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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.

The ITV Digital saga

When writing about the woes of the pay-TV companies last month it was not possible to foresee quite how soon the crunch would come. For ITV Digital the crucial step was taken on March 27th, when an application by its owners Granada and Carlton Communications to put it into administration was agreed in the High Court. The joint administrators, Nick Dargan and Nick Edwards of Deloitte & Touche, were granted a court order to run the company for the next six months, with the stipulation that they will be expected to report back to Mr Justice Etherton two weeks from March 27th on the progress they have been able to make. While ITV Digital is being run by the administrators, Granada and Carlton Communications will continue to provide funds to enable it to continue broadcasting.

The problem faced by Granada and Carlton Communications was that they didn't have the funds to be able to keep the loss-making pay-TV broadcaster in operation until breakeven is achieved, expected to be some time in 2004, and in the meantime meet the various contractual obligations entered into by ITV Digital to provide programming, transmission, services, set-top boxes and so on. The biggest obligation, which tipped the balance, was to pay £178m to the Football League over the next two years to continue broadcasting its matches. The League has been paid up to August, when £89 is due. A reduced offer of £50m, which was rejected by the League, was made by ITV Digital to continue broadcasting football over the next two years.

The problem for the administrators is to renegotiate the ITV Digital contracts with a view to making the company a viable business. If this proves to be impossible, ITV Digital is likely to be put into liquidation. Most observers feel that the prospects for its survival, with its contracts renegotiated, are reasonably good. In the event of liquidation, broadcasting would cease and the franchise would be put up for offers. This procedure might be avoided if an offer from an acceptable broadcaster was made to the liquidators for what was left of ITV Digital. Whatever happens, digital terrestrial TV viewers would still be provided with a considerable range of free-to-air channels.

It's a sad state of affairs, but ITV Digital has always been in an awkward position. It has, with government encouragement, been trying to persuade viewers to convert from analogue to digital reception. But the main advantage of digital transmission is the number of extra channels that can be provided, and in this respect viewers are better off with BSkyB or the cable companies. With its limited number of additional channels, there has been little reason for viewers to go for the ITV Digital option. And it seems that those who did were none too satisfied: the churn rate for ITV Digital has been running at about 25 per cent, which compares with 10·4 per cent for BSkyB and 17·7 and 18·7 per cent respectively for the cable operators NTL and Telewest.

ITV Digital's life to date has been short and difficult. It was launched in November 1998 as ONdigital, and was immediately presented with a problem – a lack of set-top boxes. The following year BSkyB decided to provide set-top boxes free, and ONdigital had to do the same. This hardly helped! There were subsequently management changes, which are always unsettling. Then, last year, it was relaunched as ITV Digital. It might have been managed better, but was effectively sunk by that over-generous arrangement with the Football League. The final straw was probably the collapse in TV advertising late last year: it severely limited Granada's and Carlton Communications' ability to continue funding ITV Digital.

> ITV Digital's life has been short and difficult . . . it was effectively sunk by an over-generous arrangement with the Football League

On the cable TV front, NTL has come close to bankruptcy and may well apply for Chapter 11 (the US equivalent of administration) protection. It has failed to make an interest payment of $96m (£67m), but this seems to be part of an agreed debt rescheduling that's being negotiated – the company has the cash, and there's a thirty-day period before it is technically in default. Negotiations on restructuring the company's massive $17bn (£12bn) debt continue. In the midst of all this the company announced a $15·8bn (£11bn) pre-tax loss last year. Its future is clouded to say the least.

Over in Germany the Kirch Gruppe, which has a majority stake in the country's largest TV broadcaster and owns 70 per cent of the pay-TV operation Premiere, has come close to collapse. Talks between the company's shareholders and banks on a rescue package, because it cannot service its debt and commitments, have made little progress. Whatever the outcome, its founder Leo Kirch is set to lose control. He made the same basic mistake as ITV Digital, in over paying for programme material.

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INDEXES AND BINDERS

Indexes for Vols. 38 to 50 are available at £3.50 each from SoftCopy Ltd., who can also supply an thirteen-year consolidated index on computer disc. For further details see page 433.

Binders that hold twelve issues of *Television* are available for £6.50 each from Television Binders, Pringle, Street Blackburn, BB1 1SA.
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TELETOPICS

Bright prospects for CE retailing

The latest report from retail research group Verdict Research, entitled *Verdict on Electrical Retailers 2002*, says the prospect for consumer electronics retailing over the next five years is good but not without danger. "The sector is the retail tiger" it comments, "both exhilarating and fast-moving, but simultaneously dangerous and unforgiving."

During the past five years the growth of consumer spending on electricals has averaged 5·7 per cent annually, to a total of £19·6 billion in 2001, well ahead of the overall growth in consumer spending at 4·6 per cent. The sector is set to outstrip DIY, another buoyant market, and the report predicts that the rate of growth in CE spending will be maintained over the next five years. Sales of electricals are expected to rise by 36·2 per cent in the years to 2006, against a growth of 19·2 per cent in total retail spending. Purchases of flat-screen TVs, DVD players and computer games will drive the market. As Verdict's chairman Richard Hyman put it, "electricals technology has become the new rock'n'roll as consumers enhance their lifestyles with must-have gadgetry". The report points out that product areas such as TV, DVD and IT are driven by innovation, "which seems to capture consumers' imagination as a matter of course".

But this growth rate has attracted the attention of those in other retail sectors. Particularly with lower-priced items, supermarket chains and on-line merchants have shown increasing interest. Because of the trading pressure, the report considers that casualties amongst electrical retailers are likely to remain higher than average in the retail industry.

The report says the four main features of the electricals sector are shortened product life cycles, the increasing grip of the market leaders Dixons and Comet, growing price competition and increased pressure on profit margins. To achieve success, it's necessary to "drive volumes and improve operational efficiency". Price is the overriding factor. Products move rapidly from the early purchasers stage to the mass-market stage, which means that the period during which premium prices can be maintained is squeezed. This puts further pressure on margins, which "will always be low where there is a high level of relatively non-exclusive merchandise".

The market leaders' dominance has been enhanced by the development of larger superstores by Currys (part of the Dixons Group) and Comet. Stores with an area of about 25,000 square feet are three times the size of the first superstore sheds. Verdict concludes that the electrical superstore has come of age. Despite the number of failures in recent years, for example Tempo, Tiny, Gateway, ScottishPower and The WAP Store, the total sector selling space appears to have increased.

Verdict's advice to smaller retailers is to develop product authority and service advantages that provide added value.

Roadstar has introduced a range of mini TV sets with high-resolution, widescreen TFT colour LCD screens in sizes 4, 5·6 and 7in. Top of the range is the 7in. Model LCD7169 (see photo), which is expected to sell at about £300. Power can be from a battery pack, AC adaptor or DC car lighter adaptor. An AV socket provides connection to a camcorder, VCR, DVD player or video games console. The range also includes a portable DVD player and, to be released later this year, a combined DVD/CD player, FM/AM stereo radio and 5in. LCD monitor.

The NDS/Canal+ spat

In an application to a Californian district court Canal+ has claimed that NDS, a technology company owned by Rupert Murdoch's News Corporation, undertook considerable work on extracting the code from its TV smart cards and published the code on a website frequented by counterfeiters. The Canal+ smart-card technology is used by ITV Digital amongst others, and Canal+ is seeking damages in excess of $1bn. NDS says that the claim is "outrageous and baseless". It maintains there is "clear evidence that the pirate community targeted Canal+ early in 1998 and succeeded without help from anyone, particularly NDS". NDS plans to file a counterclaim. It could be a long time before we know the outcome – litigation in the US tends to be a lengthy process.

Pirate cards have been a problem for ITV Digital which, it has been estimated, could have lost upwards of £100m from their use.

Free-to-view STBs

The Pace digital TV adapter is not, at present, capable of being upgraded for the reception of pay-TV channels because the company was unable to reach a business agreement with ITV Digital. It seems that the upgrade feature would have involved some shared costs, for example a call centre and a distribution channel for the smart cards required to enable pay-TV reception. Some last-minute technical changes were made to the adapter before it went on sale.

Other adapters have been announced. Nokia is to launch one based on its Mediamaster 9850T ITV Digital STB at a price expected to be about £150. An entirely new model, the Mediamaster 221T, is likely to follow in July or August. Both boxes are planned to be upgradable for pay-TV use and will incorporate the MHEG system to provide access to interactive services. Netgem has launched a free-to-view digital terrestrial TV STB, the TVMate, in Australia and plans to launch a UK version in the autumn. The Australian box is based on open DVB/HTML standards. It incorporates a modem and provides interactivity using either the broadcast or the return path.

On the cable front, Pace has announced that it will not supply further STBs to NTL because of difficulty in obtaining credit insurance. NTL had been taking 30 per cent of Pace's output of STBs. The cable company has announced an agreement with Samsung to become a second supplier of STBs.

New video products

Samsung has demonstrated the world's largest TFT-LCD TV set, which has a 40in. widescreen display that consists of approximately 980,000 pixels (1,280 x 768), i.e. XGA resolution. The company will be offering a range of LCD TV sets, including 15, 17 and 24in. models.

Sharp has launched a DVD recorder, Model DV-SR100, in Japan. It uses DVD-RW or DVD-R discs and offers two recording modes, VR which is designed for editing as well as repeat recording/erasing and Video which enables recordings made on the machine to be played by other DVD-Video machines. There's an IEEE 1394 digital video in/out socket for connection to a digital camcorder and a progressive scan output. Price in Japan is the equivalent of about £690. No details of a UK launch have been released. In the UK, Sharp has added the entry-level Model VL-NZ8S to its range of MiniDV camcorders, with viewcam presentation. There's a 3in. 270° rotating

Sharp's new entry-level MiniDV camcorder Model VL-NZ8S.

LCD screen, an 800,000-pixel CCD image sensor and provision for using an optional high-sensitivity zoom microphone. Still images can be recorded using the SD Memory/ MultiMedia card slot.

Thomson now has TV/DVD combi models with 14, 24, 28, 32 and 36in. screen sizes. Prices range from about £300 for the 14in. model to £2,000 for the 36in. one.

A number of new products have been introduced by JVC. The 42in. plasma-display TV Model AV-42PD20ES incorporates a twin tuner and Natural Scan Widescreen Plus technology. CRT Model AV-32HD25EJS provides 100Hz scanning with High Density PAL technology which, like Sony's Digital Reality Creation and Toshiba's Digital Frame Scan, uses digital interpolation techniques to provide 1,250-line scanning. Model HM-VDR10EK is a DVD-RAM recorder that provides a recording time of one-six hours, can also use DVD-R discs and is compatible with DVD-Audio discs. It offers simultaneous record and playback, enabling a programme to be watched from the beginning while the rest is still being recorded. Model HR-XV1EK is a combined DVD-Video player and Nicam VHS recorder. The DVD player can also read CD-R/RW discs and MP3 files. Model XV-NA7 is a DVD-Audio player that's compatible with DVD-Video, CD, VCD and CD-R/RW discs and can read MP3 files. Other features include integrated Dolby Digital, DTS and MPEG decoders. MiniDV camcorder Models GR-DVP5 and GR-DVP7 have a 1·02 Megapixel CCD image sensor, a web cam function and an MPEG-4 e-mail video clip facility. Model GD-DV3000 has a 1.33 Megapixel CCD image sensor and an f1.2 lens. Other features include an MPEG-4 e-mail clip facility, a web camera function, DV index navigation and Digital Colour NightScope. It can handle MP3 sound and has a digital still camera function, 300x digital zoom, SD Memory/MultiMedia card slot, USB interface and DV in/out and analogue input sockets.

Panasonic had launched two well-specified DVD players. Model DVD-RV32EBS at about £180 plays DVD-Video, DVD-R, Video-CD and recordable CDs, including discs with MP3 files. Features include two Cinema modes to enhance picture quality with movies, and a 4:3 zoom function to eliminate the black bands when a 16:9 movie is played back via a 4:3 aspect ratio TV set. The Super Hi Speed Scan facility enables you to skip through a disc at up to 200 times the normal playback speed (an on-screen indicator keeps tabs on progress), while the Dialogue Enhancer facility enables you to add about 6dB to the speech channel should the dialogue be drowned out with 5.1 multi-channel audio. Model DVD-XV10EBS at about £230 is an ultra-slim (52mm high) model with the above features and still picture display. Panasonic has also launched two new Nicam VCRs, Models NV-FJ630 and NV-FJ730, with CVC Super. CVC (Crystal View Control) uses a microcontroller to continuously check the video tape and heads for optimum picture quality: the Super version uses Super Ferrite heads, which were previously used only with Panasonic's high-end S-VHS recorders. Other features include a 35x jet-search system and Q-Link.

Denon has launched a high-end DVD-Video/Audio player, Model DVD-A1, which has a vibration-resistant chassis that consists of a single layer of 1·2mm copper-plated sheet and three layers 1·6mm steel. It plays DVD-Audio, DVD-Video, DVD-R/RW, CD and CD-R/RW discs and can read MP3 audio and JPEG video files. Connectors include two sets of composite video output sockets, two S-video output sockets, an RGB scart socket and optical and coaxial digital outputs. All this comes at a price – about £2,500!

This palm-sized, battery-powered spectrum analyser, the Bantam Model 401B, has been released in the UK by HF Instruments. It covers the range 30-1,024MHz, is fully programmable and can be used on the bench or in the field for measuring harmonic and spurious emissions, identifying unknown or unwanted signals, signal monitoring, field strength measurement and EMC testing. There's an E-field probe for trouble-shooting and EMC measurements. Price is in the £2,000 region. For further details phone HF Instruments on 01420 590 000, refer to the website at www.hf-inst.co.uk or e-mail sales@hf-inst.co.uk

News from TiVo

TiVo has upgraded the software for its UK hard-disk PTR service – the upgrade is being carried out automatically for subscribers during the spring period. New features include an Overtime Scheduler, which enables programmes to be recorded up to ten minutes before the scheduled start time and three hours after the stop time. For easier searching, navigation markers are placed at fifteen-minute intervals. There are plans for a Series 2 model with a larger hard disk. US digital satellite operator DirectTV plans to use TiVo technology in its next-generation of receivers.

TiVo signed up some 100,000 new subscribers during the fourth quarter of its last financial year, bringing the global total to 380,000 at the end of January 2002. Revenue for the year grew 318 per cent to $19.4 million (£13.9m). The net loss made during the year was $157.7m (£112.6m), significantly better than the $216.6m loss made during the year to the end of January 2001.

Corrections

Because of a production problem the incorrect heading appeared above our main news story last month, on page 324. The first item should have been headed 'Blue laser optical disc standard announced', not 'Digital TV adapter from Pace' which was repeated from the previous month.

Harry Todd's web address is
www.toddweb.co.uk
not as given on page 325 last month. You can find information there on TV-trade related injuries and the legal steps open to sufferers.

Technology developments from Sony

Sony recently released details of a number of developments in several areas, including DVD-Video, DVD recording, digital imaging, Super Audio CD, the MiniDisc, recording media and TV displays. George Cole reports on the innovations and products we can expect to see later this year

Sony has a reputation for innovation and will be launching a number of new formats and products later this year. The company believes that consumer electronics is moving into a new era, which it calls Networked AVIT. It will blur the traditional line between PC and consumer electronics products. Sony describes these new products as "post-PC devices", because they are designed to be simpler to use than a PC.

Sony sees a future in which many devices, including camcorders, digital TV sets and games consoles, will be connected to the internet to upload content, such as home video films, or download content, such as music, videos and games. For this to happen there needs to be a large infrastructure of web-enabled products. Sony has already launched camcorders with built-in browsers, and forecasts that by 2005 it will be selling 50 million networked products a year. If Sony's view is to realised, large numbers of households will require a high-speed, broadband connection. We are still a long way from this situation, especially in the UK. But BT's recent decision to reduce the wholesale cost of broadband connections could help to promote the rollout of broadband across the country.

Sony is working with companies such as Nokia and AOL Time Warner on the development of an operating system that will ensure interoperability between different consumer electronics products. It is also building Bluetooth technology into more equipment, including camcorders and mobile phones. The current Bluetooth standard has a maximum data transfer rate of 1Mbits/sec and an operating range of 10m. The company also sees technologies such as IEEE 1394 (FireWire/i-Link/DV) and IEEE 802.11b (wireless Ethernet) playing a major role in home networking.

A glance at the future is provided by Sony's prototype Multi-Entertainment Terminal, which the company has been demonstrating at various events. It uses the Windows 2000 PC operating system and includes a DVD player, an FM tuner, a 40Gbyte hard disk and a web browser for connection to the internet and downloading content.

TV sets

Sony will this year launch its first plasma Wega TV sets with built-in speakers, a TV tuner and an optional AV rack. Research carried out by the company has revealed that many consumers prefer conventional AV furniture rather than hanging their equipment on the wall. The sets have 32 or 42in. screens and will be launched in June. They incorporate Sony's Real Digital System, which uses a new bi-pixel circuit that converts interlaced signals to progressive scanning, improving the resolution.

Sony's 50in. widescreen projection set, Model KF-50SX200, has a 3·15m-pixel display. It uses three (for R, G and B) XGA LCD panels, each with 1·05m pixels, to create the display. An optical engine helps to maintain consistent brightness. Sony says that the brightness approaches that of a 36in CRT, so the screen can be viewed in normal lighting conditions. Other features include Digital Reality Creation, Virtual Dolby Surround sound, twin tuners, three scart sockets, a front S-video socket and 2.5-level teletext with a 2,000-page memory.

Other new models include the KV-28LS60 and KV-32LS60 with widescreen CRTs and 100Hz scanning.

DVD recording

The DVD-Video system has become the fastest-growing consumer electronics format ever. Sony says that by the end of the year worldwide sales of DVD-Video players will have reached 100 million. The huge uptake has led to interest in DVD

recording. In the audio market, the sale of blank audio tapes has declined while the sale of CD-R discs has grown. Discs have several advantages compared with tape, including random access and easier storage. An attractive feature provided by DVD recorders is instant recording – press the record button and the machine automatically finds available blank space on a disc. Several DVD recording formats have been developed. I'll provide a brief overview before considering Sony's strategy in this market.

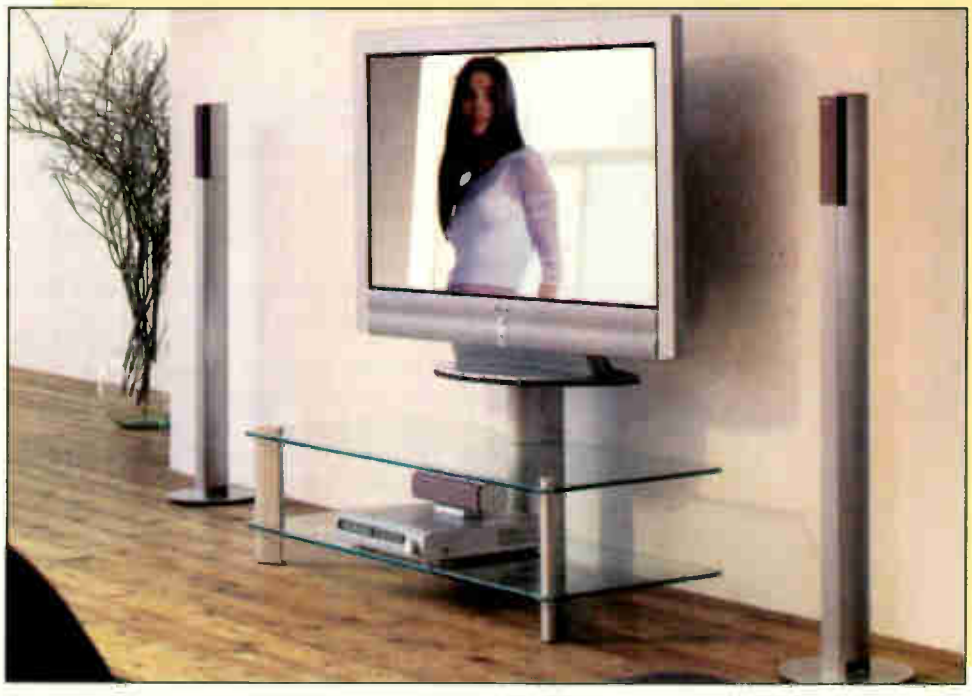
There are two basic DVD recording formats, write-once and rewritable. With the former, data recorded on a blank disc cannot be altered or erased: with the latter, data can be over-written and the disc re-used. Write-once formats use an organic dye as the recording medium, above the disc's reflective surface. The record laser alters the physical structure of the dye, making it non-reflective when the laser is switched on. The playback laser, operating at a lower temperature, detects the reflective and non-reflective sections of the track, interpreting them as binary ones and zeros.

Rewritable formats use phase-change technology. The discs have a recording/reflective layer that contains a complex mixture of rare-earth elements. Its natural state is crystalline, which is reflective. The pulsed recording laser converts sections of the track to an amorphous state, which has much lower reflectivity. The low-power playback laser interprets these reflective/non-reflective sections of track as ones and zeros. An intermediate laser temperature converts the recording layer back to a wholly crystalline state ready for a fresh recording.

Recording formats

There are five DVD recording formats, two write-once and three rewritable. DVD-R and DVD+R are write-once formats, using organic dye and a disc surface with a groove (with DVD-Video and DVD-ROM discs there's no groove). The DVD-RAM, DVD-RW and DVD+RW rewritable formats all have a groove: while the DVD-RW and DVD+RW formats use only the groove for recording, the DVD-RAM system records on both the groove and the 'land' area between. Fig. 1 compares these formats. The DVD-R, DVD+R, DVD-RW and DVD+RW formats have a track pitch of 0·74 microns between groove centres – this is the same track pitch as DVD-Video and DVD-ROM, though there are no grooves with these playback-only formats. With DVD-RAM the track pitch, between adjacent groove and land areas, is 0·615 microns.

The DVD-RAM format provides hard-disk type features such as high-speed random access, and the discs can be rewritten up to 100,000 times – this compares with 1,000 times for DVD-RW and DVD+RW discs.



One of Sony's new Wega plasma TV sets, see text.

Blank recordable DVD discs can store between one and six hours of video, depending on picture quality: as the recording time is extended, the data rate and picture quality are reduced. Most DVD recorders offer several recording modes, with picture quality varying from DVD-Video to VHS. But identical recording-time settings can provide different levels of picture quality depending on the format used for audio recording. Two-channel PCM audio recording requires six times more data than two-channel Dolby Digital audio. Thus with PCM fewer bits are available for the video. As with DVD-Video, DVD recorders store content in the form of files and chapters.

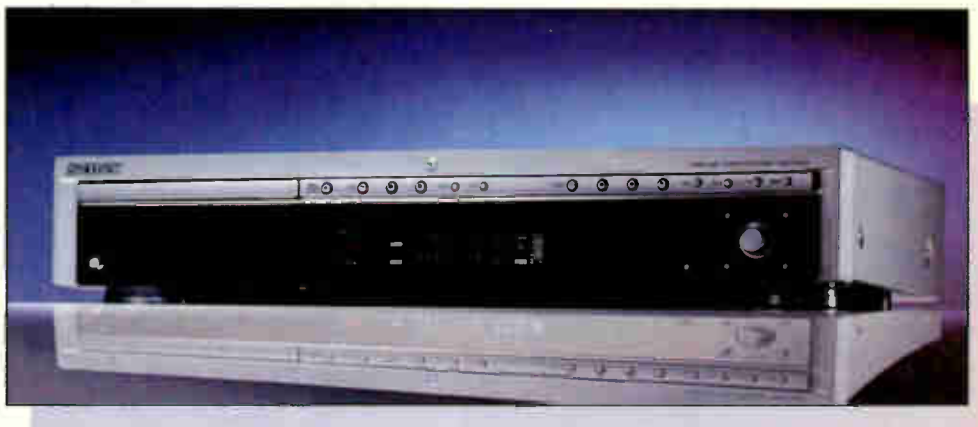
The DVD-R, DVD+R, DVD-RW and DVD+RW formats provide recordings which, in theory at least, are compatible with ordinary DVD-Video players. DVD-RAM is incompatible with DVD-Video because of its use of land-and-groove recording and the fact that the discs are normally kept in a protective caddy. To play rewritable discs with a DVD-Video player the disc has to be finalised, as with a CD-R disc. During finalisation a menu screen is created, providing easier playback operation.

The DVD-RW and DVD-RAM formats also offer a VR recording mode that has MiniDisc-type editing features such as the selective deletion of recorded scenes and the ability to vary the playback order. But the VR mode is incompatible with nearly all existing DVD-Video players, though many future players may offer compatibility.

The Sony approach

The result of all these recording formats and permutations is a potentially confusing mixture of disc compatibilities. For this reason Sony has decided to launch a dual-format DVD recorder later this year, conforming to the DVD-RW and the DVD+RW formats. The latter is an 'unofficial' format developed by Sony, Philips and others. The advantage claimed is very high compatibility with DVD-

Sony's HAR-D1000 hard-disk audio recorder.



Sony's DVD-Video player Model DVP-F41MS is compatible with Memory Stick cards.

Video players (at least 90 per cent). DVD-RW is an 'official' format supported by Pioneer, Sharp, LG and others. The Sony DVD recorder will also read and write DVD-R and possibly DVD+R write-once discs. Sony suggests that they could be used for a number of purposes such as recording TV programmes, transferring VHS footage to DVD and storing home video movies on disc.

As different people will use different recording formats and modes, a dual-format DVD recorder will be able to cater for a wide range of users. It will be possible to produce recordings that are compatible with DVD players and recorders owned by friends and relatives. Sony refers to this as "disc communication". The PAL version of the recorder may also offer a progressive-scan output – Sony says that the DVD Forum is currently finalising the standard for this feature.

Sony's new MiniDV camcorder Model DCR-TRV50 incorporates Bluetooth technology.

Sony has no plans to include DVD-RAM in its product range, arguing that the format does not have compatibility with DVD-Video. In addition, since DVD-RW and DVD+RW are similar, it's easier to develop a recorder that caters for these two standards

Sony has launched DVD-R and DVD-RW media discs in Europe.

Blu-ray optical discs

Sony is one of the nine companies that support the new Blu-ray high-density video disc format – a brief summary of its characteristics was included in Teletopics last month. It uses a blue-light laser and discs with a recording capacity of up to 27Gbytes, almost six times that of DVD. They will be able to store more than two hours of high-definition video or almost thirteen hours of standard-definition video. Although the system has still to be ratified by various standards organisations, Sony believes that Blu-ray could be on the market in Japan next year.

The announcement of Blu-ray puts a question mark over the long-term future of the current DVD recording formats, but Sony argues that Blu-ray is not a DVD format and says that it is committed to making a success of DVD-RW and DVD+RW.

DVD players

Model DVP-F41MS is Sony's second DVD-Video player that can be installed either vertically or horizontally, a feature that first appeared with the PlayStation 2 games console. It's also the first DVD player to have compatibility with Sony's Memory Stick memory card system. Memory Stick, about the size of a stick of chewing gum, is designed for storing images, audio and data. The current maximum storage capacity is 128Mbytes, but larger-capacity versions are being developed. But why would anyone want to use a Memory Stick in a DVD-Video player? Sony explains that users can play back music downloaded via a PC or the internet without having to use the PC for the playback. The DVP-F41MS can also read CD-R and CD/RW discs with MP3 or JPEG data files. A graphical interface enables the user to read the contents of recordable CDs or Memory Sticks on a TV screen.

The DVP-F41MS also uses a new operating system, called Precision Drive 2, which includes a high-speeding motor and a dynamic tilt-compensation mechanism. Sony claims that this provides more accurate DVD tracking. The Precision Drive 2 OS is compatible with DVD-R, DVD+RW and DVD-RW discs, the latter in both the standard and VR modes. Another feature, Block Noise Reduction, filters the borders of component blocks in the display and reduces on-screen block-noise artefacts. The DVP-F41MS is due to go on sale in May.

Model D-VM1 is the first DVD-Video Walkman, which can be used with a dedicated LCD monitor or a home TV set. It weighs 571g and measures 150·2 x 31·8 x 167·7mm (w x h x d).

The Picot name has been given to a series of DVD-Video players aimed at the 15-25 age group. The first product, Model DVP-PQ1, is a portable player that certainly looks different. Its front panel can be customised, using reversible inlays, and there are plans to offer downloadable inlays from a special website.

Digital imaging

Sony dropped the Video 8 format last year but continues to market Hi-8 camcorders. There are three new models, CCD-T748, CCD-TRV208 and CCD-TRV408. They include a new, proprietary Easy Dubbing feature that provides various editing possibilities using any brand of VCR without the need for a LANC editing cable. The user can connect his camcorder to a VCR via pre-subscribed infra-red codes and use the camcorder to control both devices.

Sony has no doubts that the future of the camcorder market will be digital. In 1998 only 13 per cent of the camcorders in Europe were digital: Sony expects the digital percentage to rise to 71 per cent this year. The company supports two digital camcorder formats, MiniDV and MicroDV, as well as the hybrid analogue/digital format Digital 8.

This year Sony is offering USB streaming as a standard feature with its new digital camcorders. Media streaming works by sending audio and video as a continuous data stream instead of as files downloaded on to a hard disk. The advantage is that you don't have to download a complete file before listening to a music clip or watching a video file. Thousands of websites now use media streaming technology, from companies such as RealNetworks, Microsoft and Apple.

In order to use the USB streaming system, you have to connect the camcorder to a PC via a USB port and install USB driver software and third-party conferencing software such as Microsoft NetMeeting. This enables a camcorder to become a webcam and broadcast live video across the internet – the frame rate is 30/sec and the resolution 320 x 240.

Two new MiniDV camcorders, Models DCR-TRV50 and DCR-TRV40, have 1·5 Megapixel CCD image sensors that provide a resolution of up to 530 lines. The former model includes Bluetooth technology, enabling it to be used with other Bluetooth devices such as a mobile phone. One application could be to post live footage of your latest holiday on the web, using a Bluetooth mobile phone as a wireless modem.

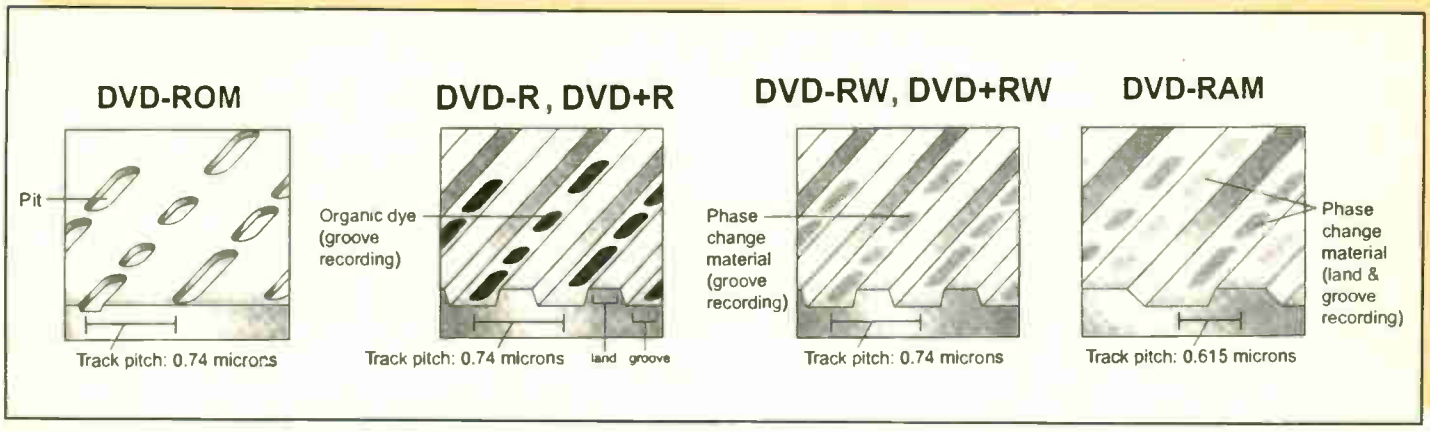


Fig. 1: The DVD-ROM/DVD-Video, DVD-R/DVD+R, DVD-RW/DVD+RW and DVD-RAM disc formats compared.

Sony is to launch two new MicroDV camcorders, Models DCR-IP45E and DCR-IP55. The MicroDV format uses videocassetes that are 70 per cent smaller than with MiniDV and MPEG-2 video compression. Both models have USB streaming capability while the latter model incorporates Bluetooth technology. And, to show that nothing is completely new in technology, the two models include handgrip designs that were first seen with Super 8 cine cameras.

On the digital camera side, the Mavica still camera Model MVC-CD400 has a 4 Megapixel CCD image sensor chip. It records images on 8cm CD-R or CD/RW discs and, when connected to a PC, can be used as an external CD/RW drive.

Audio

Sony co-invented the Super Audio CD format, which uses a one-bit audio encoding system called DSD (Direct Stream Digital). It's claimed to be more efficient than the PCM audio technique used for audio CD and DVD-Audio. Sony has combined SADC and DVD-Video, Model DAV-S400 being the latest product to incorporate the two systems in one box. The company has no plans to offer DVD-Audio products, and says that there should be 1,000 SACD titles available worldwide by the end of the year. At present (March 2002) there are almost 600 titles, 350 of which are available in Europe.

Sony is to launch its first hard-disk audio recorder, Model HAR-D1000. The hard disk has a 40Gbyte capacity, enabling it to hold the contents of up to 500 CDs using the ATRAC compression system. The HAR-D1000 has a CD tray and can copy discs at 2x speed. It can be linked to a PC for downloading audio files. Sony says that it has no plans for a hard-disk video product this year.

Sony is to launch MiniDisc and Memory Stick Walkmen with a Net MD feature. This uses a USB connection to transfer music between a PC and the music player at 32x speed, enabling 80 minutes of music to be transferred in 2·5 minutes. There are to be four Net MD products, including Model MZ-N1 which weighs just 87g. ■

Avoiding virus attacks

PC viruses have become a plague and cause wasted time and effort. The solution is to play safe and install protection. This is available in various forms. Nick Beer surveys the current situation and makes recommendations

The TV/video servicing industry was slow to take to the use of PCs as a business aid, despite their usefulness for such chores as invoicing and spares ordering. Those who are still sceptical about the need for them might point to the virus problem, which is getting steadily worse. A virus attack can result in many, many hours being wasted on cleaning up PC(s) and data. But protection against viruses need not be expensive or cause heartache. I've now had quite wide experience of virus protection and repair, with both single PCs and networks. The aim of this article is to provide information to enable you to avoid infection problems.

In a previous, very useful article on virus attacks (see the February and March issues) Peter Marlow mentioned Sophos as a provider of anti-virus (AV) software. I have very little experience of this company's products, because the company I work for sells and installs Norton Anti Virus products. The Norton brand name is a trademark of the Symantec Corporation. Other well-known anti-virus brands are McAfee and Dr Solomons, both of which are owned by Network Associates. You can obtain further information at these companies' websites, as follows:

http://www.drsolomon.com/

http://www.mcafee.com/anti-virus/default.asp?

http://www.sophos.co.uk/

http://www.symantec.com/nav/

Fig. 1: The LiveUpdate screen in NAV2001.

How anti-virus software works

Anti-virus software is an PC application just like any others. When installed, usually from a CD-ROM though it can be downloaded from the web, it appears as a program in Microsoft Windows. There are different modes of protection, as follows.

(1) Real-time protection. If an infected file is opened the software detects this, stops the virus infecting your system and puts the file out of harm's way.

(2) Scan detection. The software scans your hard disk at a scheduled time each day, say at 1 pm while you are out at lunch (because the PC will be slowed down while the scan is being carried out), or on demand. Alternatively if you want to transfer the contents of a CD or floppy disk to your PC, you can scan the disk first.

(3) E-mail protection. E-mails are monitored as they are downloaded and any viruses present are prevented from doing any harm.

What the software actually does depends on which version of which software is in use, but when it detects a virus it will either automatically, or prompted by the user, try to clean the infected file. If it is unsuccessful it will quarantine the file, i.e. put it in a safe folder where it cannot be accessed. When you are happy that the quarantined folder is disposable, it can be deleted from quarantine.

Why doesn't it always work?

It's usually your fault! Hundreds of new viruses are created every month. Most are variations on a theme, some are new. Anti-virus companies will generally know about them before you do. They update their software to detect the new viruses, and usually have 'virus definitions' at their websites for downloading within hours of the first infection. Most AV software has an auto-update facility: you connect to the internet and it downloads all the updates and installs them for you.

For example Norton Anti Virus 2001/2 has a facility called LiveUpdate, see Fig. 1. When you purchase the software – it costs about £35 including VAT – you get one year's free updates. After this you pay to continue the updates or buy the latest software, which comes with another year's inclusive updates.

LiveUpdate can be set so that each time you connect to the internet it checks – behind the scenes, without you doing anything – for updates and either automatically, or after checking with the user whether it's OK, downloads and installs them.

So how can you get hit by a virus? Simple: you haven't kept your virus definitions up-to-date. Check at least every couple of days.

Viruses exploit software weaknesses and user weaknesses. Many viruses exploit 'security loopholes' in certain Microsoft products – Windows, Internet Explorer and Outlook Express. This is logical: Microsoft is by far the most widely used software, so those who want to cause trouble concentrate on it. Since it's an almost impossible task to test all permutations with a piece of software, we have to accept that all software potentially has bugs.

When Microsoft spots or is made aware of a security issue with one of its products, it usually reacts very quickly (there have been exceptions!) and provides free patches for downloading at its websites. But what it cannot do is make you download and install them. Unless you do, you will be vulnerable. So, as with virus definitions, you must keep your operating system, internet browser and e-mail client software updated. This is simple with Microsoft. Visit the website at

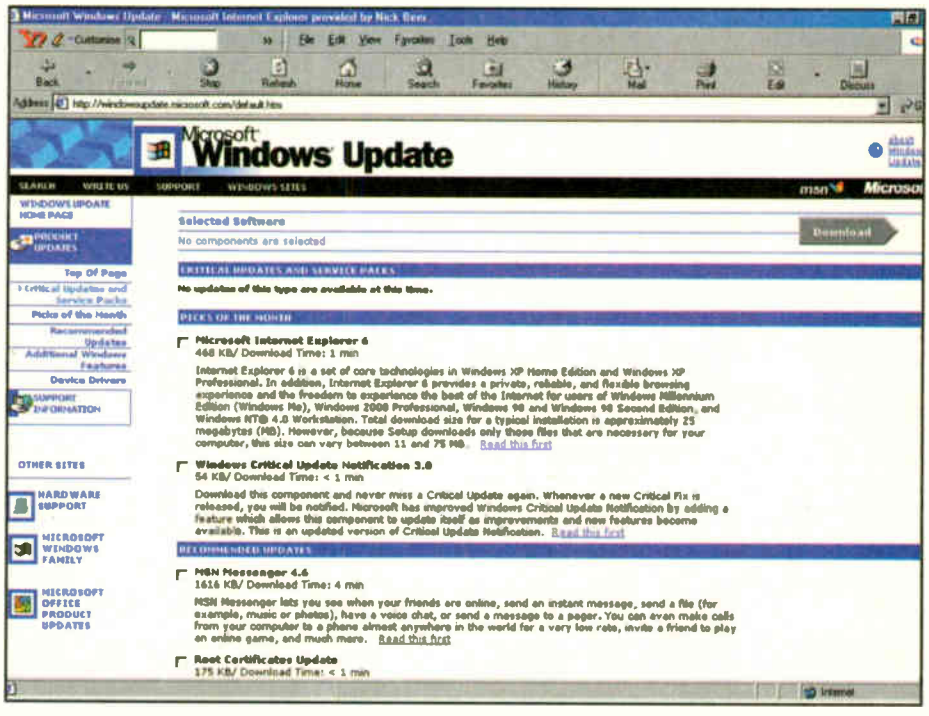


Fig. 2: The Windows Update site.

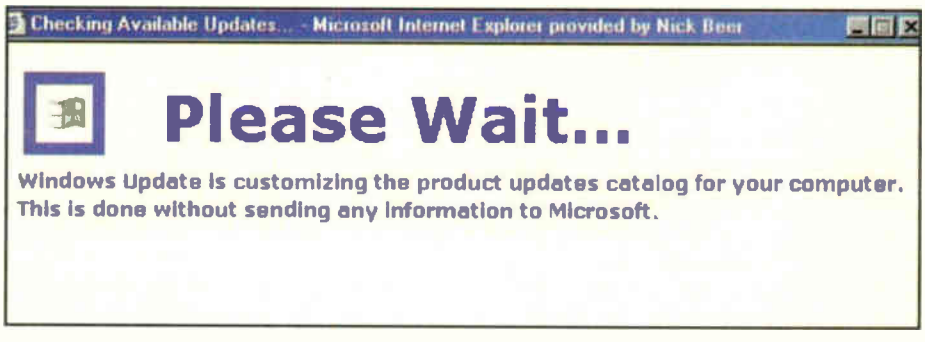


Fig. 3: Message displayed when using Windows Update.

http://windowsupdate.microsoft.com/default.htm

Alternatively, if you have a later Microsoft operating system, click the Windows Update option in the start bar. The site will look at your current installation on-line and provide a list of the things you should update (Critical Updates) and some options as well. See Figs. 2 and 3.

What about user weaknesses? There's apathy, because even when people know the precautions they should take they don't do so. And there's stupidity when, despite all the warnings, people get caught out by opening e-mail attachments. Never open an e-mail attachment unless you are expecting it, even when it's from someone you know. If curiosity is killing you, ensure that your virus protection is up-to-date and scan the attachment first. Never open a .pif or .exe attachment.

One of the most successful viruses of all time was the "I love you" virus. People saw that message and, even though it was from someone they'd never heard of, opened the attachment and instantly infected their PC (and any devices to which it was linked in a network). Another promised that the attachment contained a picture of Anna Kournikova. Who admits to opening that one?!

A particularly annoying trend is when people, who usually think they are being helpful, send on virus warnings to their friends. This may seem ungrateful but, in my experience, most such warnings are in fact hoax viruses.

If you think you have a virus

If you think you have a virus, run a full system scan with the latest definitions installed on your anti-virus software. If it doesn't find anything, check out at your AV software provider's website. For example at the Symantec Antivirus Research Centre site http://www.sarc.com/ (see Fig. 4) you can search keywords, message subjects, etc. It also lists all the hundreds of hoaxes.

If you think your virus has been e-mailed to your contacts in Outlook or Outlook Express, check your Sent Items folder and see. Pass on only warnings that are valid. Don't loose friends!

A classic hoax that has been around for a few months is the sulfnbk.exe warning.

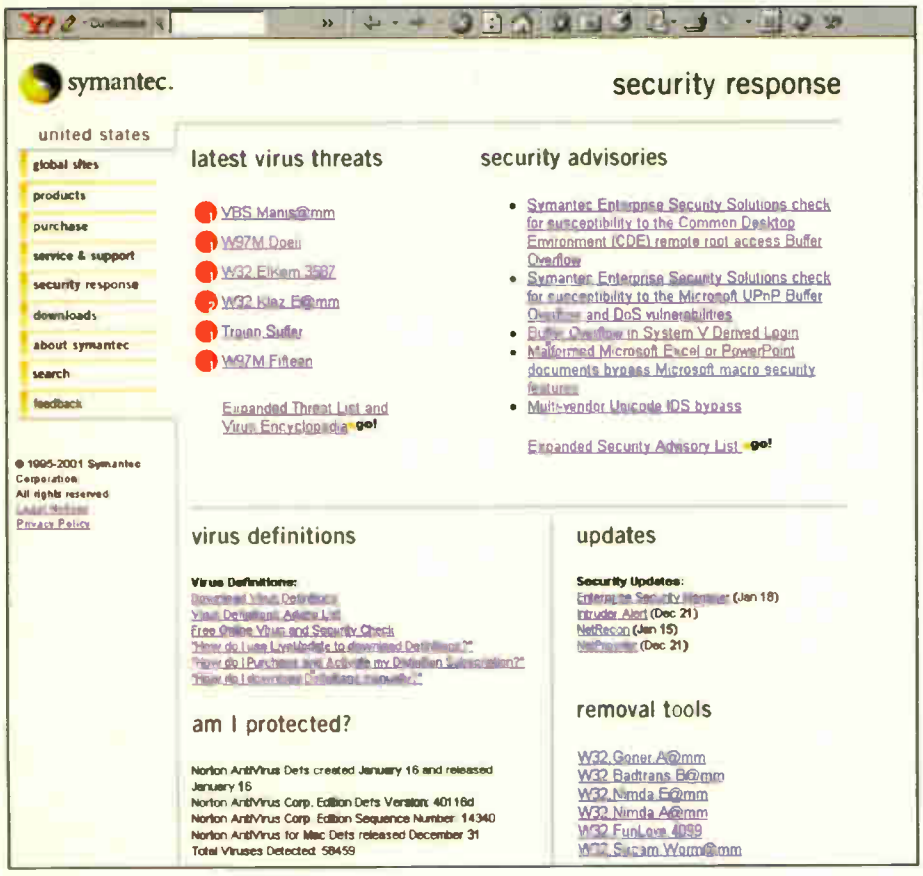


Fig. 4: Symantec's anti-virus site.

This is an e-mail from a friend telling you that he thinks he might have passed on a virus. It tells you to check your Windows/system directory to see if you have this file. If so, it says, you are infected and should delete the file. But it's a Windows system file, and should be there!

Server systems

If you have a network with a server computer running a server operating system (Windows NT4 Server, or Windows 2000 Server in its various versions) you can use a brilliant product from Symantec, Norton Anti Virus Corporate Edition. It might sound a bit over the top for five or so PCs in your shop. But look at it this way. You have to buy five copies of an anti-virus package, one for each PC, at about £35 each. Then, every few days, you have to go to each PC and connect it to the internet to update its definitions. Are all your PCs connected to the internet? Do you have the time to go round updating them all? Can you rely on the individual users to do it?

Why not use a program that's installed on a server computer and automatically downloads new definitions to a schedule, passing them to each connected PC automatically. No user intervention required! It also handles the more complex security issues with server operating systems. For more information visit

http://enterprisesecurity.symantec.com/products/products.cfm?ProductID=23&PID=10275709&EID=0

We run this system with our Windows 2000 Advanced Servers and workstations running Windows 2000 Pro, ME, 98 and 98SE, and have installed it on clients' networks running Windows 2000 and NT4 Server.

ISP's role

You can also check your ISP (Internet Service Provider). The recent Nimda 32 virus attacks hit users at all levels. They were extremely inconvenient, and cost a lot of companies a lot of money to clear. Two massive and very prominent ISPs were spreading the problem, because they were using Windows-based servers that they hadn't patched, despite the security alert being well known and a patch having been available for, I think, about two years.

Some ISPs offer an e-mail pre-scanning service: e-mails are scanned on their servers before delivery to you. The Exeter-based ISP Eclipse Internet offers this service for example. For more information visit

http://www.eclipse.net.uk/index.cfm?Id=Product&product=mailsafe

If you get caught

If, despite all the warnings here and elsewhere, you do get caught most AV software providers have, as mentioned in Peter Marlow's recent article, removal tools for the common viruses. It's the wrong approach to the problem but, once you've got a virus, it's the only answer. For examples visit

http://www.symantec.com/avcenter/tools.list.html

Other options

Some believe that the best way to avoid virus threats is to avoid Microsoft products. Most homes and businesses use PCs with Microsoft software however, so the present article has concentrated on this. Apple Macs use Microsoft browser and e-mail client software, while PCs may use non-Windows operating systems such as Linux, Unix or OS2. These have their own risks, which are best left to those with relevant experience. But some will decide to use non-Microsoft browser and e-mail client software with their Windows-based PC. There are various options here. Netscape has the Navigator browser (http://home.netscape.com/computing/download/index.html?cp=hop01ft6) and Communicator e-mail client (http://info.netscape.com/fwd/hop01ft1/http://mailredirect.netscape.com/) software. Other e-mail client software is Lotus Notes (http://www.lotus.com/home.nsf/welcome/notes) and Eudora (http://www.eudora.com). The problem is that the Microsoft product comes with your PC. Others may also be free, but they have to be downloaded and set up. Some people can't bother.

The e-mail client software you decide to use with a business network will be a different decision from what you choose to use at home. Network e-mail servers such as Microsoft Exchange, Floosietek FT Gate (http:/www.floosietek.co.uk – extremely good value for money), Lotus Domino (http://www.lotus.com/home.nsf/welcome/domino) and Tobit David (http://www.uk.tobit.com) will be running on local servers, and e-mail client software will talk to them, not the ISP. Most will run with most clients, but David comes with its own client software, which also handles faxes, SMSs and voicemail. This is a complex subject that requires a separate article.

In conclusion

I hope that this article, along with Peter Marlow's previous one, will have heightened your awareness of the PC virus threat while explaining what can be done to prevent it causing you trouble. It's a fascinating subject, though you won't agree if your first experience of viruses is when you have been infected. A check at the various sites mentioned in this article will keep you entranced for days. Just don't panic! ■

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10uF	CAP52	£0.50	10
22uF	CAP53	£0.45	10
33uF	CAP54	£0.50	5
47uF	CAP55	£0.85	10
68uF	CAP133	£0.55	10
100uF	CAP56	£0.85	10
150uF	CAP57	£0.95	5
220uF	CAP58	£1.45	5
330uF	CAP134	£1.60	10
470uF	CAP135	£1.75	10
680uF	CAP59	£6.50	10
1000uF	CAP60	£4.35	10
2200uF	CAP61	£2.45	2
3300uF	CAP62	£10.00	5
4700uF	CAP136	£3.50	2
50 Volts			
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4.7uF	CAP140	£0.35	10
10uF	CAP63	£0.50	10
22uF	CAP64	£0.70	10
33uF	CAP141	£0.85	10
47uF	CAP65	£0.85	10
68uF	CAP142	£0.90	10
100uF	CAP66	£0.85	10
220uF	CAP67	£1.75	10
330uF	CAP68	£2.45	10
470uF	CAP69	£4.35	10
680uF	CAP70	£4.90	5
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1500uF	CAP143	£4.50	5
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4.7uF	CAP77	£0.35	10
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22uF	CAP80	£0.75	10
33uF	CAP81	£0.85	10
47uF	CAP82	£0.95	10
68uF	CAP83	£1.30	5
100uF	CAP84	£1.20	10
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220uF	CAP86	£2.80	10
330uF	CAP87	£4.00	10
470uF	CAP88	£5.25	10
680uF	CAP89	£5.00	10
1000uF	CAP90	£5.40	5
100 Volts			
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1uF	CAP92	£0.85	10
1.5uF	CAP93	£0.70	5
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3.3uF	CAP95	£0.50	5
4.7uF	CAP96	£0.50	5
10uF	CAP97	£0.95	10
22uF	CAP98	£1.05	10
33uF	CAP99	£1.55	5
47uF	CAP100	£1.75	10
100uF	CAP101	£2.10	10
220uF	CAP102	£6.00	5
470uF	CAP103	£6.00	5
160 Volts			
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10uF	CAP105	£2.60	10
22uF	CAP153	£2.30	10
47uF	CAP106	£4.35	10
100uF	CAP154	£4.50	5
220uF	CAP155	£2.00	2
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10uF	CAP158	£2.25	10
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CT2863UNT	POWER SUPPLY	ONWAKIT
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TVC563	STANDBY FAULTY	MODKIT37
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CF28A50F	FRAME OUTPUT	MODKIT36
CF28C22F	FRAME OUTPUT	MODKIT35
CF28C28F	FRAME OUTPUT	MODKIT36
CF29C42F	FRAME OUTPUT	MODKIT35
GOODMANS		
147TT	POWER SUPPLY	ONWAKIT
149T	POWER SUPPLY	ONWAKIT
1430RA	POWER SUPPLY	ONWAKIT
1430RS	POWER SUPPLY	ONWAKIT
1430RW	POWER SUPPLY	ONWAKIT
1450T	POWER SUPPLY	ONWAKIT
1455TS	POWER SUPPLY	ONWAKIT
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2029T	POWER SUPPLY	ONWAKIT
2029TA	POWER SUPPLY	ONWAKIT
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AV29SX1EN1	FIELD OUTPUT KIT	JVCKIT1
AV29SX1PF	FIELD OUTPUT KIT	JVCKIT1
AV29TSIE1	FIELD OUTPUT KIT	JVCKIT1
C14E1EK	POWER SUPPLY	ONWAKIT
C14T1EK	POWER SUPPLY	ONWAKIT
C21ET1EK	POWER SUPPLY	ONWAKIT
CS21M3EK	POWER SUPPLY	ONWAKIT
MATSUI		
1455	POWER SUPPLY	ONWAKIT
1498	POWER SUPPLY	ONWAKIT
2086	POWER SUPPLY	ONWAKIT
2098	POWER SUPPLY	ONWAKIT
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The Panasonic Motion DV Studio

Brian Storm describes the use and features of this digital video editing system, which works with IBM-compatible PCs

The Panasonic Motion DV Studio program version 3.0 was released early last year. It provides non-linear editing of digital video (DV) footage using an IBM-compatible PC, and is available in three different packages as follows:

VWDTM20E: This is a CD-ROM package for editing and embellishing digital video footage. It contains non-linear editing facilities, titling facilities, transition selections and makes possible various effects. It's also possible to add animations and sound overlays.

VWDTM21E: The CD-ROM editing package plus an internal PCI card for a PC.

VWDTM22E: The CD-ROM editing package plus a PCMCIA slot adapter card for a laptop computer.

The packages all rely on the PC to be used having OHCI (Open Host Controller Interface) support. You can confirm this by consulting your PC's Device Manager. Generally, most computers that came with Windows 98 Second Edition or later installed will support OHCI. This rules out machines that have been upgraded, because although the software will support IEEE 1394 protocols the hardware won't. More sophisticated hardware cards and software will be required with these older PCs. At the time of release the target operating system was Windows Millenium Edition, as it contains IEEE 1394 (FireWire) support as standard.

I've tried Motion DV Studio 3.0 with Windows 98 Second Edition, Windows ME, Windows 2000 and Windows XP. It seems to work correctly with all these operating systems. But bear in mind that it's a consumer product, so Panasonic will not generally support it for use with business operating systems such as Windows NT and 2000.

PC requirements

For a PC to run Motion DV Studio 3.0 the minimum requirements are: a Celeron 333MHz main processor; 64Mbytes of RAM or more to guarantee smooth operation; an Ultra DMA-33 hard drive with at least 10Gbytes capacity; a main PCB that supports OHCI; and a CD-ROM drive for installation.

Most modern PCs have a good specification and will exceed these requirements. But the speed of the hard drive may well let the side down. This shows up as jerks during video playback, as frames of video information are dropped when trying to keep up with the sustained high data-transfer rate. Make sure that you always have DMA in the BIOS options enabled and, if given a choice, opt for a higher spin-rate hard drive.

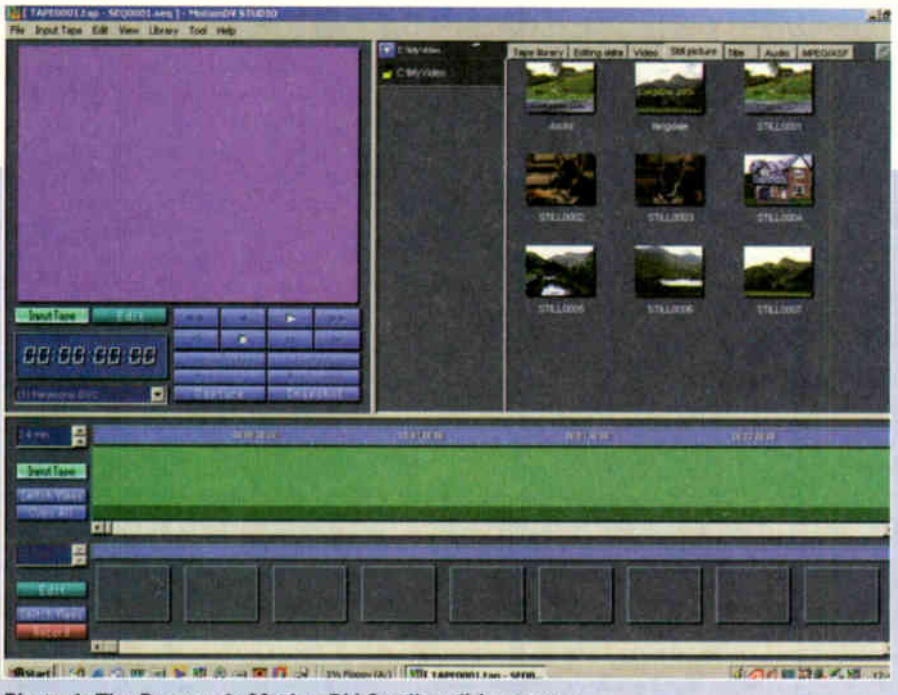


Photo 1: The Panasonic Motion DV Studio editing screen.

Installation and running

During installation of the program you will be prompted for PAL or NTSC support, as the two formats are not compatible for DV.

When you run the program you will see the screen shown in Photo 1. The large window at the top, left shows the available picture, from the camera, tape or edit selection. Beneath this there are tape counter information and the camcorder controls.

The right-hand clip-board shows the editing information stored on the computer, including video clips, stills, audio clips and titling information. These can be dragged to the bottom edit line and assembled into a production of some kind. Fades, dissolves and other effects can be added here as well.

In operation the program feels easy to use while being capable of sophisticated effects. It allows two different DV devices to be connected, with switching between them via the selection option beneath the tape-time indication.

Once an edit has been completed it can be rendered as a DV file and sent back to the camcorder for recording on a DV tape – assuming that the camcorder has provision for DV in. Alternatively it can be stored on the PC's hard drive as an AVI file, an MPEG-1 file (for a video CD recorder) or an MPEG-2 file (for a DVD recorder).

Summary

In conclusion, the program is easy to use and can provide excellent results. The only carp I have, which applies with most programs of this type, is the length of time it takes to achieve the finished result. A few minutes of creative programme editing can mean literally hours of your time spent trying to get it perfect. ■

This 17in. Trinitron-tube monitor's production run lasted for several years. Large numbers were sold as the Dell VC7EN. In Part 2 of his series Donald M. Henry looks at the operation of the frame and line timebases and their response to multisync signals from the PC, and lists some workshop experiences

Servicing the Mitsubishi TFS6705K monitor

Most TV sets and cheap monitors have a common EHT/line output transformer. Things don't have to be arranged like this of course. Remember the Ferguson TX10 chassis? It had a huge EHT transformer (it was also the chopper transformer) and there was a tiny line output transformer. Most of us in the TV trade would agree that the slightly more expensive two-transformer approach has provided better overall reliability in a number of models over the years. It's the same with monitors. In the TFS6705K you will see a large EHT transformer, T601-1, on the main board. It's joined by a white rubber-insulated lead to a smaller transformer (T601-2) which is mounted vertically on the HV-SUB PCB at the rear. Now for the surprise: neither of these is the line output transformer, which is T502. Nor, incidentally, are they the 'flyback'. Service manuals and catalogues seem to call anything 'flyback' if it's connected to the tube's final anode! This is a malapropism. The term 'flyback' refers to the action of electron beam(s) returning to the left-hand side/top of the screen when deflected by the scan coils. We will return to the EHT section of the TFS6705K in Part 3 next month.

The real LOPT can be found by tracing back from the red/blue scan coil wires. It's a good idea to get into this habit, as the situation is less than obvious with many designs because of the number of transformers and chokes present.

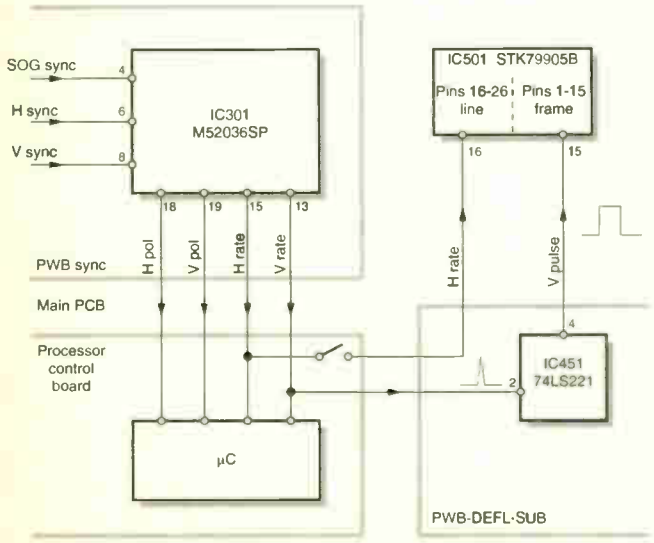


Fig. 1: The sync-signal paths.

Multisync operation

The main difference between a 625-line TV set and a multisync monitor is that in the former the line output stage operates at a single frequency, 15·625kHz, while in the latter it must be able to change automatically between several rates. Typically this can be between 31·5kHz and 104kHz plus as the user switches between applications, say from a DOS prompt to Windows-based programmes. Multisync frame rates also vary, typically from 50Hz upwards to about 130Hz. I recall the happy days of 405/625-line TV system switches and solenoids with sets such as the Bush TV161 series and those fitted with the Thorn 1400 chassis, along with the smells of burning Paxolin and sweaty triplers. But things are rather different with a multisync monitor. You'll find FET switches, which are a welcome change.

Transformer and scan-coil efficiency decrease as the line frequency increases, because of former losses, and the width is reduced. Monitors compensate for this by increasing the supply voltage to the line output stage. This can be done by using a FET as a DC-chopper, fed from the HT supply, whose output is referred to as +B. Conditions that vary the +B voltage are when the H-sync rate from the PC changes or when the user control asking for a change in width is pressed. This FET system will be covered when we come to the power supply in Part 3, but it's important to mention the variable supply before considering the rest of the line timebase circuitry.

The need to produce displays at different frequencies presents another problem. The line output stage tuning capacitor that optimises conditions at one frequency obviously won't do so at others. This is dealt with by using control circuitry that selects from a range of tuning capacitors, switching them in and out of circuit as required. Because of the high peak voltages involved, the high gate impedance of an FET makes it an ideal switch for this purpose. They are used in most makes/models regardless of whether control is by a microcontroller chip or conventional logic circuitry. To maintain line linearity throughout the frequency range, the polarised coil inductance needs to be varied.

In most designs this is done by using a relay, rather than an FET, to connect another coil in parallel.

In the frame timebase, adjustment to maintain full display height is carried out by resistive networks and adjustment potentiometers (cheaper 14in. monitors) or processor-based DAC control to set the V-drive voltage as appropriate for the deflection mode.

This flexibility is required to cater for the various input signal combinations. Table 1 lists details for various PC modes provided by the Blackstar 1410 pattern generator.

Note that while the sync-signal frequencies determine the scan rates it is the combination of rates and polarities (either positive- or negative-going sync pulses) that provides the information required to define the operating mode. The various modes conform to industry-standard timing diagrams for the active scan area, i.e. the video information. Setting these modes enables manufacturers to achieve the correct frame amplitude and select appropriate line timebase components for optimum size of the video display. The video-content position (left and right, up and down) is factory-memorised to conform to the various modes. Time to return to the specifics of the TFS6705K monitor however.

Table 1: Some common display modes

Mode	Resolution	Line freq.	Frame freq.	H sync	V sync
VGA1	720 x 350	31·5kHz	70Hz	+ve	–ve
VGA2	720 x 400	31·5kHz	70Hz	–ve	+ve
VGA3	640 x 480	31·5kHz	60Hz	–ve	–ve
SVGA	800 x 600	35·2kHz	56Hz	–ve	–ve
8514A	1,024 x 768	35·5kHz	87Hz	+ve	+ve
XGA	1,024 x 768	48·5kHz	60Hz	+ve	+ve

The sync-signal paths

We'll begin with IC301, mentioned last month but now in connection with the sync signals. See Fig. 1. In most PCs separate H and V sync signals leave the DB15 subconnector on the video card at pins 13 and 14 respectively. They arrive at the TFS6705K's 13W3 connector, H at pin 9 and V at pin 8, then pass to pins 6 and 8 of IC301. As mentioned last month, IC301 can alternatively accept a composite sync input at pin 4, from those PCs that provide a SOG output. IC301 extracts the polarity as well as the sync rate information. It provides four outputs: H rate at pin 15, V rate at pin 13 (these are now always +ve-going), H pol at pin 18 and V pol at pin 19. All head for the processor board at the front of the monitor, beneath the CRT. We'll leave aside for the moment what happens on this board. The H-rate pulses also end up at pin 16 of the STK79905B line generator and frame generator/output chip IC501 – they follow rather a long path to get there. The V-rate pulses arrive at pin 15 of IC501, after conditioning.

IC501 is a 28-pin black monster with two electronically-isolated sections. Pins 1-15 are used for the frame timebase section and pins 16-26 for the line generator section. All are readily accessible after removing the plastic plate from the underside of the chassis.

Frame timebase

The basic frame timebase circuit is shown in Fig. 2. The low-voltage frame circuitry in IC501 is fed with 12V at pin 14, via R408, while the output stage receives an 27V supply at pin 6. This section of IC501 contains an oscillator, a ramp generator and the driver and output stages. The frame scan coils are AC coupled via C411 (4,700µF, 25V). A pump circuit is used to provide the flyback, with the boost capacitor C403 (100µF, 50V) connected between pins 4 and 5. An adjustable DC offset is provided by pin 4 of the M62358P DAC chip IC452 to adjust the vertical centring of the image. This moves the entire raster up and down. The oscillator frequency is set by R406 (390kΩ) and C406 (0·15µF), which are connected to pin 13. This stage receives the V-sync pulses at pin 15, coupled by C409 (10µF). They are given a defined pulse length by

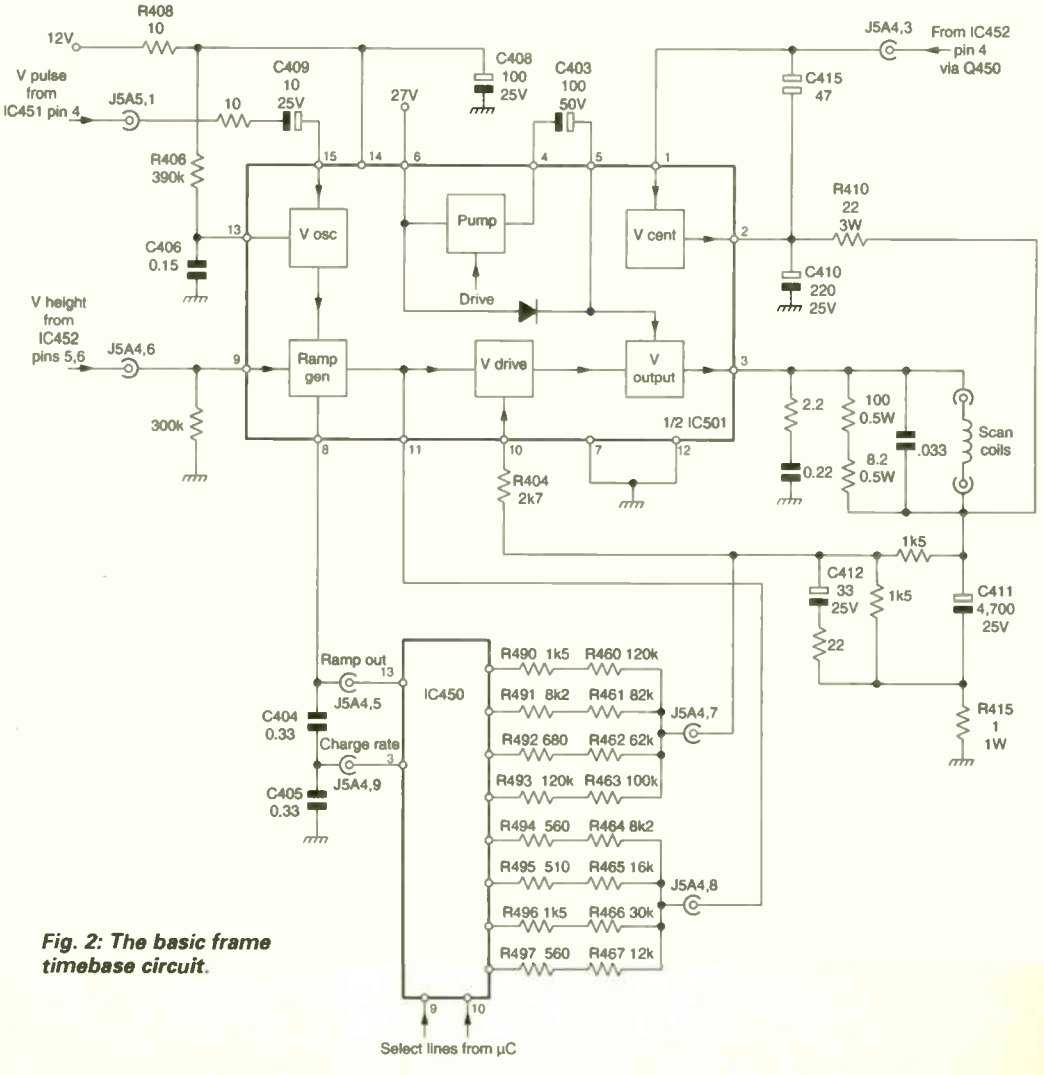


Fig. 2: The basic frame timebase circuit.

Table 2: Line output stage tuning.

Frequency	*FETs on*	*Cs added*	*Added capacitance*
Up to 33·5kHz	Q511-4	C521-4	2·18µF
33·5-37·1kHz	Q512-3	C522-3	1·21µF
37·1-40·5kHz	Q512/4	C522/4	0·97µF
40·5-44kHz	Q513-4	C523-4	0·54µF
44-49·3kHz	Q513	C523	0·39µF
54·5-61·5kHz	Q514	C524	0·15µF
Above 61·5kHz	None	None	None

IC451 (74LS221, a monostable multivibrator) on the DEFL-SUB PCB.

Height is adjusted by a DC control voltage applied to pin 9 from pins 5/6 of IC452, via pins 6 of J7A1 and J5A4. Vertical linearity compensation is required over the scanning frequency range 50-130Hz. To this end the 0·33µF ramp charging capacitors C404/5 are connected to the MC14052 dual, four-channel analogue multiplexer chip IC450 on the DEFL-SUB PCB. Its outputs are connected to pins 10 and 11 of IC501 via close-tolerance resistors. These are shown in Fig. 2 as two banks of four, R490-R497 and R460-R467. The pairs used are selected by pins 9 and 10 of IC450, which are connected to the microcontroller chip. This linearity adjustment depends on the PC signal mode and is not user or factory adjustable.

Line generator

Fig. 3 shows the line generator arrangement. H-rate (sync) pulses arrive at pin 16 of IC501 while an H-phase DC control voltage is fed to pin 17. The H-phase voltage comes from pin 7 of the DA converter chip IC452 via an op-amp in IC551. While the line oscillator's frequency is set by the H-rate pulses, the timing of the start of the scan, following the arrival of an H-rate pulse, is set by the H-phase voltage. This is how the video image *appears* to be advanced or delayed with respect to the start of the lines. It is *not* the case that the video image timing is controlled after the lines begin. A crucial difference for anyone new to this trade. The 12V supply for the horizontal-scan section of IC501 is fed to pin 23, via L501, with smoothing by C507. The line oscillator output at pin 26 is fed to the line driver circuit (Q506) and the EHT driver circuit (Q611).

R504 (24kΩ) and C504/6 (1,000pF, 220pF) set the line oscillator frequency. The charging time of the capacitors in this network is determined by the voltage fed to R546. Altering this enables the line frequency to be changed when the user switches to an application with a different scan rate.

We'll take a peek at what's present at the input side of R546,

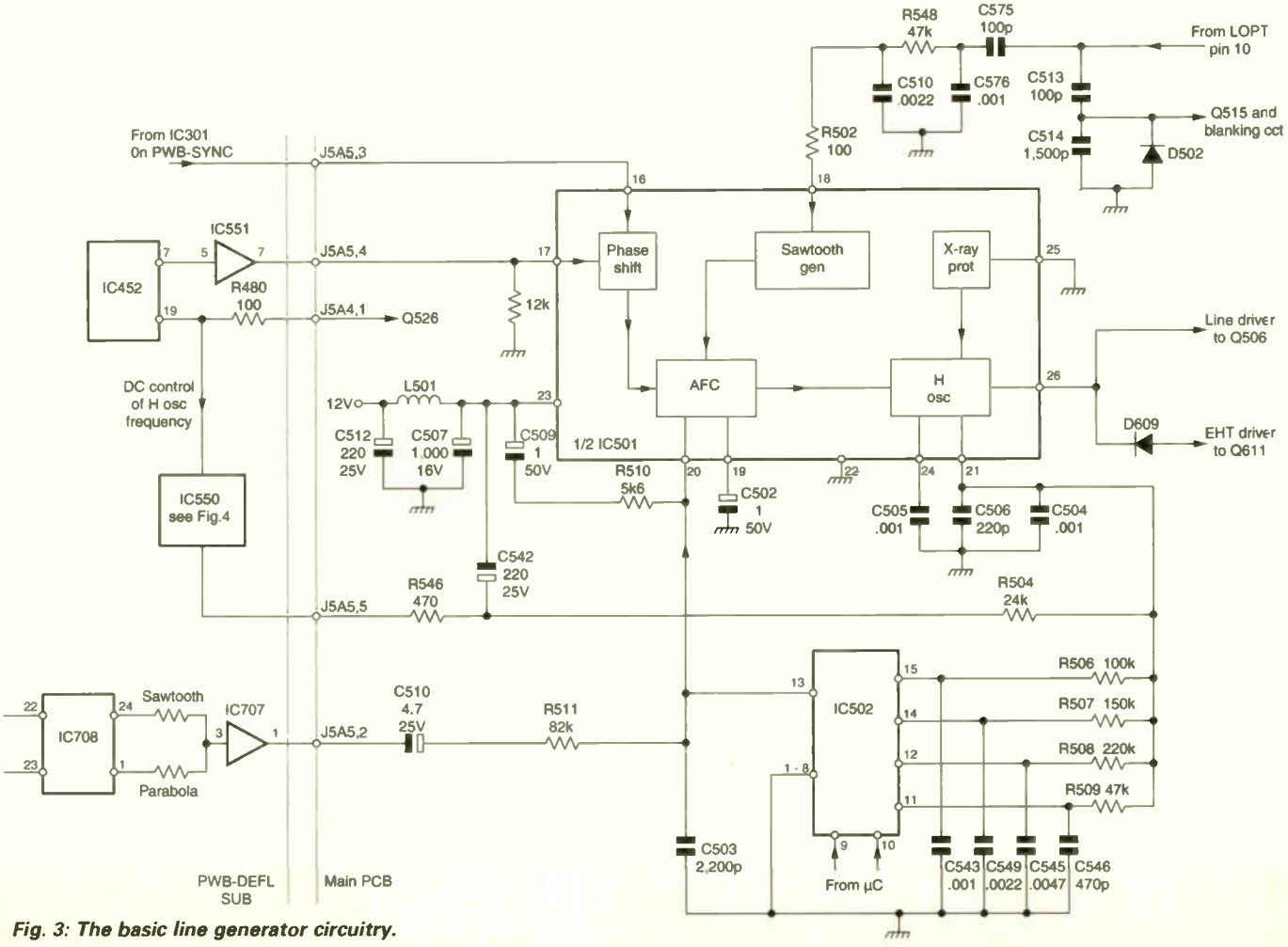


Fig. 3: The basic line generator circuitry.

see Fig. 4. This circuitry is centred on the NJM2904 chip IC550, which contains a couple of op-amps. The associated bias and gain controls VR550 and VR551 adjust the DC control voltage provided by the DAC chip IC452, at pin 19, to suit the line oscillator's time-constant circuit. One reason for mentioning this arrangement is that VR550 and VR551 are considered to be fair game by pot twiddlers. You need to know how to adjust them correctly, see later.

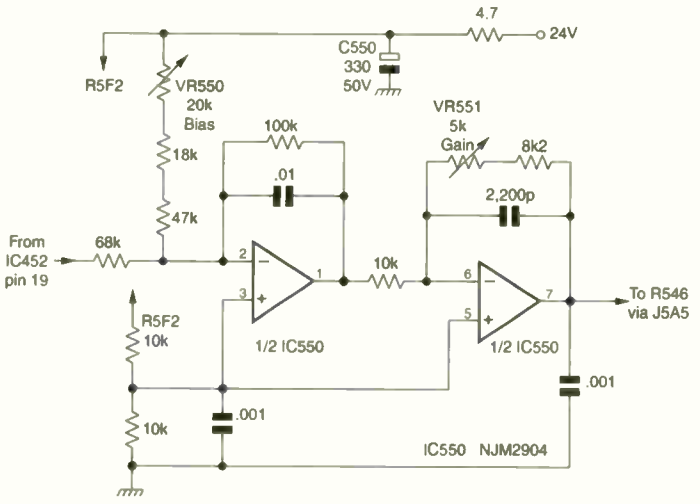


Fig. 4: The bias and gain circuitry that sets the required line oscillator frequency.

Image geometry adjustment

Returning to Fig. 3, the signal fed to C510 (4·7µF) has frame-rate sawtooth and parabolic components. It's coupled to pin 13 of IC502 and pin 20 (AFC) of IC501, but the effect is on the AFC only. IC502 is another MC14052 dual, four-channel analogue multplexer chip, of which only half is used (pins 1-8 are connected to chassis). Output pin 13 is connected to one of the input pins 11, 12, 14 or 15 depending on the data from the microcontroller chip at pins 9 and 10. Within the frequency ranges listed below, the microcontroller connects the AFC input to the junction of one of the following *RC* networks:

Frequency	*RC network*
Up to 40·5kHz	C545/R508
40·5-49·3kHz	C549/R507
49·3-59·7kHz	C543/R506
59·7kHz upwards	C546/R509

Each *RC* network forms a low-pass filter between pins 21 and 20 of IC501, with C503 to remove the line-frequency element at pin 20. The overall network comprises a range-dependent AFC switch.

The idea of applying frame-rate waveforms to pin 20 is to tweak the line oscillator dynamically during the course of each frame. That is, during the course of each frame period the line oscillator's frequency is adjusted very slightly and the time at which the scan starts is delayed or advanced in relation to the timing of the video information. (The action of the phase-shift circuit on the AFC has a similar effect on the line oscillator, only the conditions are in this case static until the user presses a button.)

The results of this dynamic image geometry adjustment on the screen are shown in Fig. 5. They are referred to as keystone and pincushion balance. Note, once again, that the video *appears* shifted in the raster: this is *not* scan correction. Fig. 5 deliberately shows a rectangular raster and the adjusted image contained within the raster.

The correction waveforms come from pins 24 and 1 of the DAC8840 chip IC708 and are combined by an op-amp in IC707 (C4082). The amplitude of the two components is controlled independently, in fact each can be inverted, by the DAC. This is done via the microcontroller chip while in the factory mode. Sadly the waveforms are difficult to reach with a scope probe, but it's well worth checking the combined waveform at C510 on the main PCB.

The amplitude of the signal at pin 20 of IC501 determines the time difference between the start of the scan and the display of active video. The higher the voltage at C510, the earlier the scan starts in relation to the video (or, if you wish, the later the video *appears* to be displayed).

Width control

The DC voltage at pin 19 of IC452, used to set the line oscillator frequency, clearly varies with this frequency. It has another role to play however, see Fig. 6. Via R480, Q526, Q502 and Q504 it controls the supply to the line driver transformer T501. This optimises the line output transistor's base current, and maintains correct impedance matching between the line driver and output stages throughout the line-frequency range.

You'll see that Q503 and Q505 act in the same way, via Q504. But these two transistors are used to apply width control, which is derived from pin 8 of IC452. Note that display width is set by the variable supply, 40-160V, fed to the line output transformer: the control via T501 minimises the power loss in the line output transistor Q591.

The line driver and output stages

The basic line driver and output stage circuitry is shown in Fig. 7. The output from the line oscillator, at pin 26 of IC501, is fed to the base of the emitter-follower Q506 and then to the gate of the 2SK358 FET driver transistor Q508, whose drain is connected to the driver transformer T501. The 2SC3688 line output transistor Q591 is mounted on its own PCB, above the main chassis, with the 39Ω resistor R521 across its base-emitter junction. Hence meter tests require Q591 to be desoldered rather than just unplugged at J510 on the main PCB. D508/9/10 provide efficiency diode action.

The conventional EW modulator diode is not present between the anode of the efficiency diodes and chassis. Instead, raster correction for pincushion and keystone distortion is applied to the gate of Q501 (IRF9620), which is connected in series with the supply to the LOPT. Its gate is pulse-width modulated by a complex parabolic waveform from the DEFL-SUB

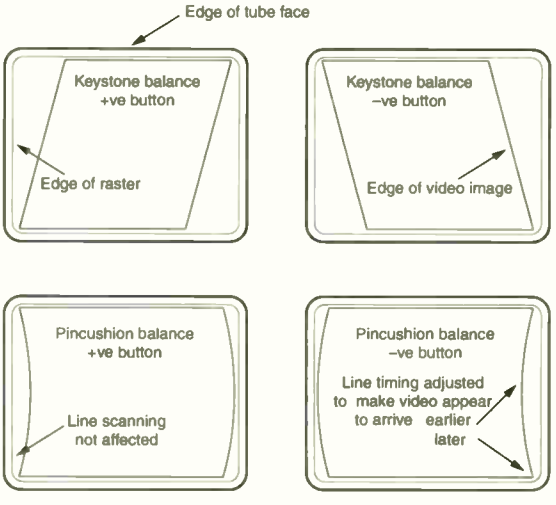


Fig. 5: Results of dynamic image geometry adjustment.

PCB. Q501 acts as a series current regulator that modulates the supply to the line output stage during the course of each frame scan. Note that, unlike the pincushion/keystone balance adjustment carried out by image timing at the line oscillator, this is real raster correction. The supply to the line output stage, applied to Q501's source, varies between 40-160V depending on the width and mode of the display. See the Part 3 for more detail about this.

Tuning

As usual, the line output stage is tuned. This is less complicated than it at first looks, when you appreciate that the tuning capacitors C251/2/3/4 are connected in circuit only as required, when the associated FET(s) Q511/2/3/4 is/are switched on by the microcontroller. The capacitors switched into circuit to cover the various frequency ranges as shown in Table 2.

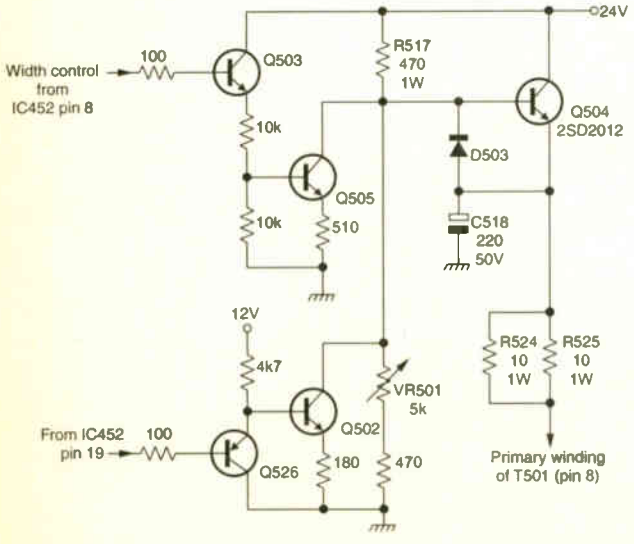
I'm not sure what happens between 49·3kHz and 54·5kHz, and don't have a signal to test such a condition! Above 61·5kHz there are only the permanently-in-circuit tuning capacitors C525/6 and C583/4 to provide tuning: they have a total value of 0·48µF. From this you can see that as the line frequency increases the tuning capacitance value decreases.

Above 44kHz the microcontroller chip switches Q510 on, closing relay RY501. L506 (68µH) is then connected in parallel with the polarised coil L505 to provide line linearity compensation.

Auxiliary supplies

Don't expect to find a 6·3V CRT winding on the LOPT or EHT transformer in a multisync monitor. However the LOPT in this monitor does provide a –100V supply for the CRT's grids from a secondary winding that feeds the rectifier diode D519. This supply is stabilised by IC503, zener diodes D520/1/2 and Q516 then applied to the blanking pulse chip IC305 on the sync PCB (see Fig. 1 in Part 1).

Fig. 6: Control of the supply to the line driver transformer T501.



Feedback

Pin 5 of the LOPT feeds rectifier D518, via the 1·2Ω fusible resistor R535. The voltage developed across C533 (22µF) is potted down and fed back to the power supply via Q519 and Q520 to regulate its 40-160V output. Twiddlers are also inclined to have a go at VR504 in Q519's base circuit. Correct adjustment is described below.

In the event of line collapse the voltage across C533 falls, Q517 switches off, Q518 conducts and, via D529, shorts out the drain of Q611. The EHT drive then shuts down and stays in this state until power is switched off.

If the power supply or line output stage has gone mad and is producing excess voltages, this condition is detected at R535. There's a link from here via D526 to pin 10 (overvoltage) of IC955 in the power supply. More on this in Part 3.

Setting up

Here's a basic setting-up procedure, as outlined in the service manual. Go through it only if you are certain that the monitor has been twiddled.

(1) Check for 168V across C956 in the power supply, with a 31·5kHz signal applied. Adjust VR951 if necessary.

(2) Set VR550 and VR551 to mid position.

(3) Place toggle switch SW951 in its centre position (his enables the line oscillator to run free without sync lock-up).

(4) Connect a frequency-counter probe to the red scan coil wire and apply a 40kHz signal to the monitor (the nearest I can find with my graphics card is 640 x 480 at 75Hz, which produces 38kHz).

(5) Adjust VR550 for 40kHz ± 0·2kHz.

(6) Apply a 64kHz signal to the monitor (1,152 x 864 at 70Hz gives 64kHz). Adjust VR551 for 64kHz ± 0·2kHz.

(7) Repeat steps 4, 5 and 6.

(8) Flip the toggle switch back towards the CRT neck.

(9) Check for sync lock with as many signals as you can.

(10) For the following, apply only an H-sync signal, with no V-sync or video. Make up a special lead and switch box from spares.

(11) Apply a MAC II signal at 35kHz for H sync.

(12) Adjust the user controls for maximum width.

(13) Apply a 64kHz H-sync signal and set the raster (not video) to measure 300mm wide (± 4mm) by adjusting VR504, which is on the main PCB near pin 28 of IC501.

(14) Connect the DVM to TP-H-DRIVE, near the scan-coil plug, and adjust VR501 for a minimum reading.

(15) This ensures correct line-drive current and level of feedback to IC955 for the chopper FET to provide the variable +B supply.

Workshop experiences

I've had the following problems that were caused by the STK79905B chip IC501. **(1)** frame collapse. **(2)** Flickering frame drive. **(3)** Very cramped frame scanning in the lower half of the screen, with widely-spaced, erratic jumpy lines above. The chip may have been dry-jointed internally, as tapping while cold seemed to have some effect on the display. **(4)** R408 was found to be open-circuit when IC501 had failed. **(5)** I once found that the line oscillator wouldn't synchronise. Otherwise, the line generator section of IC501 is excellent.

I did have one wild goosechase, which is always much harder when you don't have a circuit diagram. The complaint was excessive width: the front controls had no effect. In fact I had two of these monitors with the fault, both at the same time. Most unusual, since the line timebase is usually very reliable. Fortunately I had a working monitor with which to make comparisons.

A check on the voltage at pin 9 of J7A2 (the edge connector on the PWB-DEFL-SUB module) in the first faulty monitor confirmed that it varied between about 0·2-8V via the DAC when the width-control buttons were pressed. This voltage is passed to pin 9 of the green hybrid chip IC955 in the power supply, via R965. IC955 in turn controls, by means of pulse-width

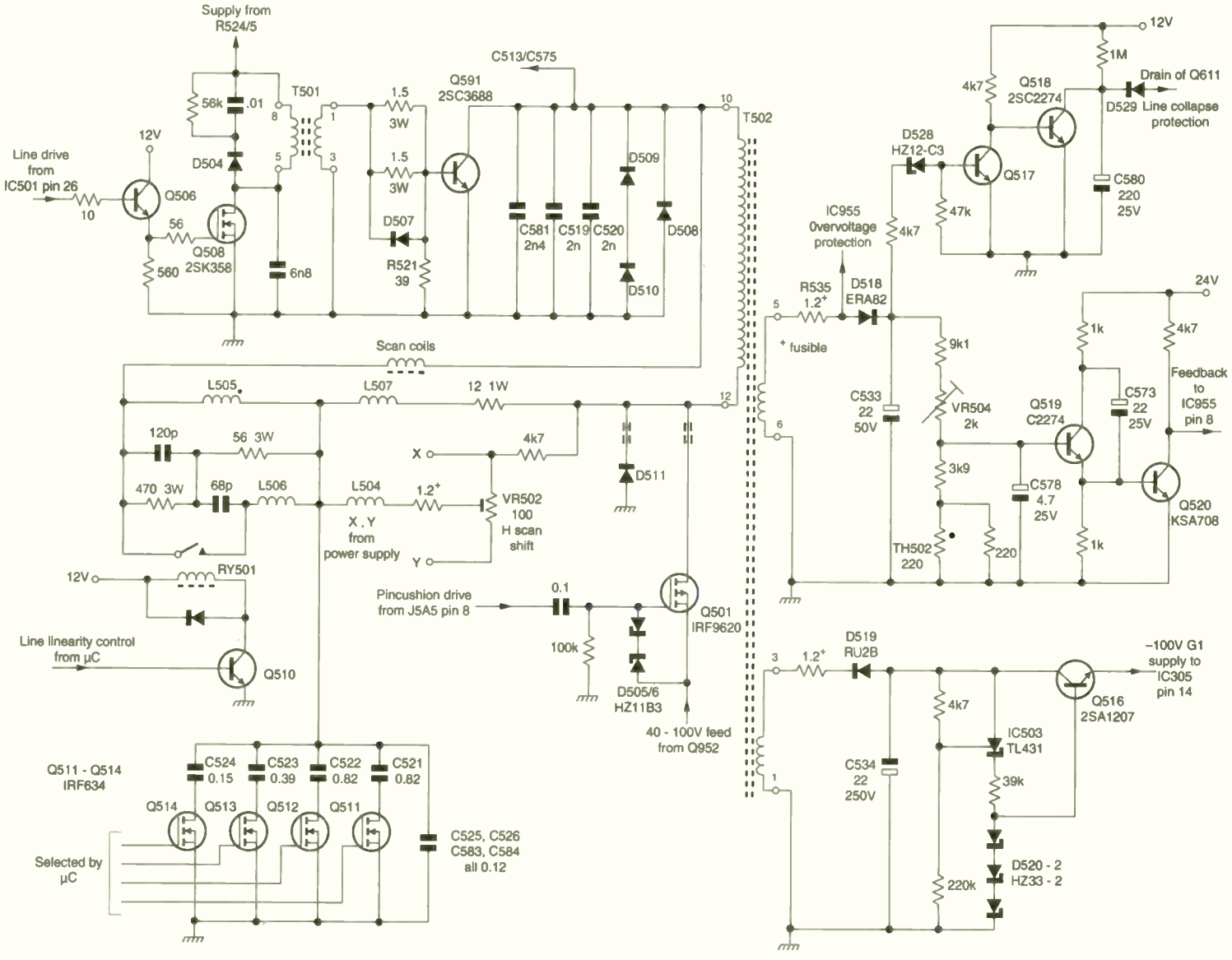


Fig. 7: Basic line driver and output stage circuitry.

modulation, the output from the +B regulator FET Q952 (IRF9620) depending on the type of PC signal present or the user's H-size setting. Comparison with the conditions in the working monitor seemed the best way of establishing what was wrong.

In the VGA mode the output from Q952 (at its drain) in the working monitor was 66V. In the faulty monitor it was 86V. This is the input to Q501 (EW correction FET), which feeds the line output transformer. Checks on the mark-space ratio of the drive output at pin 12 of IC955 to Q952 showed that in the faulty monitor it had a long 'on' time, hence the high output from Q952. It seemed that IC955 was working, though mysterious green things should never be trusted! So where was the cause of the trouble? It seemed a chicken-and egg situation.

I found some noisy-looking traces at pins 6, 7, 8 and 10 of IC955. Pins 6 and 7 are connected to an *RC* network only, so attention was turned to pins 8 and 10. Pin 10 is for overvoltage protection, the feed coming from pin 5 of the LOPT. Suspecting a fault in the line output stage, I checked the voltage at the cathode of D518, which is also fed from pin 5 of the LOPT, and obtained a reading of 32V in the working monitor and 20V in the faulty one. This was a bit of a surprise, as one might have expected the excessive line timebase activity in the faulty monitor to produce an increased voltage. A check on D518's reservoir capacitor C533 (22µF, 50V) in the faulty monitor showed that its value had fallen to 10µF. Replacement of this component cured the fault in both the defective monitors. A strange coincidence.

Next month

In Part 3 I'll concentrate on the EHT and power supply sections of the monitor, with notes on the most common causes of tripping.

Corrections to Part 1

(1) In paragraph 2, page 330, the vertical refresh rates should have been given as 50-130Hz (not 30-64Hz). See top of column 2.

(2) On page 332, in column 3, "Other outputs from IC305 are . . ." should have read "Other inputs to IC305 are . . ." This is 27 lines down from the top of the column.

John Coombes on how to tackle the various faults you could get with this VCR

Hitachi VTF645 fault-finding guide

This is one of a group of popular VCRs, introduced in about 1996, that incorporate the US mechanism. In the following run down on fault conditions you could encounter I'll start with mechanical problems.

Mechanical faults

The most common cause of chewed tapes is a worn pinch roller. In some cases the bearing may warp or be distorted: the incorrect balance causes tape chewing.

If the pinch roller is OK, check the clutch pulley assembly – items 229 (pulley, part no. KX11443) and 239 (gear, part no. KF10551) in the exploded view (bottom) in the manual. Look for damage or broken plastic retaining lugs. Problems here can cause many different faults, including tape looping during eject, which can be very intermittent. There may be no take-up or drive in the play mode. No fast forward/rewind can be the result when the pulley has broken.

If these items are all OK, check the operation of the capstan motor. You may have to remove the motor, dismantle the flywheel spindle, clean and relubricate the shaft and bearing, reassemble and set up. A faulty bearing can cause tape looping/creasing at the top and bottom. If the bearing is badly contaminated the capstan motor may have to be replaced, because the hole in the bearing has become oval. In this event, even if the tape drive is OK after cleaning, the sound can suffer from wow and flutter, with poor music.

In some cases there may be no tape damage but the VCR makes a groaning noise in playback, record, fast forward or rewind. This also requires the capstan motor bearing to be cleaned and the spindle set up. Follow with a soak test.

If there is very intermittent tape chewing or looping check the two small moulded pins, which secure the clutch unit, on the shaft.

If the tape is not being wound back into the cassette check that the reel spools (supply item 248, take-up item 250) are rotating correctly. The spools should be lightly lubricated. If not friction can, over a period of time, result in elongated holes. The spools then slow down and stick, with the result that the tape drags or spills out over the drive mechanism.

If these items are all in order, it may be worth checking through the tape path to ensure that there are no sticky patches on the guide poles, the audio/control head or drum assembly. If the tape sticks it can be damaged.

Tape damage can also be caused by incorrect operation of the brakes, item 254 left and/or item 255 right. They can break or, very often, one of the lugs that holds the brake spring can crack. The spring then drops off and the brakes don't operate correctly.

Another cause of tape damage is when the VCR timing is badly out because the mode switch (S2101) is faulty. Check by cleaning or by replacement.

If the VCR sometimes tries to load without a tape, or ejects immediately after loading, replace the front-loading switch (S2102).

A problem I've come across on a number of occasions is an intermittent corrugated effect on the playback picture, with a loud whine or squeal. It can also occur in the record mode, with the symptom being recorded. Very often the cause is a vibrating sleeve on one of the guide poles. Another cause is a faulty back-tension arm (part no. KX11531).

If the VCR powers down intermittently, check the capstan motor. It may be possible to cure this by dismantling, cleaning and relubricating the motor. If not, check the motor by replacement.

In a few rare cases there has been no reset pulse to the microcontroller IC, with the voltage on the B5V line low at 4·6V. The cause has been heavy electrical leakage in the capstan motor, which must be replaced.

If the VCR can't thread the tape or lift it up and down in the cassette housing, replace the pulley (part no. KX11443) and gear (part no. KF10551) in the clutch pulley assembly.

Diagnostic fault finding

This VCR produces diagnostic malfunction codes in the LC display as an aid to fault finding. To display the fault code, press the channel down button with the power turned off and hold it. The code is displayed as long as the button is held. Various possibilities are as follows.

If **code 01** is displayed there's a problem with the front-loading (FL) mechanism. If the mechanism is jammed, check the unit for broken cogs or levers and ensure that it moves freely along the tracks. If the FL unit isn't jammed, check whether the capstan motor rotates. If it does there's a mechanism fault.

If the capstan motor doesn't rotate, check the FG output from the motor. This is fed to pin 40 of the HD6433977SB54 microcontroller chip IC901 via pin 5 of PG001/PG601, C601 (2·2µF, 50V) and R636 (3·3kΩ). Servo control from pins 25 and 75 of IC901 is fed to the capstan motor via pin 1 of PG601/PG001. Checks here should show whether the motor or IC901 is at fault.

If **code 16** (servo fault) is displayed, check for 5V at pin 41 of IC901 with the power on. If the supply is present, replace IC901. If the 5V supply is missing, check the M5278L05 5V regulator IC905 which should have 9V at its input and 5V at its output.

If **code 04** (reel lock) is displayed and the capstan motor rotates, does the supply reel turn in reverse? The reverse signal comes from pin 60 of IC901 and is supplied to the capstan motor via pin 7 of PG601/PG001. If pin 60 is high, check for a mechanical fault – the gears and drive belt. If pin 60 is not high, replace IC901.

If the supply reel is OK, check whether the take-up reel rotates during playback. If it doesn't, check for a mechanical fault. If it does rotate, check for pulses at the base of Q2104 (DTC144K) on the mechanism sensor board. No pulses here suggests that the SG236 take-up reel sensor chip IC2101 is faulty. If Q2104 is receiving pulses, check whether they arrive at pin 88 of IC901. If not, suspect Q2104 and its associated components. If they do, check IC901 by replacement.

The SG237 supply reel sensor feeds pulses to Q2103 (DTC144K). These should arrive at pin 89 of IC901. Carry out the same checks to ensure correct operation in this path.

If **code 07** is displayed there's a loading problem. The loading motor could be faulty, but the first thing to check is the 12V supply at pins 7 and 8 of the BA6209 loading motor drive chip IC904. If this supply is missing, check whether R976 (2·2Ω fusible) is open-circuit or C914 (33µF, 25V) is short-circuit. IC904 provides drive outputs at pins 2 and 10 – there should be 0·6V at these pins. If IC904 is providing drive outputs the motor is suspect. If there is loss of the outputs replace IC904. If tape loading or unloading is intermittent, check for dry-joints at the pins of IC904.

Electronic faults

If there are no outputs from the power supply, check whether the 1·6A mains fuse F851 is open-circuit. If it is, check the S1WBA60 mains bridge rectifier D851 for shorts and, if necessary, the FS3KM-18A chopper MOSFET Q851. If Q851 has failed R856 (0·33Ω, 1W) which is in series with its source will probably be open-circuit. On rare occasions shorted turns in the chopper transformer T851 are the cause of F851 being open-circuit. If F851 is OK, check whether circuit protector QF851 (ICP-N38, 1·5A) is open-circuit.

If the VCR works but there are no E-E pictures the 33V tuning supply is missing. The main suspects are the HZS30-3 zener diode ZD2501 which could be short-circuit or Q2506 (2SA844CD) which could be open-circuit or leaky.

Loss or intermittent loss of colour is very often caused by IC201 (HA118203F), but check for dry-joints first. Another cause is the 4·43MHz crystal X202, which could also be dry-jointed.

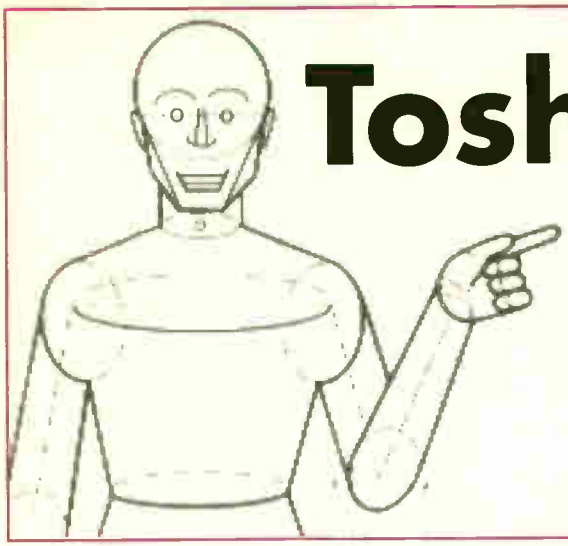
If there is no sound, distorted sound or crackles on sound, check for dry-joints at the SAA7283GP Nicam decoder chip IC1810 and if necessary replace the chip. If there is only one channel, left or right, with Nicam sound, IC1810 or the dual op-amp chip IC1802 (NJM4558M) could be faulty.

If the display is poor or doesn't function, check the BU9716K LCD driver chip IC1701. If only part of the segments show, check the display (LCD1701) by replacement. IC1701 receives inputs from pins 98, 99 and 100 of IC901: if necessary check that these outputs are present.

If there is loss of information to the microcontroller IC901, the ST24C02 EEPROM chip IC903 is suspect. Before replacing it, confirm that the 5·1V supply at pin 8 is present and correct. It comes from D861 in the power supply.

If remote control doesn't operate though the handset is providing an IR output, check for dry-jointed or high-resistance connections at the TFMS5380B IR receiver IR1701. Its output at pin 1 is fed via pin 5 of PG1703/PG703 to pin 82 of IC901, which could also be dry-jointed. Alternatively either device could be faulty.

If the handset is the cause of the problem, check for poor battery connections – make sure that there are no dry-joints at the connector. If necessary check for dry-joints at the LED and the crystal. Sometimes the legs on the crystal break off, giving loss of operation. The handset may have been damaged by being dropped etc. In many cases such damage is beyond economic repair. ■



Toshiba service briefs

Models VTV1402B and VTV1402S

A common cause of the dead set symptom is failure of the 2SD2627LS line output transistor Q406, which goes short-circuit. The part no. is BZ510036. To prevent further failure, the two 1,000pF, 500V capacitors C417 and C438 should also be replaced. Suitable replacements are supplied with Q406 when this is ordered from Toshiba. Fig. 1 shows the positions of these components.

Models 32MW7DB and 40WH08B

There have been complaints that the picture brightness fluctuates when objects in the foreground move, for example the brightness of the map in the background fluctuates when the weatherman moves his arm. An improvement can be obtained by changing some data values in the receiver's design mode: this reduces the action of the black-extender circuit.

Note that data should not normally be changed in the design mode, as some changes can result in a non-working set. So special care is required.

To enter the design mode, first enter the service mode as follows. Press the remote-control unit's mute button, then press it again and hold. While holding it down, press the menu key on the set's front panel. The letter S should appear at the top-right corner of the screen and RCUT at the top-left corner. You are then in the service mode.

To enter the design mode, press and hold the remote-control unit's call button, then press the menu key on the TV set's front panel. The S at the top-right corner of the screen should change to D. You are now in the design mode. Use the channel-up and channel-down keys to select the data name required, and the volume-up and volume-down keys to change the data. To store new settings, switch the set to standby then on again.

The data settings to change to deal with the brightness fluctuation problem with these sets are as follows:

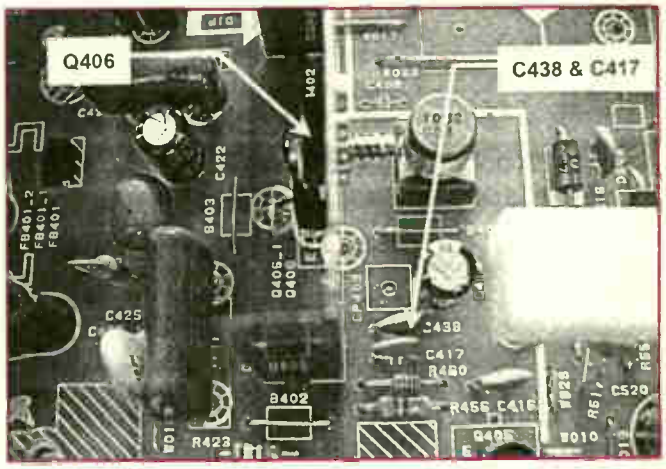


Fig. 1: Positions of Q406, C417 and C438 in the Toshiba Models VTV1402B and VTV1402S.

Data name	*New setting*
BS2	07
2BS2	07
3BS2	07
NBS2	07
WBS2	07

The above information is from the Toshiba Technical Bulletin AH85.

The following list gives spares department addresses and telephone numbers or, where these are the same, service department or head office addresses and telephone numbers. Also included are details of various spares distributors. Stocks of spares may no longer be available for defunct brands.

TV/VCR SPARES GUIDE 2002

Aiwa
Tel 0870 1699 602
Spares & fax 0870 1699 603.
e.mail:
spares@aiwa-euroservice.com
See also CPC, KSA Wholesale Components, SEME and Willow Vale.

Akai Spares from Prima International, Prima House, 4 Elland Road Industrial Park, Elland Way, Leeds LS11 0EY.
Tel 0113 251 1500
Fax 0113 251 1535.
e.mail:
akaispares@prima-international.com
See also CPC, Chas Hyde and Wizard.

Akura See CPC, also Iain Stewart.

Alba Radio Ltd., 12 Thames Road, Barking, Essex IG11 0HZ. Spares for Alba, Bush, Roadstar and some Goodmans and Hinari models. Some Brother microwave, Dirt Devil and Power Devil spares.
Tel 020 8787 3000
Fax 020 8787 3110.
See also CPC, SEME, Willow Vale, and Wizard.

Ambassador Brand name used by Sentra Electronics.

Amstrad Spares handled by CPC. See also Willow Vale and Wizard.

A.R.D. Electronics Plc., Warehouse and Distribution Centre,
Shorten Brook Way,,
Altham Business Park
Altham, Accrington,
Lancashire BB5 5YL
Tel 01282 683 000
Fax 01282 683 010.
e-mail: sales@ardelectronics.com

Autovox See Comet Group plc.

Beko (UK) Ltd., Beko House, 36/38 Caxton Way, Watford Business Park, Watford, Herts WD1 8QZ.
Tel 01923 818 121
Fax 01923 819 652/3.
e.mail:spares@beko.co.uk
See also SEME.

Beovision/Beocord Bang and Olufsen UK Ltd., Unit 630, Wharfdale Road, Winnersh, Wokingham, Berks RG415TP.
Tel 0118 969 2288
Fax 0118 969 3388.

Binatone Telecom plc., Unit 1, Ponders End Industrial Estate, East Duck, Lees Lane, Enfield EN3 7SP.
Tel 01325 304473
Fax 01325 304498
Trade only.

BPL Spares for TV sets made in India available from Falmouth Hi Fi, 14 Market Strand, Falmouth, Cornwall TR11 3DE.
Spares also available for Crown, Dansai, Datsurai, Kuro and Zenor
Tel 01326 313 412
e.mail falmouthhifi@yahoo.co.uk

Bush See Alba Radio Ltd. Also CPC, SEME and Willow Vale.

Cambridge Spares available from CPC and SEME.

Canon Consumer Imagining Service Centre, Unit 130 Centennial Park, Elstree WD6 3SE
Tel 0870 241 2161
Fax 020 8731 4139
See also CPC.

Cathay Spares available from Diamond Television.

Comet Group plc., After Sales, PO Box 92, Preston PR2 9GY.
Tel 08706 052 020
Fax 01772 664 835.
e.mail:accessoriesdirect@cpc.co.uk

CPC Plc., Component House, Faraday Drive, Fulwood, Preston, Lancs PR2 9PP.
Tel 01772 654 455
Fax 01772 654 466.
e.mail:sales@cpc.co.uk
Authorised spares distributor for Akura, Aiwa, Alba, Amstrad, Bush, Citizen, Epson, Ferguson, Fidelity, Goodmans, Grundig, Hinari, Ingersoll, LG, Logik, Matsui, Orion, Pace, Panasonic, Philips, Pye, Saisho, Samsung, Sharp, Sony, Thompson, Toshiba and Triumph.
Compatible spares available for Akai, Baird, Bang and Olufsen, Beko, Blaupunkt, Brandt, BT, Cambridge, Canon, Casio, Crown, Daewoo, Decca, Dual, Finlux, Fisher, Fujitsu, Funai, GEC, Granada, Hantrex, Hitachi, ITT, JVC, Loewe, Luxor, Marantz, Maspro, Memorex, Mitsubishi, NEC, Nikkai, Nokia, Normende, Pioneer, Proline, Questar, Rediffusion, Roadstar, Saba, Salora, Sansui, Sanyo, Schneider, Sentra, Shintom, Siemens, Skantic, Solavox, Tashiko, Tatung, TEC, Telefunken, Tensai and Thorn.

Crown Spares available from Key Electronics. See also SEME. Made in India models see BPL.

Daewoo Electronic Sales UK Ltd., Daewoo Building, 640 Wharfedale Road, Winnersh Triangle, Wokingham, Berks RG41 5TP.
Tel 01189 252 500
Fax 01189 256 774.
Note: Daewoo brand products only, not OEM products. For the latter, refer to the original distributor. Account holders only.
See also CPC and SEME.

Decca See Tatung (UK) Ltd., CPC and Wizard Distributors. Spares for chassis up to and including the 110/115 series available from D&S Electronic Services, Building 15, Unit 4, Stanmore Industrial Estate, Bridgnorth, Salop WV15 5HR.
Tel 01746 766 641
Fax 01746 766 641.

Denon Spares available from Hayden Laboratories Ltd., Hayden House, Chiltern Hill, Chalfont St Peter, Gerrards Cross, Bucks SL9 9UG.
Tel 01753 888 447
Fax 01753 880 019.
e.mail:info@denon.co.uk

Diamond Television, 15/15a Rodbourne Road, Rodbourne, Swindon, SN2 2AG. Spares for Cathay and Venturer products. Murphy TVs with model numbers starting CTV, the Murphy VCR7101, Sansui SV77 VCR and Osaki VCR31/2/3 plus mechanical parts for the VCR35 also spares for the Venturer audio range.
Tel 01793 497 591
Fax 01793 431 687.
e.mail:
sales@diamondtv.freeserve.co.uk

Dual See Wizard Distributors.

Dynatron Pre-1981 sets, see

TV/VCR SPARES GUIDE 2002

Philips Service; post-1981 sets, spares from SEME.

Elftone Electronics Ltd., 4 Beresford Avenue, Wembley, Middx HA0 1YZ.
Tel 020 8902 6222
Fax 020 8903 5011.
e.mail: enquiry@elftone.com

Etron Brand name used by Nikkai Imports Ltd.

Eurosat Distribution Ltd, 5, Oxgate Centre, Oxgate Lane, London NW2 7JA.
Tel 020 8452 6699
Fax 020 8452 6777.
www.eurosat.co.uk

Expert. Sets use Tatung, GEC, or Luxor chassis.

Ferguson Spares available from Thomson Multimedia Sales UK Ltd., 30 Tower View, Kings Hill, West Malling, Kent ME19 4NQ.
Tel 01732 520 920
Fax 01732 520 995.
e.mail:simmondsk@thmultimedia.com
morhenp@thmultimedia.com
See also CPC, HRS, Chas Hyde, SEME, and Wizard.

Fidelity Spares available from SEME, HRS, CPC, Wizard and Willow Vale.

Finlux Spares available from GenServe Ltd.

Fisher Spares available from Sanyo UK Sales Ltd., Sanyo House, Otterspool Way, Watford, Herts. WD2 8JX.
Tel 01923 222 244
Fax 01923 818 251.
See also CPC and Chas Hyde.

Fujitsu General, Unit 150 Centennial Park, Centennial Avenue, Elstree, Herts WD6 3SG.
Tel 020 8731 3450
Fax 020 8731 3451
e.mail: heather@fujitsu.co.uk

GEC Spares available from CPC, HRS, and SEME.

General See Fujitsu General.

GenServe (GTS) Ltd., 11 Caen View, Rushy Platt, Swindon SN5 8WQ.
Tel 01793 886 332
Service 01793 886 333
Spares 01793 886 322
Fax 01793 886 323.
e.mail:genserve@dial.pipex.com

GoldStar See LG Electronics UK Ltd. Also A.R.D, CPC, Chas. Hyde and SEME.

Goodmans See Alba Radio Ltd. or Comet Group plc. depending on model. Also CPC.

Grundig Spares available from CPC and Willow Vale. Spares for VCR4000 and SVR4004 ranges available only from Willow Vale.

Harwood Spares available from Key Electronics.

Hinari Spares available from CPC, Chas Hyde and SEME.

Hira The Hira Co., Ltd., Elizabeth House, 1 Elizabeth Street, Manchester M8 8JJ.
Tel 01618 347 432
Fax 01618 324 566.

Hitachi Sales (UK) Ltd., Dukes Meadow, Millboard Rood, Bourne End, Bucks SL8 5XF.
Tel 01628 643 435
Fax 01628 643 000.
www.hitachi.service
See also Chas Hyde and Willow Vale.

HMV Sets use Ferguson or Fidelity chassis.

HRS Electronics Ltd., Medco House, Connect Business Park, Bordesley Green Road, Birmingham, B9 4UA.
Tel 0121 766 6668
Public orderline
Tel 0121 766 5124
Fax 0121 766 7274.
e.mail:
mailorder@connect-distribution.co.uk
Wide range of video, audio and television spares for Fidelity, GEC, Hitachi, Nikkai, Pace, Philips, Pye, Saisho, Sanyo, Sharp, Tatung, Toshiba and many more. Also all leading domestic appliance brand spares.

Charles Hyde & Son Ltd., Prospect House, Barmby Road, Pocklington, Yorks YO42 4LZ.
Tel 01759 303068
Fax 01759 303620.
Web site: charleshyde.co.uk
Sole authorised UK spares distributor for Akai, Hitachi, Nokia, Sanyo, Teac, Tascam and Yamaha.
Approved spares and accessories distributor for Alba/Bush, Thomson/Ferguson, JVC, Goldstar, LG, Matsui, Philips, Saisho and Sharp.
The ASWO service partner for UK and Ireland.
Extensive spares stocks available for Mitsubishi, Samsung, Sony and Toshiba.
Selected ranges of specific genuine and/or replace-ment pattern spares for Decca, Fidelity, Hinari, GEC, Grundig, Luxor, NordMende, Orion, Panasonic, Saba, Salora, Sentra, and Tatung.
Full range of semiconductors, passive components, triplers, LOPTs and remote controls.

ITT Spares available from GenServe Ltd. See also CPC.

JVC (UK) Ltd., JVC House, JVC Business Park, Priestley Way, Staples Corner, London NW2 7BA.
Tel 020 8450 3282
Fax 020 8452 2534.
Account holders only.
See also CPC, Chas Hyde and Willow Vale.

Kenwood Electronics UK Ltd., Kenwood House, Dwight Road, Watford, Herts WD1 8EB.
Tel 01923 816 444
Fax 01923 819 131.
See also KSA.

Key Electronics Unit 5, Brow Mills Industrial Estate, Brighouse Road, Hipperholme, Halifax HX3 8EF.
Tel 01422 203676
Fax 01422 263224.
Spares for Crown Corporation, Harwood, Kyosho and Ssangyong products.

Konica Plane Tree Crescent, Feltham, Middx TW13 7HD.
Tel 020 8751 6121
Fax 020 8755 0681.

Körting See SEME.

KSA Wholesale Components, 582 Green Lane, Small Heath, Birmingham B9 5QG.
Tel 0121 772 2834
Fax 0121 772 7487.
Authorised spares distributor for Aiwa, Kenwood, Philips, Philex, Pioneer, and Samsung.

Kuro Made in India models see BPL.

Kyoshu Spares available from Key Electronics.

LG Electronics UK Ltd., LG House, 264 Bath Road, Slough, Berks SL1 4DT.
Tel 01753 500 400
Fax 01753 517 445.
See also A.R.D. Electronics, CPC and Willow Vale.

Llaytron Laltex Group, Laltex House, Leigh Commerce Park, Greenfold Way, Leigh, Lancashire WN7 3XH.
Tel 01942 687 000
Fax 01942 687 070.

Logik Brand name used by Dixons. Spares available from Partmaster, CPC, HRS.

Loewe Spares available from Wizard.

Luxor Spares available from GenServe Ltd., CPC, Chas Hyde and Willow Vale.

Manhattan
Eurosat Distribution Ltd., Oxgate Lane, London NW2 7JA.
Tel 020 8452 6699
Fax 020 8452 6777.

Marantz Hi Fi UK Ltd., Kingsbridge House, Padbury Oaks, 575/583 Bath Road, Longford, Middx UB7 0EH.
Tel 01753 680 868
Fax 01753 680 428.
See also SEME and CPC.

Matsui Brand name used by Currys and Dixons. Spares available from Partmaster. Also CPC, Chas Hyde, SEME and Wizard.

Metz No UK source of spares. Manufacturers address: Metz Werke Gmbh 2 Co., D8510, Furth, Germany.

Mitsubishi Spares available SEME, CPC, Willow Vale and Wizard.

Morphy Richards
Spares available from R and M Technical Services.

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Murphy Spares available from Diamond Television for TV sets beginning with CTV and VCR 7101. Some sets fitted with Fidelity chassis. Older sets fitted with Rediffusion chassis. Earlier sets fitted with Rank chassis.

NCS See GenServe (GTS) Ltd.

NEC Spares available from SEME and CPC.

NEI See Stewart (Iain) and SEME.

Nikkai Spares available from CPC, HRS, Stewart (Iain) and Wizard.

Nokia Spares available from GenServe Ltd. and Chas Hyde.

NordMende Spares available from Thomson Multimedia. See also SEME.

Orion See CPC and Chas Hyde.

Osaki Brand name used by Rumbelows. Spares for models VCR31/32/33, also mechanical parts for VCR35 available from Diamond Television. See also SEME.

Pace Micro Technology plc, Victoria Road, Saltaire, Shipley, West Yorkshire, BD18 3LF.
Tel 01274 532 000
Fax 01274 537 128.
Spares also available from A.R.D. Electronics, Eurosat, HRS, CPC and Willow Vale.

Panasonic (UK) Ltd., Panasonic House, Willoughby Road, Bracknell, Berks RG12 8FP.
Tel 01344 860 133
Fax 01344 861 598.
Account holders only.
Non-dealer orders handled by SEME Ltd.

Partmaster Direct,PO Box 1924 Sheffield S2 5XX
Tel 0870 909 0444
Fax 0870 909 0333
www.partmasdter.co.uk
e.mail: sales@partmaster.co.uk
Spares for Dixons/Currys ranges – Matsui, Link, Logik, Prinz, Saisho. Also Sanyo.

Philips Service Centre, 420/430 London Road, Croydon CR9 4QX.
Tel 020 8686 5414
Fax 020 8681 0796.
e.mail: cesparesuk.orders@philips.com
Account holders only supplied.
See also CPC, HRS, Chas Hyde, KSA, Willow Vale and Wizard.

Pioneer (GB) Ltd., Pioneer House, Hollybush Hill, Stoke Poges, Slough SL2 4QP.
Tel 01753 789 876
Fax 01753 789 534.
Account Holders only.
See also CPC, KSA and SEME.

Prinz Brand name used by Dixons. See Partmaster.

Proline Brand name used by Comet Group plc.

Pye See Philips Service. Also SEME.

Quart see Denon, Hayden Lab.

Questar See CPC.

Roberts Radio Technical Services
97-99 Warton Road, Isleworth, Middx TW7 6EG.
Tel 0208 560 6644
Fax 020 82329739
Helpline 020 8758 0338.
e.mail: spares@rmtv.co.uk
Spares for Roberts Radio and Morphy Richards models.

Roadstar See Alba, CPC and SEME.

Saba Spares available from CPC.

Saisho Brand name used by Dixons. See Partmaster, CPC, HRS, Chas Hyde, SEME, Willow Vale and Wizard.

Salora Spares available from GenServe Ltd. and CPC.

Samsung Euro Service Centre, Unit A, Stafford Park 12, Telford Shropshire TF3 3BJ.
Tel 01952 207 171
Fax 01952 293 459 (spares only).
Also CPC, Chas Hyde, KSA, Willow Vale and Wizard.
Agents in N. Ireland Don Berg Elec tronics Ltd., School Masters House, Ranafast, Co Donegal, Eire.
Tel 00 353 754 8275
Fax 00 353 757 1031.

Sansui Spares available from CPC, or Diamond Television for VCR Model SV77.

Sanyo UK Sales Ltd., Sanyo House, Otterspool Way,Watford, Herts WD2 8JF.
Tel 01923 222 244
Fax 01923 818 251.
See also Chas Hyde, and Partmaster.

Schneider Spares available from Wizard and CPC.

Seleco See SEME.

SEME Ltd., Hudson Road, Melton Mowbray, Leics LE131BS.
Sales Hotline 01664 484 000
Fax 01664 563 976.
e.mail: sales@seme.co.uk
Web: www.seme.co.uk
Internet catalogue: www.seme.co.uk/solo
Sole authorised distributor for Mitsubishi and Toshiba.
Authorised spares distributor for AEG, Airflow, Alba, Aiwa, Baird, Beko, Bendix, Bissell, Bush, Crown, Credo, Cannon, Daewoo, Electrolux, Europart, Ferguson, Hotpoint, LG, Marantz, Matsui, NEC, NordMende, Osaki, Panasonic, Pace, Philips, Pioneer, Pye, Parkinson Cowan, Saisho, Sharp, Sony, Technics, Telefunken, Thomson, Tricity, Thorn and Zanussi.
Spares available for Akai, Akura, Amstrad, Bush, B&O, Blaupunkt, Braun, Cambridge, Crown, Dansai, Decca, Denon, Dynatron, Fidelity, Fisher, GEC, Finlandia, Finlux, Fujitsu, Funai, GEC, Goodmans, Graetz, Granada, Grundig, Hinari, Hitachi, ITT, JVC, Jackson, Kenwood, Körting, Loewe, Logik, Luxor, Memorex, Murphy, NEI, Nokia, Orion, Proline, Rediffusion, Roadstar, Saba, Sabre, Salora, Samsung, Sansui, Schneider, SEG, Seleco, Sentra, Sharp, Siemens, Solavox, Tashiko and Tatung.
For Panasonic and Pioneer Spares telephone
Tel 01280 823 523
Fax 01280 814 916.

Sentra Post-1991 spares available from Alba.
See also SEME, CPC and Wizard.

Sharp Spares available from A.R.D. Electronics, Willow Vale, CPC, HRS, SEME and Wizard.

Siemens Spares available from Appliance Care Limited, Unit F4, Ballymount Drive, Ballymount Road Industrial Estate, Walkinstown, Dublin 12.
Tel 00353 145 02655
Fax 00353145 02520.

Skantic Spares available from GenServe Ltd. and CPC.

Solavox Brand name used by Comet Group plc. See also CPC.

Sony UK Ltd., Spares Division, PO Box 58, Newbury, Berks RG13 9LQ.
Tel 01635 861 133
Fax 01635 874 099.
Account holders only. See also CPC, Chas Hyde, Willow Vale and Wizard.

Ssangyong Spares available from Key Electronics.

Steepletone Products Ltd., Park End Works, Croughton, Nr Brackley, Northants NN13 5RD.
Tel 01869 810 081
Fax 01869 810 784.

Stewart (Iain)
3 Royds Avenue, Linthwaite, Huddersfield HD7 5QU.
Tel 01484 842 761
Mobile 0777 307 0474.
Stockist for NEI and some Nikkai spares, also spares for current Akura models.

Tandberg R.D.E. Tandberg, Holly Tree House, The Green, Full Sutton, York YO41 1HW.
Tel 01759 372 795.

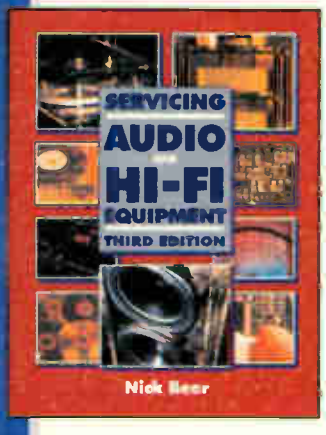
Tatung (UK) Ltd., Service Division, Stafford Park 10, Telford, Shropshire TF3 3AB.
Tel 01952 290 111
Fax 01952 292 096.
Trade only.
Spares also available from CPC, HRS and Willow Vale.

BOOKS TO BUY

VIDEO AND CAMCORDER SERVICING AND TECHNOLOGY

This book provides fully up-to-date coverage of the whole range of current home video equipment, analogue and digital. As well as essential information for repair and trobleshooting, the author provides clear explanations of the technology of video equipment, which will enable the service engineer to gain a thorough knowledge of the equipment with which they are working.
As well as traditional VCRs the book includes the full range of video cameras designed for home use and editing systems, and the latest DVD and hard-disk equipment.
READERSHIP: Service engineers, servicing students, advanced electronics DIY.

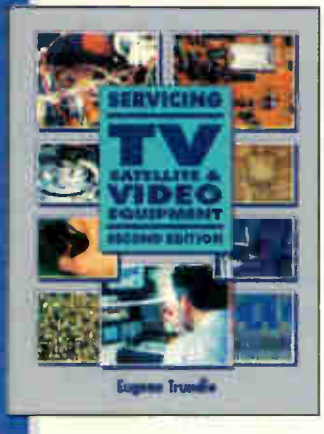
Price UK £23.00 EUR £25.00



SERVICING AUDIO AND HI-FI EQUIPMENT

Service engineers and technicians have come to regard this book as essential to their work. As a bench-side companion and guide it has no equal. Its purpose is to ease and speed up the processes of fault diagnosis, repair and testing of all classes of home audio equipment: receivers, amplifiers, recorders and playback machines. The mechanics and electronics of domestic audio are examined by Nick Beer in a down-to-earth and practical way, concentrating on what goes wrong, how to track down problems, and how to solve them.
READERSHIP: Service technicians and engineers, audio engineers.

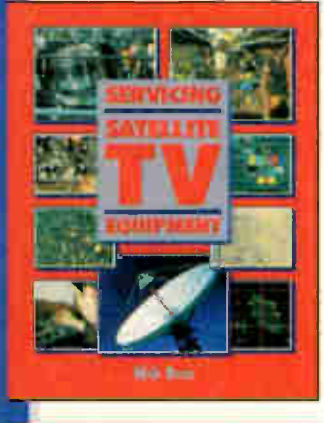
Price UK £35.00 EUR £37.00



SERVICING SATELLITE TV EQUIPMENT

This is the definitive practical guide to fault-finding, troubleshooting and servicing satellite television equipment, both indoors and outdoors. It will take you through all areas of satellite television system servicing from the simplest fixed dish to fully motorised systems. From PAL to Mac to MPEG all contemporary systems are covered.
READERSHIP: Service engineers, satellite equipment designers and manufacturers audio engineers.

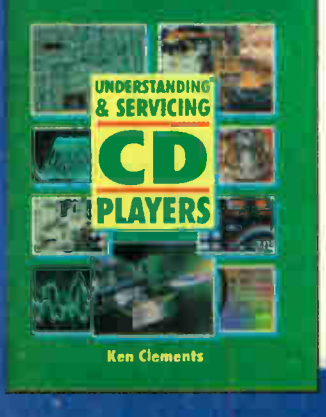
Price UK £35.00 EUR £37.00



SERVICING TV SATELLITE AND VIDEO EQUIPMENT

The first edition of this unique 'hands-on' fault-finding book became the guide and mentor for thousands of service technicians and engineers in many countries and was widely adopted as a college text. In its new and updated form its usefulness is enhanced by five new chapters, including fault diagnosis in digital TV and video equipment, satellite-receiver repair and interfacing/hookup. All the chapters have been based on many years of practical bench and field experience, the book wastes little space on theoretical principles and circuit description where it is well covered elsewhere: here the emphasis is on the practical business of fault diagnosis and repair.

Price UK £35.00 EUR £37.00



UNDERSTANDING AND SERVICING CD PLAYERS

Engineers who need to achieve a better understanding of CD technology will find this book an essential tool for fault diagnosis, adjustment and repair. This book not only covers the mechanical design but also the integrated circuits within a CD player. It is written for immediate application and is well illustrated, so it should become a welcome addition to the rack of tools available to the service engineer. Ken Clements has extensive experience of the service industry both as a service manager and later in technical training with Sony and Pioneer. It is his hands-on knowledge that makes the book so valuable, not only as a wide-ranging reference but also as a benchtop manual to be kept within reach at all times when working with CD players.

Price UK £35.00 EUR £37.00

Post your completed order form to:-
Jackie Lowe, Cumulus Business Media, Anne Boleyn House, 9-13 Ewell Road, Cheam, Surrey, SM3 8BZ
Price includes delivery

How to pay

Title

❑ I enclose a cheque/bank draft for £_____
(payable to TELEVISION)

Please charge my credit/charge card
❑ Mastercard ❑ American Express ❑ Visa ❑ Diners Club

Credit Card No: Expiry Date:

_____

Signature of Cardholder_____

Cardholder's statement address: (please use capitals)

Name_____

Address_____

_____

_____

Post Code_____Tel:_____

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Technics See Panasonic.
Telefunken Spares available from Thomson Multimedia (see Ferguson) CPC and SEME.

Teleton See Fujitsu General.

Texet Spares available from The Hira Co, Ltd.

Thomson TV and VCR spares available from Willow Vale.

Thorn brand equipment. Spares available from Thorn UK Ltd., Glaisdale Drive, Bilborough, Nottingham NG8 4LA.
Tel 0115 900 7111
Fax 0115 929 5899.

Toshiba European Service Centre, Units 6/7 Admiralty Way, Southern Trading Centre, Camberley, Surrey GU15 3DT.
Tel 01276-694 000
Fax 01276-600 521.
www.toshibs-tuk.com
See also A.R.D. Electronics, CPC, HRS, KSA, Chas Hyde, SEME, Willow Vale and Wizard.

Trical Brand name used by Hinari Consumer Products Ltd.

Trio See Kenwood Electronics.

Triumph Brand name used by Currys. See Partmaster, CPC.

Venturer Audio spares vailable from Diamond Television.

Willow Vale Electronics Ltd., Connect Business Park, Bordesley Green Road, Birmingham B9 4UA
Tel 0870 6000 271
Fax 0870 6000 272.
E-mail sales@willowvale.co.uk
Web www.willowvale.co.uk
Appointed spares distributor for JVC and Sharp.
Spares distributor for Alba, Amstrad, Aiwa, Bush, Grundig, Hitachi, LG, Mitsubishi, Pace, Panasonic, Philips, Saisho, Samsung, Sony, Tatung, Thomson, Toshiba, VDO Mannisman (Philips car audio).
Distributor for Altai, Antex, AWI, Classic, Electrotube, ERL, Hameg, JBC Soldering Solutions, Kamasa, Labgear, MBO, Mercury Telecraft, One for All, Philex, Portasol, Servisol, Treston, TTI, Uniross, Vogels, Wavetek, Weller, Wolsey and many others.

Wiltsgrove Ltd., 35-38 River Street, Digbeth, Birmingham B5 5SA.
Tel 0121 772 2733
Fax 0121 766 6100.
e.mail: sales@wiltsgrove.co.uk
Official distributor for Antex, Adcola, CME, König, Nikkai, Philex and Thorn.

Wizard Distributors, Empress Mill, Empress Street, Manchester M16 9EN.
Tel 0161 872 5438 or
Tel 0161 848 0060
Fax 0161 873 7365
e-mail:
sales@wizard-distributors.co.uk
Website:
www.wizard-distributors.co.uk
Spares stocked include Akai, Alba, Amstrad, Decca, Dual, Ferguson, Fidelity, Hitachi, Loewe, Matsui, Mitsubishi, Nikkai, Philips, Pye, Saisho, Samsung, Schneider, Sentra, Sharp, Sony, Tatung, Toshiba. Trade only.

Yamaha
Spares availble from Chas Hyde

Zenor Made in India models see BPL.

General/miscellaneous parts suppliers

AV-Services
186 Croydon Road,
Croydon CRO 4PJ.
Tel 020 8656 6006
e.mail: avservicing@aol.com
Spares distributor for König and Philex. Genuine spares for Ambersil, Beko, Mercury, Mitsubishi, Philips and TDK.

Economic Devices,
The Coach House, Muxton Lane, Telford, Shropshire
Tel 01952 273130
Fax 01952 405478
e.mail: john@telepart.co.uk

East London Components,
63 Plashet Grove, East Ham, London E6 1AD.
Tel 020 8472 4871
Fax 020 8503 5926.

Electromail, PO Box 33, Corby, Northants NN17 9EL.
Tel 01536 204555
Fax 01536 405 555.

Electrovalue Ltd,
Unit 5, Beta Way, Thorpe Ind. Park, Egham, Surrey TW20 8RE.
Tel 01784 433 604
Fax 01784 433 605.

Express Tubes,
The Mill, Mill Lane, Rugeley, Staffs WS15 2JW.
CRTs only supplied
Tel 01889 577 600
Fax 01889 575 600.

Farnell Electronic Components, Canal Road, Leeds LS12 2TU.
Tel 0870 1200 200
Fax 0870 1200 201.

Grandata Ltd,
KP House, Unit 15, Pop In Commercial Centre, Southway, Wembley, Middx HA9 0HB.
Tel 020 8900 2329
Fax 020 8903 6126.
e.mail:sales@grandata.co.uk

J.W. Hardy,
231 Station Road, Stechford, Birmingham B33 8BB.
Tel 0121 784 8478
Fax 0121 789 7931.

Irwin Electronics,
Unit 200, JC Albyn Complex, Burton Road, Sheffield S3 8BX.
Tel 0114 273 9622
Fax 0114 275 9909.

JJ Components,
Rear of 243/247 Edgeware Road, Collindale NW9 6LU
Tel 020 8952 2371
Fax 020 8952 7982.
e.mail:
jjcomponents@compuserve.com

LRC Videos
3-5 Whitfield Street, London W1T 2SA.
Tel 020 7323 2107
Fax 020 7323 2191.

Manor Supplies,
9 Whitchurch Parade, Whitchurch Lane, Edgware, Middx HA8 6LR.
Tel 020 8952 8808
Fax 020 8952 8809

Maplin Electronics, Freepost NEA9433, Barnsley S73 0BR.
Tel 01226 751 155
Fax 0870 264 6001.
E-mail: <recipient>@maplin.co.uk
Website: www.maplin.co.uk

MCES, 15 Lostock Road, Davyhulme, Manchester M41 0ES.
Tel 0161 746 8037
Fax 0161 746 8136.
www.mces.co.uk
Tuner, modulator, upper drum, LNB and digital TV equipment repairs.

Nikko Electronics, 358 Kingston Road, Ewell, Surrey KT19 ODT
Tel 020 8393 7774
Fax 020 83937395.

Philex PLC, 110-124 The Broadway, West Hendon, London NW9 7PP.
Tel 020 8202 1919
Fax 020 8202 0015.
e.mail: sales@philex.com

PV Tubes, 108 Abbey Street, Accrington, Lancs BB5 1EE.
Tel 01254 390 936
Fax 01254 872 166.

RS Components, PO Box 99, Corby, Northants NN17 9RS.
Tel 01536 201 201
Fax 01536 201 501.

Sendz Components,
63 Bishopsteignton, Shoeburyness, Essex SS3 8AF.
Tel 01702 338 894
Fax 01702 338 805.

TW Electronics (Newbury) Ltd., Beacon House, Harts Lane, Burghclere, Newbury, Berks RG20 9JZ.
Tel 01635 278 678
Fax 01635 278 266.

Vista Electronics,
Unit 2, Wingate Grange Industrial Estate, Wingate, Co. Durham TS28 5AH.
Tubes:Tel 01429 837 100
Components: 01429 838 057
Fax 01429 837 101.

DX and Satellite Reception

Terrestrial DX and satellite TV reception reports. News on TV broadcasting and satellite band changes. The current sunspot cycle. An easy-to-build VHF preamplifier circuit. Roger Bunney reports

A NASA-TV news conference prior to the STS109 Shuttle flight to the International Space Station. Reception via NSS K.

As a result of the double peak in the current solar cycle (number 23) there has been extensive F2-layer reception in the UK from early morning through to early evening. On February 27th, the day I'm writing this column, ch. R1 vision (49·75MHz) abruptly lifted above the noise at 0715 hours GMT for about fifteen minutes before fading. suggesting a really log-hop path from SE Asia/China. There was further reception later. On some days ch. E2 (48·25MHz) does better, on others ch. R1. On several days we have had Australian TV ch. A0 (46·25MHz), not only as video buzz on a scanner but real video on a TV screen! There was a slight tropospheric lift early in the month, with reception from France, but the main news is the on-going F2 propagation.

I logged ch. E2 and R1 signals on many days during the month. When I checked the frequency offset with Australian ch. A0 reception on the 24th, via a scanner, I found that it was at 46·1718MHz. This confirms that the signal was from RTQ-0, Mount Mowbullan, Darling Downs, Queensland. Is scanner reception true DX-TV? The video buzz was clear, but the signal level was below the locking level with even a D100 plus TV receiver combination.

On the 20th I was home from work early and noted, from 1445-1500, a steady ch. E2 video buzz from due south. There was a locked but unidentifiable picture on-screen, fading out by 1515. The signal was obviously from Africa, but exactly where? One advantage with a scanner is that you can weaken the signal sufficiently, using a Radio Shack variable attenuator for example, to be able to isolate and measure the single video carrier, then compare the result with a listing of known video offsets. This gives instant identification of signal origin. Cyril Willis has logged ch. E2 video carriers at 48·2369, 48·2498 and 48·2240MHz for example. One recent catch he had with his scanner was hearing the Californian Highway Patrol at 42·12MHz, from Napa, with mention of the Golden Gate Bridge. He adds that DXers down under have been enjoying excellent TE (transequatorial skip – see below) reception at up to Band II! Cyril locked a strong TV signal from RTQ-0 at 0833 on the 16th.

Hugh Cocks in the Algarve has also received the Australian ch. A0. He has been experiencing TE reception from the south after dusk, extending towards WSW to bring in American signals as late as 0300 next morning. Peter Schubert (Rainham, Essex) also enjoyed F2 reception on most mornings during February, from before 0800 through to lunchtime, using crossed Band I dipoles. In the north Frank Lumen (Irvine, Scotland) has been using a multi-standard Thomson TV set for F2 reception.

I received, via e-mail, an extensive log from Robert Copeman in Melbourne, Australia. Several entries related to Black Sea radar, which operates at 33-34MHz – the frequency varies daily – and produces a characteristic buzzing noise. Another unusual entry is Woodpecker, from the Philippines, operating at about 43·649MHz.

To summarise, there have been lots of strong signals during the month, via F2 in particular. But, so far, no buzz from New Zealand ch. 1 at 45·25MHz.

A scanner has become an essential tool for monitoring the low VHF and lower Band I TV channels. With new all singing and dancing models being introduced, older ones are being pensioned off. As a result most SW radio dealers have available reasonably inexpensive scanners that cover Band I TV and below. I use an AR2002 and a slightly newer Icom R7000 with a discone aerial at 35ft. The rather older SX200 is available for as little as £50. It's basic, solidly built and has twenty memories, enough for all the Band I TV channels.

Transequatorial skip propagation occurs after a day of high MUFs as the F2 layer breaks up when the sun sets in the west. The F1 and F2 layers fragment, producing ionised layers that reflect signals at perhaps 1·5 times the daytime MUF, usually on a north-south axis moving towards the SW. In the UK, reception is best in the south and Channel Islands – TE conditions improve as you go farther south. That's why Hugh Cocks in Portugal enjoys signals that fail to reach our shores.

Satellite sightings

If you will be holidaying near Southsea this year, check out the Explosion Museum at Gosport. It features all types of armaments and explosives used in warfare, with the emphasis on Royal Navy material. If however you had been monitoring Europe*Star-1 (45°E) on the afternoon of February 24th you could have watched your own explosion. A CNN video feed appeared at 11·544GHz V (SR 5632, FEC 3/4) with the identification Qandahar. It showed US troops unloading piles of captured explosives, shells. etc. from a lorry and piling them in two lines. Armourers attached plastic explosive, inserted detonators and wiring and then retired a safe distance over a small hill. This was followed by a massive explosion, with a large smoke mushroom.

Satellite feeds from Afghanistan have been reduced considerably, but over February 15-17th the BBC was using unusual screen identifications on colour bars – "BBC – UKI-302 Kabul" alternating with "BBC – UKI-302 New Tube". This was from 45°E at 11·481GHz V. Roy Carman (Dorking) has also noted feeds from Quandahar. It seems that there's a CNN team there to video the US military at work. At 11·685GHz V he logged a US Marines Huey Cobra being checked and rearmed. Two days later, at 11·544GHz V, he saw the marines grouping, boarding helicopters and flying out. Interesting that the lights in the helicopters are orange and gradually dim as the drop-off zone is approached: this is to help the troops adjust to the Afghanistan darkness when on foot.

I don't usually spend time checking the digital signals at 19·2°E (Astra), but on the 17th Edmund Spicer (Littlehampton) suggested that I look at 12·344GHz H (27500, 3/4). This is a Dutch multiplex, with RTL-4, RTL-5, Discovery, Animal Plant and National Geographic, all encrypted. But I also found "no name", which had earlier been captioned "transponder news channel". When I checked there were just colour bars and an unusual test card, then the screen went black.

The Winter Olympics from Salt Lake City, Nevada, were a main feature during February. The Globecast package via NSS K (21·5°W) carried two feeds on most days. There were interviews and events at the usual 11·590GHz V (20145, 3/4), with many reports for overseas. On the 21st for example "RTL Lisbon Text Signal" was seen on channel 1. A channel 2 special on the 15th featured NASA-TV from the Johnson Space Center, with engineers and the crew of the next Shuttle flight, STS109, to the International Space Station.

The World Economic Forum was carried by Reuters via NSS K on February 2nd, at 11·462GHz V. I have to say that it was not exactly compulsive viewing!

Our Sutton correspondent Nick reports that when APTN disappeared from Hot Bird at 13°E he found a website that directed you to 12·629GHz H (5632, 3/4) via Eutelsat 2F4 (10°E).

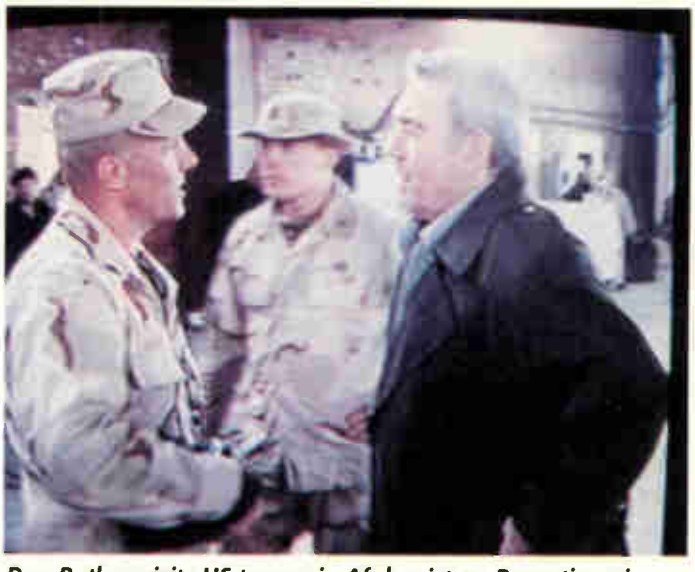
Astra 1D is at present at 24·2°E and has been seen downlinking NTSC video. Check "Channel D Germany" at 10·714GHz H (2170, 3/4). Sometimes the transmission is free-to-air, at other times it's encrypted.

RSD receivers

I have a problem with a couple of new RSD ODM-30-CI receivers. When presented with certain news feeds, for example Reuters. they blank the screen and produce the caption "please insert cam". However a three-year old RSD ODM-300, which doesn't have a common interface slot. happily displays the Reuters feed and all other signals. Can anyone suggest a way of overcoming the ODM-30-CI problem? I just want the receivers to work like the ODM-300. There's unfortunately no RSD factory back-up, as the company has ceased UK production.

Broadcast news

Russia: The authorities have closed down the Moscow-based independent TV station TV6 and put the licence up for bids. Recently the TV6 channel spectrum has been used by NTV-Plus to transmit the Winter Olympics from Salt Lake City.



Dan Rather visits US troops in Afghanistan. Reception via Europe*Star-1.

Local-TV: My Television Portsmouth is transmitting to the east and north east from a Gosport waterfront apartment. The channel is E29, e.r.p. 1kW. My Television Southampton is not yet in operation. It's seeking a channel allocation change to E29, with aerials on the Fawley power station chimney. Manx-TV is expected to start this year, with low-power transmitters initially serving Ramsey, Douglas, Onchan and Peel.

A Winter Olympics transmission from Salt Lake City via Globecast (NSS K).

Spain: The government has decided to use the MHP digital standard, but decoders will not be available until next year. This will affect the government's plans for DTT.

Italy: The Italian prime minister and media mogul Silvio Berlusconi intends to privatise two of the three RAI national networks. He will also appoint the RAI board. These services are in competition with his own commercial and pay-TV operations.

Austria: The country's first commercial TV licence has been awarded to Austrian Television (ATV).

The Netherlands: The e.r.p. of the Smilde transmitters that radiate TV2 and TV3 on chs. E44 and E47 has been reduced from 1,000kW to 250kW.

Belgium: RTBF is transmitting a new local TV channel, AB-3, using ch. E60. There are now two OVB-T digital TV channels in operation in Brussels. These transmit on chs. E55 and E61 (H) at 2kW e.r.p.

Sunspot cycle 23

Sunspot cycle 23 peaked during the winters of 1999-2000. Subsequently, following the expected period of decreasing spot counts and much lower MUFs (maximum usable frequencies), there has been a second peak in solar activity this winter. It has provided reception at up to ch. E3 (55·25MHz), with sustained and regular signals from SE Asia, the Middle East and even Australia (ch. A0). In fact a double-peak has occurred in all three of the latest eleven-year periods, i.e. cycles 21, 22 and 23. This is in contrast with the previous well-defined solar cycles, and is making it difficult to calculate specific cycle periods. The accepted eleven-year periods could be at an end.

The second peak in the current cycle is the result of greater solar activity than the first peak some eighteen months ago.

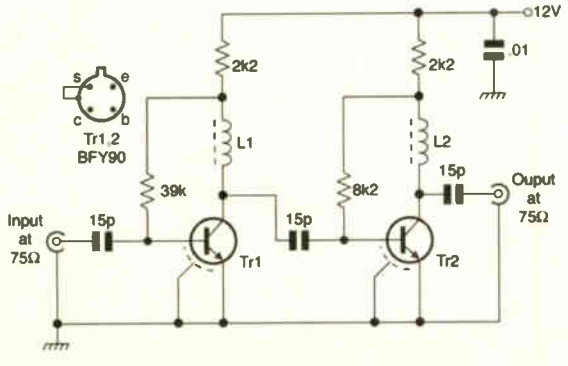


Fig. 1: Ian Moody's wideband VHF amplifier design.

Simple VHF preamplifier

Ian Moody (Sutton, Surrey) has designed an adaptable, two-stage wideband amplifier for use in Band I, Band II or Band III, depending on the collector coils fitted. The circuit is shown in Fig. 1. It uses the very cheap BFY90 transistor, a well-proved device that has been used in the past for DX purposes, or the similar 2N5179. No alignment is required. Provided the usual VHF construction practices are followed – the use of low-noise resistors, very short lead lengths, a copper-clad PCB and, preferably, a diecast/metal housing – the design should be repeatable and stable.

The input circuit is flat and wideband. Ian suggests the use of Polytron Band I, II or III pluggable input bandpass filters, which are available from Aerial Techniques (see nearby advertisement), should there be any concerns about breakthrough. Despite using self-resonant collector coils, it would be possible for 'out-of-band' signals to pass through. This could result in interference from taxis for example, particularly in Band III. Those requiring high-gain amplification in Band I should remember, in residential areas, the problems caused by low-power 49MHz equipment. If you live anywhere near an MW transmitter, it would be advisable to include a choke across the input to minimise breakthrough.

The amplifier requires a 12V supply at 9mA. Ian measured the signal voltage gain at 40MHz and found that a very respectable 27dB was achieved. The Farnell coils used in the original design had self-resonance at 57MHz in Band I, 95MHz in Band II and 199MHz in Band III. Order codes are 524-128 Band I, 508-240 Band II and 608-464 Band III. But there's a minimum quantity of five of each, and for non-account customers a minimum order of £10. Farnell's phone no. is 0870 1200 200. Suitable coils with a similar self-resonance are available from Maplin. The Band I coils, order code WH33L, are self-resonant at 56MHz and have an inductance of 4·7μH; the Band II coils, order code WH31L, are self-resonant at 110MHz and have an inductance of 2·2μH; the Band III coils, order code WH29G, are self-resonant at 157MHz and have an inductance of 1μH. All these Maplin coils cost 69p each including VAT. Trade readers could check for equivalent inductors in the RS catalogue.

Satellite news

Pegasus Satellite TV, in conjunction with state and local police, have arrested a Dallas pirate who had been supplying DirecTV cards throughout Georgia. He was given a hefty fine plus ten years probation. For more information go to http://www.pgtv.com

Scopus Technologies of San Diego and the Argentinian company Extel Engineering have developed a new security system for use with integrated receiver-decoders to prevent distribution fraud. SatLock establishes an IRD's exact location to within 3/100ths of a minute for both latitude and longitude. Should an IRD be moved by more than 50 yards the IRD locks out and stops working. For more information check http://www.scopususa.com

The Indian national broadcaster Doordarshan launched a 24-hour culture channel, DD Bharati, which uses the former (now closed) DD News Channel slots. It provides children's, health and local heritage/cultural programming. Transmission is both terrestrial and via satellite. ■

Service Casebook

Michael Maurice

Hitachi C2976TN (A5 chassis)

There was an EW fault with this set – the picture was expanded and bowed. I first found that L751, which appears to be the EW loading coil, was dry-jointed. But resoldering it didn't cure the problem. The EW drive comes from IC601 (TDA8350Q), which is also the field output chip. A fair bit of dismantling has to be carried out before this IC can be replaced, but it's the usual cause of the fault. Make a note of the connections of the three small capacitors that are mounted on the print side of the PCB, across several of the IC's pins. I've had this fault several times now.

Philips 28CL6770/05 (FL1.0 chassis)

This set was stuck in standby. The cause appeared to be simple enough – the BU508AF line output transistor was short-circuit. But the set was still stuck in standby when I had fitted a replacement. So I disconnected the protection circuit and tried again. There was severe arcing from the CRT's scan-coil connector and the replacement BU508AF bit the dust.

I remade the connection to the scan coils, fitted another line output transistor and switched on. The set worked with the protection circuit disconnected, but when it was reconnected the set remained in standby. The fault had damaged several of the small, surface-mounted transistors in the protection circuit.

I've since had a number of these sets with the same fault, and I now know to go straight to the CRT's scan coil connector PCB to repair any damage here. Fortunately with all subsequent jobs of this type the protection circuit hadn't been damaged.

Nokia ST51D2 (Mono Plus chassis)

This set's picture was almost negative. When I checked the set on the bench I quickly discovered that the cause of the problem was on the vertically-mounted text PCB. The video signal was being very severely crushed here.

There's very limited access to the print side of this board and, as most of the components are surface-mounted, fault-finding is difficult. I decided to disconnect the board from the main PCB and remount it at an angle so that I had easier access to the print. Once this had been done it didn't take long to discover that the culprit was transistor R08 (BC858).

Sony KVM2141U (BE2 chassis)

This set was brought in because it was dead. But the label on the back, stuck there by a previous repairer, suggested trouble before I had even got the back off! And so it proved to be.

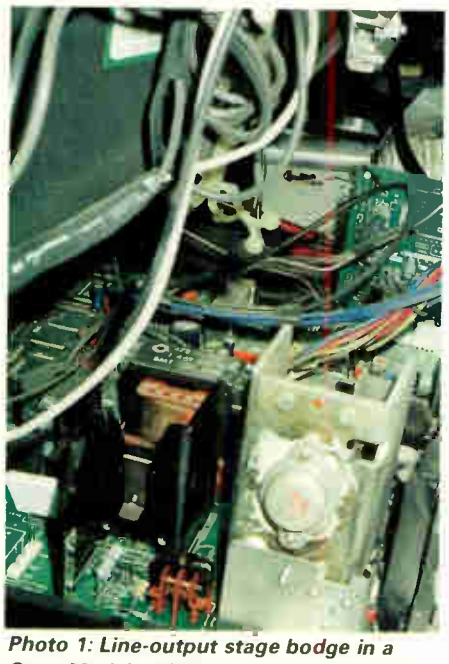


Photo 1: Line-output stage bodge in a Sony Model KVM2141U. To fit a BU208A output transistor, a previous repairer had bolted a scrap heatsink to the one mounted on the PCB.

The BU508AS2 line output transistor had been replaced with a BU208A. As this transistor obviously wouldn't fit on the original heatsink, the repairer had taken a heatsink from a scrap set and bolted it to the original one. Photo 1 shows the bodge.

A new transistor was obtained from Sony, together with a clip and the circuit protector. Once these items had been fitted the set worked correctly.

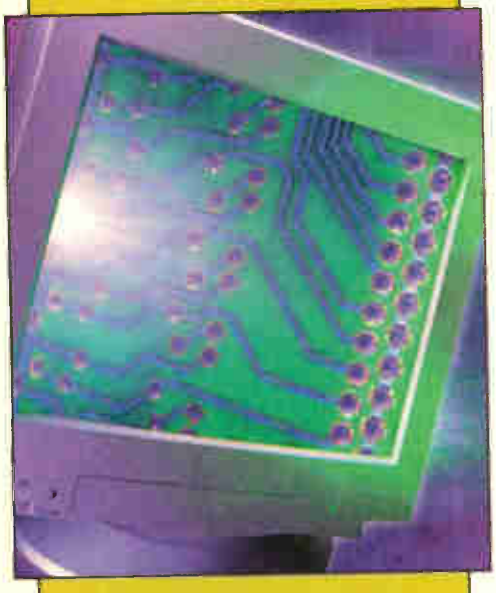
Mitsubishi CT29B2STX (Euro 12 chassis)

There were several reported fault symptoms with this set: no text, sound crackling, picture geometry distortion and, sometimes, failure to come on from cold. This suggested two things, a problem in the power supply and EEPROM corruption. The usual causes of failure to turn on from cold are C906 (47µF, 50V) and C909 (2·2µF, 50V) in the power supply. The former is the chopper drive coupling capacitor while the latter is in the slow-start circuit. EEPROM corruption can be caused by leaky electrolytic capacitors on the secondary side of the power supply or the EEPROM itself. I replaced all these items, but when I switched on after doing so there was – nothing!

Checks showed that there was 330V across the 2SD1887 chopper transistor, and that the TEA2261 chopper control chip had a start-up supply. I decided to replace the TEA2261 chip and the chopper transistor. When I switched on again the set started up and went into standby. So far so good. But when I used the remote-control unit to switch the set out of standby there was a loud bang. A flame shot out of the side of the chopper transistor and, before I could reach for the switch, every component between the base of the transistor and the IC had been burnt and the top had been blown off the IC.

I was quite shaken by this, and started to look for a cause. I've had chopper transistors fail before in these sets, but never like this! I decided to rebuild the power supply, this time with parts obtained from a different source. When I showed the new supplier the blown transistor he suggested that it was probably a graded part or a second.

I fitted the new parts and switched on, making sure I was sufficiently far from the set. To my delight it came on and then came straight out of standby. I left the set running for a few minutes, then set about reprogramming the EEPROM. The picture and sound were, as expected with these sets, excellent. ■



MONITORS

Fault reports from
Gery Mumford
Peter Illidge
and
Ian Field

We welcome fault reports from readers – payment for each fault is made after publication.

Reports can be sent by post to:

Television, Fault Reports,
Anne Boleyn House,
9-13 Ewell Road,
Cheam,
Surrey SM3 8BZ

or e-mailed to:
tessa2@btinternet.com

Acer 7176ie

This monitor was dead because, as often happens, the 2SC5048 line output transistor Q306 was short-circuit. But replacements failed repeatedly after a few hours on soak test. The cause was rather obscure. There are three series-connected 2·2µF, 450V electrolytic capacitors, C3950-52, in the line output stage. They varied in condition between very-high ESR and open-circuit. In addition C353 (10µF, 450V) was a little low in value. Once replacements had been fitted the monitor performed reliably. **G.M.**

CTX1769ME

This monitor was dead apart from a soft chirping noise. The power supply was tripping, but the usual suspects were all OK. I decided to carry out checks on the primary side of the circuit and discovered that D101 (BYV26), in the snubber network, was short-circuit. **G.M.**

Eizo Flexscan F56 (MA1785)

This monitor powered up but tripped loudly, with its LED blinking green. After a substantial strip-down (many screws, and metal plates everywhere!) I was able to carry out some checks and found that a surface-mounted fuse, F905 (T3A SMD). was open-circuit. It's on the secondary side of the power supply. As no short-circuit could be found, I fitted a replacement. The monitor then produced a fine display and was flawless after a long soak test. **G.M.**

Viglen CA1426LT

This old monitor was dead with a blown-up power supply. The BUW12A chopper transistor Q1, its 2SA966 driver transistor Q2 and the current-sensing resistor R4 (0·47Ω, 1W fusible) had all failed. The supply is based on a UC3842 chip, IC1, so I decided to replace this as well. The monitor then produced a very good display. **G.M.**

Acer 7176ie

There was excessive width and EW bowing. Checks in the EW diode-modulator circuit revealed that D309 (FES8JT) was very leaky. **G.M.**

Relisys TE770

This 17in. monitor had no display. The customer said that it had become darker and darker. When I tried the monitor I found that the EHT rustled up at switch on and all the supplies seemed to be present. So I took a look at the CRT panel and found that R5C1 (530kΩ, 1W) was open-circuit. It's in the CRT's first anode (G2) feed. All was well once a replacement had been fitted. **P.I.**

IBM Thinkpad laptop PSU

The complaint had been "no operation". When I opened the PSU, which is based on the use of a '3842 IC, I found that it was working. Flexing the low-voltage cable produced brief flickers in the LEDs on the laptop, so there was obviously a break in the wire. If you want to trim back the PSU end you have to salvage the strain relief gland from the off-cut and glue it on to the trimmed cable, and feed the separate leads through the ferrite ring as with the original, but this is still easier than dealing with the four-pin connector at the other end! I took care over the repair and it looked as-new – but still didn't work. There were breaks in the wire inside the four-pin connector.

At this point I contacted the customer to tell him that it might be better to order a replacement lead from IBM. In reply, he said that he had explored this possibility on a previous occasion and found that it wasn't cost-effective. He asked me to attempt a repair to the moulded plug.

The plug is easier to cut open than it looks. It's not solid-moulded but assembled, though the solder connections are moulded into a softer plastic under the plastic cover. This made identification of which wire goes to which pin hard work – until I realised that the pin designations are embossed on the computer casing, around the connector recess. The solder tag had parted from one of the pins, and two of the wires were broken inside the insulation, so this end of the lead had to be pruned back a couple of inches as well.

Now I know that these connectors are assembled instead of one-piece moulded, it's worth trying to pry the plug hood from the connector insert instead of cutting it away. However you do it, silicon rubber sealant is suitable for securing and insulating the solder connections. With a bit of practice it may be possible to make the repair look as good as new. **I.F.**

ICL 15505/002

This monitor's power supply had blown up. I've never had much luck repairing one of these power supplies when it has gone bang. The self-oscillating chopper transistor has no emitter resistor, and I suspect that when the transistor goes short-circuit it dumps the full charge carried by the reservoir capacitors C807/8 into the chopper transformer's primary winding, damaging this item. R801 (3·3Ω, 10W) in the negative feed is misleading in

this respect – it's the surge limiter between the rectifier and C807/8.

In view of the work involved in removing the power-supply module from the chassis and stripping it down, I wanted to complete the repair in the simplest way possible and not have to do it again. Fortunately I had a scrap 15505. It had been taken out of service because of very random failure to start. I had never actually seen this fault, but the customer complained that the monitor started every time except when he wanted to sell it! There was undoubtedly a power supply fault, but at least it wasn't a blown up. I decided to see if I could use it to replace the blown-up one.

When I examined the intermittent power supply I found that R803 (56kΩ, 3W) looked heat-bleached, though it checked out OK. I replaced it to be safe. R810 (390kΩ) had 'wrinkly-looking' paint, and its resistance was greater than my DMM's 20MΩ limit. The blown-up power supply had a 1 per cent instrument-grade component that looked and tested as-new in this position, so I 'borrowed' it. It's advisable to replace C815 (4·7µF, 63V), C812 (10µF, 63V), C821 (47µF, 25V) and C826 (47µF, 63V) to avoid problems later. A curious thing about C821 is that it's huge in comparison with C826, which is tiny. All the electrolytic capacitors in the regulation circuit on the primary side of the power supply are 105°C types. I assume that C821 is an extra-low ESR type. If there is any doubt about the performance of a replacement in this respect, add a 1µF, 63V metal-film capacitor in parallel with it, on the print side of the PCB.

Once I'd renovated the intermittent power supply it proved to be a suitable replacement for the blown up one.

This monitor has a text-mode button that selects green-amber text on a blue background. The **Olivetti** version is **Model CDU1493**. There is also an **Apricot** version. **I.F.**

Mitac AM4050PD

This monitor had already received attention – the BU2508DF line output transistor Q501 was missing. In addition I found that Q612 (IRF9620) was short-circuit. Because of this situation, it was difficult to assess what could have been the basic cause of the trouble.

Monitors in this range tend to suffer from random line output transistor failure because the flyback tuning capacitor is defective. So work started with replacement of C501 (3,900pF, 1·6kV). Q501's base drive is coupled by C508 (100µF, 16V), which could have dried out, the result being a slow drive-waveform rise-time and thus excessive dissipation. I replaced it as a precaution.

At this stage in the proceedings the condition of the line output transformer was still unknown. In most cases feeding the full HT to the LOPT via a series-connected 60W lamp will confirm whether or not there are any further faults in the output stage, while limiting any fault current to a safe level. This time the current was limited to too safe a level, giving little information about the condition of the output stage.

A method I often use when checking Samsung monitors, which use a similar PWM width regulator, is to feed the line output stage from the lower 75V power supply output instead. A look at the Mitac power supply showed that the next lower rail was a bit higher, at 80V, but it seemed a reasonable risk to take. So a temporary diode (type 30DF6) was added between C916/L905 and L601. The result was a display of almost exactly the correct width for the screen mode in use, proving that the line output stage was OK.

Unfortunately when a replacement IRF9620 MOSFET had been fitted in the PWM width-regulator circuit nothing happened. The pulse generator (U601) in this chassis is an NE555N, which I tried replacing without any luck. The cause of this remaining fault turned out to be ZD601, which protects the IRF9620's gate. It was short-circuit, and the markings were unreadable.

With an n-channel MOSFET the protection zener diode is usually rated at 18-20V. But the IRF9620 is a p-channel device. So I decided to use what one finds in Samsung chassis – typically a 6·2V or a 9·1V zener diode. I used the lower of the two ratings. Once the diode had been fitted the PWM circuit worked correctly and the monitor was restored to life, producing correct-width displays in all the available modes. **I.F.**

Dell Vi428E

"Picture wrapped round" the customer had said. This suggested that the power supply was working, so there was no need to replace the three small electrolytics on the primary side of the power supply. Adding non-electrolytic ESR-shunt capacitors would ensure that this situation continued for well beyond the warranty period for the repairs. While doing this I reworked any dry-joints I came across. The feedback pin on the primary side of the chopper transformer had a severe dry-joint. With these matters attended to, along with a few more dry-joints in the timebase area, it was time to try the monitor out.

There was no display, and I soon found that the line drive was missing. There was a short burst at switch on, but the monitor shut down almost instantly. Since the power supply continued to run and the CRT's heaters were being driven, switching off to reset the safety circuit then very quickly switching on again before the cathodes cooled should have produced a clue. It did: the symptom displayed was a vertical line.

No damaged components could be found in the coupling to the line output stage, but the soldering around transistors Q406/7 looked odd. While I was attending to this I noticed that the PCB pad for fixing the underside screening plate beneath the LOPT, next to T401, was damaged. On some versions of this chassis the pad surrounds the slot. In this version the hidden (when the screen is fitted) part of the solder pad has a gap, so the only circuit path is via the very thin part of the pad, which often gets damaged when the screen is removed. When tracing the track away from the break, I could find no other path to chassis. So the circuitry downstream was left floating. The cure is to fit a stout, insulated wire link nearby, where it will not be disturbed when removing the screen.

All was well after doing this and attending to a few more dry-joints. **I.F.**

Dell P1428E

This monitor had been to my workshop before. The customer told me that he had stored it temporarily in an 'extension' that's similar to a conservatory, and that it "went bang" as soon as he plugged it in. On surveying the damage I saw that the PCB had tracking marks and 'nibbled' track edges between the –320V and the +320V pad under the chopper transformer. This is typical of condensation damage caused by the storage conditions described by the customer. But the monitor had suffered in exactly the same way before. Having trimmed the faulty track edges and cut deep grooves in the PCB material to ensure that any even partially carbonised material had been removed, I was not expecting the fault to recur.

This time I removed the transformer and cut a guard ring with a needle file, spanning a good centimetre at either side of the affected area. My best guess is that a manufacturing defect had resulted in unusual porosity in that small area of the PCB. Despite the apparent severity of the burn marks, the only other item that had suffered damage was the 3·15AT fuse. **I.F.** ■

VCR CLINIC

Reports from
Eugene Trundle
Kevin Green
Bob Flynn
Steve Barlow
Ivan Levy, LCGI
Michael Maurice
Dean Ratcliffe and
Graham Bond

We welcome fault reports from readers – payment for each fault is made after publication. See page 424 for details of where and how to send reports.

Sony SLV-SE710G

This very new machine chewed tapes because the supply spool didn't reel in the tape at eject. I found that the capstan didn't turn backwards in rewind or reverse-search either. The capstan motor was the cause of the trouble. **E.T.**

Panasonic NVG21

This machine had no display. Some checks in the power supply revealed that C1018 (47µF, 63V) was faulty. A replacement cured the display fault, but when a cassette was inserted the machine switched off. Some further capacitor checks proved that C1023 was the cause. Thank goodness for the ESR capacitor tester. It comes into its own with this type of fault. **K.G.**

Sony SLV-E720 (H mechanism)

This VCR became very noisy in play or record, especially after running for a while. A scraping type of noise could be heard, the same as with previous Sony models when the capstan motor is faulty. Although this model uses a different type of motor, it was the cause of the trouble. After removal it felt very warm. A new motor and pinch roller cured the problem. **B.F.**

Saisho VR3400

If the cassette won't eject because the tape is caught up under it, or a loop of tape catches up as the cassette is ejected, take a look at the limiter post arm – item 328 in the diagram in the manual. It should move freely. If it's stiff, remove it and clean off all the grease from its shaft and on the deck where it goes through. Refit it, with a small amount of new grease, and check that it springs back into position. **B.F.**

GoldStar P234I (D27 mechanism)

This VCR had a tape stuck in it. When it was plugged in, the mechanism unlaced towards the eject position, returned to the play position and then remained lifeless until it was unplugged and plugged in again. You then got the same shuffle. There was also no display at the front.

When I replaced CP19 (1,000µF, 10V), CP21 (47µF, 50V) and CP25 (100µF, 10V) in the power supply – they all give trouble – I was rewarded with the same shuffle of the mechanics but there was now a display. This revealed all. It said "lock on" – the machine was in the child-lock mode. Pressing 'C lock' on the remote control unit released it, giving normal operation. **B.F.**

Toshiba V720UK (DX-9R deck)

The take-up spool didn't turn in play, so the tape looped up inside the cassette. The reason why it didn't turn was that the centre gear (item K221) had a split in its side. The parts connected to it are all known to crack, usually giving rewind problems. The centre gear can be obtained from Charles Hyde, under part number 15005GA. **B.F.**

Aiwa FX3500

The complaint with this VCR was that "wait" appeared in the display and no other operation was possible. When I switched the machine on it burst into life with no sign of a fault. I then inserted a tape and selected play. The machine played back without any problems, so I left it on test while attending to other jobs.

When the tape came to the end the forward drive ceased and rewind began. Almost immediately the machine stopped and "wait" appeared in the display. At this point no further operation was possible – unless the mains supply was disconnected and the machine was restarted. When I did this and tried rewind again the same symptoms appeared. I inspected the deck, but couldn't find any defect with the mechanics or the deck sensors. It seemed that the system control was detecting a deck fault and shutting the machine down. After replacing a couple of items without success I changed the lower drum, using one obtained from a scrap machine. I was surprised when I found that this cured the fault, restoring normal operation.

I now know why I refuse to throw away that huge pile of scrap VCRs in the corner of my workshop! **S.B.**

JVC HRJ220

The report with this VCR said no play, wind or rewind. On test this was found to be correct, though the machine did seem to load a tape and made an attempt to play. But there was no tape movement.

On close inspection I found that the pinch roller didn't quite touch the capstan. It is not easy to spot but there's a piece of black plastic, with a spring moulded into it, that acts as the pinch-roller cam. Because this plastic cam was cracked, it didn't apply any pressure to the roller. Normal operation was restored once a new plastic cam with spring had been fitted. **S.B.**

Sanyo VH335e

This machine played slow and cut out, with wowing sound and no drum sync. I initially thought that there was a mechanical fault, but after a general service I found that the machine would switch between the LP and SP modes. The cause was reservoir capacitor C501, which was open-circuit. **I.L.**

Panasonic AG7350
This industrial VCR had no S-VHS playback: there was just an unsynchronised picture, with the stereo sound present. The VHS picture was OK. I found that the S-VHS signal was present at pin 5 of IC6 (the sub-emphasis board), but there was no output from IC6. A replacement sub-emphasis board cured the fault. **I.L.**

Hitachi VTF860
The complaint with this machine was noisy fast forward and rewind. I found that the capstan had partially seized. A replacement capstan assembly cured the problem. **I.L.**

Sony SLV-E730
There was a tape stuck in this machine, because the slider assembly was broken. A replacement, part no. 3-977-442-03, restored normal operation. **M.M.**

JVC HRD755
When play or record was selected the tape would start to load up then unload. The cause could be a worn loading belt or loading block of course, but not this time. The drum failed to rotate because it was partially seizing. I dismantled the motor, but couldn't find the cause. It would appear that the upper drum's mountings had dropped slightly, with the result that it was seizing on the lower drum. I dismantled the drum and added a very thin shim, then reassembled it. The motor then turned freely. Once I had reset the tracking and checked the tape path this lovely old VCR was finally restored to life.

Although JVC would not have approved of the repair, it was either this or writing the machine off – a new lower drum is prohibitively expensive. **M.M.**

Panasonic NVHD90B
There was no UHF output from this machine, the cause being a dry-joint within the RF modulator assembly. **M.M.**

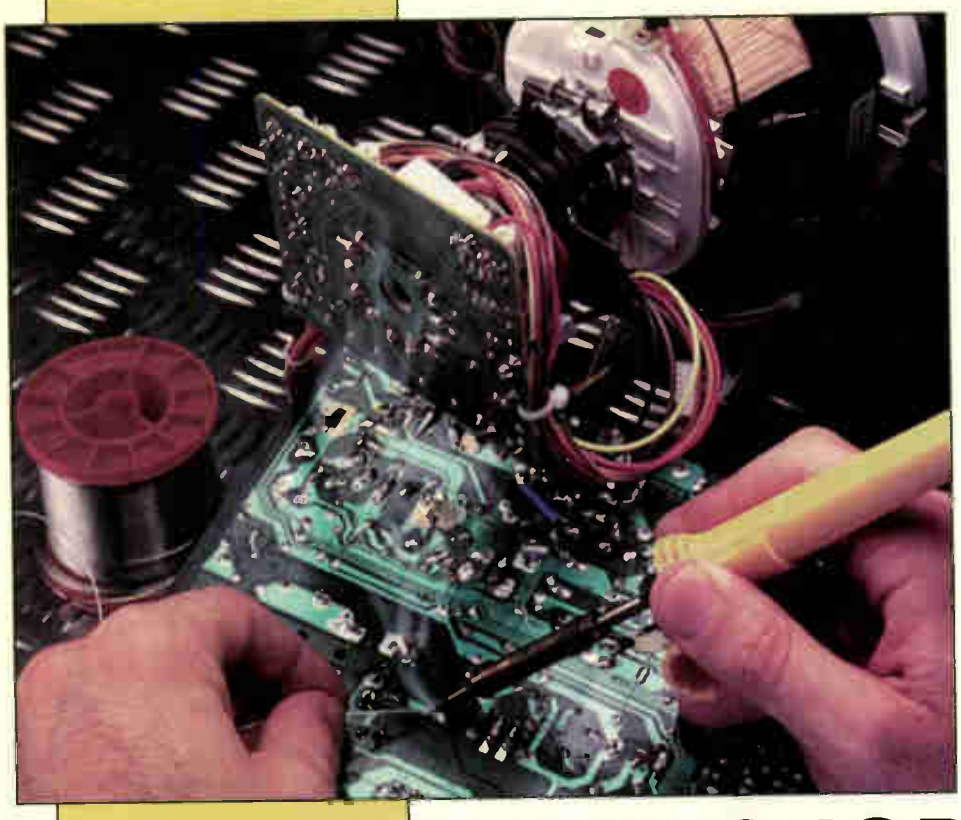
Panasonic NVHD605
The complaint with this machine was no tuning. The on-screen display menu was OK, but when a channel number was dialled manually the picture was dark with line and field slip. The cause of the problem turned out to be the surface-mounted 4053 switching chip IC3902. **D.R.**

Ferguson FV405HV
This machine was dead with the BUZ91 chopper transistor running hot. I replaced the following items: the chain of 180kΩ resistors between pin 8 of the chopper transformer and CP011; RP04-RP09; and the two ZPD10 (10V) zener diodes in series with PD020 and DP044. **D.R.**

Panasonic NVSD230B
The customer complained that the playback sound speeded up and slowed down. There's an official modification for this: change C2519 to 0·18µF, part no. ECUM1C184KBN. **D.R.**

Toshiba V312B
The complaint was no functions, though a cassette was accepted and laced up normally. In this event, check the data and clock pins 2 and 3 of the SDA5642 chip IW31 – this applies to machines without OSDs. If the signal is OK, unsolder pins 2 and 3 of IW31. If the machine then functions, IW31 is defective and must be replaced. The part no. is 276TX4341. **D.R.**

Mitsubishi HSB12
A problem you can get with these machines is failure to erase the sound and picture and record new programmes. It's sometimes intermittent. The usual cause is failure of C333 (10µF, 50V) on the top panel. As a result, the voltage at pin 1 of IC310 reads about 0·5V instead of 11V in the record mode. This prevents the bias/erase oscillator working. **G.B.** ■



JACK'S WORKSHOP

Jack Armstrong

A Panasonic TU-DSB30

A strange and very old fellow stumbled into the workshop. He was dressed in tweeds and a 'deerstalker' hat, and held a magnifying glass in one hand and a satellite receiver in the other. As he plonked it on the counter I saw that it was a Panasonic TU-DSB30 Sky digibox.

"Bug in there somewhere" he said, "but damned if I can see it."

"Pardon?" I asked.

"Switches to standby all by itself, you know. Does other funny things too, all by itself. Even when I'm just changing channels, it does things."

"Ah, an intermittent fault then."

"Precisely. My neighbour said it must be a 'soft-wearing bug'. So I got my magnifying glass out, the one I use for my stamp collection, but dashed if I can see any bugs in there. House is certainly clean. Housekeeper makes sure of that. I'd be on to her if she didn't. No bugs about – had enough of them during the war. Don't talk to me about bugs."

I was only too happy no to. "Leave it with me" I said, "I'll soon have it fumigated for you."

He marched out and I put the receiver on test in the back room. As it seemed to be OK, I left it for a few hours. It was still OK when I returned, but rapid channel-changing made it go to standby. Most odd. It was also very hot to touch.

I dismantled it and checked the ESR of the electrolytic capacitors in the power supply. They seemed to be fine. But the multi-pin connectors on the power-supply PCB and the main board looked a bit dull – see Photo 1. So I applied a tiny amount of contact-cleaner to them and worked the connectors up and down a few times. I also fitted a SatCure miniature cooling fan, as shown in Photo 1. As there is no room for one on the mother board I attached it to the vertical steel front panel, using the double-sided foam tape supplied with it. The fan stirs the air inside the unit and helps to keep everything at an even temperature, removing 'hot spots'. This should improve reliability.

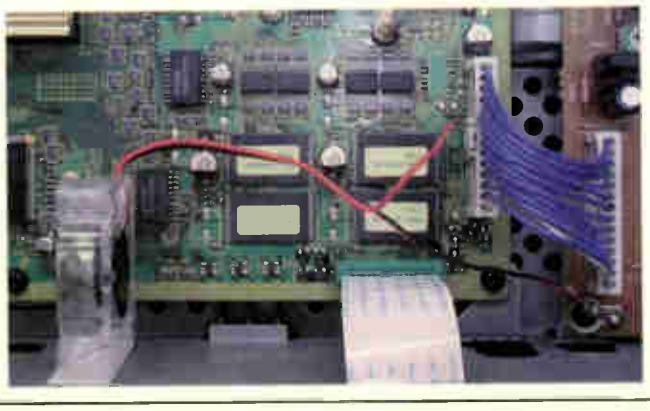


Photo 1: Multi-pin connectors between the power supply and main PCB in the Panasonic TU-DSB30 digibox. Also, the addition of a miniature cooling fan to remove 'hot spots'.

I couldn't instigate the fault again so, next day, I handed the receiver back to the customer – fully 'fumigated'. As he hasn't been back I assume that the steps I took got rid of the 'bug'. Intermittent faults like this are always difficult to handle: you can never be certain that you've cleared the fault and, even if you have, there's no guarantee that the receiver won't bounce back later, with similar symptoms but a different cause.

The Panasonic TU-DSB31

Another Panasonic digibox arrived for repair the same day. It was the later TU-DSB31. The owner had carelessly heaved the second RF output connector right off, while disconnecting the unit to move it.

These connectors, see Photo 2, are not easy to obtain. But I found that they are listed at the SatCure website (http://www.satcure.uk). I ordered one and fitted it the next day. As happens all too often, the customer wasn't the least bit grateful. He insisted that it should have been fixed under guarantee.

I pointed out that it hadn't been bought from me – it had been 'free' from BSkyB – and that in any case I didn't cover Sky warranties. I offered to remove the new part for a bargain labour charge of only £25. He decided that he would keep it, and paid me with bad grace.

"I won't be back" he said as he departed.

Good, I thought, as I went into the back room to do some more repairs. An hour later I noticed the flashing lights of a roadside assistance vehicle outside. When I listened at the curtained window I discovered that my customer had broken his key in the car door lock – and was blaming me for his situation!

I bolted my door, put the 'closed' sign up and went out the back way for lunch.

Remote-control extenders and cable systems

Since repair work decreased some time back I've been supplementing my income by selling accessories. One of the most popular is the Powermid XL remote-control extender system. It consists of a transmitter and receiver in the form of two small, black pyramids. They enable you to lie in bed and control the satellite receiver, DVD or VCR downstairs.

I had one returned last week by an irate

Photo 2: RF output connector for the Panasonic TU-DSB31 digibox.

customer as 'faulty'. If he'd told me what he wanted it for I wouldn't have sold it to him in the first place. But he was a Mister Know-it-all, so I didn't bother to ask. In fact he has a cable box that was manufactured by Pace Micro Technology for Telewest.

The cable digibox situation is a bit confusing. NTL took over the cable TV distribution business of Cable & Wireless, though for a long time it looked as if C&W would take over Telewest. Anyway, the cable digiboxes currently around are: C&W (now NTL) Model DiTV1000; Telewest Model Di1000T; NTL Model Di4001.

The C&W and Telewest boxes use almost identical hardware though the software differs. Both use an IRDA remote-control system and DOCSIS cable modems. The NTL box is somewhat different. It uses a conventional remote-control system and a DAVIC cable modem.

When it comes to remote-control extenders, you should be all right with an NTL box unless it's one that was originally from C&W. I do not know of any universal remote-control units or extenders that can be used with a Telewest or C&W box. The Powermid remote-control extender system does work with the Scientific Atlanta CATV converter Model 8602 that was supplied by NTL.

The following notes explain the difference with the IRDA remote-control system, which was chosen by some cable operators as a high-speed approach that provides a degree of 'future proofing' in its design. The system was designed for remote keyboard use (web browsing) and to enable several handsets to be used simultaneously, as required when playing video games. At some time in the near future cable operators may offer this feature.

Conventional remote-control handsets modulate a carrier (switch it on or off) which is normally in the range 35-60kHz. The IRDA-standard system is designed to enable computer peripherals to be linked without cables. Its use with digiboxes should not be surprising, as modern digital cable set-top boxes contain powerful microprocessor systems. Furthermore the Pace boxes were the first to have an integrated cable modem within the box. The data transmitted by an IRDA remote-control handset consists of discrete pulses of IR radiation, i.e. it's not carrier based. The pulse rate is approximately 115kHz, and the handsets have identification keys/tabs that enable the receiver to identify the handset. Each key sends a seven-byte package of data within 600µsecs (the time that it takes a conventional system to transmit one or two bits of information). The data is thus sent very quickly, freeing time for a second handset to jump in. The receiver software also adds a time stamp to the data, to enable a games programme to decide which handset responded first. The system and protocols used are covered by patents.

In theory it should be possible to devise a remote-control extender that will work with this system. But, unless a million people badger the cable operators, I don't think it will happen. ■

If you have any questions about SkyDigital problems or Apple Mac computers, or need spare parts for either, please visit the web site at: http://www.satcure.com

Information and spare parts for analogue satellite receivers can be found at http://www.netcentral.co.uk/satcure

Information and parts for ICE (in-car entertainment) equipment can be found at http://www.satcure-focus.com

Test Case 473

The Test Case workshop has recently been troubled by a bout of 'bounced' jobs – ones that come back after a repair with further problems or, allegedly, the same problem. More often than not these 'repeat faults', if they exist at all, are the result of neither defective materials nor poor workmanship.

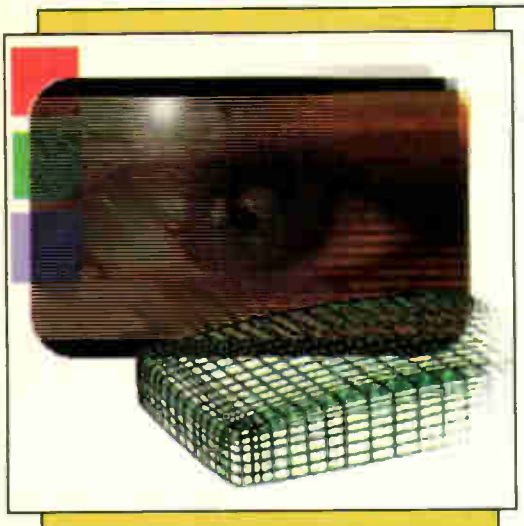
A typical example was the Panasonic NV-HD625 VCR, with hi-fi/Nicam sound, that had graced Real Technician's bench only a few days earlier. It had arrived in the workshop with the complaint 'no sound', just that. RT had played a prerecorded tape, checked the E-E sound, and made an off-air recording. The VCR had passed all these tests. As RT had no luck with several attempts at phoning the customer, he cleaned the heads and returned the machine to the shop with a nominal charge. Now it was back again, with a card that said "same as before". But at least this time there was a mobile phone number for its owner, which enabled RT to ascertain the real symptom. The job card should have said "intermittent loss of sound, only during the first ten minutes of own recordings and happens only with certain tapes". A sample recording in the machine showed that this did indeed happen.

RT very quickly noticed that just before the hi-fi sound cut out the tape counter froze, resuming its count a little before the sound returned. This was strange! During the short period of no count and no sound the picture deteriorated a little, though it remained perfectly watchable. RT made a recording on a tape of his own. On a couple of occasions during the first two minutes of playback the counter stopped for a second or two, though the sound continued. So whatever was the cause of the problem, it was sensitive to the type of tape in use.

Using the customer's sample cassette, RT carefully watched the path of the tape across the ACE head while the fault was present. It didn't deviate noticeably from the correct alignment, but there was some upward movement in the picture-search modes. RT made a mental note that a new pinch roller would be required, but that this probably wouldn't cure the problem.

The tape's back tension when running was next checked. RT found that it was about normal, but also that increasing it a bit 'cleared' the fault, even with the sample tape supplied. Obviously the back tension couldn't be left at a high setting, but this was a useful clue: very often the effects of wear in the rotating heads can be masked by a high back-tension setting. But if this was the cause of the problem, what about the erratic tape-counter operation? RT decided to check the tape path around the head drum, but discounted this factor as the fault showed up only with the machine's own recordings, with which slight misalignment errors would cancel during playback.

Maybe the control-track head was worn? Close inspection with a bright light and a dental mirror revealed some grooving here, but this didn't seem to RT to be excessive. Finally RT switched on his oscilloscope and actually found the cause of the fault. What was it? And did this machine actually get to be repaired? For the answers, turn to page 433.



TV FAULT FINDING

Reports from
Michael Dranfield
Philip Salkeld Bob Flynn
Martyn S. Davis Gary Laidler
M.J. Goodall Graham Richards
Bob Dewis and Graham Boor

We welcome fault reports from readers – payment for each fault is made after publication. See page 424 for details of where and how to send reports.

Bush 1407

This set wouldn't store channels. On inspection I found that there was a small spillage around the microcontroller chip IC602. Cleaning this up seemed to clear the fault, but the set came back a few days later with the same trouble. Suspecting that IC602 had been damaged I fitted a replacement, obtained from a scrap set. But the fault was still present. I then found that the –30V supply to the memory chip was low at –12V. The –30V zener diode and memory chip were both OK: the cause of the fault was C602 (1nF) which decouples the zener diode. This small, green disc capacitor was leaky. It was nowhere near the area of the spillage, which was a red herring. **M.D.**

Philips L6.3 chassis

If the BU1508AX line output transistor Tr7906 is faulty, make sure that choke L5420 in its base drive feed is not open-circuit. If it is, the replacement transistor will not last for long. **M.D.**

Protech 7295 (Vestel 11AK12 chassis)

The cause of field collapse in this set was traced to R818 (22kΩ, 1W) which was open-circuit. It provides the feed to the 33V tuning-voltage stabiliser and also the field sawtooth charging capacitor. **M.D.**

Bush WS6671

These widescreen sets are now just out of guarantee and some have come in with the symptoms dead with a ticking noise. On every occasion I've found that the BU2508AF line output transistor is short-circuit because C626 is dry-jointed. **P.S.**

Sharp 51AT15H (5BS-A chassis)

All this set produced was a snowy raster. It didn't take me long to find that there was no 12V supply to the tuner, because R243 (5·6Ω, 0·5W) was open-circuit.

It pays to replace C713 (1,000µF, 35V) in the power supply whenever one of these sets comes in for repair. It's the reservoir capacitor for the –10V line, and can be responsible for many faults with this chassis. **P.S.**

Bush 2868NTX (11AK19-5 chassis)

EW problems are quite common with these sets. With this one the cause turned out to be C630 (470nF) – it's not the usual cause. Fault finding can be difficult without a circuit diagram. **P.S.**

Sharp 66ES03H (CA10 chassis)

This set produced only half the field scan. The field output transistors Q501 and Q502 are surface-mounted FET devices: one of them was short-circuit. I decided to replace them both (Q501 part no. RH-TX00171BMZZ and Q502 part no. RH-TX00172BMZZ), and also had to replace the 2·5mA circuit protector F601. Once this had been accomplished there was full scanning. **P.S.**

Hitachi C32W510SN-311

This set was dead with the standby light pulsing. After some general checks, which proved fruitless, it was time to try disconnecting the supplies to various devices. I started with the field output chip, which was OK, then tried the TDA7263M audio output chip IC4000. This was the culprit – it was short-circuit between some of its pins. **P.S.**

Philips 14CF1014 (CF1 chassis)

This old set belonged to an elderly lady who wanted it repaired for sentimental reasons. She assured me that it produced a good picture. The fault was loss of field sync, so I reached for the hairdryer and freezer. This led me to C2377 (10µF, 63V), which is connected to pin 4 of the TDA2577A timebase generator chip IC7375. A replacement cured the fault and she was right – it was a cracking picture. **P.S.**

Toshiba 2877 (C7SS chassis)

This set came in because it was dead. Some quick tests revealed that the HT voltage was low at 60V, but disconnecting the feed to the line output stage didn't make any difference. Everything pointed to a defective chopper device, the STRS6709 chip Q801. I checked with Toshiba Technical who agreed that this was likely to be the cause and said that it is also important to replace D809 (part no. 23316672), D813 (part no. 23316725) and D804 (part no. 23316678). The part no. for Q801 is 23905084. The set sprang to life once these items had been replaced. Thanks, Toshiba. **P.S.**

Pioneer SV2801

The usual causes of intermittent loss of sound are poor connections at the speaker plug sockets or the earthing of the AM/FM sound module. On this occasion however the fault was eventually cured by replacing the 17·7292MHz crystal QS46 (part no. 266.407). **B.F.**

Bush 1473T (11AK08 chassis)

The picture would sometimes become smeary or even black out completely. Prodding about anywhere near the CRT base panel would produce either symptom. The cause of the trouble was traced to the earth wire at PL901. Although it appeared to be well soldered, the wire was not making it through the PCB. **B.F.**

Hitachi C2119T (G7PS chassis)

The BUT12AF chopper transistor Q903 and P6KE180A overvoltage diode ZD903 were short-circuit with the 6·8Ω, 5W surge limiter resistor R901 open-circuit. The most common cause of this is poor solder joints at the chopper transformer T901, either on the transformer itself or where it's soldered to the board. Resolder these before replacing the faulty parts.

For a reliable repair the following troublesome components should also be replaced: R909 (39kΩ), C906 (4·7µF, 250V), C908 (33µF, 100V), R902 and R903 (both 82kΩ, 0·5W). **B.F.**

Daewoo DVT1482P

The customer's complaint with this TV/VCR combi unit was no sound or picture with a smell of burning. A good look around the TV section before switching it on revealed a hole in the side of the line output transformer. A replacement was ordered and fitted. Fortunately nothing else had failed. **B.F.**

Amstrad CTV1410 (Onwa chassis)

A 'dead' Onwa chassis without the usual problems! The HT voltage was about 50V instead of 112V and there was no standby relay action. The relay is driven by Q610, which was OK but wasn't being driven by pin 36 of the microcontroller chip IC602. R632 (33kΩ), the load resistor at pin 36 of IC602, was open-circuit. **B.F.**

Goodmans 336NS (F16 chassis)

Although this set worked there was a strong smell of burning. It came from one of the line output stage tuning capacitors, C134 (17·4nF), which is connected in parallel with a lower voltage rated 1·8nF capacitor. As I couldn't find a supplier for a 17·4nF capacitor I replaced both capacitors, using values 10nF and 9·1nF with the working voltage uprated to 2kV. The picture size and EHT were OK when the set was switched on again, and a long soak test proved that all was well. **B.F.**

Philips 52ZY3535 (Anubis B AA chassis)

There was a blacked out screen with perfect sound and a faint smell of burning. The picture was blacked out because there was no field scanning. I found that R3452 (4·7Ω) in the supply to the TDA3653B field output chip IC7400 had burnt out. As no shorts could be detected, I fitted a replacement and tried again. This time R3450 (3·9Ω), which is in series with R3452, failed. All was well once R3452 and IC7400 had been replaced. **B.F.**

Sharp 66ES-D7H (DA100 chassis)

There was sound but no picture, because of field collapse – a thin line could be seen across the screen. In this chassis IC501 provides the field scanning. It receives a 13V supply, which is obtained from the rectifier circuit D609, F602 and C616 in the line output stage, at pins 14 and 16. It was tempting just to replace the IC, but we've no record of failures here. A check on the 13V supply revealed that it was low at 8-9V. There was no difference when IC501 was disconnected, so I starting to look at the smoothing capacitors.

C616 measured low in value, but a replacement made no difference. A look at the circuit diagram showed that the supply arrives at IC501 via L502, with C501 (470µF, 25V) for smoothing. This capacitor measured correctly, but a replacement restored the correct voltage and the scanning. **M.S.D.**

Ferguson F14VB12A

We've had several of these TV/VCR combi units with the complaint intermittent loss of sound. In every case the cure has been to replace the switching chip IS001, part no. 101-22-010. **M.S.D.**

Orion TV705R

This 14in. set was dead with no front LED light. When I removed the back I found some sort of Philips chassis, with a power supply based on the TDA4605 chip. Close examination revealed a continuous ticking sound. So it seemed that the power supply was in the protection mode, and I decided to check whether the line output transistor was OK. Good guess: the BUT11AF transistor was short-circuit. A replacement restored the set to life. **M.S.D.**

Hitachi C2976TN (A5 chassis)

There were lines at the top of the picture. I found that the 44V supply from the line output stage to pin 8 of the field/EW output chip IC601 was low at about 25V. This suggested a faulty voltage-doubler circuit – D718/9 (BY33J) and C725 (33nF, 400V). It's quite common for the diodes to fail, but in this case C725 was open-circuit. **M.S.D.**

Thomson 37MG73J (ICC9 chassis)

How many of these monsters did we sell? This one had a field scanning problem: the picture was broken up, with folding horizontal lines, from about mid screen to the bottom. In a situation like this it's always wise to go for the obvious. So I replaced the TDA8177 field output chip IF01 and anything around it that looked like an electrolytic capacitor. All to no avail. It was time to get serious and use the scope.

IF01's input waveform, at pin 1, was of the correct shape but had a serious, ringing distortion on it. The output waveform, at pin 5, also had this ringing. The drive comes from pin 16 of IV01. Was this chip faulty? There is feedback from the scan-coil circuitry to pins 17 and 18 of IV01. Scope checks on the feedback waveforms revealed the same ringing. Suspecting that the problem was being caused by line signal that wasn't being filtered out, or some sort of HF instability in IF01, I switched the set off and started to check all the resistors in this area, especially low-value ones. Sure enough RF11 (1·5Ω) was open-circuit. It's part of a filter network at IF01's output, and a replacement cleared the fault. Amazing that such a small component produced such a dramatic effect on such a big set! Incidentally RF11 is a critical safety component, part no. 15022560. **M.S.D.**

Akai CT2862UNT

This set was brought in because of field collapse. Rectifier D406 (BA157) was short-circuit. R422 (0·68Ω) was open-circuit and the TA8427K field output chip IC401 had failed. All probably because C401 (100µF, 35V) was open-circuit. **M.S.D.**

Bush 2863NTXA (11AK12 chassis)

The problem with this set was field collapse. As I didn't have a circuit diagram I carried out cold checks in the field output stage and found that R818 (22kΩ) was open-circuit. **G.L.**

Sony KVM2141U (BE2A chassis)

This set produced a fading picture: it was as if someone was turning the contrast up and down. A small puddle of electrolyte led me to C021 (22µF, 50V), which is associated with the brightness output from the microcontroller chip IC001. The capacitor read perfectly when checked with a capacitance meter, but a replacement cured the fault. **G.L.**

JVC C14A1EK (MV chassis)

This set produced a bright raster with flyback lines. The obvious likelihood was that the supply to the RGB output stages was missing. As usual, this is derived from the line output transformer. A check on the rectifier circuit here showed that the fusible surge-limiting resistor FR557 (47Ω, 0·5W) was open-circuit. **G.L.**

Hitachi C2119T (G7PS chassis)

The problem with this set was intermittent field collapse. I attended to the dry-joints around the field timebase chip IC601, R909 (39kΩ) in the power supply (error-sensing network) and two power supply capacitors, then put the set on test. After about half an hour the field collapse was back. Flexing the board restored the picture, and more dry-joints were dealt with. But, after much head scratching, the cause of the trouble turned out to be the 1N4002 flyback boost diode D601. It was going open-circuit intermittently. **G.L.**

Alba CTV3458

I've had three of these sets in recently, all with the same fault. The sets were dead with the mains fuse blown. In each case the culprit was C8 (1nF, 1kV), which produced a reading of just a few ohms. **G.L.**

Sony KVM2171U (BE4A chassis)

There was field collapse, and a quick check showed that the field output chip's supply was missing. Further checks brought me to R814 (0·47Ω) which was open-circuit. No cause of its demise could be found and a replacement restored the picture. **G.L.**

Goodmans GTV9200

The symptoms with this 5in. mains/battery portable were loss of the picture, which might return when the first anode voltage control (part of the focus pack) was moved, or the brightness varying as the set warmed up. They would suggest that the focus pack was faulty. In fact the culprit was C801 (2·2nF, 1kV), which is mounted on the tube base PCB. When it was checked out-of-circuit its capacitance read correctly, but its DC resistance had fallen to 500MΩ – just enough to upset the action of the A1/focus supply chain. **M.J.G.**

Sharp 66AS05H (4BS-C chassis)

Someone had fitted the wrong line output transistor (Q600) in this set. It should be type 2SD1546, but an S2000AF had been installed. Well, they are shown together in

an equivalents book. But the set had worked for only three days, and the replacement transistor was very cooked and short-circuit. The 2SC2271 driver transistor Q601 and 2SC2412 pre-driver transistor Q606 had also failed.

Correct replacements were fitted, but the set still wouldn't start up. A check at pin 12 of the MC44002P colour decoder/timebase generator chip IC800 revealed that the line drive output was at only 1V instead of 3V peak-to-peak. I didn't have an MC44002P in stock but I did have an MC44007P, whose pin connections are identical. Being bold (occasionally), I decided to try it. This paid off: the set worked perfectly and, many weeks later, is still doing so. Since IC800 had been faulty, with a low line drive output, an S2000AF might have worked after all. **G.R.**

Grundig ST63-725/8/FT/GB (CUC6330 chassis)

This multi-standard set mislead me briefly. It produced a negative-looking picture, which made me think there was video overloading. In fact the set was working to the wrong standard – I think it was in the Secam instead of the PAL mode. The picture was OK with a scart video input.

Use the remote-control unit's P/C key to get the user menu, then set the standard (S) to number 2. Use the OK key after each operation, otherwise the new information won't be stored. **G.R.**

De Graaf D51KS4D

An inspection of the chassis showed that there were a number of faulty electrolytic capacitors. Once they had been replaced the set was still stuck in standby. I found that the optocoupler D315 was faulty. It's a CNY75, but a CNX82A will do. **G.R.**

Bush 2857NTX

The fault description read "RGB fault". There was a blank green screen, which was put right by replacing Q555 (2SC1815) and Q552 (2SC2482). But the picture that was no w displayed was weak and milky. An over-sensitive beam limiter perhaps? I telephoned Bush Technical and was advised to check R433. It should be 150kΩ but read open-circuit. A replacement put matters right. Thanks Bush! **G.R.**

Toshiba 2805DBT

If there is distorted field scanning/ foldover with lines across the screen, look for C372 and C317. One is near the TDA8170 field output chip and the other near the TA8739P field generator/EW correction chip. They are the only two red electrolytics on the chassis, and both are 2·2µF, rated at 50V, 105°C. They also tend to leak electrolyte. **G.R.**

Philips 14PV2841/05S

We've had a number of these televideo units with the problem that the remote-control unit works for TV but not for the VCR commands. Every time the remote-control unit has been defective. The keys still transmit signals, but maybe the frequencies have shifted. The handset is reasonably priced, the Philips part no. being 4822 219 10593. **G.R.**

Samsung CI5937AN (Z68 chassis)

You can get the following symptoms with these sets. At switch on there is no picture because of low heater voltage. After about five minutes the picture appears, but with lack of width, very jagged verticals and an arcing noise from the line output transformer. The transformer is not the cause: the item to replace is the HT reservoir capacitor C828 (470µF, 250V), which goes open-circuit. **B.D.**

Sharp DV3761H (4BSA chassis)

The job sheet said that the picture would close in or stretch at the top. I replaced the EEPROM chip, reset all the usual parameters and left the set on test. All seemed well for a few days, then the fault reappeared. After a lot of headscratching the cause was eventually found: the field ramp charging capacitor C512 (82nF), which is connected to pin 6 of the MC44006 jungle chip IC801, was intermittent. A replacement, followed by a further soak test, proved that all was now well. **G.B.**

Answer to Test Case 473

– page 429–

Though intermittent in their effect, the causes of the problem in Real Technician's bounced Panasonic NV-HD625 VCR were to do with part parameters. The main cause was control-track head wear: its output, with a signal impaired during the record phase, was borderline, sometimes insufficient to trigger the tape-counter and operate the servo-control action. The initial effect on tracking was minimal, insufficient to have much effect on the video playback but enough to reduce the level of the off-tape hi-fi stereo sound carriers to below the muting threshold. The rotary heads were also worn to some extent. This machine had plainly seen quite a lot of use during its four and a half years' life!

All this investigation had taken up quite a lot of time – the £15 paid by the customer for the previous check had long since disappeared in terms of a fair labour charge. If only people (and shop-floor staff) would supply accurate and concise fault descriptions! RT had to quote for a new ACE head and pinch roller, their fitting and alignment, and point out to the customer that the prognosis was not good in view of the degree of rotary-head wear present. The result was almost inevitable: the job was not sanctioned. And the customer tried to get his £15 back! No chance!

NEXT MONTH IN TELEVISION

Servicing the Sony AE1C chassis

The Sony AE1C was the last of the AE1 series chassis. It was used in a number of models released during the 1991-2 period. John Coombes provides a fault-finding guide.

Test report: the Hauppage TV add-on for PCs

The Hauppage WinTV Nova-t unit plugs into a PC's USB port and takes an input from a TV aerial. You can then view all the free-to-air terrestrial digital TV channels – and hear the radio channels – via your computer. You can also record programmes. It's pretty good, with a few wrinkles. Peter Marlow uses one and provides a detailed test report on its performance and operation.

Home networking

Mark Paul provides an update on the 'intelligent home', covering the latest technology in this field. The three approaches – use of existing wiring as the transmission medium, installing new wiring, and RF techniques – are covered.

More on the Mitsubishi TFS6705K monitor

Next month's instalment will concentrate on the power supply, including the arrangement for varying the HT feed to the line output stage to cater for different display standards, and the separate EHT system.

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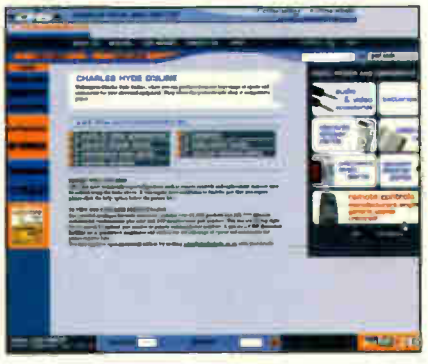

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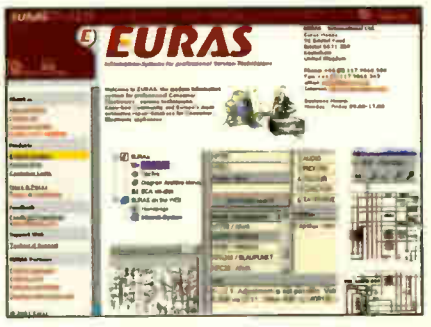

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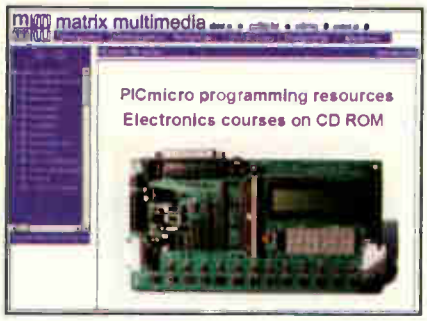

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SATELLITE NOTEBOOK

Reports from Michael Dranfield and Christopher Holland

Pace ZIF tuner module

A common problem is "no satellite signal received". If you go into the services menu and select signal test, the display will usually show that the signal strength is OK but no signal quality and no lock.

An oscilloscope check with the digibox running will confirm whether the tuner is faulty. When the test points identified in Photo 1 are checked with the scope you should see an analogue signal of 400mV or more. If the tuner is faulty you will usually find that the Q (quadrature) output is missing.

These tuners can be repaired by Kesh Electrics, 6-8 Main Street, Kesh, Co. Fermanagh, N. Ireland BT93 1TF. The turnaround is extremely quick, and I must say that proprietor Gordon McCrea is one of the most helpful people I have ever come across.

The above note applies to all models that use the zero IF tuner, including the 2500B. **M.D.**

Digital channel update

The latest channel changes at 28·2°E are listed in Table 1 – where allocated, the EPG number is shown in brackets after the channel name.

Gaydar Radio and Teamtalk Radio, both mentioned here last month, have been allocated numbers 908 and 910 respectively in the Sky EPG. They are both received via transponder 33.

BBC Knowledge, EPG number 573, has ceased transmission and been replaced by BBC4, EPG number 161. See Photo 2. BBC6 Music, EPG number 911, has started via transponder 3. A promotion ran from March 8-10th. See Photo 3.

Various tests with four Arabic channels are being conducted via Eurobird transponder D4S (11·527GHz vertical). See Photo 4. They can be added using the digibox Add Channels facility, and are currently listed as aol, atn, atl and sc in the list of channels found. See Photo 5. **C.H.**

Table 1: Latest digital channel changes.

Channel and EPG	*Sat*	*TP*	*Frequency (GHz)/pol*
BBC4 (161)	2A	1	11·719/H
BBC6 Music (911)	2A	3	11·798/H
ESPN Classic	2B	33	12·344/H
Family Radio (909)	2B	33	12·344/H
Motors TV (429)	EB	D4S	11·527/V
Shop on the Box (652)	EB	D5S	11·546/H
Quantum	EB	D11S	11·662/H

TP = transponder, 2A = Astra 2A, 2B = Astra 2B, EB = Eurobird.

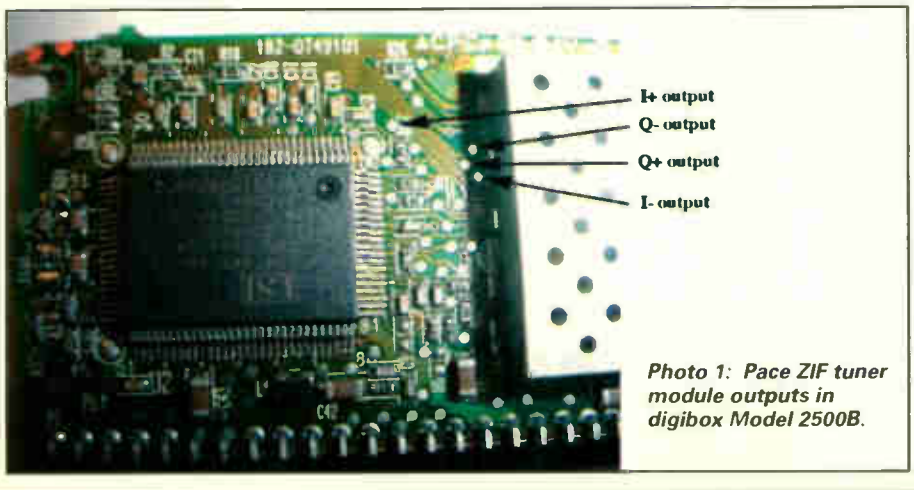

Photo 1: Pace ZIF tuner module outputs in digibox Model 2500B.

Photo 2: BBC4 opening.

Photo 3: BBC6 promotion.

Photo 4: Arabic channel testing via Eurobird.

Photo 5: Add Channels for transponder D4S.

AUDIO FAULTS

Reports from
Michael Maurice
Dave Gough
Mark White
Ivan Levy, LCGI
Colin McCormick and
Geoff Darby

We welcome fault reports from readers – payment for each fault is made after publication. See page 424 for details of where and how to send reports.

Aiwa MX-Z9300 Mk II

I've had two of these units with an identical fault: there were popping sounds, then the unit went dead. The solution is to remove the main PCB from the chassis, which is not easy, and resolder every joint that looks suspect. Pay special attention to all power transistors and ICs. You will find that all is well once this has been done. **M.M.**

Sony LBT-XB20

These monster stack systems look to me like a cross between the dog robot K9 and Darth Vader's helmet, but they provide a regular source of work. The usual symptom is a 'no disc' display. The CD unit, a five-changer carousel affair, is at the base of the stack, and dust ingress to the laser assembly is a constant problem.

To reach the laser assembly is no mean feat. Remove the case/cover first. Then, after detaching all the cables/connections from the power panel, I remove the power supply complete with its supporting chassis. Be careful about this, because it's quite heavy and has sharp edges. Give the carousel and laser assembly a thorough clean – I remove the carousel. Once you have completed the cleaning you will find that the unit works normally. **D.G.**

B&O Beomaster 3300 (type 2952)

The reported fault was very low sound, and I found that the volume control made no difference past number 10 on the indicator. With the aid of the service manual I located the IC for the volume control stage, IC6. Some quick checks at its pins showed that there was no voltage at pin 1 instead of 16V. The cause was C92 (100µF, 25V), which was short-circuit. There were normal sound levels once this item had been replaced and the unit had been reassembled. **M.W.**

Peavey CS8005

This amplifier was brought in because channel 1 wasn't working. After extensive tests on the transistors in the output stage I found that the protection relay was in operation. No shorts or leakage in the output transistors or associated devices were detectable however. When I carried out voltage and resistance measurements in the protection circuit I found that the thermal resistor R207 was open-circuit. It's on the heatsink. A replacement cured the fault. **I.L.**

Denon DCM270

I've had several of these CD players that cut out or stop playing after several tracks. The laser is usually OK, the cause of the problem being the ribbon cable that connects the laser to the main PCB. **I.L.**

Sony PCM2500

The complaint with this professional DAT recorder was glitching with the green and red error lights coming on. I found that the amplitude of the RF waveform was pulsing up and down. Close inspection of the deck revealed dirt on the capstan shaft. The cure was to clean the shaft thoroughly. **I.L.**

Technics SE-CA01

This is the amplifier section of the CA01 system, which has a metal-boxed amplifier section right next to the transformer – hardly audiophile stuff. The fault was reported as one channel being very quiet. I traced the cause to a dried up DC blocking capacitor, C205 (10µF, 16V), in a preamplifier stage. This seems like bad design: surely everyone knows that you don't pass audio signals through an electrolytic capacitor, because of the poorly-defined frequency-response characteristics? The owner told me that the unit had cost some £300, so this lack of attention to sound quality was unforgivable. But the system does have flashy displays and lots of buttons to press! **C.McC.**

JVC XL-EX70

This is the CD section of the CA-EX70R system. It was completely dead, with no outputs from the power supply. The cause was R111, which is in one leg of the AC feed to the mains bridge rectifier. It was open-circuit. As cold checks failed to reveal any reason for its failure I simply fitted a replacement, which restored full, normal operation. A long soak test confirmed that there were no other problems. **G.D.**

Sony MZ-E60

This personal MiniDisc player wouldn't read discs. A replacement laser unit, which is very easy to fit, was required. Removal of the door gives access to the top of the deck, which is secured to the body of the unit with two tabs that engage in slots at the right and one screw at the left. The deck can be lifted right out once the flexiprints have been released.

When the new laser unit had been fitted and the unit had been reassembled I ran the automatic set-up program. To do this you use two test discs in sequence. They are expensive, but if you want the auto set-up to proceed without problems there is really no alternative. The discs can be obtained from Sony, and can be used with other units in the MZ-xx range. **G.D.** ■

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LETTERS

A scam

After more than fifty years in the trade people continue to amaze me. An old customer of mine, a local businessman, phoned me a couple of evenings ago to ask for help. He had bought "a new 33in. TV set and video recorder" and couldn't get them tuned in. Would I help? I had finished for the day and had nothing further planned, so I agreed to call round in the next hour or so to sort him out. In these days of cash-and-carry deals and complex setting-up menus this kind of job is becoming very common, especially when a houseful of sets and 'boxes' have to be persuaded to work together in harmony.

On arrival I was shown into the lounge, where the new purchases were on proud display – a large-screen TV set in a silver cabinet on a black metal stand, and a Nicam stereo VCR in a graphite-coloured case on the shelf below. I felt behind to check that the aerial and RF leads were properly in place, and whether a scart lead was fitted (no), then switched the TV set on. After a few seconds a snowy raster appeared, with three pairs of red, green and blue horizontal lines across the centre of the screen and the top, right-hand-corner channel graphic rolling quickly upwards. When I asked for the remote-control unit I was given what appeared to be an elderly Mitsubishi one which didn't work. I then tried a Mitsubishi remote-control unit of my own. I knew it was OK, but this didn't produce any results either.

The results so far suggested an EEPROM failure, so I had the main room lights turned on and paid closer attention to the set. As I turned it and its stand round I noticed that the silver finish was of poor quality, and as soon as I got a clear look at the rear of the cabinet it was obvious that the set had been inexpertly resprayed – without masking off the maker's label or the scart, phono or aerial sockets! I decided to remove the back cover to establish the make and model number. Only six of the nine back screws were in place: when they had been removed it took some further levering to free the back, which the respray had firmly cemented to the front. The interior of the set resembled a well-filled Hoover bag, and the label that adhered to the CRT flare told me that the set was a Mitsubishi Model C28S7B (about seven-eight years old?).

At this point I turned my attention to the VCR, which was a Mitsubishi HS-761V(B) that seemed to be in good condition. But it refused to accept a cassette, and when I removed the top cover I found that the plastic tracks for the cassette tray had broken away (no bits inside the cabinet!) while the right-hand side panel of the tray was also damaged (there was no cassette door release lever). For good measure the remote-control unit that had been supplied was not even a Mitsubishi one.

At this point my customer returned to find out how I was getting on. I had a few questions for him! It transpired that as he was finishing up at a job (he's a builder) and reloading his van a wagon drew up in the road. The driver had asked him if he wanted to buy any TVs or videos, as he had a failed delivery that was being sent back to Ireland. He had jumped at the chance of a 'bargain' and, for £200 cash-in-hand, had bought a "33in. widescreen CTV and a matching Nicam-stereo Video Plus VCR" – unseen, no boxes, just covered with plastic bubble-wrap. The fact that there were no user instructions, and that the two remote-control units had come from a box of assorted handsets in the cab of the lorry, had apparently not rung any alarm bells.

I had trouble keeping a straight face as I explained to him that his 33in. TV was actually a resprayed eight-year-old 28in. black-cabinet set with a major fault, and that the VCR was of similar age and had major damage which was probably unrepairable. This model doesn't have a complete cassette-lift subassembly that can be replaced: the side panels of the cassette lift are extensions of and part of the main chassis pressing, and replacement plastic side tracks (like those made for Philips Charley decks) do not seem to be available.

I still cannot understand how a 'successful' trader could have allowed himself to be taken in so easily. He had actually considered buying another set, a Sony, on behalf of a friend. I wonder how many more people were taken in that day, and how widespread this racket is. He hadn't even made a note of the type and registration number of the lorry, nor of any

The pay-TV problem

It's my opinion that both ITV Digital and Sky Digital have made fundamental errors in their approach to selling their services. The packages on offer are daunting in their complexity. Pay a for x months and you get m + n + p, then it becomes pay a + b + c to get m + n + p and lots of channels that nobody wants, and if you sign up on a Wednesday between 11 am and 2.30 pm you get a half price installation with a free trip to Switzerland in November on Freddy Laker Airlines.

If ITV Digital had offered football on its own at say £10-£12 a month, it would have had its five million subscribers by now. All packages offered should be simple, and it should be easy to get your preferences separately. The 'dross' channels would soon disappear, which couldn't be any worse than the usual cost-cutting exercise of job losses.

Keep it simple, so that the viewer can budget, and there could still be a future for ITV Digital. The number of people cheating with pirate cards proves this.

Cyril Randle,
Orchard Hills,
Walsall.

side-panel graphics. I'm afraid that my sympathy didn't extend to waiving my call-out charge. To add to his woes, as I left the house his wife was giving him a good earbashing.
John C. Priest,
Thornton, Blackpool.

Phone technology

In his April column Jack Armstrong said that in the early days of the telephone designers introduced an electronic voice feedback system from the mouthpiece to the earpiece so that the user would hear his own voice in the earpiece and therefore talk more softly.

This is not quite accurate. Very early telephone circuits consisted of a carbon-granule microphone 'transmitter' and a moving-diaphragm earpiece in series with a DC supply (provided by the telephone exchange), a similar arrangement being used at the other end of the line. Because people could hear their own voices at quite a high level through the earpiece, they tended to talk too quietly. Designers introduced a simple transformer arrangement to feed the microphone signal back to the earpiece out-of-phase, so that the user would hear his own voice at a much lower level and therefore speak up. This arrangement was known as the anti-sidetone induction coil (ASTIC for short).

I was an apprentice engineer with the GPO (as it then was) in the Sixties and, with today's technology, would have thought it possible to design a mobile phone so that people could hear their own voices through the earpiece. There's progress for you!
Martin McCluskey,
Thornaby, Stockton on Tees.

Poor pictures

I was as astounded as Chris Cory (letters March) to read the previous letters praising stunningly-good pictures with modern sets. My experience of widescreen sets has been awful: plastic-looking faces, poor definition and unacceptable geometry.

I had been in the TV trade for twenty two years until I left to work for a London local authority. When I was seven years old I used to make my own radio sets and amplifiers. From fourteen I worked in a TV shop, repairing Bush 141s, Thorn 2000s etc. – I was really keen. But during the last five years I've become very depressed and disillusioned with the whole trade. When I was running my own shop, which I sold as a going concern, in Norwich I regularly had to send brand-new TV sets with digital signal processing back to the manufacturer: the picture quality was so poor that you couldn't have them on if you had a used or good-quality analogue set on in the shop at the same time. When we had new sets in for repair, perhaps running on soak test waiting for a once-a-week fault to appear, they would often be shown up by an old set such as a TX100 for the rubbish they are.

I sold a 32in. Toshiba set to a good friend of mine who uses it with a Sky digibox and a DVD player, and cringe every time I visit him because the picture is so awful. I still use a Philips System 40 receiver as my own set at home. When the broadcasters choose to transmit a good unprocessed signal the picture is truly stunning.

I think the reason people buy the current widescreen monstrosities is not because they provide a good picture but because of the cabinet styling, to impress their friends. OK as long as they don't turn the TV set on during a visit!
David Huddleston,
London W2.

Channel balancing

Roger Bunney's description of a grouped channel-balancing system (April issue, page 356) highlights a problem that has become very common over the last few years – the imbalance between signal levels received in different parts of the UHF band. We are now in the era of wideband reception, with signals – analogue and digital – available at many frequencies across virtually the whole band, from channel 21 to channel 68. A common situation seems to be that the lower-frequency channels are inconveniently strong in comparison with those at higher frequencies, as in the case described by Roger. Since cable losses are greater at the higher frequencies, the opposite situation at the aerial terminals would often be more helpful.

All over the country there are transmitters that radiate four group A (chs. 21-34) channels at high power and Channel 5 somewhere in group E (chs. 34-68) at lower power, with digital multiplexes all the way from one end of the band to the other at various power levels. Signals that are transmitted using the highest channel frequencies often arrive at an alarmingly lower level than the others, even when the transmitted power is the same, because of the greater effect of signal screening at high frequencies.

As Roger discovered, the imbalance can be a real problem when the signals need to be amplified for distribution purposes. A large distribution system will have individual filters and levellers for each channel. This usually enables the problem to be solved by adjusting a few presets, though in an extreme case extra amplification may be needed for the weakest channels. The problem is more difficult with small systems, where the cost of channel-pass filters for five channels and six digital multiplexes is not warranted.

Roger's solution, the use of a diplexer to provide separate high- and low-band signal paths, with attenuation in one path, has worked quite well for us but has its limits. Because the diplexer doesn't perform perfectly in creating the two signal paths, especially near the crossover point, the signal phase relationships at the combiner can produce a strange response pattern, with peaks and troughs. Since digital multiplexes must be reasonably flat across their 8MHz bandwidth, problems can arise. If these effects cause a problem with one particular analogue channel however, the length of one or other of the paths can be altered on a trial-and-error

A home-recorded disc problem

Over the past couple of years I've noticed an ever-increasing tendency for hi-fi equipment fitted with the stacking type of multichanger to come in for repair with discs stuck inside. When you get it apart, you invariably find a home-recorded disc at the root of the jam up. Many CD burners purchased for domestic PCs come complete with ripper software – if not it can be freely downloaded from the net. So Johnny hi-fi owner starts copying all his friends' best discs. Flushed with success, he then just has to get cute and buy some label printing software and cheapo labels from his local PC superstore. A quick scan of the original disc, print out later and hey presto! a pretty fair clone has been produced.

The trouble starts a few weeks later when the edges of the label begin to peel. The underside, now the top side for a short distance, is still sticky enough to grab on to anything with which it comes into contact. This is often the tray, or some other piece of mechanism, immediately above it. So, when the mechanism comes to change, the tray is retracted but the disc stays where it is, ready to graunch up when the mechanism tries to ram the next tray in. I have known this to result in power supply as well as mechanical damage, and often severe scratching of the disc.

Whenever one of these units comes in – Sony, Technics, Sharp, Sanyo – it's worth warning the owner about this, even when the fault has not actually occurred. Single players and carousel types are generally not affected, as the vertical clearances are much greater.
Geoff Darby, Monitech,
Earls Barton, Northampton.

basis to provide compensation.

On one occasion where a good group-A aerial was in use I experimented by adding a group-E array with an extra amplifier, using a diplexer to combine the signals. The phasing problem just mentioned was much in evidence, and in addition the overall polar response of the two arrays was seriously affected. In other words it was a disaster!

What's needed is a 'magic' wideband aerial, with much more gain at the top of the band than the bottom but good directional characteristics throughout the band. Somehow I don't think we shall ever see such a product. More feasible would be a masthead amplifier with a gain of say 3dB in ch. 21 rising steadily to 16dB in ch. 68. I've mentioned this idea to representatives from Labgear and Antiference with no result other, I suspect, than a significant tapping of the forehead after they'd gone.

Equalisers or 'slope filters' are available of course, but all the ones I've tried provide only 6-7dB of equalisation across the UHF band. Two such equalisers can be cascaded, but this isn't elegant and the filters cost about £18 each. For the time being however, until something better turns up, this is the solution we've adopted.

Perhaps someone out there could design a simple circuit with the following performance: through loss in channel 21 about 14dB, dropping evenly to 2dB or less in ch. 68, with accurate impedance matching and low VSWR across the band. Any volunteers?

Bill Wright,
Micklebring, Rotherham.
wrightsaerials@aol.com

HELP WANTED

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

Wanted: EHT/focus lead for the Fidelity Model WSTV3132NF. All expenses paid. G. Smith, 83 Avenue Vivan, Fence Houses, Tyne and Wear DH4 6HZ. Phone 0191 385 8328 or 0790 423 4301.

Wanted: Circuit diagram or service manual for the Philips PM5509 colour pattern generator. David H. Syddall, Watson House, Moorside Road, Edgworth, Bolton, Lancs BL7 0JY. Phone 01204 853 413.

For disposal: An early 26in. Philips colour TV set (G8 chassis) in good working order. Purchased in January 1972. Original bill of sale from the Philips Staff Shop, Mullard, Mitcham available, also installation instructions and a fault location guide supplied by Combined Electronic Services Ltd., Purley Way, Waddon, dated May 1971. If any collector or museum of working TV sets is interested in providing a home for this set, please contact Mick Scholes on 020 8660 7039 (phone/fax).

Wanted: ACE unit for a Sony SLC9 Betamax VCR. Phone Steve Rowley on 01889 578 416 or e-mail steve@srowley.fsbusiness.co.uk

Wanted: Circuit diagram or service manual for the Blaupunkt car radio Model Montreux RDR49. Will pay all usual expenses. Phone John Cousin on 020 8340 6896 or e-mail john@jcousin.fsnet.co.uk

For sale: Grundig 28in. TV set (CUC720 chassis) with teletext and original 400TT remote-control unit, working and in very good condition. Owned and maintained by engineer from new. Comes with the following spares: RGB and text PCBs (29504-005-21 and 29504-018-01GB), relay, scan coils, spare remote control unit, various ICs and circuit diagrams. Will accept any reasonable offer. Buyer to collect (from Hanham, Bristol). Phone George Baker on 0117 967 1312 or e-mail eosbarker@talk21.com

Wanted: Manual and circuit diagram for the Hameg HM203-5 oscilloscope. Will pay expenses. Phone Martin Scobie on 01803 293 157.

Wanted: Service information for the JVC HR-C3EK battery VCR. It won't latch on. Also I have an Akai VS23EK VCR which works well except that when play is selected L appears in the display. Is this a parental lock? I have no instruction book or remote-control unit for this machine. R.K. Drew, 76 Laburnum Avenue, Taverham, Norwich NR8 6JZ. Phone 01603 261 073.

Wanted: For spares, Quad 405 power amplifiers, Quad FM3 tuners and Quad 33 and 44 control units. Also require Spendor BC1 speakers. Phone Mike on 01758 613 790.

Wanted: Circuit diagram for the Philips G2.1AA chassis; keyboard for the Sinclair 128K, Amstrad part no. ESU2456; and an old Commodore 64 keyboard or a complete unit for spares. Donald Bills, 46 Blewitt Street, Pensnett, Brierley Hill, Dudley, West Midlands.

Wanted: Line output transformer for an Aiwa 14in. TV/VCR combi unit. Unfortunately only part of the model number is available, VX-T, but the numbers on the transformer are Philips 20111 OP441 3213006. R. Thomas, 80 Dynevor Road, Skewen, Neath SA10 6TW. Phone 01792 510 467.

Wanted: Power supply panel for the Akai VS-A60 VCR. Ian Howes, 10 Munnings Close, Carlton Colville, Lowestoft, Suffolk NR33 8AW. Phone 01502 512 695.

Wanted: Help with an LG Electronics VCR, Model W9061. There's no recording despite the red circle logo on display. Any clues as to what to do or replace? Please e-mail Jack Detsios on tacksdex@hormail.com

Wanted: Some 6·4mm (0·25in.) tape on 10in. reels to enable me to service/repair a Revox tape recorder. Does anyone have such tape available or know of a possible source? Please write (I'm hard of hearing) to Ian Johnson with price, amount available and how to pay for it. Address 6 Heathfield Crescent Kidderminster, Worcestershire, DY11 6PF.

Wanted: Circuit diagrams for typical domestic radio sets (not TV) from the 1940s to the 1980s. This is for an HMP group educational project on past technology. If you are disposing of old data please send to me and I will forward. Roger Bunney, 35 Grayling Mead, Fishlake, Romsey, Hants SO51 7RU. Phone 01794 517 497.

Wanted: Service manual for the Ferguson FV59S VCR (photocopy OK). Rod Tyler, Tyler TV, Littlecote Estate, Petworth GU28 0EF. Phone/fax 01798 342 210 or e-mail r@rtyler60.fsnet.co.uk

Wanted: CRT projection 'gun' for a Pioneer SDT5000 rear-projection TV set. A. Robinson, 24 Eastfields, Stanley, Co. Durham DA9 7DH. Phone 01207 290 387 (daytime), 01207 282 340 evening).

Wanted: A Philips G11 TV chassis, working or not. Will pay a fair price and all expenses. Peter Ward, Petgra, Forest Corner, Ringwood, Hants BH24 3JW. Phone 01425 475 445.

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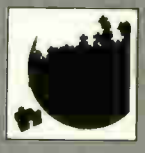

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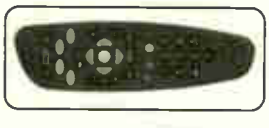

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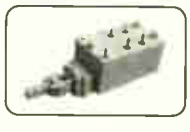

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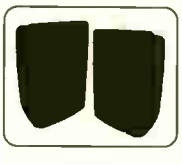

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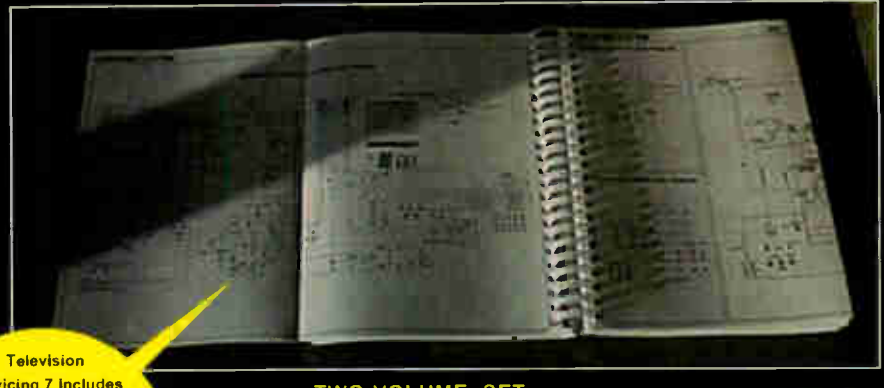

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WHAT A LIFE

A mixed bag of faulty VCRs and TV sets. The current state of TV broadcasting – rubbish TV. Donald Bullock's servicing commentary

Steven has been spending a few days walking on Exmoor with his wife and dog, so Paul and I have been guarding the fort. Paul is far more patient than me, even with the silliest customers. When I arrived the other day he was talking to Mr Shiner, who had brought in his Mitsubishi HSB82 VCR.

A troublesome VCR

"I know 'e's old, Paul, but I'm sorta attached to 'm like" Mr Shiner said, "you understands now, don't you?"

"Sure do" Paul replied, "and you're going to tell me he's not well, aren't you?"

"Yes, 'e's poorly" Mr Shiner continued, "produces awful pictures and keeps drifting off tune."

"Leave him with me" Paul said.

When Mr Shiner had departed he set about testing the machine. "Tuning drifts all right" he commented, "and there's a sort of red shadow to the left of images."

"To the left?" I queried. "You don't mean to the right, do you? After all the scanning beams move from left to right, so most picture disturbances are to the right of the object."

"Definitely to the left" Paul replied, "but I'd better attend to the drifting first."

Several electrolytics were leaking their electrolyte – C210 (47µF, 16V), C232 (10µF, 16V), C203 and C208 (both 470µF, 10V). Replacements cured the drifting, but the red shadow was still present. Paul hunted around for more faulty electrolytics and found five, C221, C6001, C6E5, C116 and C3D1, all 470µF, 10V. Once they'd been replaced the red shadow had gone. But that wasn't the end of the story. There was also slight field bouncing. Paul tapped around the tuner and IF cans and found that this affected the bouncing. Close examination revealed that they were dry-jointed to the board. Once they had been resoldered the results were excellent.

A big Philips TV

Our next caller was Mr Weedler. We've suffered from him for years. Won't lift a finger if he can get some mug to wait on him, and doesn't like paying for anything.

"Here Don" he simpered, "help me with this telly, will you? It's a big 'un, see, a 28in. Philips, and my back's bad. I'm parked just outside."

He was parked outside all right. About eighty yards up the road, on the other side, and the traffic was building up nicely. When we got to the car he supervised as I struggled to get the set out from the back seat. Then he trotted off back to the shop while I followed as best I could. When I arrived he was sitting down. Paul helped me get the set on to the counter.

"I 'spect he was heavy, eh?" said Weedler. "I'll leave it to you."

The set was a Model 28ML8800, which is fitted with the FL1.6 chassis. When I plugged it in a good picture appeared. But the on-screen display and teletext were too dark, and the standby LED was flashing. I noticed that Paul was studying the screen too.

"Ah, you're good at these, aren't you?" I said. He looked surprised. "So I'll hand it over to you then."

Just then we heard a slight crack and the picture quivered. Paul prodded about on the tube's base panel, then the line output transformer, but everything there seemed to be all right. Then we heard the crack again, and saw a spark jump from one of the legs of the line driver transformer to the board.

Just then we heard a slight crack and the picture quivered. Paul prodded about on the tube's base panel, then the line output transformer, but everything there seemed to be all right. Then we heard the crack again, and saw a spark jump from one of the legs of the line driver transformer to the board. It was dry-jointed. Paul resoldered it, switched on again and studied the screen carefully before he spoke.

"I reckon the EEPROM chip's been damaged and corrupted by that sparking. It's a 24C04B1, IC7137, and has to be programmed for this particular model. The arcing must have changed its data. We'll have to fit a replacement and program it.

He fitted a new chip then briefly shorted pins S23 and S24 together. From the service menu that appeared on the screen he selected A, Options Alignment, then B, and adjusted Option 2 to 103, using the remote-control unit's plus and minus buttons. Finally he pressed Menu to revert to the original screen, then D to store. Now that the receiver was set up it worked normally. With the similar Model 25ML8300, fitted with the FL1.7 chassis, you follow the same routine but set Option 2 to 39.

"Very clever, Paul" I said, "I'd better go and make the tea."

When Mr Weedler came back for his set he didn't like the size of his bill. Nor the long and lonely walk to his car with the set.

The Goodmans 1405R

When I returned with the tea Paul was tuning a Goodmans 1405R TV set. He carried out a search and locked to a station, producing a good picture, but after a few seconds the tuning drifted off.

Paul decided to replace the 33V tuning supply stabiliser IC104, which can be the cause of this symptom. But the fault persisted. He went on to check various other components in the tuning voltage circuitry. After spending an hour he'd found nothing amiss.

"Can't understand it" he said then, a minute or so later, added "I seem to recall reading somewhere about this. The setting of the tuneable AFC tank coil connected to pin 47 of the TA8690AN jungle chip IC201 is supposed to be very critical."

When he checked the coil he found that the core was waxed in, though it looked as if someone had disturbed the wax slightly. He went through the routine of retuning the set while rocking the core to and fro very slightly. After a while he found a position where the tuning remained stable. A lengthy soak test confirmed that the set was now satisfactory.

Mrs Phillips' VCR

Then Mrs Phillips arrived with a Sanyo VCR, Model VHR789E. She's a decent type who runs, and lives over, a little general store. Amongst other things the store features a rack of delicate china ornaments.

"Can you mend this for me, boys" she asked, "it's gone dead. And when you've

done that could you nip back and take a look at my telly? I can't manage the two together."

I opened up the VCR and carried out some checks in the power supply. There was HT from the mains bridge rectifier but no chopper circuit start-up voltage. My eyes settled on a pair of 560kΩ resistors, R5002/3. Both proved to be open-circuit. The machine worked normally once replacements had been fitted.

When I'd reassembled the VCR Paul offered to take it back to Mrs Phillips and have a look at her TV set. He had the set with him when he returned, and was grinning.

"What's the joke?" I asked.

"No joke" he replied, "only when I got to Mrs Phillips she was having trouble with one of her customers. One of ours too, Mr Weedler. She has a prominent notice on her rack of china ornaments. It reads 'You touch, you break, you pay'."

"Well?" I asked.

"Well, old Weedler had touched all right. And broken one. He didn't want to pay. Boy, did she straighten him out."

. . . and her TV set

Mrs Phillips' TV set was a JVC C14ET1EK, the one fitted with an Onwa chassis. Apparently it worked well enough for about a quarter of an hour, then the colour would drop out. She reckoned that as the evening wore on after that the picture changed to a sepia tone. We connected it up, threw a blanket over it, and watched. It did exactly as she said.

Paul made for the AN5601K colour decoder/timebase generator chip IC301. As we didn't have one in stock, he checked a few suspicious-looking peripheral components. This didn't bring to light anything obviously wrong. The next step was to carry out some voltage checks.

Pin 12, which is connected to the chroma signal processing section of the chip, should be at about 5V. The feed to this pin comes from the line output stage derived 12V line via a 2·2MΩ resistor, R337. Paul obtained a voltage reading of just 1·4V at pin 12. When he checked the value of R337 he found that it had risen to about 4MΩ. A replacement cured the trouble, and Mrs Phillips was delighted.

Today's rubbish TV

In a recent questionnaire fifty per cent of viewers said that TV programmes have worsened of late. I'll say they have. What surprises me is that so many of us continue to allow TV sets to take up house room. Never before has so much rubbish gone out on so many television channels. There's barely enough decent TV programming to justify a single channel.

Take comedy, if you can find any. There have been lots of fine programmes in the past, such as Steptoe and Son, Are you Being Served?, Hancock's Half Hour, Fawlty Towers, The Two Ronnies and Dad's Army. There's nothing to compare with them today. What comedians do we have to replace the likes of Les Dawson, Max Wall and Bernard Manning? And where are there programmes in the same class as the Forsythe Saga, Upstairs Downstairs and All Creatures Great and Small? Gone, that's where. It seems that we shall never see their like again, except as occasional repeats.

The trouble doesn't stop with today's terrible so-called 'stars'. There are also the gabbling and insulting programme presentations. And the BBC has succumbed to copying the advertisements in the commercial channels, punctuating the spaces between its programmes with ever more childish 'advertisements' of its own.

A final thought. Where do the TV broadcasters find their armies of brash, shrill young female announcers? On second thoughts, don't tell me. ■

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2SC3973B	£1.00	2SK1464	£1.00	BU222	£1.00	BUX39	£1.00	BYX55/600	10p	ALP-15	£3.50
2SC4313	£5.00	2SC4891		BU326	£1.00	BUX84	50p	BYX71/60	20p	IK7ST 6931 B1	£3.00
2SC4589		1500V/15A	£2.00	BU407	40p	BUX84AF	50p	BYZ106	10p	IN5401	3p
10A/1500V	£2.00	AN5521	£1.00	BU508A	90p	BUY49	20p	BZW-C110	5p	IR106A	10p
2SC7350	15p	AN5551	£1.00	BU508AF	£1.00	BY187	5p	BZW83-C20	3p	L298N	£4.00
2SD200	£1.00	AN5831	£2.00	BU508D	80p	BY208-800	8p	CA3123Q	50p	LA7830	£1.00
2SD401	40p	BC550C	20p	BU508DF	£1.00	BY228	15p	CD4555BE	20p	LA7831	£1.00
2SD716	£1.00	BDV648	50p	BU705	£1.00	BY229	6p	CLE871A	£5.00	M708 ABI	£1.50
2SD787	30p	BDV658	50p	BU801	50p	BY255	5p	FE3B	4p	M708 LBI	£1.50
2SD789	30p	BF869S	20p	BU806A	£1.00	BY299-200	15p	HA1140	£1.00	M37204ECSP	£1.00
2SD820	£1.00	BF870	20p	BU807	50p	BY299-800	30p	HA1185	£1.00	M58658P	£1.00
2SD868	75p	BPW41	15p	BU808DFI	£1.00	BYT71-800	15p	HA1196	50p	MN650	£1.00
2SD880	30p	BT Phone Batterys	£1	BU824	50p	BYV19-30	15p	HA11485ANT	£1.50	S13522V	£1.00
2SD1264	50p	BU105/04	80p	BU826	£1.00	BYV28-200	15p	HA11804INT	£1.50	SAA1061	£3.00
2SD1266	£1.00	BU108	£1.00	BUK444/800	£2.00	BYV95B	10p	HA51338SP1	£2.00	SAA3018	£1.00
2SD1398	£1.00	BU124	50p	BUK445/600	£2.00	BYV95C	12p	HA51338SP3	£2.00	SAA5010	£2.00
2SD1415	£1.00	BU126	80p	BUK454/600	£1.00	BYV96D	10p	HCF4520	50p	SAA5231	
2SD1427	£1.00	BU180A	65p	BUT11	50p	BYW20-08.9	£1.00	HCF4520BE	50p	(TEXT)	£2.00

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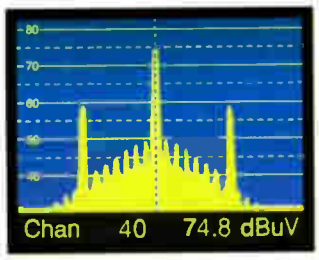

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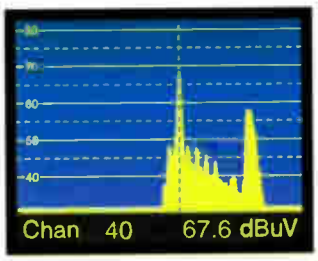

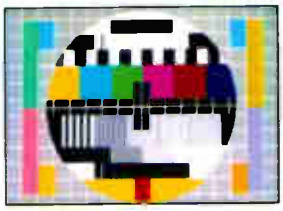

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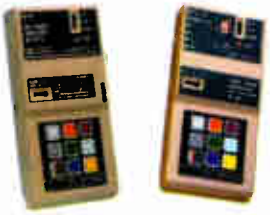

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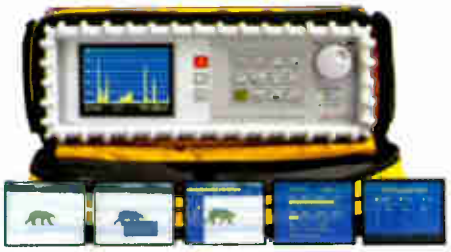

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