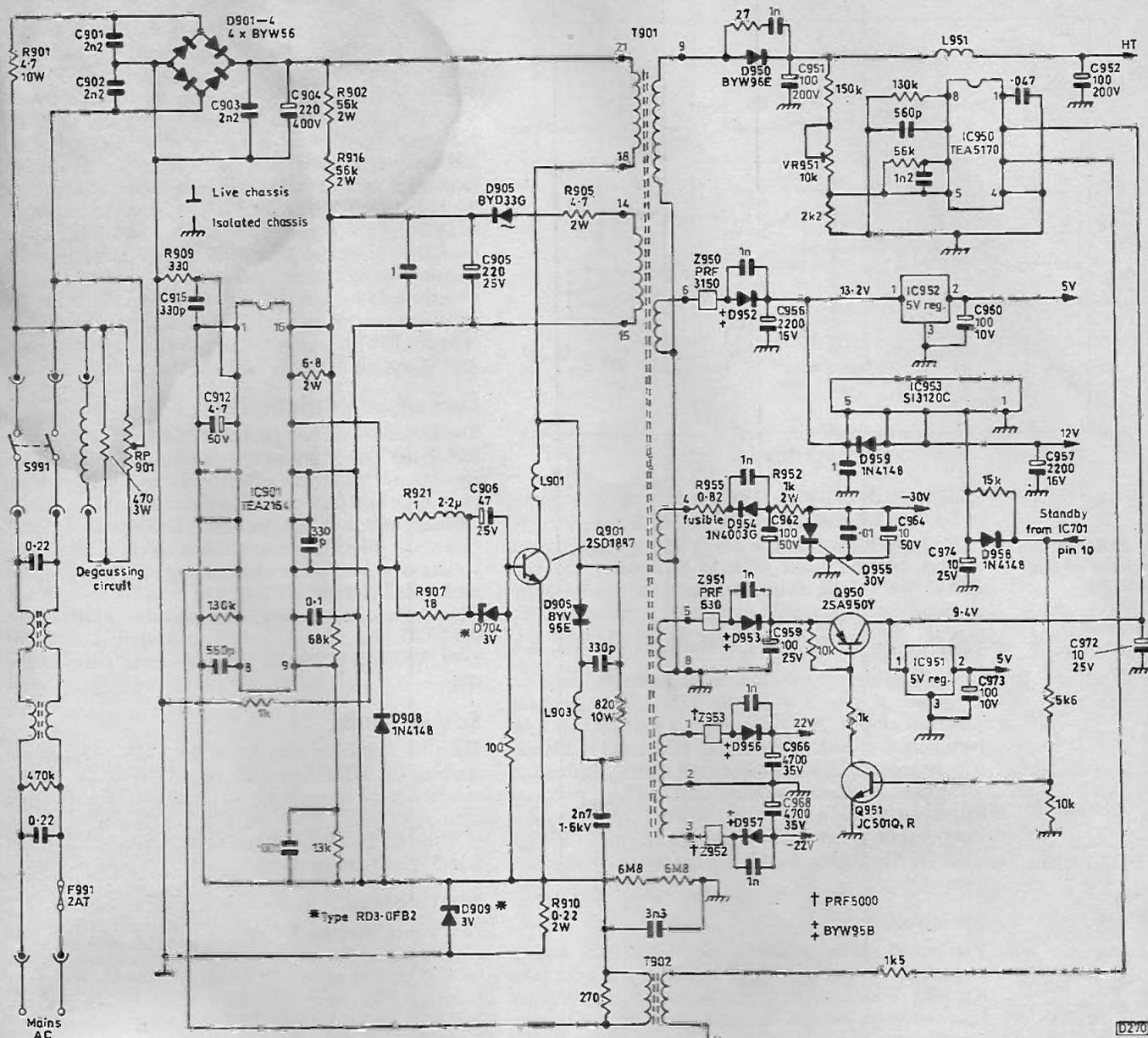
If the above checks have failed to reveal anything amiss, check whether the 3-15A circuit protector Z950 (type PRF3150) is open-circuit. If so and there appears to be no reason for the failure, Mitsubishi advises upgrading the protector to type PRF5000 (5A) – part no. 299P132010.

With Z950 open-circuit there will be no 13V input at pin 1 of the 5V regulator IC952 and pin 5 of the SI3120C 12V regulator chip IC953. Thus the microcontroller chip IC701 and the TDA2579A timebase generator chip IC501 will have no supplies. It's worth remembering that IC953 is turned on at pin 2 by a 5V feed from IC701.

If there is any problem with IC950, the master and slave regulator chips IC950 and IC901 should be replaced as a pair.

The Line Timebase

A short-circuit line output transistor (Q552, type 2SD1879) is the most common fault in the line output stage. This will load down the power supply. The usual reasons for the failure of Q552 are dry-joints at coil L553 in its emitter circuit or at the driver transformer T551, or shorted turns in the line output transformer T553. This item may have to be checked by replacement.



Dry-joints around T553 can cause intermittent or permanent loss of the picture and sound.

If there is no picture, check whether the CRT's heaters are alight. If not, check for dry-joints at pins 9 and 10 of T553 and at pins 9 and 10 of the tube's base socket – also ensure that the tube's pins are clean and not bent.

Loss of the line drive may be the cause of the no picture symptom. Check the BF419 line driver transistor Q551, which could be short- or open-circuit. Then check its feed resistor R551 (6.8kΩ, 5W) which may be open-circuit. If the line driver stage is OK, check whether there is a line drive output at pin 11 of the TDA2579A timebase generator chip IC501. If this waveform is missing, check whether IC501's supply (11.6V) is present at pin 10. Check back to source – IC953 via L557, with C507 (100µF, 25V) for smoothing – should this supply be missing. If the supply is present, replace IC501.

T553 can be the cause of no picture, intermittent flashing on the screen or even focus variation. Excess humidity can result in breakdown of its insulation, with arcing. Watch out for damp homes!

If there is just a loud squeal from the power supply,

T553 probably has shorted turns. Other possible causes are the EW modulator diodes D551 (BY228) and D552 (BYW96E), and their parallel tuning capacitors C576 and C578 (both 0.01µF, 1.6kV). Check them for shorts.

Dry-joints at the plug/socket for the line scan coils can be the cause of line collapse. Also check for dry-joints at plug/socket EA on the pincushion correction (PCC) PCB.

If there is sound but just a bright raster with flyback lines, check whether the tube's first anode (screen) control is faulty – it's on the LOPT. If this item is OK, the cause could be loss of the HT supply to the RGB output stages: check whether the fusible, 2.2Ω resistor R559 is open-circuit or the 47µF, 250V reservoir capacitor C565 is short-circuit.

The Field Timebase

The obvious item to check in the event of field collapse is the µPC1498H field output chip IC401. Before replacing it, check carefully for dry-joints at its pins then check that its 28.7V supply is present at pin 6. If this supply is missing, check whether C412 (470µF, 35V) or C567 (1,000µF, 35V) is short-circuit, whether

Fig. 1: The chopper power supply circuit used in the Mitsubishi Model CT2965STX (Euro 8F chassis).

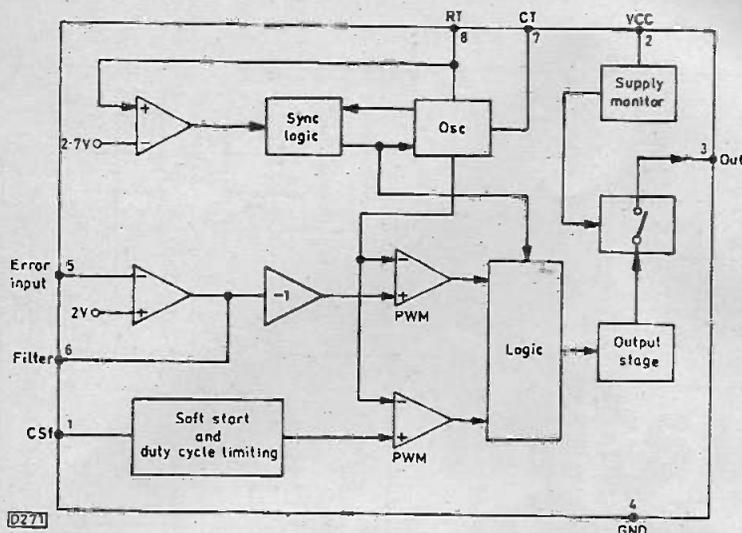


Fig. 2: Block diagram of the TEA5170 master regulator control chip.

R563/R570 (both 0.82 Ω , 0.5W fusible), or D553 (BYW95B) is open- or short-circuit.

Dry-joints at the scan coil plug/socket connections are another possible cause of field collapse in the scan circuit. We've also known the scan coils to be open-circuit. Another possibility in this area is failure of C408 (330pF, 500V). This fault can be intermittent and difficult to trace.

If the output stage and scan circuitry are OK, check for dry-joints at pins 1-4 of the TDA2579A timebase generator chip IC501. Note that if a receiver is left on for a long time with field collapse IC401 and IC501 can both be ruined. This can make fault finding difficult.

The field amplitude control VR402 (500k Ω) can cause height variations when faulty. If the field linearity is incorrect or intermittently incorrect, check VR401 (500k Ω). The carbon tracks of these preset controls can deteriorate.

Sync Faults

The brown sealant which is across the PCB can be responsible for loss of sync, no colour, line jitter or false line hold. What happens is that the sealant can introduce high-resistance leakage – thus the symptoms can be very intermittent. The cure is simple: scrape all the brown sealant around suspected components off the PCB. A common fault is loss of sync because of the sealant around pins 5, 6 and 7 of the TDA2579A timebase generator chip IC501.

The Signals Side

An intermittently blank raster and ghosting or ringing are problems you sometimes get. They can be very intermittent, and are not necessarily related to heat or a cold start. To overcome the problem, resolder coils L4 and L5 in the IF unit IP1A1 then retune all channels to the correct setting and ensure that the AFC switch is in the on position. In most cases this will solve these problems. Otherwise it may be necessary to replace the tuner and IF unit.

If there is no picture or sound, or the picture reappears intermittently, suspect the IF unit.

If there is a raster with no picture content, replace the tuner.

The tuner can also be responsible for tuning drift. But first check that the 33V supply is stable. The μ PC574J-K 33V stabiliser IC704 could be faulty – check it by replacement if necessary. If this item is OK, suspect the 2SC1740S-E transistor in the tuning supply integrator

circuit. Check it by replacement. If still in trouble, replace the three 0.47 μ F capacitors C721/2/3 in the integrator network.

If the drift is apparent only on channel change, there's a modification that can be used to improve the AFT pull-in range. It comes as a kit, part no. AFT1.

If the various channels can be tuned in but are not retained in memory when the set is switched off, check the M58630P EAROM chip IC702. First ensure that its \sim 31V supply is present at pin 2. If this is missing, check the RD30FB3 zener diode D955 which could be short-circuit and the fusible resistor R955 (0.82 Ω , 0.5W) which could be open-circuit. Then ensure that its 5V supply is present at pin 1. If this voltage is low, C960 (100 μ F, 10V) is probably open-circuit. If the supplies are OK, check IC702 by replacement.

Loss of one Colour

The 2SC2688-M,N output transistors Q651 (red), Q652 (blue) and Q653 (green) are suspect when the fault is loss of one colour. If the fault is intermittent, you can swap over transistors to prove the point.

Check the 5k Ω bias presets VR651 (red), VR652 (blue) and VR653 (green) if the problem is grey-scale variation with loss of or increase in one colour – their tracks can deteriorate.

Loss of one colour can also be caused by a fault on the AV/RGB PCB. Check the DC conditions around the AN5352 chip IC2T0. If they are correct, suspect the chip.

Sound Faults

The first step is to ensure that the \pm 21V supplies are reaching the STK4132II audio output chip IC3S1. Check at pins 3 and 1 respectively of plug/socket PA. If either is missing, check back to its source in the power supply. If necessary check the 100 Ω fusible resistors R3T8 and R3U3 which can go open-circuit.

No Teletext

First check that the 5V supply is present at pin 4 of plug/socket TX3. If this is missing, check IC951 (μ PC78M05H) and C973 (100 μ F, 10V) in the power supply. Other items to check if necessary are the 13.8MHz crystal X7701 and the SAA5231 chip IC7705.

Remote Control

If there's no remote control operation, check whether the handset or the infra-red receiver is at fault. In the event of a suspect receiver, check that its 5V supply is present at pin 1 of plug/socket RH. Check this plug/socket for dry-joints or poor connections. If a scope check at pin 5 of the microcontroller chip IC701 produces a pulse waveform, check IC701 by replacement.

If the handset is at fault, check its batteries and the battery connections first, also that the TV/VCR switch is in the TV position. Other things to check if necessary are the SE1003 LED, which could be dry-jointed, and the KBR393 crystal X1 which could be dry-jointed or defective. The M50462P chip IC1 is suspect if the other things mentioned are all OK. If there is intermittent operation or only one button doesn't function it may be necessary to replace the remote control handset.

Model CT2964STX

This model has a lot in common with the CT2965STX, including the line timebase and several of the sub-panels, but there are different field (AN5521) and audio (LA4270) output chips and the chopper power supply is totally different. Some of the information above also

applies to the CT2964STX therefore.

The power supply circuitry in Model CT2964STX is a modified version of the arrangement used in the Euro 4 chassis. There are two chopper circuits, the main one which is based on an STR59041 chopper chip IC901 and a standby supply that produces -30V and 5V outputs. The basic arrangement was dealt with in my article on the Euro 4 chassis in the July 1991 issue of *Television*.

A fault with the STR59041 chopper chip in Model CT2964STX can cause high voltages with the failure of many components on the main PCB and the pincushion control (PCC) PCB. If the PCC PCB is badly damaged it may be necessary to fit a replacement. Ensure that IC901 and the 2SD1879 line output transistor Q552 have been replaced. I have never had PCC PCB burn-ups with Model CT2964STX.

Another problem you can get with Model CT2964STX is a pattern that looks like co-channel interference. It usually occurs only at switch on, lasting for a few minutes. The cause of the fault seems to be ripple on the 12V line, the usual culprit being C920 (470µF, 25V, 105°C). If replacing this doesn't solve the problem, check C925 (10µF, 25V) and the connections to the 12V regulator IC902 - if the legs seem to have overheated and are a dull colour, fit a new µPC7812H IC. On some occasions it may be necessary to replace the equivalent components in the 5V supply: reservoir capacitor C922 (100µF, 25V), smoothing capacitor C923 (100µF, 10V) and regulator chip IC903 (µPC78M05H).

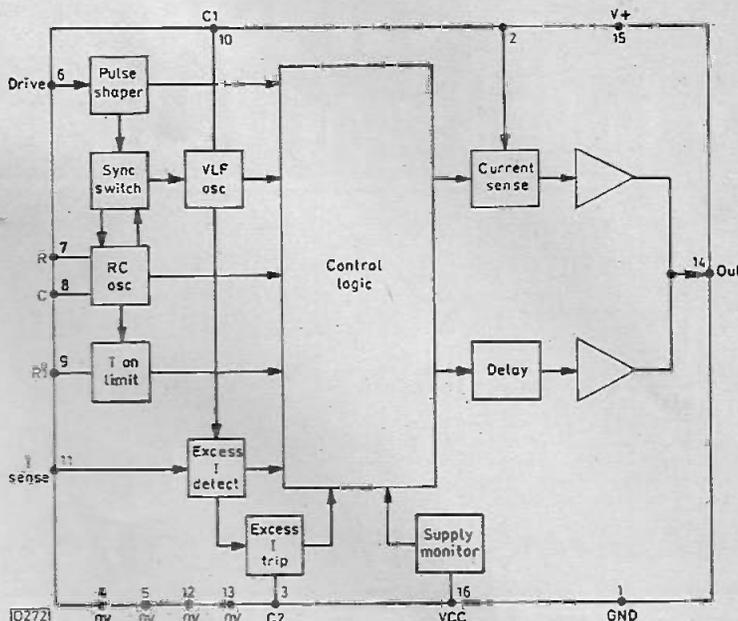


Fig. 3: Block diagram of the TEA2164 slave regulator control chip.

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CTV14RS	1465	19.99	ANS921	2.99	LA7838	6.00	STK7226	6.50	TD41520	4.00	
EASY 10	1480A	16.99	AP025	1.50	LA7839	30.00	STK7308	4.25	TD41521	3.50	
CTV741	1482A	16.99	AN7171	3.40	MA91BB1	6.50	STK7348	4.50	TD41522	7.00	
AMSTRAD	CT282BETX	16.99	AN7178	4.25	MA91BB2	8.50	STK7356	6.00	TD41524	7.00	
CTV2200	14.99	CT2894ETX	18.90	BA1109	1.80	MS453A-54	16.00	STK8250	6.00	TD41554	7.00
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Z9021	KT4	16.99	BA1231	2.99	MS454B	3.99	STR81119	7.75	TD42378	3.00	
Z9021	KT4	16.99	BA1232	1.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
FIDELITY	KT30	10.99	BA1233	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000C	KT40	16.99	BA1234	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000D	KT40	16.99	BA1235	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000E	KT40	16.99	BA1236	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000F	KT40	16.99	BA1237	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000G	KT40	16.99	BA1238	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000H	KT40	16.99	BA1239	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000I	KT40	16.99	BA1240	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000J	KT40	16.99	BA1241	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000K	KT40	16.99	BA1242	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000L	KT40	16.99	BA1243	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000M	KT40	16.99	BA1244	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000N	KT40	16.99	BA1245	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000O	KT40	16.99	BA1246	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000P	KT40	16.99	BA1247	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000Q	KT40	16.99	BA1248	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000R	KT40	16.99	BA1249	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000S	KT40	16.99	BA1250	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000T	KT40	16.99	BA1251	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000U	KT40	16.99	BA1252	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000V	KT40	16.99	BA1253	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000W	KT40	16.99	BA1254	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000X	KT40	16.99	BA1255	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000Y	KT40	16.99	BA1256	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2000Z	KT40	16.99	BA1257	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2001	KT40	16.99	BA1258	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2002	KT40	16.99	BA1259	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2003	KT40	16.99	BA1260	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2004	KT40	16.99	BA1261	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2005	KT40	16.99	BA1262	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2006	KT40	16.99	BA1263	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2007	KT40	16.99	BA1264	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2008	KT40	16.99	BA1265	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2009	KT40	16.99	BA1266	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2010	KT40	16.99	BA1267	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2011	KT40	16.99	BA1268	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2012	KT40	16.99	BA1269	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2013	KT40	16.99	BA1270	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2014	KT40	16.99	BA1271	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2015	KT40	16.99	BA1272	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2016	KT40	16.99	BA1273	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2017	KT40	16.99	BA1274	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2018	KT40	16.99	BA1275	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2019	KT40	16.99	BA1276	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2020	KT40	16.99	BA1277	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2021	KT40	16.99	BA1278	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2022	KT40	16.99	BA1279	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2023	KT40	16.99	BA1280	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2024	KT40	16.99	BA1281	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2025	KT40	16.99	BA1282	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2026	KT40	16.99	BA1283	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2027	KT40	16.99	BA1284	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2028	KT40	16.99	BA1285	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2029	KT40	16.99	BA1286	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2030	KT40	16.99	BA1287	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2031	KT40	16.99	BA1288	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2032	KT40	16.99	BA1289	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2033	KT40	16.99	BA1290	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2034	KT40	16.99	BA1291	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2035	KT40	16.99	BA1292	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2036	KT40	16.99	BA1293	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2037	KT40	16.99	BA1294	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2038	KT40	16.99	BA1295	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2039	KT40	16.99	BA1296	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2040	KT40	16.99	BA1297	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2041	KT40	16.99	BA1298	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2042	KT40	16.99	BA1299	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2043	KT40	16.99	BA1300	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2044	KT40	16.99	BA1301	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2045	KT40	16.99	BA1302	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2046	KT40	16.99	BA1303	2.99	MC1300B73	3.99	STR81119	7.75	TD42378	3.00	
D2047	KT40	16.99	BA1304	2.99	MC1300B73	3.99	STR81119	7.75	TD423		

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1N4001	0.04	2SC2570A	0.30	AMS265	1.74	BC558C	0.10	BR744	1.02	CD4016	0.14	RS156	2.40	TD41012A	1.56	TD468020	4.27
1N4002	0.07	2SC2655	0.31	AN5435	1.46	BC558C	0.06	BR749	0.43	CD4017	0.47	RS358	0.55	TD41015	1.37	TD46601	1.46
1N4004	0.04	2SC3153	2.65	AN5512	1.78	BC563E	0.14	BR755	0.28	CD4049	0.35	RS68A8Y10	15.90	TD41035T	4.27	TD46801D	4.02
1N4005	0.07	2SC3182	1.20	AN5515	2.73	BC637	0.11	BSX20	0.35	CD4053	0.54	RS7106	0.26	TD41044	1.43	TD44605	4.10
1N4006	0.04	2SC3225	0.50	AN5521	1.66	BC639	0.21	BT139600	1.29	CD4093	0.32	RS7153	0.17	TD41060	1.00	TD44905	1.70
1N4007	0.06	2SC3330	0.52	AN6610	0.84	BC640	0.11	BT151500R	1.12	CD4093	1.29	RS715M	0.44	TD41085C	1.74	TD44952	1.70
1N4148	0.06	2SC3502	0.45	AN7171K	5.55	BC848B	0.20	BT151800R	1.15	CMK82A	2.10	RS730M	0.30	TD41170	2.02	TD47240A	2.57
1N5062	0.26	2SC3795	2.89	BA157	0.89	BC848C	0.10	BZ208A	1.46	CMK83A	2.55	S2000A3	1.54	TD41170M	2.57	TD48132	1.87
1N5400	0.11	2SC3795B	2.21	BA158	0.87	BC858B	0.24	BZ2080	1.61	CNY75B	0.52	S2000AF	1.71	TD41170S	2.05	TD48140	4.82
1N5401	0.14	2SC3807	0.91	BA159	0.11	BC859C	0.19	BZ28A	1.36	DTA114ES	0.31	S2055AF	3.74	TD41180P	1.69	TD48145	1.87
1N5402	0.12	2SC3885A	6.82	BA3910B	6.99	BC875	0.33	BU406	0.89	DTA124ES	0.19	SAA129302	10.37	TD41180P	3.16	TD48153	16.24
1N5408	0.14	2SC3892A	6.82	BA5406	2.14	BD131	0.26	BU426A	1.29	DTC124E	0.19	SAA5012	3.34	TD415160	3.59	TD48170	4.70
1N6263	0.20	2SC4204	0.60	BA5412	2.44	BD132	0.26	BU500	1.41	DTC124ES	0.77	SAB3035	1.71	TD415180	4.27	TD48172	2.85
1N9114	0.04	2SC4242	2.31	BA6109	1.85	BD135	0.33	BU500S	1.35	DTD144ES	0.79	SDA2516	2.09	TD41519	4.27	TD48175	0.41
1S1555	0.07	2SC4517	4.70	BA6209	1.46	BD136	0.20	BU508	0.29	FTX749	0.43	SGSF344	10.70	TD41520B	2.48	TD48179FS	3.98
2N2222A	0.23	2SC4517A	2.52	BA6209M	1.27	BD137	0.46	BU508AF	1.32	HA13001	3.85	SL1430	1.02	TD41524A	2.39	TD48180	4.87
2N2369A	0.19	2SC4518	0.12	BA6219B	1.76	BD138	0.29	BU508B	1.56	HA13108	2.57	SL1431	2.82	TD415530	4.79	TD48180	3.59
2N3055	0.50	2SC4742	5.11	BA6222	1.70	BD139	0.31	BU5300F	1.88	HA13317	2.05	SL1432	10.17	TD415540	8.12	TD48180	2.53
2N3773	1.52	2SC536	0.30	BA6238A	2.91	BD140	0.24	BU508V	2.48	HA13318	1.88	SL1431	3.06	TD415570	4.23	TD48180	2.13
2N3904	0.32	2SC8050	0.52	BA6247	1.95	BD233	0.23	BU606	1.83	HA13319	2.05	SL1431	10.00	TD415580	7.58	TD48180	2.11
2N4123	0.30	2SC945	0.12	BA718	1.08	BD234	0.24	BU807	0.51	HA13351	13.29	SL1431	10.23	TD41670A	2.98	TD48180	2.29
2S41013	0.35	2SD1207	0.57	BA785	0.96	BD237	0.31	BU908	1.60	HA13352	7.69	SL1431	9.48	TD41675A	3.05	TD48180	7.84
2S41015	0.11	2SD1266	0.82	BA786	0.21	BD238	0.24	BUK444500B	2.57	HME251	14.32	SL1431	10.08	TD41904	1.83	TD48180	4.26
2S41015GR	0.11	2SD1275	1.41	BAW76	0.03	BD239	0.33	BUK454600C	2.99	KAZ263	0.55	SL1431	11.49	TD41908A	2.14	TD48180	3.40
2S41020	0.44	2SD1292	0.64	BA114	0.17	BD240	0.44	BUK454800A	4.99	K8108	1.42	SL1431	2.87	TD42004	3.05	TD48180	9.50
2S41175	0.26	2SD1397	2.31	BC107B	0.20	BD244A	0.34	BUK455600B	2.54	NAE210AH	6.15	SL1431	2.82	TD42005	1.83	TD48180	2.48
2S41296	0.60	2SD1398	2.14	BC108	0.24	BD244C	0.42	BUT11	0.85	LAI230	1.95	SL1431	15.00	TD42006	0.86	TD48180	3.68
2S41370	0.43	2SD1426	3.51	BC108C	0.15	BD433	0.29	BUT11A	0.95	LA4282	4.83	SL1431	4.07	TD42008	1.86	TD48180	0.40
2S41706	0.50	2SD1439	5.86	BC109A	0.20	BD434	0.31	BUT11AF	1.18	LA4440	3.45	SL1431	0.84	TD42009	0.84	TD48180	2.91
2S4608	0.24	2SD1441	5.90	BC141	0.36	BD437	0.28	BUT12A	0.97	LA4445	3.45	SL1431	9.52	TD42040H	4.34	TD48180	0.82
2S4673	0.10	2SD1453	3.85	BC147A	0.24	BD438	0.38	BUT12AF	1.81	LA4700	4.27	SL1431	4.87	TD42050	4.56	TD48180	0.86
2S4733	0.10	2SD1497	4.74	BC148A	0.35	BD826	0.35	BUT18AF	1.37	LAG558S	0.60	SL1431	8.12	TD42170	1.20	TD48180	1.12
2S4769	1.20	2SD1541	4.06	BC157	0.13	BD839	0.57	BUT18A	1.19	LAG558S	0.27	SL1431	5.52	TD42270	0.98	TD48180	0.86
2S4872A	0.35	2SD1546	7.69	BC158B	0.12	BD901	0.52	BUT18AF	3.48	LA7520	2.94	SL1431	5.80	TD42540	1.20	TD48180	1.12
2S4933	0.36	2SD1548	3.95	BC182L	0.14	BD902	0.80	BUT18AF	0.80	LA7900	1.81	SL1431	5.14	TD42540	1.12	TD48180	0.36
2S4966	0.41	2SD1554	3.25	BC184A	0.12	BD939F	1.01	BUT18AF	1.81	LA7900	1.81	SL1431	7.37	TD42576A	5.95	TD48180	0.95
2S4970	0.19	2SD1555	2.65	BC184L	0.06	BD165C	1.00	BUT18AF	1.60	LA7835	2.99	SL1431	9.48	TD42577A	2.98	TD48180	0.50
2S4984	0.38	2SD1556	5.11	BC184C	0.10	BF180	0.38	BUT18AF	1.38	LA7837	2.48	SL1431	23.41	TD42578A	2.97	TD48180	0.40
2S81010	0.35	2SD1651	2.36	BC212	0.89	BF194	0.22	BUT18AF	1.60	LC7132	4.70	SL1431	9.30	TD42579A	4.01	TD48180	0.47
2S81143	0.77	2SD1710	2.52	BC212B	0.10	BF199	0.84	BUT18AF	0.84	LED36	0.63	SL1431	4.48	TD42581E	4.27	TD48180	0.40
2S81243	0.60	2SD1877	2.14	BC212L	0.10	BF224	0.21	BUT18AF	0.84	LED3R	0.10	SL1431	5.56	TD42582C	1.80	TD48180	0.82
2S8641	0.21	2SD1878	2.63	BC213L	0.04	BF240	0.11	BUT18AF	0.84	LED3Y	0.10	SL1431	10.52	TD42582C	3.05	TD48180	0.93
2S8649A	0.77	2SD1884	3.35	BC2237B	0.19	BF244	0.43	BUT18AF	0.84	LM317T	1.29	SL1431	3.68	TD42583A	2.21	TD48180	0.17
2S8686	2.05	2SD1887	3.56	BC238	0.11	BF245A	0.19	BUT18AF	0.84	LM324N	1.48	SL1431	3.42	TD42583A	2.19	TD48180	0.80
2S8698	0.35	2SD1911	5.90	BC238C	0.07	BF245B	0.41	BUT18AF	0.84	LM339N	0.50	SL1431	8.11	TD42583A	2.89	TD48180	0.45
2S8716	0.43	2SD350A	1.97	BC307	0.06	BF256A	0.23	BUT18AF	0.84	LM358N	0.52	SL1431	6.07	TD42583A	0.64	TD48180	0.40
2S8764	0.30	2SD400	0.34	BC307B	0.15	BF258	0.04	BUT18AF	0.84	MA9481	11.85	SL1431	10.86	TD42583A	1.32	TD48180	1.74
2S8772	0.50	2SD401A	0.77	BC308	0.09	BF324	0.18	BUT18AF	0.84	MS218L	0.89	SL1431	7.69	TD42583A	4.79	TD48180	1.82
2S8774	1.61	2SD468	0.28	BC308B	0.19	BF391	0.18	BUT18AF	0.84	MS4544L	2.84	SL1431	11.49	TD42583A	6.75	TD48180	0.65
2S8891	0.80	2SD669A	0.84	BC309C	0.14	BF420	0.21	BUT18AF	0.84	MS8655P	4.96	SL1431	1.35	TD42583A	2.48	TD48180	0.21
2S8892	0.35	2SD716	1.63	BC327	0.10	BF421	0.24	BUT18AF	0.84	MC13002P	7.69	SL1431	1.87	TD42583A	3.86	TD48180	2.57
2S91213	0.14	2SD756	0.47	BC328	0.14	BF422	0.19	BUT18AF	0.84	MC14065B	0.21	SL1431	2.87	TD42583A	5.30	TD48180	1.85
2S9124	0.48	2SD837B	1.12	BC337	0.14	BF423	0.14	BUT18AF	0.84	MC14426P	1.29	SL1431	2.29	TD42583A	1.90	TD48180	1.25
2S91318	0.19	2SD856	0.79	BC338	0.06	BF458	0.31	BUT18AF	0.84	MDA2062	13.74	SL1431	2.72	TD42583A	8.57	TD48180	0.80
2S91573	0.35	2SD898B	0.41	BC368	0.10	BF459	0.43	BUT18AF	0.84	MI2955	0.80	SL1431	2.70	TD42583A	2.24	TD48180	0.21
2S91740	0.16	2SD965	0.87	BC369	0.10	BF460	4.82	BUT18AF	0.84	MI4052	3.34	SL1431	4.83	TD42583A	5.30	TD48180	1.85
2S91815	0.17	2SK1118	1.40	BC372	0.48	BF469	0.34	BUT18AF	0.84	MI4802	2.91	SL1431	2.74	TD42583A	10.31	TD48180	16.63
2S91827	0.90	7406	0.69	BC517	0.16	BF470	0.38	BUT18AF	0.84	MI13005	0.86	SL1431	3.28	TD42583A	4.27	TD48180	10.85
2S91959	0.18	7407	0.69	BC548A	0.11	BF471	0.37	BUT18AF	0.84	MI18004	2.60	SL1431	5.87	TD42583A	5.90	TD48180	2.40
2S92001	0.23	74N004	0.34	BC548B	0.12	BF487	0.57	BUT18AF	0.84	MI3055T	0.74	SL1431	3.95	TD42583A	12.02	TD48180	1.46
2S92023	3.10	7805	0.78	BC547	0.11	BF759	0.38	BUT18AF	0.84	MI3055T	0.21	SL1431	4.50	TD42583A	1.54	TD48180	1.29
2S92060	0.30	7808	0.72	BC547A	0.04	BF763	0.23	BUT18AF	0.84	MI3055T	2.05	SL1431	2.74	TD42583A	2.95	TD48180	1.91
2S92078	1.00	7809	0.69	BC547B	0.11	BF788	0.52	BUT18AF	0.84	MI3055T	3.30	SL1431	4.18	TD42583A	2.57	TD48180	3.44
2S92120	0.23	7812	0.52	BC548	0.06	BF869	0.25	BUT18AF	0.84	MPS406	0.35	SL1431	4.70	TD42583A	1.84	TD48180	3.75
2S92230	0.55	7815	0.82	BC548A	0.11	BF869S	0.48	BUT18AF	0.84	MPS421	0.23	SL1431	4.90	TD42583A	2.82	TD48180	1.70
2S92235	0.36	7810S	0.35	BC548C	0.06	BF871	0.41	BUT18AF	0.84	MPS456	0.23	SL1431	5.82	TD42583A	4.66	TD48180	1.68

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diameter of 50cm. It is recommended that the dish should be a minimum of 80cm and not more than 1 metre. This may involve upgrading the size of the dish, in which case an 80cm or 95cm dish can be provided.

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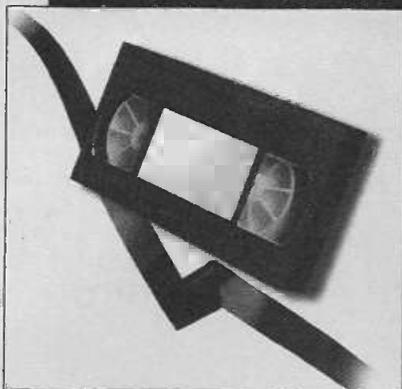
The common fixed dish system has been made obsolete overnight, thanks to the invention of a new and ingenious horizon-to-horizon mini polar mount which is available now at a price that most families can afford. It is a do-it-yourself add on unit which can be tailored to fit most existing mounts provided that your original pole is vertical and has an outside

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Reports from
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Gerald Smith

Philips VR323 (Charlie Deck)

Tape damage because it rides up or down the capstan is a routine fault with the older Charlie range of VCRs. The cause is often a defective pinch roller, but lately I've had several cases where this has not been the cause. The take-up torque has been excessive because the coupling (item 214 in the exploded view of the deck) is faulty. This item and the pinch roller are included in service kit 4822 310 31803.

Take care with the back-tension band when fitting a service kit to a Charlie deck. Make sure that it is clipped into its holder. I've come across cases where this has not been done. The resultant low back tension produces spotty playback pictures with the tape running up or down the capstan. P.B.

Ferguson 3V65

This machine thought it had a tape inside and was trying to rewind it, though there was no cassette present. When I've encountered this fault on previous occasions the cause has been loss of the switched

VCR Clinic

outputs from the STK5481 chip. But in this case the supplies were all OK. There was no voltage at the cassette lift however. On inspection the motherboard was found to be suffering from dry-joints at the connectors, especially at CN1. P.B.

Pioneer VR737

This machine worked all right but there was no display. I was able to use the Philips VR6484 manual to find that fuse 1216 in the power supply was open-circuit. P.B.

Mitsubishi HSM57

"Noise on Nicam" was the complaint. Sure enough when stereo was selected in the E-E mode there was a loud rushing noise that swamped the audio signal. Mono E-E sound, also hi-fi record and playback sound, were OK.

A problem in the area of the digital-to-analogue converters seemed likely – otherwise I would have expected the internal muting to have been in operation. Checks around the TD6710AN chip soon bore fruit: the 16.93MHz resonator X7A2 wasn't oscillating. A replacement restored the Nicam sound to normal. P.B.

Logic VR960

If the problem is no operation light and no functions, the STK5332 power regulator chip is probably faulty. J.C.

Toshiba V215B

If there's no fast-forward movement because the main brake has not released, being in the on position, reset its mechanical position. J.C.

Panasonic NVL20

There was no display or operation. C1109 (1µF) in the power supply is the usual cause of this – it goes open-circuit. But this time the mains input fuse had blown because

the bridge rectifier D1102 (S1WBAGO) was short-circuit. Note that the STRD1816 auto voltage-selector chip IC1101 can go short-circuit between pins 2, 3 and 4. J.C.

GoldStar RQ2931

It's becoming quite common to get a dead machine, the cause being failure of the KIA7806 6V regulator chip IC101 in the power supply. G.T.

Toshiba V404B

There were no results. Power supply checks showed that the outputs were all low by about 50 per cent. The U4614B control chip IPO01 in the primary side of the power supply was faulty. G.T.

Ferguson FV26D

A check in the power supply of this dead machine revealed that R1 was open-circuit. It's a safety resistor which is mounted near the mains transformer. G.T.

Panasonic NVJ45

There was no E-E tuning, though loophrough and playback were fine. The tuner used in these VCRs is known for problems, but not of this sort. Checks showed that its 12V BU supply was missing. This comes from the adjacent band-switching chip, which is largely redundant in the UK version. Pin 12 of this chip produced a low reading of 0.2V, though its supplies and controls were all fine. A resistance check here produced a reading of 1kΩ to chassis. So I tried, to no avail, a replacement chip from a scrap unit.

I then noticed that the tuner had been replaced, and that one lug of its case is soldered very close to the print to the BU pin. There are a couple of surface-mounted links on this print. One was touching the

rather bulbous joint on the tuner's lug – or was it? The resistance check had produced a reading of $1k\Omega$: it now read short-circuit! Tidying up the joint restored the $1k\Omega$ reading and the tuning. But I didn't trust the original chip. N.B.

Samsung VIK316

This machine produced a very dim display. It was invisible in standby, and barely visible when powered up: Otherwise the unit worked fine. The filament supply was at 2.5V, with 6V peak-to-peak of hash on it. This pointed to capacitor trouble, and we duly found that C38 (100 μ F, 10V) was open-circuit. The correct filament supply voltage is not quoted in the manual: with the machine working correctly I found that the reading was 5.72V. N.B.

Panasonic NVG10

This elderly VCR's playback vision was dull and there was no field sync. When a recording was played back on another machine it was fine. It seemed likely that there was a faulty electrolytic in the playback luminance path, and a search for a suitable candidate brought me to C306 (10 μ F). A scope check across this capacitor proved its guilt, while a warm iron on its top cleared the fault. A replacement restored the playback vision. N.B.

Mitsubishi HS337

This machine came in because it had mechanical problems, and did need a good service. On test from cold however it was found to produce very weak playback vision – a check on a recording with another machine proved that the fault was with playback only. We found that a small resistor had been tacked across C2C1 (10 μ F) on the print side of the PCB, to which it was glued. This glue was now conductive when cold. Removing it and cleaning up the area cured the fault. N.B.

Panasonic NVL25 Remote

As the remote control handset that goes with this model is expensive to replace I decided to try to repair it. The problem was that the scanner section wouldn't switch off – the red beam stayed on all the time, with the result that battery life was very short. Pin 13 of IC2, the scanner control chip, was stuck at 1.5V – this is the power-on line. The switching signal comes from a microcontroller chip via QR2, which is a UN2211 digital transistor (internal biasing). As the base of

this transistor toggled correctly while its collector voltage remained at 1.5V it was obviously open-circuit. A replacement restored normal operation – it's a surface-mounted device. N.B.

Panasonic NVG40

There was no capstan phase lock in the playback mode though record was OK. Checks around IC2101 on the servo sub-pack produced the following results: the capstan speed duty cycle at pin 16 was correct at 50:50, though the DC voltage was high at 5V instead of 2.5V; the capstan phase duty cycle at pin 17 was wrong at 1:99, with the DC voltage at 0V instead of 2.5V; the DC voltage at pin 2 (tracking MMV) was low at 0.3V. The latter seemed odd, as this is a simple DC control voltage obtained from the 5V supply via the tracking control. Herein lay the simple answer: there was no 5V at the top end of the tracking control as the grey single wire to the control sub-PCB from the timer PCB (pin 4 of P7503) had broken off. It had never been secured by tape or glue. N.B.

Panasonic NVJ35 etc

The dead machine symptom with any model that uses this power supply can be caused by C1119 (680 μ F) on the secondary side of the supply being short-circuit. This is unusual however: the usual cause is C1109 (1 μ F) on the primary side of the supply. The difference is that with C1119 short-circuit you get a slight chirp at switch on. N.B.

Ferguson FV11R/JVC HRD170

There was heavy patterning on the playback picture. One could have been forgiven for suspecting the heads, but this was not the cause. A 4MHz signal was being superimposed on the playback FM.

We scoped every conceivable circuit to try to find the source of the interference. It was only when the short interconnecting lead between the tuner/IF and the mother board was disturbed that there was a noticeable change in the interference signal. When the lead was disconnected, removing the power to the tuner/IF board, there was no interference.

As our scope checks showed that there was a substantial amount of the offending interference signal on the power supply rails, we looked questioningly at the 5V regulator chip on the tuner/IF board. It seemed to be running very hot, and

when a quick burst of freezer was applied the patterning disappeared. It seems that as the 7805 regulator's temperature rose it began to behave as an effective signal generator. K.E.

Matsui VX2500

Our customer complained that this machine wouldn't record. On test it soon became apparent that the cause of the fault lay in the receiver section, where it was possible to select stations but the signals were badly broken up. As the problem looked like poor demodulation, we decided to replace the LA7577 chip IC01. This restored normal operation. K.E.

Samsung VI611

This machine's clock display was intermittent. There should be -24V at pin 17 of the power supply's output socket: when the display was out there was only -1V here. The -24V supply is derived from the mains transformer by rectifier D1 (1N4002) and its reservoir capacitor C3 (47 μ F), with stabilisation by Q1 and ZD2. As you often find in Samsung machines, some of the components are glued to the PCB. The trouble is that the glue becomes conductive. This was the cause of the problem – when the fault was present Q1 was bottomed. Removing the glue cured the fault. C.W.

Sharp VCA55

When this machine had been used in the search mode, particularly in the forward search mode, it would sometimes continue to move the tape at search speed after play had been selected – with the play symbol showing in the display. The cause of the fault was traced to the capstan motor. Although its control voltage would change to the play level, the motor would continue to run at the higher speed. C.W.

Sharp VCM20

Even after fitting a heatsink Q901 blew intermittently. In addition the chopper transformer would buzz. The cause of the problem was dry-joints on the optocoupler IC901. G.S.

JVC HRJ565

There were various erratic faults, for example the power light not lighting, the capstan going into the rewind mode by itself, the machine cutting off to standby and failure to accept tapes. The cause was oxidised glue in the power supply. G.S.

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: Alignment instruction videotape for the Panasonic G deck, also a main TV PCB for the Amstrad TVR3. Service TV, 18 Benfleet Road, Hadleigh, Essex SS7 1QB. 01702 558 444.

Wanted: Circuit diagram or any other information on the Princeton Graphic Systems LM300 monitor. E. L'Amie, 8 Harty Avenue, Wigmore, Gillingham, Kent ME8 0NA. 01634 234 661.

Wanted: Deflection yoke for a Matsui Model 2160 (line coils are shorted) and a readable copy of the circuit for the Matsui 1422, also an MAA4032A control panel chip (IC01) for the ITT Model TX3437 (Compact B-110 chassis) or a working scrap panel. Chris Lowe, Electrotech Services, 10 Buttermere Road, Redcar, Cleveland TS10 1LL. 01642 486 868.

Wanted: Service manuals for the Toshiba V9600B and Ferguson 3V29 VCRs. B. Ashton, 23 Newcastle Street, Barrow-in-Furness, Cumbria LA13 9TB. 01229 836 769.

Wanted: HVR block and H Stat for the Sony Model KV2060UB. Need not be new as long as working. M. Payne, 294 Whiteleas Way, South Shields, Tyne and Wear NE34 8HW. 01915 192 848 after 4.00 p.m.

Wanted: Power supply/timebase panel for the Fidelity Model CTV14S (ZX2000 chassis), preferably working. Keith Patton, 1 Glendale, Duneaney Road, Glarryford, Ballymena, Co. Antrim BT44 9QB. 01266 685 531.

For disposal: Telequipment scopes, Models D32, D61 and S51, and an Advance E2 signal generator, all with manuals. Zenith 100L variac. *Television* magazines from 1971 to date. Minimal cost to collector. Also an EMI L2A tape recorder: offers please for this rare, unused item. A Ferguson 25in. colour set with 4000 chassis, working and free to collector. Harry Mellor, Gatesgarth, Back Lane, Airton,

Skipton, North Yorks BD23 4AL. 01729 830 417.

Wanted: LOPT (part no. 02-463003123) for the Seleco Model 16ZB312GB. M. Tapscott, 2 Oaktree Cottage, Royal Oak Road, The Pludds, Glos GL17 9UG. 01594 861 169.

Wanted: Circuit diagrams for the B&K Precision Model 1500 oscilloscope, made by the Dynascan Corporation. Good photocopies OK. Also details of any UK source of spares. Nigel K. Goodman, 24 Greenacres, Westfield, Nr. Hastings, East Sussex TN35 4QT. 01424 756 221.

Wanted: Service data for the Panasonic NV7000EM multi-standard VCR, the JVC HR7200/Ferguson 3V29 and the Toshiba V9600B. Also looking for a Mazda CRM173 or equivalent 17in. CRT. Terry Martini, 122B Cannon Street Road, London E1 2LH. 0171 702 8774, fax 0171 702 8216.

Wanted: New or used. Tuner/IF unit and cassette carriage for the Fisher FVH-P905; video deck for the Akai VSF440; head preamplifier screening can top lid (item 501a in the exploded view) for the Philips VR6760. Colin McCormick, 23 Shapleys Gardens, Staddiscombe, Plymouth, Devon PL9 9TY. 01752 693 615 or 01752 405 201 (home).

Wanted: Circuit diagram or service manual (photocopy OK) for the HCM 1421B monitor (made by Hyundai). W.J. Alderman, Outspan, Quethiock, Liskeard, Cornwall PL14 3SQ.

Wanted: Service manual for the CM335 14in. monitor or can anyone tell me who made/distributed it - there's no make shown on the monitor. Also an MN15245SAY-1 IC and a service manual for the Datsura CDR9009 14in. CTV. K. Howells, 81 Wye Court, Thornhill, Cwmbran, Gwent NP44 5UL. 01633 838 464.

Wanted: Service manual or circuit diagram for the Philips PM3110 oscilloscope. Geoff Salt, 133 Cromwell Road, St. Andrews,

Bristol BS6 5EX. 01179 425 649.
For disposal: Twenty different valve types for TV sets, new and boxed. Must cover postage. J. Harris, 44 Rymond Road, Birmingham B34 6BT. 01217 487 240.

Wanted: Viewfinder CRT (NEC 0.5in. type C1M40P45 5H51) for the Hitachi VK-C1600E camera. Peter J. Wills, 2 Gard Close, Barton, Torquay TQ2 8QU. 01803 327 725.

Wanted: B&O Beogram 2000/3000 turntable/CDX CD player; also an RC handset for the Ferguson FV12L VCR. Tim Jarman, 203 Lynchford Road, Farnborough, Hants GU14 6HF. 01252 511 299.

Wanted: Service manual or information on the Sharp VCT72H and Bush VCR3501 (photocopy OK). C. Raynor, 39 Northway, Lymm, Cheshire WA13 9AT. 01925 822 673.

Wanted: Working lower drum assembly for the Sony SLV373UB (secondhand will do) and a capstan motor assembly for the Hitachi VT428E. David Paines, 2 Sycamore Crescent, Bawtry, Doncaster DN10 6LE. 01302 710 797.

Wanted: IF transformers or a complete chassis for the Bush VTR103 portable radio. Roger White, 47 Bosvean Road, Shortlanesend, Truro, Cornwall TR4 9DX. 0187 276 186.

Wanted: Function select switch and service manual/data for the NEC TV5500 TV/radio/cassette combination. Stephen Hall, 9 Reayrt Aalin, Ramsey Road, Peel, Isle of Man IM5 1US.

Wanted: Circuit diagram and any other information on the Harvard 14in. monitor, also supplier for the SGST444 line output transistor. George Watson, 30 Bradwell Close, Mickleover, Derby DE3 5DY. 01332 722 781.

Wanted: Scan coil type 89-2389-00 to fit CRT type 510VSB22. R.M. Dowling, 393 Blackfen Road, Sidcup, Kent DA15 9NJ. 0181 303 1721.

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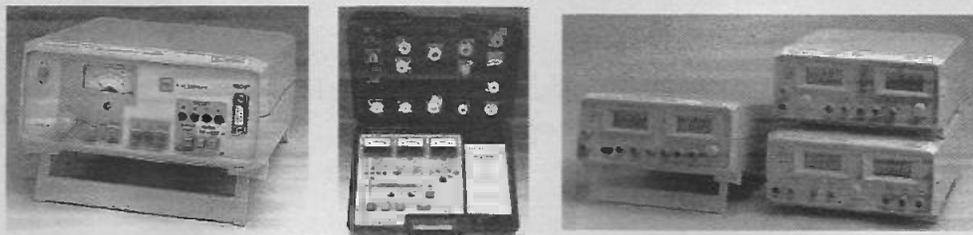
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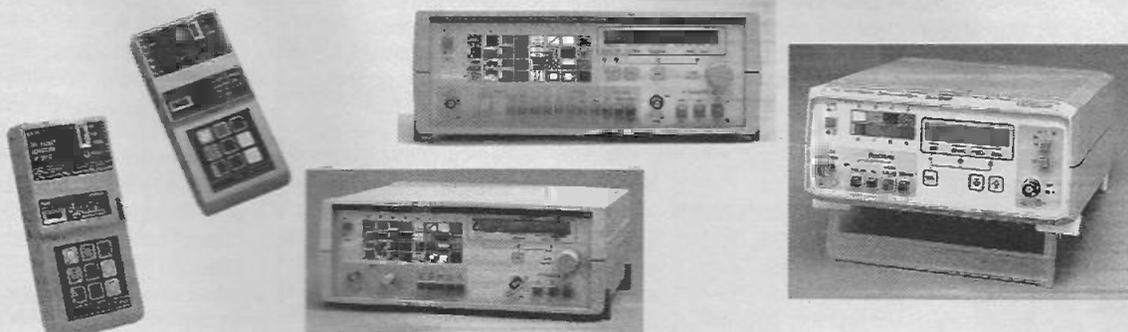
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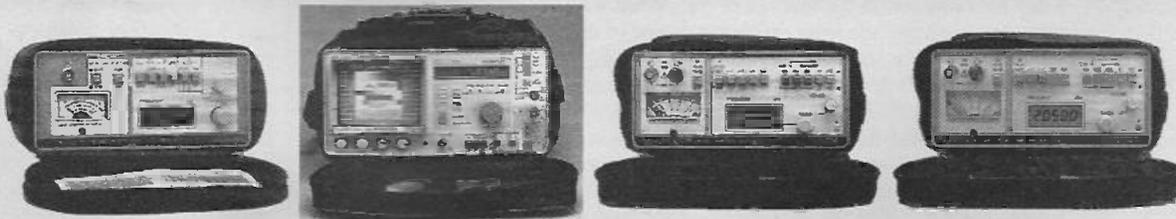
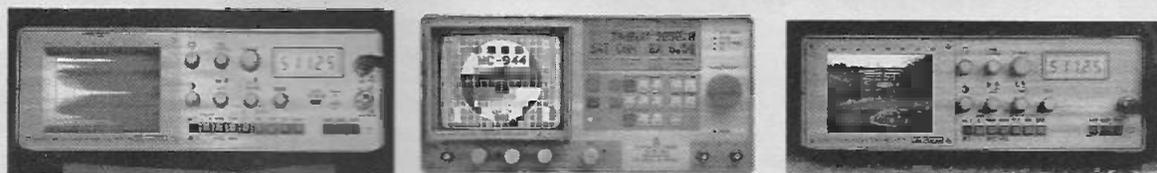
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What a Life!

**A mixed batch of TV problems and customers of various sorts.
Donald Bullock's workshop scene**

While we were in Spain last week our neighbour, the Widow Twerpy, called us over. Her Sky News channel had suddenly deteriorated – it was just possible to see and hear what was going on through the snowy screen and hissing sound. We weren't all that surprised, as there had been a spell of winter storms with strong gales (those who only visit Spain for summer holidays have no idea!). But the other channels were all OK. In fact apart from Sky News her reception was excellent.

We tried another receiver-decoder, but it made no difference. So we connected a new download from her LNB to the receiver-decoder. This made no difference either. Time to take the LNB to the workshop for investigation.

It's an older type, with an open-ended horn. As I was wondering whether the damp had got into it, out bounced a huge jumping spider. They are common in these parts. I have seen one pounce from nowhere on to a bluebottle, then grip and eat it in a trice. I was frightened to death.

But the spider cleared off. I studied the LNB carefully and decided to open it. Then I saw a pair of powerful arms protruding from behind the Avo. All further work was swiftly delegated to son James.

He connected the LNB to our workshop dish, and found that the fault was still present. Sky News was virtually unviewable. So he shone the bench light into the horn, picked up a pair of tweezers, and in no time had removed a huge ball of cobwebby stuff from deep inside the horn.

Then he reached for a screwdriver and hesitated. He looked worried. "I hope there isn't one of those jumping spiders inside" he said.

"Don't worry" I replied. "It's gone. Jumped out and disappeared some-

where behind the Avo. James got up and fled.

After a while I managed to coax him back. He opened the LNB, removed the rest of the debris, and reassembled it. Then he tested it again. Sky News was now perfect. The reception I mean, not the programme.

More LNB Trouble

As the boys took the LNB back to the Widow Twerpy I returned to the house to find Greeneyes peering at a mass of snow on the screen of our 27in. Sanyo set, which is run from a separate LNB feed.

"Look what's just happened to Sky News" she said. "It was all right a minute ago."

I looked at the picture. It was as bad as the Widow Twerpy's had been. And the other channels were all perfect. More spiders?

As the LNB is a dual-output type, I decided to swap over the downloads. What with the rain and the winds, one of them might have become waterlogged. But this made no difference. It was going to be another workshop job.

When I opened it I found that rainwater had got in at the cable exit points – there was a small area of green corrosion. I cleaned this off, carefully valeted the unit with a just-warm hairdryer, then reassembled it. It worked perfectly after that. When I refitted it I sealed it up like Fort Knox.

More Sound

A man who looked like a ransacked ferret approached the workshop the other day. He was nursing an Hitachi colour portable, Model C14 P216. There's a stock sound fault with these sets, and I sniffed easy money to be made.

"Come in, er... Sir" I smiled. "Wollitis Mr Block, is this" he

said, holding up the set. "Wollitis is the sound."

"Good, good" I said with great sincerity. "Tell me what it really is, what it really is."

"Wollitis, Mr Block, is I wanted the sound louder. So wollidid, Mr Block, is I opened it up and connected my big hi-fi speakers."

"You stupid twi – er – oh, I see. Ha ha. And why not, eh?" I reached for a pen. "And what name is it?"

"Stoar" he said, "Mr Stoar."

I opened Mr Stoar's set. The original small 8Ω, 2W speaker was both disconnected and ravaged. The wires that had previously connected it lay over the panel.

In this chassis the 10V supply that powers the audio output chip is derived from the line output transformer, via R402 (4.7Ω) which is a safety resistor.

R402 had departed. For reasons that I applaud, the TBA820M audio output chip has been superseded by a KA2201. A new chip, a new speaker and a new safety resistor put the set right.

Mr Stoat came back the next day. "Wollitis, Mr Block, is I've come for the set" he announced.

I hoisted it on to the counter. "Wollitis, Mr Stoat, is twenty quid" I said, "and wollit' ll be if you do it again is forty."

Pffh etc

As he left a large lady barged in carrying a big, clumsy looking set. "He goes 'pffh', Mr Bloop, then the tube goes" she said, throwing her arms apart. "Funny, innit. 'Pffh' an' the tube goes!"

The set was a Pioneer SV2102. I longed for the old days, then faced up to the present. The "tube going" was in fact intermittent field collapse. And when I opened the set I found that it wasn't too frightening – the cabinet contained a Ferguson/

Thomson chassis. I soon saw that the cause of the trouble was a dry-joint at one side of CL54, a 250V, 0.56µF capacitor in the field scan circuit. Resoldering the joint cured the problem.

Davey Ruggles

Our next caller was Davey Ruggles. A decent loser, Davey makes a meagre living from collecting scrap in his battered little lorry. He'd be better off on the dole, but he's not the type. He and his wife have two children and live in a converted bus. They are the most contented family I know.

"I've got some decent customers, Don" he said. "One of 'em gave me this set. If it's worth mending I might make a bob or two. It's the wife's birthday next week, and trade ain't been so good lately."

The set was a Matsui 2086. There was no brightness, and when I advanced the setting of the tube's first anode preset control, after marking it carefully (easier than searching for references later), I found that field collapse was the cause of the trouble. Then I noticed that R419, a safety resistor, was glowing red hot.

We didn't have the circuit diagram, and I didn't feel rich enough to buy one nor well enough to face up to trying to read one obtained from the boys who, to me, are still Mastercare. So it was a matter of attempting a bit of logical diagnosis.

The supplies involved in generating the field scan would probably be derived from the line output transformer. R419 provided a clue. When I traced its wiring, I came to the line output transformer via rectifier diode D406 and safety resistor R421. The associated reservoir capacitor is C423. What was cooking R419?

On the other side of R419 I found a 12V, 1W zener diode (ZD401) that seemed to be short-circuit. But when the set was switched off it read OK. So I switched on again. The field scan jumped up for a second or two then collapsed as R419 began to get hot under the collar. Was it the zener diode or something else? There's a 220µF, 16V smoothing capacitor (C422) in parallel with ZD401. I removed and tested it, but it seemed to be OK. Because I've an inborn prejudice about and suspicion of electrolytic capacitors however I decided to replace it. This time the field scan came up and stayed up. All was well.

Curious, if not paranoid, about this

I connected the electrolytic to a bench power supply via a cut-out. I wound up the supply gradually: when the output reached 8V the cut-out tripped and the capacitor became warm.

When Davey returned we got him to join us over a cup of tea and told him that the set was a write off. He went a bit quiet, but soon brightened up. "Oh well, it didn't do any harm trying" he said, "what do I owe you?"

We waved this question aside and topped up his tea. Steven went out. When Davey had finished his tea he went back to his lorry – then returned almost immediately.

"Hey" he said, "that set's on my passenger seat with a sticker on it saying 'Mended, no charge'. What's it all about?"

"Compliments of the house, Davey" I said, "give your wife and family our regards."

Card Trouble

Jim Sawney is a keen pike angler. He was wearing his waders when he came through the door and put an Amstrad SRD400 satellite receiver-decoder on the bench.

"I've had this blasted thing in my fishing bag for over a week" he said. "Forgot all about it. Now the wife wants to record 'The Princess and the Grinning Prat' tonight. Any chance of saving my life? The Sky card is with it. Can I pop in tonight, on my way home from fishing, to see if it's done?"

I noticed that it was raining hard. "Are you going fishing in this?" I asked.

"It'll soon blow over" he replied as he plodded out.

When he'd gone Steven tried it out. It seemed to be all right. Then he put the card in and a message came up on the monitor – "your card is invalid".

Steven checked that the 5V supply was correct at the test point just above the ten-pin connector CN01. It was. Then I saw him blow into the slot before reinserting the card. This time it worked. I looked at him.

"What sort of magic was that?" I asked.

"It's the card contacts" he replied. Then he dismantled the receiver and cleaned them. "Third this week" he commented.

Fidelity ZX4000 Chassis

I picked up a Fidelity CTV1405R (ZX4000 chassis) which was dead, and started to look for the circuit.

"Are the fuses intact?" Steven asked.



A commotion outside. . .

They were.

"Then replace D21" he continued. "It's a BY299 diode and you'll find that it's short-circuit."

I took out the diode and checked it. Steven was right. A replacement got the set working again. I looked at Steven.

"What does it do?" I asked, "and how did you know?"

"Dunno what it does" he replied, "but when the set's dead and the fuses are OK it's always that diode."

Actually it's the HT rectifier.

Jim's Return

Somewhat later Jim Sawney loomed up outside. He looked drowned and worn out, but he'd had a successful day – there were two fifteen pounders tied to the handlebars of his bicycle. He propped the bike up carefully and came in.

"Hi chaps" he said. "I don't think I've ever felt so knackered. I've walked through twenty miles of river bank mud spinning for them pike. Any luck with the Amstrad? Dare I go home?"

"It's ready" Steve told him, "only a matter of some tarnished contacts."

"Magic!" said Jim. "I can look forward to an evening of peace. I can do with it, I'll tell you."

Just then there was a terrific crash outside. A passing dog had spotted a cat sniffing round Jim's bike and had leapt at it, tripping the owner.

We ran out to confront a general mêlée. Tripped dog owner, barking dog, spinning bicycle wheels and a cat up a lamppost. Then Jim came out.

"You did say you wanted a bit of peace, didn't you?" I asked him. "Not just yet awhile though!"

Satellite Notebook

Reports from Hugh Cocks, Nick Beer and Michael Maurice

Reverts to Standby

The owner of a Pace MSS100 receiver that was almost a year old phoned to say that it would sometimes revert to standby while he was viewing. If it was left for a few minutes it would sometimes come out of standby and resume normal service.

When I called the receiver was of course behaving impeccably. But tapping the case produced a pink screen with the "LNB short-circuit" message, then within a couple of seconds the standby mode.

Fortunately I'd had a previous encounter with the section of the power supply involved. Obviously the voltage reaching transistor Q4, which monitors the LNB voltage, was low or non-existent when the board was tapped. It comes via Q2, a TIP31A transistor that's fixed to a heatsink near the mains transformer. When I removed the board from the case I could see the minimal amounts of solder that connected Q2's legs to the PCB. Resoldering them cured the problem. How it took nearly a year to show up is another odd one! H.C.

Poor Mains Connection

The owner of another Pace MSS100 got in touch with us because his three-month old receiver wouldn't come back on after redecorating the living room. The mains fuse (FS1) was lightly blown, though the TOP202 chopper device U1 in the power supply was OK. D2 in the mains bridge rectifier circuit had gone short-circuit instead, and the 47µF, 400V reservoir capacitor C3 didn't look too healthy. After replacing these two items and the fuse the receiver chirped back into life. TOP202 power supplies do chirp when power is applied, while PRD and SS series BUT11A power supplies ping, but I digress. . .

I called round to install the

receiver, as I wanted check on the condition of the mains lead – it hadn't been brought in with the receiver. Just as well I did. The lead was plugged into a very poor extension socket that made intermittent contact. This had undoubtedly caused the trouble. H.C.

Pace SS9000/Ferguson SRV1

There were hum-like bars on the picture, as though C416 in the tuner was in trouble. Having replaced C416 and the various capacitors that give trouble in the power supply I was still left with hum-like noise. Scope checks showed that there was, at worst, 2V peak-to-peak of noise on the 12V supply. When the set had warmed up the amplitude of this noise fell to about 0.5V p-p. Replacing the 12V supply's reservoir capacitor C21 (2,200µF) cleared the fault, with the noise down to an insignificant level. N.B.

Amstrad SRD500

This receiver wouldn't even produce an accurate test signal, let alone pictures and sound. I replaced all the electrolytics in the secondary side of the power supply, and the start-up resistors in the primary side, but there was still no picture or sound. The test signal worked however.

A scope check at the scart socket produced an unrecognisable signal where there should have been composite video. So I heated various components on the main board, which quickly brought me to C514 (100µF, 25V). It's part of the filter in the LNB supply. A replacement restored normal operation. M.M.

Pace MSS200

The picture was OK but there was no sound, just noise. On looking inside I noticed that the MSP3400

digital sound processing chip U14 was discoloured (burnt) on top. A new chip restored the sound. M.M.

Pace VC100 VideoCrypt Decoder

We see quite a few of these stand-alone decoders. They are sometimes branded NordMende. The power supply PCB, which sits alongside a video in/out PCB, is almost identical to that in Pace SS9000/9200 series receivers. The case is also similar to a Pace SS9200IRD, but has only an authorise button, a card slot and a power-on LED. It was superseded by the VC200.

This particular VC100 decoder had been connected to a motorised Grundig system and had worked well for several years. Then, according to its owner, the picture suddenly started to look "grey" intermittently with a coded signal, though the decoded picture could be seen weakly in the background. A substitute decoder worked well, so I returned to the workshop with the offending one. It so enjoyed the trip that it worked faultlessly for the next 24 hours on soak test.

Eventually the fault did appear. Decoding still took place, but the video level dropped dramatically. There was also a small ghost on the decoded picture. Although decoded video came out of the decoder PCB correctly, it became attenuated in the de-emphasis network L4/L5 which feeds the emitter-follower transistor Q22. The cause of the problem turned out to be at the junction of L4 and L5: resoldering this restored normal operation.

Unlike the Thomson SVA1, this decoder passes the incoming baseband signal straight through to the scart socket unless it detects a VideoCrypt signal. This is useful if you have a MAC decoder, but a nuisance if a clamped output is required. The decoder can be

modified as follows to overcome the problem: bypass the 4053 CMOS switch U1 by linking Q22's output (which would normally go to pin 1 of U1) to the base of Q14 (which is normally fed from pin 4 of U1). This gives a clamped output irrespective of the video input. **H.C.**

A Reception Problem

Mr Pugh has been a customer of ours for over ten years. He started out with a 2.8m steerable dish and a Connections 2450 receiver in the early days, watching the film channels before there was any encryption and when the future Astra satellite project was still called Coronet! About four years ago he decided to retire the 2450, and we updated the system with a Pace PRD800 receiver and a 13/17V polarisation-switching LNB. The dish is now much larger than required, but does give a cracking picture – even in monsoon rain conditions!

A few months ago the picture deteriorated, with an odd effect: better pictures were obtained when the dish was moved away from the peak signal position. Not wanting to be distracted and confused by this odd symptom, I ran a new length of cable out of the window and along the ground to where the monster dish lives, then looked again. Everything was now as it should be. Why should the old cable have produced the odd effect of improved pictures away from the dish's peak signal point?

Then I remembered. At the time of the original installation I had to include a line amplifier, as the cable run was fairly long and the 2450's tuner (actually it had two, low- and high-band) needed a fair IF level at 1,700MHz to receive Music Box (which turned into Superchannel in 1987) via Eutelsat 1 F1!

I found the line amplifier – it was dry as a bone, having been mounted in a plastic box – and replaced it with a back-to-back F socket. The original cable then gave excellent results across the band. In time the cable may need to be changed, but since the results were OK and the run is awkward I left it alone.

Why had the line amplifier gone funny? As the signals improved when the large dish was moved away from its optimum position, the amplifier must have been overloading. This is not surprising in view of the size of the dish. The problem started when Astra 1E came into operation, with signals above 11.7GHz. No doubt the LNB produced some output at the higher IF, the extra signal being more than the amplifier could handle. Astra 1F operates above 12.1GHz and

shouldn't have caused much trouble to the system. **H.C.**

A Noisy PRD800

The owner of this Pace receiver complained about a "strong whistling noise". While he could hear it at a moderate level, his children said that it was very loud. When I arrived I could hear the whistle outside the front door – the owner clearly had hearing with a greatly attenuated HF response.

As the receiver was an early production model, I replaced C5 (22µF), C7 and C8 (both 10µF) in the power supply as a matter of course. This immediately cured the problem. Since the power supply runs at something over 25kHz, we were possibly hearing a half-frequency signal. It's unusual for one of the electrolytics to radiate such a loud sound – certainly it's the first time I've had this with a Pace receiver. **H.C.**

Pace SS6000

This elderly receiver continues to give good service. It is used mainly for reception of the BBC radio stations via Astra. Fortunately it's kept as cool as possible, which has no doubt contributed to its longevity. The local power supply can be described as "pretty rough" at best, the customer living out in the sticks far from the distribution transformer. Anything that draws a heavy load produces a severe voltage fluctuation.

The owner keeps his SS6000 because of its non-chopper power supply as much as anything else. Certainly we'd have seen more of him had he used a switch-mode power supply receiver. He has a small stock of spare mains fuses and, being technically minded, is not bothered about having to remove the top occasionally to replace the fuse. On this occasion however he was stumped.

The receiver came on with channel 1 and wouldn't budge. This happened after a particularly violent supply voltage variation. We cleared the problem by pressing setup 987 on the remote control unit. This is the unlock code for the SS6000: the feature ensures that accidental channel change can't occur whilst taping, and was discontinued in later models. To lock the receiver you enter the same code – or, failing that, local power supply variations will do the trick! **H.C.**

A Pace SS9200

This receiver was stuck in standby – pressing the standby button on the

front panel made no difference.

When I removed the top I found that PCB discoloration around the power supply was minimal for the receiver's age, which was a good sign. So I removed the decoder PCB and tried again. After a longer than normal time the receiver came on, but with horrible liney pictures on the non-coded channels. Removal of the decoder board lowers the load on the power supply, and is a good initial check to see if the receiver will stagger into life, albeit reluctantly!

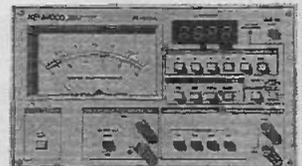
At this point I replaced all the large DC electrolytics, also the chopper transistor's base drive coupling capacitor C9 (1µF) and C416 in the tuner (the small green electrolytic above IC401). The receiver then produced good results.

The channels had returned to their 'factory default' settings however, so most of them had to be retuned. The normal cause of this is C9 drying up (the next step is failure of the chopper transistor). Retuning these receivers is unfortunately a boring and time-consuming task! **H.C.**

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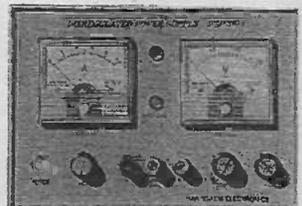
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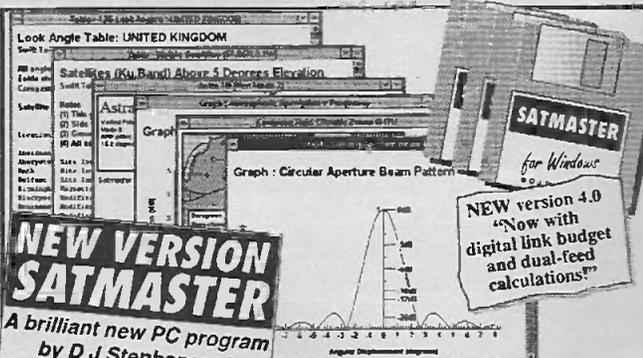
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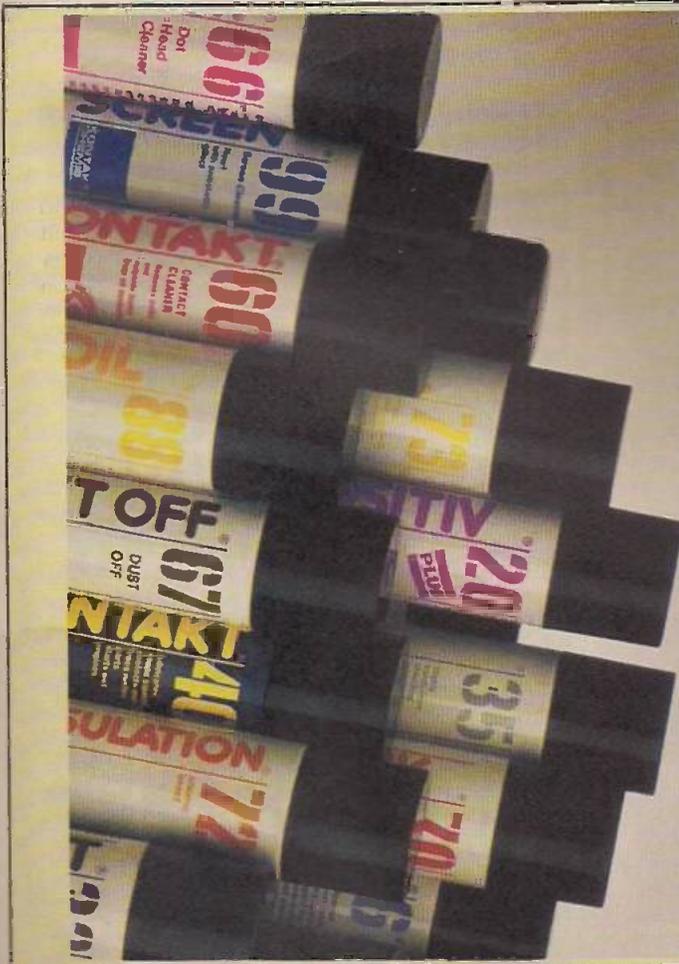
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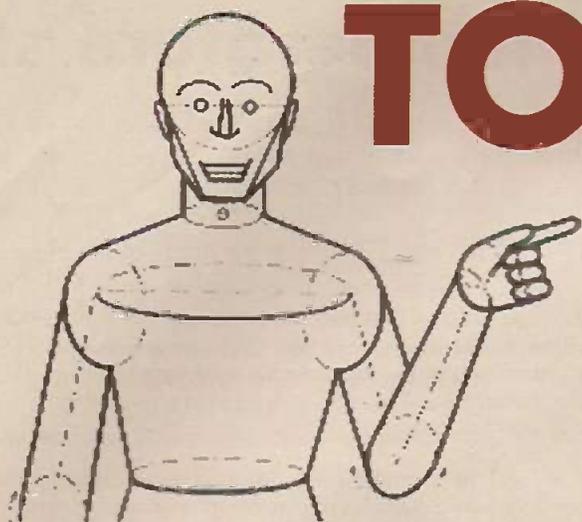
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For further details and a leaflet contact Manzan Electronics, 107 Duke Street, Birkenhead, Merseyside L41 8BN. The telephone/fax number is 01516 451 575.



TOSHIBA

Service Briefs

The following notes are based on issues CDH62 and CDH63 of the Toshiba Service Bulletin

TELEVISION

Model 219T9B

HT rises slowly and reaches only 90V: Replace C814 (100 μ F, 50V) in the chopper drive circuit. C814 goes low in value.

Model 258T7B

AN7171NK audio output chip IC606 damaged: The 12V supply may be high. If so C866 and C869 (both 10 μ F, 50V) may be low in value or open-circuit. Replace IC606 (part no. 23318195), C866 and C869.

Models 2112DB, 2512DB, 2812DB

No channel ident, teletext dark, OSD in black: The TA8775N RGB switching chip ICY50 is faulty. Part no. is B0383933.

Model 2152DB

White interference lines in the background on chs. 39-51: The Sony UF811B tuner H001 is faulty. Part no. is 23321181.

Models 2535DB, 2835DB

No sound, distortion only as volume setting is increased: The TA8776N audio processor chip IC601 is faulty. Part no. is B0383935.

Models 2552DB, 2555DB, 2852DB, 2855DB

Faint horizontal lines across the screen, similar to a 50Hz hum bar: Posistor R890 is passing RF – disconnect the degaussing coil to prove. Part no. for the posistor is 24000875.

Models 2857DB, 3357DB

No colour at switch on: Replace the 4.43MHz crystal X503, part no. 23153979.

Hissing or ticking noise from the back of the set: Check the LOPT (T461) chimney for internal corona discharge. Unclip the EHT lead and clean the chimney and lead or replace T461 (part no. 23236447).

Low and distorted Surround and centre audio

channels: TA1217N audio processor chip QG01 faulty. Part no. is B0385645.

Model C2225

No sound: C614 (0.01 μ F) could be faulty.

VCRs

Models V204B, V254B, V404B, V454B

Failure to record sound, bias oscillator not working: The BC847B oscillator transistor TS030 is faulty. Part no. is 70010331.

No colour: The TA8892N YC processing chip IV001 is faulty. Part no. is 70011884.

Dead, power supply ticking: CP007 (10 μ F, 50V) is low in value. Replace.

Models V205B, V215B, V255B, V425B, V705B

Intermittent failure to load tape fully, ejects tape; horizontal patterning on playback picture; all power supply secondary voltages low, even with no load: The 5.6V zener diode DP094 is leaky. Part no. is 70011286.

No playback sound; low voltages at pins 12 and 22 of the BA7795LS chip IS001; AF signal OK at pin 12 but no AF at pin 22: Replace the 220nF chip capacitor CS012, part no. 70041009.

No record audio, E-E low, playback OK; no AF at pin 16 of the BA7795LS chip IS001: Replace the 220nF chip capacitor CS016, part no. 70041009.

Dead, power supply ticking: CP007 (10 μ F, 50V) is low in value. Replace.

Models V205B, V215B, V255B, V425B, V825B, V855B

Failure of the auto tape speed function to operate with a timer recording: Replace the microcontroller chip IT001.

In Models V205B and V215B the microcontroller is

type TMP90CR74DF-7482, part no. 70012601.

In Models V255B and V425B IT001 is type TMP90PR74ADF-7525, part no. 70012600.

In Models V825B and V855B IT001 is type TMP90CR74ADF-7485, part no. 70012596.

Models V212B, V213B, V312B, V412B, V423B, V513B

Poor fast forward/rewind and a noise bar on frame change in slow motion: The MPS750 transistors TP81 and TP83 both faulty. Part no. is 70010939. They may check OK out of circuit. There should be 13V at pin 3 of BP03 in slow motion.

No playback colour, no colour signal at test point BW14 (next to socket BF03 on the main PCB): Head preamplifier module 0800 faulty. Part no. is 70090231 in Models V212B and V213B, 70090185 in the other models.

Will not accept a tape, the loading motor runs continuously: The servo/logic chip IT01 is faulty. In Models V212B and V213B it's type ST9030PQ1, part no. 70011687 (this is a new part no.). In the other models it's type ST9030BQ1, part no. 70011398.

Intermittent rewind and fast forward. Play, cue, review OK: Check for wear at the nylon post on the main brake charge lever K156, where it touches the clutch housing. Replace K156, part no. 70030994.

E-E OK, playback of prerecorded tapes OK, own recordings have no sound and the picture is ragged and jumps: The 220nF chip capacitor CN13 is leaky. It's between pins 21 and 22 of the AN3248NK luminance processor chip IN01. Part no. is 70041000.

Model V215B

Video head switching line visible on screen, cannot be correctly adjusted. Also unable to enter VTR SET-UP, PROG or CH PRESET menus on OSP: Replace the ST24C04 EEPROM chip IT003, part no. 70011892.

Models V215B, V855B

No playback chroma: Replace the TL8843P comb filter chip IV001, part no. 70011891.

Models V226B, V255B, V425B, V426B, V513B, V726B, V813B, V825B, V854B, V855B, V856B

Timer doesn't cancel PDC recordings after they have been made, leading to a FULL (CLEAR PROG?) message on the screen: This is not really a fault. The timer clears all PDC recordings at 4.00 a.m. the morning after the recordings were completed, provided the VCR is still in the timer mode. If the customer has used the VCR between the recording finish time and this 4.00 a.m. clear down, it will leave the event in memory. Use the Cancel button to clear the event required manually.

Models V255B, V425B, V825B, V855B

Clock setting wrong by exactly half an hour: Cause is error in reading data from the customer's BBC-1 teletext signal (see note later). If it's not possible to improve reception, replace the main microcontroller chip (IT001 or IC501) with a version that has revised software. Part no. is 70012714 for Models V255B and V425B; 70012713 for Models V825B and V855B.

The original microcontroller software looks for the date and time (co-ordinated universal time) on a 'hidden' row of teletext data (packet 8/30, format 1) as well as a 'time-offset code' (byte 15) that's used to change automatically from GMT to British Summer Time (in half-hour increments). The original software writes this data in memory, writes it again one second later, then compares the two: if the data is the same the VCR assumes that the time is correct and starts the clock. The VCR checks this data on position 1 (BBC-1) every morning at 8.00 a.m. – unless the VCR is in use at the time.

If the received data is corrupted because of poor reception conditions, the 'time offset' (byte 15) may be read incorrectly. When this is checked at one-second intervals it is confirmed as the same data though it may not be correct.

The new software version doesn't start the clock until it receives and confirms the data three times in successive seconds, thus eliminating clock errors. But as the cause of the problem is poor reception, which will not have been improved, the VCR may not set the clock automatically. The user will have to set it manually. The daily check at 8.00 a.m. will ignore the incoming data unless it is correct for the three successive checks and not reset the clock. The later software version of the chip was fitted in production to models produced from late 1996.

Model V705B

Dead with 5V supply to the main microcontroller chip IT001 low at only 2V: Resistor RT089 (1Ω safety) is open-circuit. Part no. is 70040122.

Models V804B, V854B

No power, ever 14V supply missing: The PRF3150 circuit protector Z811 is open-circuit. Part no. is 70011864.

NEW FROM ALBAN

The Promax GV241 Monitor Pattern Generator

The GV241 has been designed to assist in adjusting and repairing analogue computer monitors. Its connector configuration provides quick links to most popular monitors without the need to prepare temporary cable assemblies.

The signals available can be used with confidence, as they are identical to those produced by the computer's own graphics card. There are eight test patterns: colour bars, grey scale, crosshatch, multiburst and R, G, B plus white rasters.

The GV241 can generate twenty nine different standards, from CGA to the sophisticated Sun 1,600 x 1,280, with selection by scrolling through memory.

There are D9, D15 and miniature D15 connectors on the front panel, also seven BNC connectors that provide R, G, B, composite video without sync, line sync, field sync and composite sync outputs.



The GV241 is available at £355 plus VAT from Alban Electronics Ltd., 6 Caxton Centre, Porters Wood, St. Albans, Herts AL3 6XT. Phone 01727 832 266, fax 01727 810 546.

Test Report

Vann Draper SL30 Soldering Station

Donald Bullock finds this the ideal soldering station for a busy workshop

My salad days in this trade were spent in the company of a Henley Solon 25W soldering iron, whose sleek ebony finish imparted a much-needed touch of professionalism to my clumsy efforts at being a TV engineer. But time moved on. The bulky components of an earlier generation gave way to miniaturisation, with printed panels that became progressively more dainty. Those of us who were slow to change with the times discovered that many hitherto rugged components now had melting points, also that printed printed tracks could curl from their panels. The Henley Solon is no more in today's technological world. Such soldering irons, once cheap and simple, have given way to instruments of much greater sophistication, many of which sell for very large sums indeed. Many have become miniaturised themselves, and most now work at far lower temperatures than was once the case. These developments have met with general approval, but there are times when an iron's inability to get really hot can be a nuisance – when removing a chassis-mounted heatsink for example. Vann Draper electronics took full account of such points, and many more, when designing the SL30 soldering station. We've had one in daily use in our busy workshop for several months now: the following report is based on our experience of using it for a wide range of jobs.

Description

The unit (see photograph) consists of a tastefully-sculptured, high-impact plastic plinth which is about seven inches deep and five inches wide. Height without the solder gun holder is about three and a half inches. This falls to about an inch at the front, because almost half the depth is used for a large display panel. Colour is matt light grey. A 2 x 3in. waterproof, flush-mounted metal tray is set into the top to accommodate a piece of natural sponge.

The solder iron sink consists of a secured metal funnel enclosed within a heavy chromium-plated spiral,

with a hard plastic collar. It can be fitted at the left or right rear corner. The on/off switch is flush-mounted at the front left of the plinth. There's a three foot connecting lead that's made of a soft 'dead' material. This plugs into a five-pin DIN socket at front left-hand side. The mains lead is at the back of the unit, where there's a central air vent, a recessed 1A fuseholder and a substantial earthing point with both a socket and a screwed button.

The control panel matches the plinth. It houses a full-width, two-colour digital display, a graduated temperature-control knob and a two-position slider display switch.

The iron itself is rated at 24V, 48W. The shaft is a hot, hollow tube into which the bit slides as far as its collar will allow. A retaining tube slips over the lot and is screwed on to a thread at the base of the shaft. This arrangement makes bit changing a simple job and precludes the corrosion that can occur with some other designs. The iron's tapered black handle has a substantial integral finger guard and is fitted with a comfortable soft plastic collar that's indented with stipples. This makes it easy to achieve precision, a welcome feature.

On Test

The two positions of the slider switch are marked set and read: a pair of green indicators within the digital display area indicate which has been selected. To start with we switched to set and advanced the temperature control knob until the bright red digital display read 250°C. Then we switched to read and allowed the iron to cool before switching it on again. When we did so the display rose from room temperature to 260°C within a minute, then quickly settled at the correct level. This was maintained whether the iron was being used intensively or was at rest.

The set/read facility is an extremely accurate way of monitoring the soldering station's temperature control. We used it extensively during our assessment of the

review model. It proved to be stable and reliable. The temperature range is from 160°C to 470°C, which is hot enough for any job likely to be encountered during normal bench work. Even when the need was to solder to chassis there was more than enough heat speedily available.

The iron is a joy to work with. Being controllable and reliable, it enabled us to concentrate on the job in hand without distraction.

As to bad points, it's difficult to think of any. It is very heavy indeed for its small size, but unlike our telephone it stays where put! On seeing it for the first time we felt that for right-handed people the power lead was inconveniently placed on the left-hand side of the plinth. But this wasn't a problem in use – we placed the plinth to the right of the job in hand.

The iron is fitted with a standard 0.8mm 45° angled bit. There's a range of seven different bits. It includes conical- and flat-bladed types in sizes 0.4, 0.8, 1.2, 1.6 and 3.2mm. There is also a cylindrical bit in size 1.2mm. They are available at £1.30 each.



Verdict

The SL soldering station is ruggedly made, well designed and good looking. It works very well. After a practical test which lasted for several months I have no hesitation in recommending it. The smooth running and efficiency of any workshop that obtains one will be enhanced.

Availability

Cost is £69.00 delivered, plus VAT. You can obtain the station from Vann Draper Electronics Ltd., Unit 5, Premier Works, Canal Street, South Wigston, Leicester LE18 2PL (01162 771 400, fax 01162 773 945). ■

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Long-distance Television

DX conditions and reception. Satellite sightings and news. Planning a DX installation to meet today's needs. Roger Bunney on the DX scene

From the DX-TV point of view 1996 was a very poor year. As it drew to an end, we were treated to chilly north easterly winds, ice, snow and temperatures below freezing – an apt counterpart to the DX conditions. During this cold period I removed the aerials and dismantled my lattice mast in preparation for a house move in early 1997.

The mast had been in service for over twenty five years. During that time all sorts of experimental aerials had been tried out on it, for different types of reception and for various TV standards, ranging from 405 to 819 lines. Part of my life came down with that mast. With digital transmissions from terrestrial and satellite sources about to increase rapidly, the next twenty five years are likely to see much more dramatic technical changes. Hopefully I will be able to keep up with them. But for a period, while the move takes place, I'll be off the air. I intend to be up and running before the start of the next

Sporadic E season.

There was very little DX-TV reception during December. Cyril Willis (King's Lynn) and Peter Schubert (Rainham) both reported improved tropospheric activity between December 7-10th. The best days were the 8-9th, with reception of DR (Denmark) in Band III and at UHF (DR2) and, as usual, many German Band III and UHF channels. The 10th produced a rare sighting of RTL (Luxembourg) ch. E7.

The mid-December Geminids meteor shower produced some strong signal pings in Band I, but always on programme! There was sufficient activity to be seen in the sky for comment to be forthcoming from our local station Radio Solent. I saw several classic burn-ups as well as the usual white-line streaks.

There have been reports of TE (transequatorial skip) reception of south African 50MHz (6 metre) beacons in the southern UK and northern France. If you have a scanner, check the following CW beacons in the late afternoon:

7Q7SIX at 50-003MHz
ZS2SIX at 50-005MHz
V51VHF at 50-018MHz
FR5SIX at 50-0215MHz
ZD8VHF at 50-0325MHz
ZS6DN at 50-05MHz
Z21SIX at 50-052MHz
ZS1SIX at 50-08MHz.

ZD8VHF is on Ascension island and FR5SIX on Reunion island (east of Madagascar): the rest are across southern Africa.

On the subject of technical change, several Dutch broadcasting groups have agreed to develop a "wireless alternative to cable". Reception would be via a decoder with a pencil-size aerial, placed on top of the TV

set. The idea is actually to complement cable systems. Experimental transmissions are due to start in January 1998, initially in Amsterdam with about twenty channels.

Satellite Sightings

Our French satellite expert Tim McClelland (Christchurch, Dorset) passed on the word that France 3 was to appear on December 18th via Telecom 2B (5°W). Sure enough programming in the clear appeared, at 12.732GHz. Check the text for programme schedules. Paulo Raymundo reports from Brazil that DirectTV is now running 32 digital channels (18 PPV) via Galaxy III R at 95°W. His pictures are good – he is using RCA hardware that cost him \$1,000, almost double what he was quoted in 1995! You can reach him via e-mail at:

raymundo@svn.com.br

John Locker (Wirral) has closed his satellite receiving system down pending a house move, but reports that his Kirch (German) 'D box' has been reprogrammed and will pick up news feeds provided the bit and FEC rates are known.

Bob French (West Midlands) has installed a 3-1m IRTE dish. Unfortunately within days the high winds snapped a casting on the H-H mount. So the system is at present motionless. Inclined orbit tracking has been incorporated, in conjunction with the Chaparral M140 receiver. Bob intends to monitor the NASA space feeds from Spacenet-2 at 69°W.

Bandula Gunasekera has set up the first digital satellite receiver in Colombo, Sri Lanka, for a local dealer/importer. It's a C band Panasat receiver that came from South Africa. Channels receivable include

A 2.5GHz downlink from a helicopter to ground then uplinked via Eutelsat I F5 at 25.5°E back to the studio for the GMTV programme.



Deutsche Welle, RAI and MCM.

Hot Bird 2 at 13°E has been carrying out tests across its frequency capability. Transmissions received include ART-Europe at 12.02GHz and RTP-1 at 11.73GHz horizontal, also signals below 10.95GHz.

A live outside broadcast to the BBC Plymouth evening magazine programme on December 12th brought back memories of the summer, when the Corporation's UKI-231 SNG truck visited Brewer's Key at Weymouth. The feed was via Orion-1 at 37.5°W (12.674GHz vertical). Orion was busy that evening, with basketball down just a little at 12.652GHz horizontal, the link being provided by BT's UKI-100 truck. The same truck was active on December 17th in Paris, with a live late afternoon report from the financial establishment – the Bank of France had that day decided not to cut the Franc exchange rate.

A much stronger signal has recently been available from AMOS-1 at 4°W. It carries a cable programme for ATV Poland. With my 1.5m dish and 0.7dB Chaparral LNB the signal is almost noise free. Check at 11.64GHz horizontal.

At this time of year the EBU's leases via Eutelsat II F4 at 7°E normally carry various skiing and other Alpine snow antics. My recently purchased, Dutch sourced EBU 'descrambler' (sound-in-syncs stabiliser and audio recovery) provides excellent entertainment value when compared with last year's wobbly pictures and silence!

Eddystone Query

A recent Eddystone User Group newsletter suggested that the company, famous for its communications receivers, produced TV sets for the domestic UK market in the mid-Fifties, though no information can be found in the Eddystone factory files. Can anyone throw any light on this? Please write in via the magazine.

News Items (Terrestrial)

Portugal: Hugh Cocks reports that RTP-1 and -2 are now testing teletext. To reduce costs RTP-2 is at present off air in the mornings. Accurate programme timing has apparently gone by the board: films often start up to ninety minutes late! Brazilian soaps proliferate on both channels.

Gibraltar: The ch. E6 and E12 allocations have been swapped following complaints from the Spanish government to the UK Radio Communications Agency that the

GBC has been in breach of the ITU's 1961 Stockholm plan. Signal Hill now uses ch. E6 at 1kW, while North Mole uses ch. E12 at a much lower power. This has caused reception problems in the Costa del Sol (Marbella, Algeciras) and in parts of Gibraltar itself.

Sweden: SVT is to start terrestrial digital TV transmission tests later this year.

Poland: Channel TVN, which at present operates in nine local transmission areas, is to join with Nasza Telewizja to create a national commercial network in competition with Polsat and TVP.

Israel: The government wants to privatise Channel One following losses of \$18m in 1996. The second channel is also under fire in the Knesset. Two cable channels (one Jewish and one Arabic) financed by advertising have been approved.

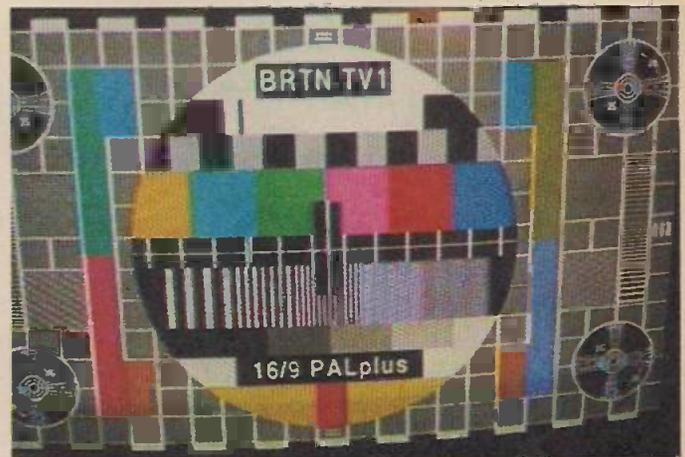
UK: To supplement their coverage Vodafone and Cellnet are seeking a 5MHz allocation in the 1,800MHz band. Microcells in town centres, large buildings etc. would use dual-band handsets. The aim is to start operating in late 1998. Note that this allocation is within the normal IF bandwidth of a domestic satellite receiver.

Satellite News

Hot Bird 2 is now up and running. Over half of its twenty transponders were booked prior to the launch. The Polish RTL-7 DTH/cable channel appeared in early December, in the clear, having moved from Hot Bird 1 – frequency is 11.489GHz (vertical).

Intelsat is engaged in final contract discussions on two new satellites to be suffixed FOS-II (Follow On Spacecraft). Proposed launch will be mid-2000. They will be positioned above the Indian Ocean with a complement of 44 C band and ten Ku band transponders. Another contract of importance in the Asian/Pacific region is for a high-power K series TV satellite to be positioned at 95°E in late 1998, with 30 Ku band transponders intended for DTH and VSAT services. On December 12th Intelsat welcomed its 140th full member, Equatorial Guinea.

German broadcaster ZDF is planning to start a free-to-air digital service, ZDF-Infobox, this coming August, with programming from ORF (Austria), SRG (Switzerland) and the ARTE channel (Germany). The German network ARD plans to open a digital TV service in June/July. Earlier still, Spain's Telefonica digital satellite package is scheduled for a March opening, just two months



after the start of Canal Plus Espagne's digital programme package. Telefonica's partners include RTVE, Antena 3 and the Mexican Televisa service.

Canal Plus and Kirch DF1 are to provide a joint digital package for the German market. RTL-5 has relaunched the Dutch channel.

The tight regulations that govern Indian broadcasting have been partially relaxed to enable private companies to uplink news and OBs via the INSAT craft, in conjunction

The 16:9 aspect ratio Belgian test pattern received via Eutelsat II F4 at 7°E with the use of a Dutch EBU decoder to provide SIS stabilisation.

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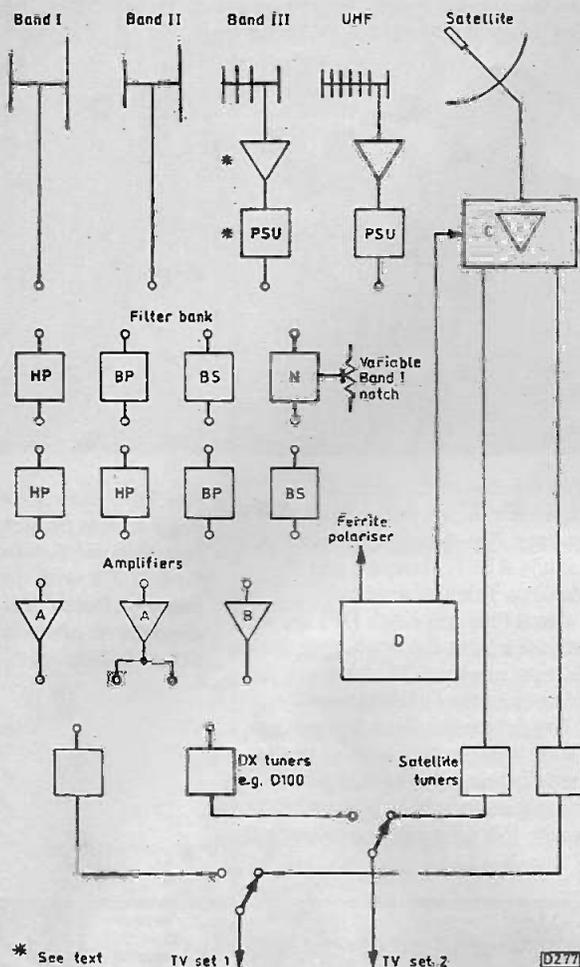


Fig. 1: Suggested layout for a terrestrial/satellite DX-TV installation, assuming two TV receivers and two satellite tuners. The filter bank includes band-pass, notch, bandstop and high-pass filters. All cabling 75Ω coaxial with common earthing. Sockets Belling-Lee type mounted on diecast boxes. A 40-230MHz amplifiers with 10dB gain; B 400-900MHz amplifier, 20dB gain; C 900-2,200MHz amplifier; D LNB and polariser power supply and control.

with the Indian national broadcaster Dordarshan.

PowerVu digital TV test transmissions are being run by the US AFRTS: the end of B-MAC transmissions has been postponed to mid-1997.

A new Arabic satellite, NILESAT-1, should be in operation over Europe by this winter with twelve 100W Ku band transponders. Orbital position is 7°W.

Avoid special offers of digital receivers intended for the Kirch D-box package is the general advice from several people with experience of digital TV reception. The response to the service in Germany has been negligible – only a few thousand subscribers have signed up. As a result nearly 100,000 decoders have been left in stock. Most of those tried out to date have been difficult to alter from their designed-in parameters. More flexible third generation chips are now appearing in Thomson equipment. It's wise to wait a little bit longer.

Robert Cooper (*SatFACTS NZ*, December issue) reports that the Taiwanese manufacturer Sun Moon Star has satellite receiver sales of over \$500m a year. The company is

at present producing the Skandia SK888 digital receiver, which was designed by Asia Digital Broadcasting with the help of SGS/Thomson MPEG engineers. It looks good.

Planning a DX Installation

Unfortunately TV-DXing isn't what it used to be! Twenty five years ago the only problem, in Bands I and III, consisted of interference from adjacent- or co-channel transmitters. These bands were the preserve of TV broadcasters. In the UK Band I has now become the home for mobile radio, baby alarms and other items – a sort of RF dustbin. Mobile radio is also taking over Band III. All this despite the fact that our European neighbours still use both bands for TV broadcasting. DXing at UHF is now a challenge of seeking weak signals amongst the mass of local megawatt transmitters and relay stations on every village hill.

During the past decade satellite services have expanded and cheap receiving equipment has become available. A growing number of TV-DXers have turned their attention from terrestrial to space reception. MPEG digital satellite TV will be the next difficulty, especially as equipment is likely to be expensive at the start. No doubt we'll get round this as well!

A TV-DXing installation today needs to be planned to include satellite reception, while more than ever the VHF coverage has to take into account local interference problems. Fig. 1 shows a basic plan.

The feeds from the Band I and II (TV) aerials come direct, without head amplifiers. This enables band-pass, band-stop or notch filters to be added prior to any weak signal amplification. Why? Consider for example a local PMR base station operating at 55.9MHz. This will completely obliterate ch. E3 and spread into ch. R2 (nominal vision carriers at 55.25 and 56.75MHz respectively). A notch filter with a 25kHz bandwidth and -40dB attenuation should reduce the interference to a manageable level before a weak ch. E3 signal is amplified – imagine trying to attenuate the local PMR base signals after amplification! Similarly a Band I filter will avoid overloading caused by out-of-band interference from a local VHF radio station – provided the filter is inserted in the aerial feed prior to the amplifier. Attenuation of at least -35dB is required. The same principle applies in Band III. Suitable filters are available from specialist

suppliers – Aerial Techniques stocks a wide range. I recall an excellent band-pass/combining filter made by Labgear, type 9032/BF if I remember correctly. This is no longer made but stocks may still be available. It had aerial input sockets for Bands I, II, III and UHF with a single output.

The UHF aerial feed comes via a head amplifier – there should be no local problems with mobile radio stations here. A medium-gain head amplifier can be used in the Band III feed. This depends on local interference conditions. Hard wire the power supplies.

The aerial feeder cables should all be terminated with coaxial plugs. Coaxial connections should also be used for the indoor preamplifiers, filters, inputs to tuners/receivers and TV receiver(s). This will provide maximum flexibility in dealing with interference problems.

If a good selection of filters is available it's safe to use wideband amplifiers indoors, providing gains of say 10 and 20dB. I suggest using separate wideband VHF (45-230MHz) and UHF (430-860MHz) amplifiers, not a wideband 40-860MHz unit. Bear in mind the growing number of cellphone masts. These transmit at around 920-950MHz and may break through if an ultra-wideband amplifier is used. As mentioned above under news items, part of the 1,800MHz band may be offered for cellphone use: this could result in IF breakthrough with satellite TV systems.

The DXing system should incorporate satellite reception facilities. The signals here are, in the UK, at 11GHz plus. Local interference is unknown, though IF breakthrough can happen (the first IF is typically 950-2,010MHz). Use double-screened cable. I suggest that the IF input from the LNB is fed to a small active RF splitter/amplifier with say one input and four outputs. Two of the outputs would feed satellite tuners, a third would be available as a spare and the fourth would be used to provide the DC feeds to the LNB and polariser.

I use an onboard LNB/polariser/splitter amplifier power unit rather than relying on feeds from my receivers. I've fitted LNB supply on/off switches to my two remote-controlled satellite receivers, which are programmed for 13V maximum to the LNB. This ensures that one receiver doesn't supply 18V to switch the triple-band LNB to the telecom band when the other receiver is being used for the FSS band.

Fig. 1 sums it all up.



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Answer to Test Case 411

– see page 321 –

The Hitachi VTM410 might have stayed on test in the workshop for ever had we not twigged that it's fitted with a wonderful feature called ITT: Instant Touch Timer. We are used to this in the record mode, where one touch of the key sets the machine to record and subsequent key strokes limit the recording time to multiples of thirty minutes, clearly shown on the display panel. But this innovative Hitachi machine does the same in the playback mode, and keeps it a secret – there is no indication that we could see, though there is a bit about it on pages 19-20 of the user's instruction manual! It is very easy to stroke the play key twice by mistake, and of course inserting a tape initiates play when the cassette's safety tab has been broken out. Our customer now takes greater care when using the play button.

The JVC HRD660 really did have a fault: it was one of those borderline things, hence the irregularity of the symptom. In the fast rewind mode the tape path across the audio/control head is maintained by a half-load system. This holds out a loop so that the control pulses can be read off the tape and counted, to indicate the tape position and trigger an index system if required. The half-load guide pole beside the audio/control head was slightly bent, leaning towards the cassette. As a result the tape path was diverted, with the tape a little high as it passed the heads. Thus control pulse transfer was not reliable.

We were able to cure the fault by carefully bending back the guide pole so that the tape passed centrally between the audio and control heads in the fast-transport mode.

NEXT MONTH IN TELEVISION

Servicing the Ferguson ICC7 Chassis

John Coombes on how to tackle the faults you could encounter with these sets.

Simple Video Security System

The idea is to use a triggered VCR to record the presence of an intruder. In designing the system Denis Mott's aims were simplicity, low cost and reliability.

Amstrad SRD400 Channel Expander

The only drawback with the otherwise excellent SRD400 satellite receiver is its limited tuning range. You can overcome this by using the Global Connections ADX-plus channel expander unit. Martin Pickering on how it can be added with automatic switching.

Repairs the Accountants' Way

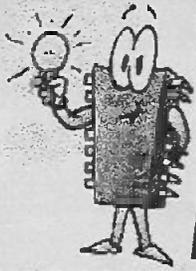
Michael Maurice argues that the influence of accountants on servicing procedures in large organisations can be horrifying.

Renovating the Panasonic NVG21/25

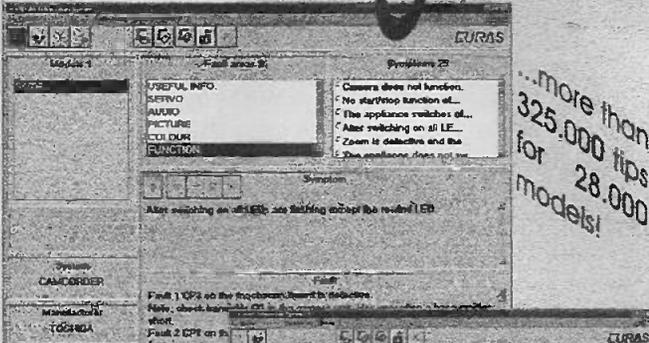
These now elderly VCRs provide exceptional picture quality and are well worth renovating. Brian Storm on what to look for and the action required.

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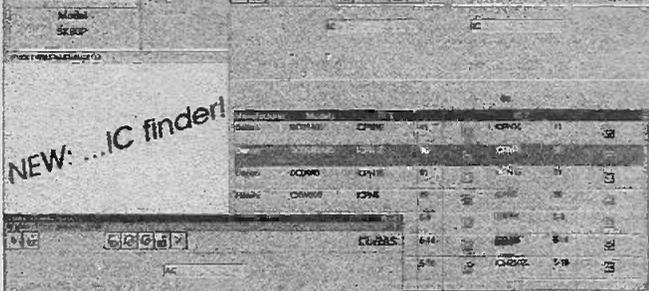
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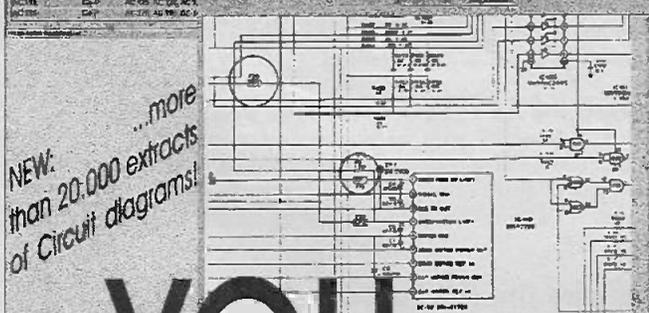
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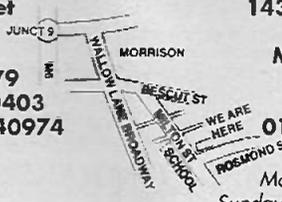
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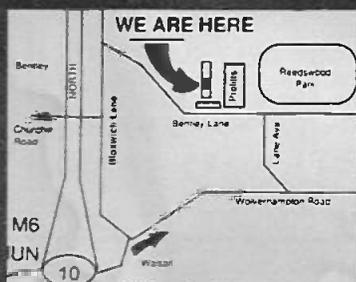
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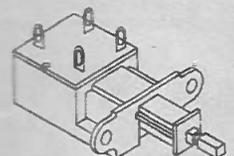
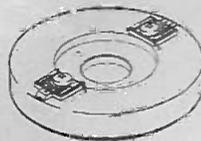
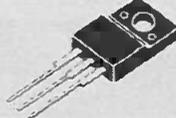
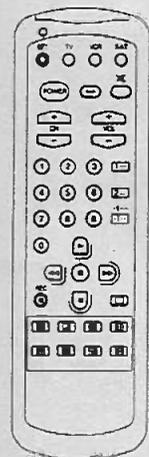
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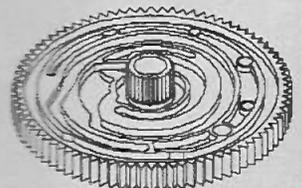
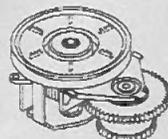
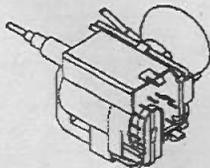


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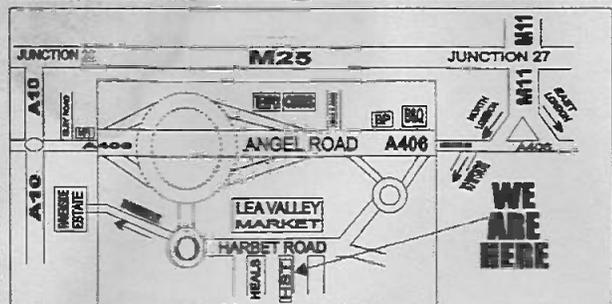
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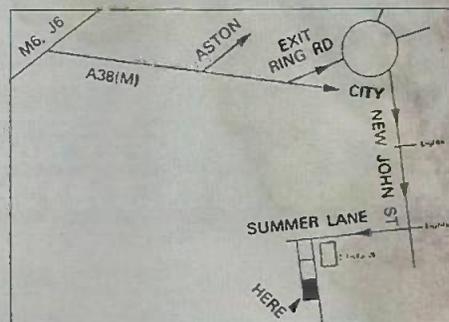
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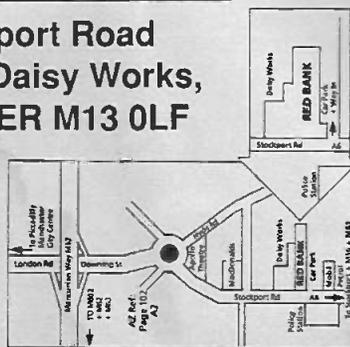
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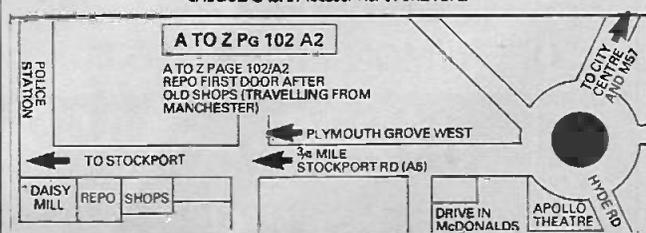
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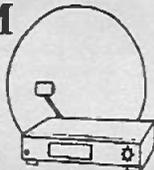
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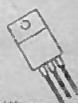
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