Servicing the Panasonic Euro-1 chassis
Testing polarisers

TEST REPORTS
The Internet STB
Video alignment test tape
CCTV monitor conversion
FireWire developments

PC-based Portable Database for field servicing

Fault Reports TVs, VCRs, PC Monitors and Satellite
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The Electronics Slowdown

T o an old-timer it still seems strange that the electronics industry should be in a state of near slump, though the semiconductor sector has been suffering from falling prices for two and a half years now. It's almost incredible in this respect that until recently semiconductor manufacturers were continuing to pour vast sums of money into new fabrication plants. Korean companies, the main ones contributing to the build up of excessive manufacturing capacity, were of course encouraged by their government to adopt this policy. Didn't it occur to anyone that every large manufacturer can't go on expanding indefinitely, that there is not room for ever more newcomers, and that there must be a point at which production capacity exceeds likely demand?

The problem here is that Far Eastern businessmen have always tended to think in terms of market share rather than profitability, assuming that the former would inevitably lead to the latter. If you are lucky enough to have government backing, there's nothing to lose from adopting this policy. In the same way that MITI in Japan encouraged Japanese consumer electronics firms to achieve world dominance, the Korean government has been playing a dubious role in encouraging the country's semiconductor manufacturers.

There was a time when the electronics industry was relatively immune to basic business cycles. Shipbuilding, steelmaking and other 'rust-bucket' industries might suffer severe declines, but the ever-developing electronics technology and the need to adopt electronic solutions in all spheres of business ensured that the electronics industry thrived regardless. That was the situation until about a decade ago. Since then the electronics industry has become such a large part of the global business scene that it's no longer decoupled from the general economic situation. The electronics industry supplies everyone: so a general decline affects electronics as well.

The present economic turmoil, which started in Thailand in June 1997 because the banking system had become over-extended, has developed to such an extent that some commentators are talking about a world slump. With gross domestic product contracting 15 per cent in Indonesia, eight per cent in Thailand and seven per cent in Korea this year (Goldman Sachs' forecasts) the situation is pretty grave. This background, taken in conjunction with the fact that electronics markets had already to some extent become saturated, suggests that tough times in our industry will continue for some time to come.

Even if there was plenty of money to spare and a general 'feel-good' situation, there are just so many PCs that people and businesses need. The PC market is a major part of the world's electronics industry: when it takes a breather, the semiconductor industry goes into significant decline. To some extent the PC market has been built up on the basis of continual replacement/renewal as performance standards have improved. But here again there are limits, set by the physics of semiconductor materials, also the cost increase as firms push manufacturing processes to the limit. It has to be asked whether we really need ever-faster processors?

The consumer sector could be the one that gets the electronics industry out of its present decline then moving forward again. This assumes that, in the same way that businesses have been prepared to continue to invest in improved PCs and servers, the public will take to digital equipment - TVs, DVD players, camcorders and other products.

It seems that the Americans, always willing to invest in the latest technology, are already starting to buy HDTV sets - before the system specification has been finalised! HDTV sets are being sold with the digital decoder to follow - at extra cost. It would be nice to have customers like that . . .

Elsewhere, it's likely that the market for new consumer electronics technology will be slow to take off, particularly with consumer confusion over different systems in Europe, the general reluctance at present of Japanese consumers to spend (Matsushita has just announced a 58 per cent decline in after-tax profits in the first quarter of its financial year), and the economic woes throughout Asia and the Pacific rim - not to mention Russia.

One area that does seem to continue to thrive is IT software. According to research carried out by CSSA, the association for software and computing services organisations, nearly 300,000 new jobs have been created in the UK's computer services industry over the last five years. This implies that over ten per cent of the new jobs generated in the UK between 1993 and 1998 were in this sector. The figures include jobs in corporate IT departments. Here, the year 2000 compliance problem and work on preparation for entry into the European economic and monetary union have increased employment. But the research suggests that independent software and computer services firms have grown even faster. So, if you fancy a change from that smelly old soldering iron, the IT field beckons.
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Test Report

At under £30 this VCR test tape from SEME is a worthwhile buy for any service organisation.

Video Test Tape

Video alignment test tapes have traditionally been very expensive. So the price tag with this one, £27.98, came as a surprise. The MB-SWISS 4, made by Nedis BV of the Netherlands, is a PAL-VHS standard-play test tape that has a wide range of features for electrical and mechanical checks and alignment. It’s recorded on high-quality Panasonic tape and has a running time of thirty minutes.

Features
The test image produced by the tape, see Fig. 1, has many of the features provided by a conventional test-card pattern – grey-scale step-wedges, colour bars, frequency gratings and white-black-white transitions. In addition there are several ‘special’ features: a head-switch point that’s well inside the main display, with associated pattern features; and some head-test blocks to give an indication of wear, balance, resonance and video head damping.

The first minute of the tape is recorded with a reversed PAL chroma field sequence, to check for an incorrectly fitted (180° out) head drum. Thereafter the pattern and sound remain steady. The audio signal is a 1kHz sinewave that’s recorded on both hi-fi/helical and mono/longitudinal tracks.

On Test
My first test of this tape was for tracking-centre, in comparison with the industry-standard JVC MH-2. It was spot-on, coming in at exactly the same tracking setting. After this I used the new tape for all my workshop needs for many weeks.

The most common uses of a test tape are for checking guide alignment and for setting the X position of the audio/control/erase head. No problems here. For azimuth setting of the audio head the 1kHz tone was adequate – not as good as the 5 or 6kHz tone that some other tapes provide.

The main features of this alignment tape spring from the fact that its field sync pulse is recorded about 13msec before the head switching point, rather than 416μsec. The only effect of this on the picture, which synchronises all right, is a ‘glass-bar’ or tear effect about a third of the way down the picture, because of the head switchover. You adjust the head-switching point to coincide with a horizontal line in the pattern, see Fig. 2. This corresponds with the exact 6-SH point required. An oscilloscope check proved that it was right.

The second virtue of the offset head-switching point is that you can easily see the skew error (corresponding with longitudinal tape tension) at the start and end of a head scan – above and below the switching pulse. The idea is to get the vertical black bar at the centre of the picture (see Figs. 1 and 2) as close as possible to the centre arrow above, by adjusting the back tension. Tolerance limits are indicated by the outer markers, one of which can be seen in Fig. 2. It worked well for me,

Fig. 1: The playback test pattern produced by the tape. The head-switching point is the ‘kink’ about a third of the way down the screen. The bottom third of the picture consists of standard (WYCGMRBB) colour bars. The VCR that was used to take this photograph had somewhat worn video heads, indicated by the reproduction of the blocks below the centre line of the picture.
compared with a torque-gauge cassette. The latter and the tentelometer will now lie undisturbed in their drawer – and I won’t have to keep replacing the damaged tape in the torque-checking cassette!

The three head-test boxes just below the centre line of the test pattern, see Fig. 1, contain specially-recorded signals to check for dropout compensation, head wear and video FM preamplifier gain, bandwidth and tuning/resonance. I found that it was easy, with some practice and experience, to judge the condition and state of wear of a video head without the need to take off the machine’s cover or use an oscilloscope.

Indeed saving on the need to use expensive and specialised test equipment is what this tape is all about. Traditional alignment tapes contain frequency sweeps with markers for adjustment of the peaking and damping of tuned head amplifiers during playback. But these adjustments disappeared from domestic VCRs years ago. Even so, the instructions that come with the tape explain how, if necessary, to set them up.

The frequency gratings/multiburst at the top, left-hand side of the pattern puzzled me somewhat: virtually all the machines I tried were able to reproduce the 3MHz grating, but none of them managed the 3.2MHz grating. Yet with a 52sec picture-scan period 3MHz equates with 312 lines, which is way above the oft-quoted 260-line ceiling for standard-VHS machines.

Verdict
This is an excellent product: a terrific bargain that I can recommend to any technician. I would like to see further versions, in the VHS-C and Video-8/Hi-8 formats.
BSkyB's Digital Offer

BSkyB has announced further plans for its digital satellite TV service. The company is offering a subsidised set-top box to new subscribers for £199, and to those who already subscribe for £159. To buy the subsidised set-top box, customers have to take out a Sky Digital package or register with British Interactive Broadcasting (BIB). The latter involves agreeing to have the set-top box connected to an existing phone line for at least one year.

The subsidy is provided by BIB, which is a joint venture whose members are BSkyB, British Telecom, Matsushita (Panasonic) and the Midland Bank (part of HSBC Holdings). According to an EC ruling, the subsidy must be available to those who wish to watch only free-to-air transmissions as well as those who subscribe to pay-TV packages. This ruling forms part of the European Commission's approval of BIB's plans.

In addition a free dish, with free installation, is part of the offer, also if required a telephone extension cable (but not an extra line) where the TV set is more than two meters from a phone point.

BSkyB is offering various subscription packages, starting at £6.99 a month for six channels. For £29.99 a month you get the complete 140-channel service. A choice of four different 15-channel packages is offered at £8.99 a month. There's a "family" selection of 40 channels for £11.99 a month.

BSkyB's digital TV service will start on October 1st.

The new oval mesh dishes for the digital service are 40cm high and 53cm wide. They are being made in the UK by Channelmaster and have a rounded edge and durable dark-grey finish. Other companies are developing similar designs which are expected to be approved and available shortly. The LNB, whose characteristics match the dish, is being produced by Cambridge initially. It has high gain and a noise figure of typically 0.7dB.

BSkyB has dropped its legal action against ONdigital over set-top box compatibility.

Digital TV Equipment

BSkyB has reached agreement with Amstrad, Grundig, LG, Panasonic, Samsung, Sharp and Toshiba on the development of TV sets that incorporate Sky's set-top box technology (IDTVs). Discussions with other manufacturers, including Philips and Sony, are at an advanced stage. Pace has agreed to work with a number of setmakers on the development of plug-in pay-TV modules for IDTVs, to support the Sky Digital services.

IDTVs for the Sky services should be in production by the end of the year. The first models to be introduced are expected to cost around £1,000. This could drop to around £500 by the middle of 1999.

Pace is working with LG Electronics and Toshiba on the development of IDTVs for both the Sky Digital and the ONdigital services.

Pace has also signed a deal with Cable and Wireless Communications (CWC) to supply 100,000 set-top boxes for the latter's digital cable TV networks. The boxes will use the US-developed multimedia cable network system (MCNS) rather than the expected European DAVIC standard. CWC is expected to run trial services at the end of the year, with commercial services starting next year.

CWC is to call its interactive system, which will offer home shopping, banking, ticket booking and other services, TV Mall. The system is based on internet technology. CWC is working with Barclays Bank, British Airways, Littlewoods Home Shopping/Granada Media Group, Associated New Media and ITN on the project.

Motorola has developed what is claimed to be the world's first single-chip front-end solution for terrestrial digital TV receivers. The MC92314DH can demodulate and decode the DVB-T 2k-carrier signals to be used by BDB. It's output is an MPEG-2 data stream for further processing. Volume production is expected to start in December, with the chips selling for below £15 in volume quantities.

A summary of BREMA members' forecasts for digital TV and set-top boxes suggests sales of 12,000 widescreen IDTVs, 4,000 4:3 aspect ratio IDTVs, 92,000 terrestrial STBs and 230,000 satellite STBs during the current year.
**Video News**

Sony has launched a camcorder that stores the video and sound in a cartridge rather than a video cassette. Model CCD-CR1E is being marketed under the name Ruvi. It’s as small as a 35mm film compact camera, weighing 370g when loaded with batteries and a cartridge.

The Ruvi is based on Hi-8 technology. The cartridges contain video heads and metal-powder tape. Horizontal resolution is claimed to be about 350 lines. A cartridge can store up to half an hour of moving video or 350 still images and can apparently be used several hundred times before the tape shows any signs of wear. Sony plans to supply replacement cartridges. The Ruvi should sell at about £550: no cartridge price has been suggested.

The Ruvi has a built-in LCD screen. Fixed focusing enables you to avoid the problem of focus change in a busy area of view as objects cross the field of vision.

To take full advantage of its digital capabilities, the VL-PD1H complies with the IEEE1394 (FireWire) digital serial data interconnection standard. For additional flexibility when recording, there are five-mode scene adjustments (including sepia), snap-still-strobe functions, six shutter speeds and a fade effect.

Canon’s new digital camcorder, Model DM-MV10, has a flip-out screen, optical and digital zoom and two audio modes – 48kHz, 16-bit two channel or 32kHz, 12-bit four channel. It’s expected to sell at about £1,400.

JVC has launched its first S-VHS VCR at under £350 in the UK. Model HR-S7500’s specification includes Nicam and a ‘Spatializer’ system to provide home cinema sound without the need for additional speakers, NTSC playback, and BEST (Biconditional Equalised Signal Tracking) for optimum picture quality with the type of tape in use.

Panasonic has launched a portable colour TV set, the Genus Model TX-G10, that’s been designed for use in all European countries. Features include an AC/DC converter for 12V or 24V battery or mains power use, PAL/SECAM/NTSC reception in several versions, and an S-video terminal. An owner-identification system enables you to program your name, address and post code into the set’s memory. The Genus should sell at about £280.

Sony plans to supply replacement cartridges. The Ruvi should sell at about £550: no cartridge price has been suggested.

Sony has also developed the Digital Mavicap, which can convert the Ruvi’s still images into JPEG files for storing on a floppy disc or other use. This will probably sell at around £125.

Sharp has introduced a digital camcorder, Model VL-PD1H ViewCam Slim, which for the first time brings touch-screen technology to camcorder use. Just a light tap on the screen enables you to control zooming, fix the point of focus or highlight selected areas of the image (backlight compensation). The VL-PD1H has a colour viewfinder and a 4in. flip-out touch-sensitive LCD screen. Fixed focusing enables you to avoid the problem of focus change in a busy area of view as objects cross the field of vision.

To take full advantage of its digital capabilities, the VL-PD1H complies with the IEEE1394 (FireWire) digital serial data interconnection standard. For additional flexibility when recording, there are five-mode scene adjustments (including sepia), snap-still-strobe functions, six shutter speeds and a fade effect.

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The annual meeting of the Domestic Appliance Service Association (DASA), plus open forum and social event, is to be held at Huddersfield on October 24th. Members, associate members, guests and anyone with an interest in the electrical and electronic service industry are welcome to attend. For further details check with Chris Hayter on 01920 872 498, e-mail dasa@globalnet.co.uk

Thomson Multimedia plans to enter into partnerships with Alcatel of France, NEC of Japan and Microsoft and DirectTV of the USA. Each of these companies is being offered a 7.5 per cent stake in Thomson Multimedia.

LSI Logic and DSP Center, a Beijing-based consumer electronics design house, have entered into an agreement to provide engineering and technical support to original equipment manufacturers (OEMs) of DVD players for the consumer market. The agreement will enable OEMs to produce clearly-differentiated players quickly and cost-effectively for the Chinese consumer market and for export.

**News Briefs**

Eutelsat has signed a contract with Matra Marconi Space for a new satellite to be called RESSAT. It will guarantee service continuity in the event of a launch failure of one of the W series of satellites, the first of which is due to go into orbit this month (October). It will be equipped with 28 transponders, based on the Hot Bird specification.

Schaffner has redesigned and upgraded its web site to make the company’s EMC (electromagnetic compatibility) expertise available to engineers and management all over the world. The site (www.shaffner.com) provides up-to-date listings of the latest EMC standards, links to standards-setting bodies, news and comment on EMC issues and product information.

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**Plasma Panels**

Fujitsu of Japan and Philips are to collaborate on the development and manufacture of plasma display panels (PDPs) for TV receiver use. Fujitsu is the leading manufacturer in this field – last year it produced some 80 per cent of the panels sold globally. The aim is to develop, by the end of the year, a 42in. PDP for sale in the USA, Europe and Japan at a price of about $6,897.

Thomson Multimedia and NEC of Japan are also collaborating on the development of PDPs.
Geoff Lewis, B.A., M.Sc., describes the latest FireWire control chip from Texas Instruments, fault-finding and the Universal Serial Bus – and takes a look at the future FireWire, the PC and TV

The basic FireWire (IEEE 1394) fast, wideband serial data connection system was described in a previous article (July, page 632). Perhaps its most important feature is that it can move packetized data around a system at very high speed. The significance of this is that with the MPEG compression system used for digital TV the data is in packetised form. Just to recap, the MPEG data is arranged in packets so that data from different channels/programmes can be combined as a single data stream then separated and used at the receiving end. Each MPEG-2 packet consists of a sync word followed by 187 bytes of data, including the programme identification, and finally a 16-byte checksum for error correction purposes.

Data Rates
It has been demonstrated that for studio and production use a bit rate of 50Mbits/sec is suitable for MPEG video data with a resolution of ten bits per sample. A bit rate of 6Mbits/sec can provide good definition with a broadcast TV receiver. With an MPEG-2 data rate of 2Mbits/sec you get VHS-quality images.

The new North American high-definition (HDTV) format proposed by the Advanced Television System Committee (ASTC) would, for distribution purposes, use a coded data rate of 120Mbits/sec, for which it is proposed to use the 155Mbits/sec Asynchronous Transfer Mode (ATM) telecommunications standard. The final transmission rate enables HD signals to be fitted within the current 6MHz NTSC channel bandwidth.

These data rates are all well within the capabilities of FireWire.

On the domestic side it’s expected that users will want to be able to edit digital video and audio signals recorded on tape.

Hence the growing interest in the FireWire system, with its ability to handle MPEG-2 video and audio signals.

A New Link Controller
The latest FireWire development from Texas Instruments is the highly-integrated link controller chip type TSB12L.V41, or MPEG-2 Lynx, which is encapsulated in a 100-pin plastic quad flat pack. It acts as a bus interface controller that transmits and receives FireWire-formatted serial data packets via the associated physical link chip. It detects lost cycle-start packets, generates and tests the 32-bit cyclic redundancy check (CRC) data, and can act as a cycle master (CM), isochronous (real-time) resource manager (IRM) and bus manager (BM).

The Lynx IC accepts decoded MPEG-2 data, inserts a time stamp, and reformats the data packets. Its first-in-first-out (FIFO) memory is large enough to provide bidirectional transmission and reception of either MPEG-2 or digital satellite system (DSS) data. In fact the Lynx acts as a system core, handling the data protocols that control interoperability: it sits between the system application software and the hardware.

The MPEG-2 Lynx can handle audio, video and data applications running at up to 200Mbits/sec. It can be used for set-top box (STB), multimedia, tape and disc drive applications that work with MPEG-2 formatted isochronous data. Because of the wide range of data inputs it can handle – MPEG-2, DSS, isochronous or asynchronous, in serial or byte formats – these are referred to generically as bulky data (BD).
Fig. 1: Simplified block diagram of the Texas Instruments MPEG-2 Lynx FireWire controller chip.

**Operation**

Fig. 1 shows a simplified block diagram of the chip. At the top left the BDIF (bulky data interface) connects the input/output data to the chip's FIFO memory. Connection is controlled by the logic conditions at four status lines: these set the link for MPEG-2 or DSS data reception or transmission.

Partitioning within the FIFO creates six queues, which buffer the data stream in four quadlet groups. There are separate memory buffers for MPEG-2/DSS transmit and receive data, isochronous transmit/receive data, and asynchronous transmit/receive data.

The local time register acts as the system cycle timer (CT). It time stamps data packets and controls the transmission/reception of what are called common isochronous packets (CIPs). An ageing function invalidates packets that are out-of-date.

The microcontroller interface (bottom left) has provision for 8- and 16-bit data: it enables the Lynx chip to be connected to most common microcontroller and microprocessor chips, such as the Texas TMS320AV700, the Motorola 68XXX and Intel 80XX series. A couple of external control lines (MCSEL0 and MCSEL1, see Fig. 2) provide device selection while logic within the chip automatically converts between data in big-endian or little-endian formats (most significant byte first or last respectively) to suit the actual processor chip – with the Motorola processors' 16-bit data bus only the lower-end byte carries actual data, the upper end byte being padded out with zeros.

Three more FIFO memories are incorporated for system control. These are shown as ACX, ACR and BWR. The data held in ACX and ACR is used to control asynchronous transmission and reception respectively. The BWR FIFO is used for reception of asynchronous transmission write/request packets – basically low-speed control data.

The data held in the configuration registers controls the various modes of operation. Access to this is via the external microcontroller chip.

The physical layer interface is connected to the physical link chip, which provides the actual connection to the FireWire bus as described in the previous article (July). This includes access to the bus, sending and receiving data and control packets and receiving acknowledgement packets.

**External Connections**

Fig. 2 shows a typical Lynx chip/microcontroller chip...
interconnection arrangement. At the present stage of development the TSB12LV41 can be used with TMS320AV700, 680X0 and 8051 microcontrollers. The logic states at the two lines MCSEL0 and MCSEL1 establish which device is actually present. Once this has been determined at power-up, the microcontroller input/output lines are all mapped to correspond with the external device’s pin functions. When used with the Texas microcontroller, this interface is synchronised by the Lynx block clock (Bclk). With the Motorola and Intel microcontrollers the interface is synchronised to the SCclk provided by the physical link chip.

The CS1 and R/W lines perform conventional functions, as do the address and data buses. The BDIR/W line controls the direction of the MPEG-2/DSS data transfers. Bulky data input or output is via the eight parallel BDI (0–7) or BDO (0–7) lines, with each mode driven by the appropriate clock signal. Two groups of three lines, BDIF (0–2) and BDIF (0–2), perform the control functions listed in Table 1.

Fig. 3 shows how time-stamped (TS) asynchronous data is passed between the Lynx chip and the set-top box control circuitry, together with error-control checks and timing signals.

Fault-finding
Much basic information about the action of this complex chip can be obtained using a DC voltmeter and an oscilloscope. Of the hundred pins, eight (10, 23, 44, 48, 60, 72, 87 and 97) are connected to ground, four (15, 41, 65 and 90) are connected to the +5V supply and eight (5, 17, 32, 43, 57, 67, 81 and 92) to the +3.3V supply.

Clock signals appear at pins 66 (bus clock), 16 (bulky data output clock), 91 (bulky data input clock), 42 (system clock) and 14 (test clock). Pins 13 and 18 are provided for test data input and output data signals respectively. Pins 45, 46, 47 and 98, 99, 100 are for the BDIF and BDOF (0-2) indicators. Bulky data uses pins 1-9 and 19-22/24-27 for input and output respectively.

Apart from sixteen address bus and eight data bus lines, most of the remaining pins are used for status and system control.

The Universal Serial Bus
PC connectivity has been further enhanced by the development of the Universal Serial Bus (USB) which provides communication at data rates ranging from 1.5MBits/sec to 1.5Mbytes/sec via a four-wire, low-capacitance cable with a maximum length of five metres. The cable contains two pairs of wires, one for power and one for signalling purposes, and is terminated by standard connectors. As with the FireWire system, USB interconnected devices are all ‘hot-pluggable’.

The USB enables devices to be added in a daisy-chain fashion to provide an addressable local area network (LAN) of 127 different interconnected units, operating in a Windows-compatible fashion (the all-zero address is excluded). A USB interface can contain multiple outputs (often four), connections to these forming a mini-star network. The USB enables any device ranging from a mouse to a monitor, including serial printers, fax machines and telephones, to be connected to a PC. Since each of the external devices must contain its own USB interface, there is no longer a need to add interface cards to the PC.

Unlike the FireWire link, USB uses differential non-return-to-zero inverted (NRZI) coding. By the use of differential coding, with each line at opposite-polarity voltage, the signal amplitude is effectively doubled. This gives the system an improved signal-to-noise ratio of about 6dB in comparison with a single-ended signalling system. The coding is also more robust under noisy conditions than some other signalling codes.

The basic power supply has to provide 5V DC, with the signalling interface driven from 3.3V. The twisted-pair signal cable has a nominal line impedance of 90Ω.

Data Transfer Types
The four basic types of signal data transfer are as follows:

1. Isochronous, for the transfer of real-time data such as voice. To avoid reproduction errors the data stream has to be delivered at a constant rate.

2. Bulk format, used for devices that need to move large amounts of data but not necessarily in real time, the output from a scanner or printer for example. The data is transferred in bursts as and when sufficient signal bandwidth is available.

3. Interrupt signals are used for requests for service and the delivery of data from slow devices such as a mouse or printer.

4. Control signals are used for bus management, initialisation and set-up. Again this involves the movement of only small amounts of data.

Packetized Format
Communication between a host PC and a USB interface can be either unidirectional or bidirectional, the data stream being organised into packets of 1msce frames as outlined in Fig. 4. Each packet is preceded by an identity code (PID). Except for the handshake byte, which carries its own error correction, each ends with a cyclic redundancy check (CRC) of appropriate length.
The token packet can be issued only by the host PC. It consists of a PID byte, a seven-bit address group (27 = 128), a four-bit end-of-packet (ENDP) nibble and five bits of CRC. The PID byte specifies either in, out or setup. In PIDs identify a data transfer from the addressed terminal to the host: the out and set-up groups operate in the reverse direction.

The data packets can carry an integer number of bytes from 0 to 1,023. The data in each byte leaves with the least significant bit (LSB) first.

The handshake PID is used to indicate the status of a data transfer, ready or received. The start-of-frame (SOF) packet is issued by the host PC at 1ms intervals. The eleven bits allow up to 2,048 frames to be enumerated.

The USB Interface

Texas Instruments has developed two specialised chips, which are bus-powered, to carry out the majority of the interface operations. These are the TUSB2040 and TUSB2070, which can be used with either four or seven down-stream ports from a single up-stream port.

The general circuit arrangement is shown in Fig. 5, which shows how the chips can be combined with power management and electrostatic discharge (ESD) protection devices to provide a mini-star distribution hub.

Power is supplied at 5V via the up-stream port and is converted to 3.3V by the TPS7133 low drop-out voltage regulator for use by the signalling-control circuits. This IC provides up to 100mA at each output port and generates a power-good (PG) signal that produces the reset action at power-up.

The set of SN75240 chips provide ESD protection while hot-plugging. They act as transient suppressors to reduce inrush current and voltage spikes that might damage the interface and also pass through the hub and damage any terminal devices connected to the output ports.

The TPS2015 chip provides multi-port power management. It checks the supply voltage and for an excess current situation, and provides short-circuit protection for the down-stream ports.

The USB standard has provision for the connection of battery- or self-powered terminal devices. Excess-current protection for these is often provided by positive-temperature coefficient (PTC) resettable fuses, for example those in the Raychem polyswitch series. Any excess current through one of these creates a sudden rise in temperature and a corresponding large resistance increase, lowering the current. When the overload condition has passed the thermal fuse reverts to its initial low-resistance value.

What's Ahead?
The possibility of connecting to the FireWire system optical-fibre links with data rates as high as 3.2Gbits/sec means that, with the addition of USB to handle computer communications at up to 24Mbits/sec, there's the prospect of full convergence between the PC and other equipment. It has been suggested that the PC could, within the next five years, be a sealed box with just two ports, IEEE 1394 (FireWire) and USB. The end of the need for plug-in cards with their attendant driver software problems would be a boon to many home-based computer users.

References and Acknowledgement
TSB12LV41 (MPEG-2 Lynx) Link Layer Controller, Product Preview Information, Texas Instruments Inc.
Data Transmission Design Seminar 1997, Texas Instruments Inc.

I would like to acknowledge the help provided by Colin Davies of Texas Instruments Inc. in the preparation of this article.
There were no deck functions and the red power-on LED went out a couple of seconds after switch-on. As with normal operation, the selected channel’s green indicator LED remained on. There was the usual cracked print around the legs of Q02 in the power supply, but repair made no difference. Checks on the STK5332 regulator then showed that the switched output at pin 5 was at only 6V instead of 13V. A new regulator restored normal operation.

Sony KV1421
The complaint was no colour after about half an hour. I found that there was a dry-joint at the 4.43MHz crystal X352 in the colour decoder circuit.

Ferguson TX100 Chassis
The customer said that this set was dead. In fact the power supply was working but there was no line drive. It didn’t take long to discover that the BC372 Darlington line driver transistor TR8 was short-circuit and its 15Ω feed resistor R143 open-circuit (note that the value of R143 varies with the type of tube fitted). I replaced these two components and, with great confidence, switched on. But there was still no line output stage operation, only the smell of R143 cooking.

I switched off and allowed the transistor and resistor to cool down. Then I disconnected the driver transformer’s secondary winding and switched on again. This time there was a healthy drive waveform at the collector of TR8 and no overheating. So I concluded that the BU508A line output transistor was overloading the stage. When it was checked with a meter it claimed to be innocent. But I’ve been caught out before, so I checked it again with the scope component tester. Hey presto, the base-emitter waveform was that of a zener diode. In went a new BU508A, and confidence returned. My only doubt was whether the condition of the tube would have warranted the repair. Fortunately the picture was good.

Mitsubishi CT25ASSTX (Euro 14SF Chassis)
Sound was OK but the picture was blanked out. When the setting of the first anode preset on the LOPT was advanced I saw that there was field collapse. It didn’t take long to establish that there was no LOPT-derived 27V supply at the cathode of D553. In fact the reading from this point to chassis was just 3Ω and, not surprisingly, circuit protector Z551 (315mA) had failed.

When the small, vertically-mounted PCB that holds the TEA2031A EW correction chip IC5E1 and a few other components was removed the short-circuit had gone. So far there hadn’t been any real surprises. I replaced IC5E1, refitted the small PCB and switched on. Up came the sound followed by a picture – with severe EW distortion. Adjustment of the three presets had no effect, and the new IC was very hot. I unplugged its PCB again and looked closely under the main board. There was a beauty of a dry-joint at one leg of the line scan coupling capacitor CS57. I resoldered this, confident that I’d found the cause of the fault. In fact I got a bit carried away and resoldered most of the joints in the line output stage and the surrounding areas. Feeling perhaps too confident, I refitted the PCB and tried again. Once more there was sound and a picture, with EW distortion and a cooking IC.

I checked the EW modulator diodes, then every component on the EW board, but everything was OK. The only likely suspects that remained were the two coils L554/5. They didn’t show any signs of distress, but I decided to order replacements. At least I’d have a couple of days’ break from it!

A few days later the coils arrived. As I placed the set on the bench my mind was already wondering about other possibilities. How’s that for confidence? Anyway once the coils had been fitted I obtained an almost perfect raster. A slight tweak of the three presets, which I’d disturbed, produced really excellent geometry.

Goodmans C1401R
The chap who brought this set in said it produced a lousy picture on all channels and had to be tuned in each time he switched on. In fact the tuner had very low gain: a picture could just be seen amongst the snow. In addition, when the tuner was gently tapped the picture broke up, a symptom you get with those Sony sets which have a VIF module that’s prone to dry-joints. The customer’s comment about the need for retuning was simply because the gain was so low he thought the set wasn’t tuned to anything.

While booking the job in I was reminded by the customer how cheap telelys are to buy. So I wasn’t to get “carried away” while repairing the set. From this it was obvious that the job would bring in very little money. I decided that there was no point in buying a tuner, which would leave no money for my efforts. It would have to be a labour-only job if it was to show a small profit. If I couldn’t fix the tuner, or the cause of the trouble was something else, I would have to suggest that the set was beyond economic repair.
When I removed and opened up the tuner I saw that the solder joints around the edge of the PCB - they include the metal case for earthing - looked crusty. So I resoldered them, also a few suspicious joints within the tuner’s circuitry. There were first-class pictures on all channels when the tuner had been refitted, and the display remained rock-steady when the tuner was tapped.

GoldStar RQ121
This mid-mount machine was dead with no power-on LED illumination or display. The customer said that “the bloke down the road” wanted £90 to fix it - “if you can do it cheaper the job’s yours”. The figure of £89.99 came to mind, but I said nothing. Instead, I agreed to have a look.

I didn’t have the circuit diagram but, when I removed the top cover, I was delighted to see that the power supply is readily accessible. Within seconds I had removed the three securing screws and had the power supply lying alongside the machine, still linked to the main board via its 12-pin connector PL101. To provide further help, the voltages are printed alongside the connector.
The 12V and 5V supplies were missing at the relevant pins. So I followed the tracks back and came to a short-circuit 13V zener diode, ZD102. There was nothing but a snowy raster. R334 (4.70) in the circuit 13V zener diode, ZD102. Once this had been replaced the 12V supply was present. The 5V supply is produced by a three-pin 7805 regulator, IC101. It had 13V at its input pin but no output. Once a replacement had been fitted the machine was back in service. The customer was delighted to pay far less than £90.

Ferguson TX99 Chassis
There was nothing but a snowy raster. R334 (4.7Ω) in the feed between the chopper power supply and the 5V regulator on the control board was open-circuit. I’ve been told that this is quite a common fault, so jot it down in your book.

Hitachi CPT2178 (G6 Chassis)
The jovial chap who brought this set in explained that he was late for work. Could I have a quick look at it? He went on to explain that switch-on would make a song and dance. I’ll fit it free of charge for this nice young man and he didn’t want the bother of having to buy a new one.

I wasn’t too concerned, because the two 82kΩ startup resistors R902/3 cause this problem. I whipped them out and checked them. One measured over 300kΩ. “As I thought” I said, “it won’t take long.”

“Fine” he replied, “I’ll pick it up tonight. I’m really grateful. You’ve come highly recommended.” Then he was gone.

What a nice guy I thought as I reached for two replacement resistors. After fitting them I switched on and waited for the rattle of EHT. I was about to fill in the repair ticket when the power supply emitted a familiar high-pitched whistle, indicating line output transformer trouble. Sure enough the transformer was faulty, but at least the transistor was OK. A feeling of relief came over me when I discovered that I had a good second-hand transformer in stock.

Seeing that it wasn’t a new one, I thought, I won’t make a song and dance. I’ll fit it free of charge for this nice young man and put it down to a public relations job. After fitting the transformer I switched on and was greeted by the crackle of EHT, followed by audio hash and a raster. Feeling much happier, I connected the aerial cable. The picture verticals were corrugated and the high-pitched squeal returned. Oh dear! It was probably only capacitor trouble, but I was getting a bit fed up. What could I charge, after giving the customer the impression that it was a simple repair taking only a few minutes to do? I gritted my teeth and started to check the electrolytics in the power supply. C905 and C910, both 4.7µF, 160V, were leaky and virtually open-circuit.

Once replacements had been fitted the job was at last complete. When he called to collect his set I told the nice young man that what had started out as an apparently simple job had in fact taken longer than expected.

“I know how you feel” he replied, still smiling, “I’ve had a day like that too”. He then looked at the set, which I’d left on the soak-test bench. “Ah, I see you’ve managed to get rid of those wiggly lines around the edges of people, and that horrible squealing noise - well done!”

Suddenly I thought this wasn’t a nice young man at all. “That’ll be fifty quid” I said.

He stopped smiling.

Ferguson FV30B
The customer’s complaint was that this machine wouldn’t timer record. Instead when the timer button was pressed, after the programming sequence had been entered, the machine went straight into the record mode – as if instant record had been selected.

I would have been baffled to know where to start without being given the additional information that no clock settings or channel information were retained when the machine was disconnected from the mains supply. Back-up battery I thought, and was correct. The 2.4V battery, mounted on the front panel assembly, was virtually flat. Once a new battery had been fitted the machine accepted and retained the clock and channel information and a timer recording was successful.

When I returned the machine to its owner I was told that it was disconnected from the mains supply every night for safety. I explained that it’s designed to be left plugged in. But I had a feeling that the nods of agreement I received on leaving the house were more of courtesy than intention.

JVC AV28FIEK (JX Chassis)
The cause of intermittently reverting to standby is usually dry-joints at the pins of the L7812ABV regulator IC521. To prevent other intermittent problems developing, the L7805ABV regulator IC522, which is mounted on the same heatsink, should also be resoldered.

Monitor Repairs
Here are a couple of recent monitor repairs I’ve had:

Viglen MTV1428LE: Intermittent frame collapse was the complaint with this one, the cause being dry-joints at the frame deflection coil plug/socket. Resoldering put this right.

Digital PCXBV-BC: The power supply had shut down because the BU2525A line output transistor 7617 had gone short-circuit collector-to-emitter. The cause was dry-joints in and around the line driver circuitry.
Martin Pickering describes the latest consumer electronics innovation, the internet set-top box. It provides PC-less internet access with an e-mail facility.

There are times when it would be helpful to be able to see into the future. Consumer electronics dealers would find it particularly helpful to know what families will want next. In this respect however you don't need to be able to look into the future: it's here now, in the form of the internet set-top box (ISTB) that's available from Satellite Scene.

The ISTB provides internet access and an e-mail facility without the need to use a computer. You simply connect it to your TV set and to a telephone line and the display comes up on the screen. It's a family-friendly system that's totally foolproof. You get your own e-mail address, and the cordless, infra-red keyboard that comes with the ISTB enables you to send e-mail messages anywhere in the world from your armchair.

Problems?
For many people the internet is an off-putting technical matter. If they have a PC they may feel that it would take hours or weeks to get the settings correct. Or maybe a new computer might be required. The ISTB is a simple solution that avoids all this hassle. It's no more difficult to use than teletext. In addition it's relatively inexpensive. The system we had for review sells at just £399, which includes a year's free internet subscription. How difficult is it to set up?

Installation
In fact it's easy. We opened the box and removed the ISTB, the keyboard, the remote-control handset, the batteries, cables and mains power supply. The batteries are fitted into the handset and the keyboard. We connected the ISTB to our TV set, using the scart cable provided, and to a telephone extension socket via the nice long lead supplied. The mains unit looks like an ordinary plug-top charger, with a thin wire to plug into the back of the ISTB.

When we switched on, the front panel lights flashed then a picture appeared on the screen. Press enter on the handset and the box dials out, connects to the internet and displays the "dialTV" home page on the screen.

From opening the box to browsing the web took less than five minutes — and there wasn't a computer technician in sight!

Comparison
How does the ISTB compare with internet access via a computer? In fact it's like using teletext rather than a computer. The handset has a nice, solid feel to it and enables you to move a pointer around the screen to select what you want to do. All very easy. Select internet and the unit dials out and makes the connection, all the while displaying little screen messages to tell you what's happening. You can use the keyboard to type in the name of any subject under the sun: the search engines will then find the information for you somewhere in the world.

The unit makes typewriter clicking noises each time a key is pressed. This feedback is reassuring. If you are sitting in your armchair ten feet from the TV set with the
keyboard on your knees it’s nice to be sure that the box has recognised each key press.

You can return to the main menu by pressing quit, and can disconnect the telephone call at any time by pressing the off key.

**E-mail**

Apart from searching for information on the world wide web you can send and receive e-mail messages to/from almost anywhere in the world. Simply select e-mail and the ISTB will dial out, connect to the internet and wait for you to send your message. Select “new” and you will see a blank message screen. Type your message, enter a title and the e-mail address of the recipient then press “send”.

You can see a list of incoming messages and replies, which you can read on the screen. No paper is involved. It’s a great way to keep in touch with relatives who live far away, or for schools to contact other schools for projects or information exchange, or even for businesses that don’t want to tie up expensive computer systems just for e-mail.

If you need a hard copy, you can connect a standard computer printer to the socket provided. If you find that the TV set doesn’t provide sufficiently good quality, you can connect a monitor to the VGA socket provided.

**What’s inside?**

Inside the ISTB’s plastic housing there’s a fully-shielded PCB assembly attached to an internal modem board. The quality of the workmanship is superb. It’s nothing less than a very fast computer with a user-friendly interface. On-board memory is limited because all incoming e-mail messages remain on the ISP server until you delete them.

The internal running software can be upgraded directly from the internet. The implications of this are interesting. If you find a feature that’s missing, or if some change to the internet makes the unit outdated, you simply "flash upgrade" by connecting to the internet home page. Then you have an up-to-date model once more. Don’t you wish you could upgrade your car as easily?

**Recording**

An interesting feature is the ability to use a VCR to record everything on screen. This could be used as a crude form or parental monitoring of what the children are browsing, or simply to record interesting web pages for future reference. From the retailer’s point of view, it enables demonstration videos to be made to impress potential customers who want to know “what this internet thing is all about?”

We even used a VCR to capture a password that flashed on the screen for just a single frame. It consisted of about eleven numerals and letters and would have been impossible to read otherwise.

**A marketing opportunity**

If you are a retailer, the potential of this unit should be immediately apparent. Apart from the domestic market, hundreds of schools are buying PCs at in excess of £1,300 each. They could buy three ISTBs from you for the same price: if only internet and e-mail access are required, they will be fine for the job.

Then there’s the office equipment market. A secretary/PA could send and receive e-mails without the need to tie up the main computer or a PC, leaving access to customer records, wages, databases etc. free. Those e-mails could be kept confidential if required. The unit is small enough to sit on a desk without wires trailing everywhere. It’s hard to beat for the small office that doesn’t have an e-mail facility yet (yes, they do still exist!).

But probably the biggest market will be all those families out there who want internet and e-mail for interactive TV.

There is endless potential, especially if you take into consideration the ISP (internet service provider) renewal at the end of twelve months and the decent mark-up offered to bona fide dealers.

**Where to get it**

So it’s about time you had a talk with the importers, Satellite Scene. You can phone the company on 01332 812 588 (fax 01332 850 300), write to it at PO Box 5070, Derby DE74 2ZU, or send an e-mail to satscene@netcentral.co.uk

The company has a very informative web site at www.netcentral.co.uk/satscene

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**Brief specification**

**Hardware**

- 32-bit RISC multimedia processor
- 4Mb RAM expandable to 32Mb
- 1Mb flash ROM, expandable to 8Mb
- Anti-flickering hardware for improved TV picture
- 33.6kbits/sec standard data/fax modem
- Parallel port for printer connection

**Software**

- Native HTML-3 compliant browser
- Netscape and HTML-3 extensions
- Full frames support
- Native IMAP and POP3 e-mail with up to four accounts
- PAP, CHAP, TCP/IP and PPP support for password authenti-
Ferguson SRD6
Nigel, our local hairdresser, brought his receiver in for repair. "Blue screen" he said, flapping his hands and looking flustered.

I suggested that this was a pigment of his imagination, because the receiver was completely dead. Maybe he'd been drinking the blue rinse?

Nigel appeared to be disgusted by my frivolity. He looked back as he went towards the door. "I need it by five. Don't want to miss Captain Kirk!"

Only the BUT11AF chopper transistor, the 1.852 fusible resistor and the fuse had failed. I fitted a 2.252 fusible resistor because that's what the circuit diagram says it is and I had this value in stock. The receiver worked perfectly.

Nokia SAT1700
The original version of the SAT1700 had a 400mAT fuse soldered into the board to protect the power supply against mains surges. It seems that Nokia bowed to public concern about the "unreliability" of this fuse, because the Mk 2 version is fitted with a 1.25AT fuse. I've never known one of these to fail – the surface-mounted items in the power supply go off like firecrackers in their haste to protect the fuse! The customers no longer complain, and seem to be happy paying me lots of money to fit "Satkit 23."

The complaint I had recently with a Mk 2 SAT1700 was not "went bang with lots of smoke" but "won't decode Sky channels". The customer was quite right, as there were no decoder messages on the screen.

I decided to replace the 1µF electrolytic next to the PTV111 sync separator chip first, since it's known to cause problems in other models. To my delight, the replacement restored normal operation.

For my own peace of mind I replaced the fuse with one rated at 500mAT. This is an excellent compromise between the original 400mAT type and the 1.25AT fuse fitted in the "improved" version.

Remote Control Problems
I had an interesting e-mail from David Needham recently. All was well when he installed a Pace MSS500IP until, for no apparent reason, the display went haywire and the receiver locked up – he couldn't do anything except switch off to reset. A Multilink remote control extender was in use – it worked satisfactorily.

When he asked Pace Technical about the problem he was told that this type of extender doesn't work with their receivers, which are too sensitive and pick up the extender's inherent radiation. A Handylink coaxial type extender was in use – it worked perfectly with his old Nokia receiver.

He decided to replace the 1µF electrolytic in the extender with a 10µF electrolytic, as recommended by the supplier.

I removed the PCB assembly and looked underneath.

"Where's the RF modulator's screening cover?" I asked.

Write me an Essay
I receive quite a few letters and e-mail communications. Provided an address is given, I reply to them all. Some are interesting and amusing – I like those – but some are simply frustrating. I have to force myself to reply to these politely.

There are the one-liners. This sort of thing: "My BDOCX123 must have a faulty crystal because it won't tune in. All I get is snow and squiggles. Thanks. J. Bloggs."

I prefer something with a friendly, informal style that tells me something about the person. It's also helpful to know of any tests that have been carried out and
the writer's level of expertise. I am hardly inspired to write a technical essay if J. Bloggs has no soldering skills or electronics knowledge. He might as well go to his local repair shop!

If you want a useful reply, tell me a little about yourself so that I can judge your level of expertise. For instance, what equipment do you have? Tell me whether the LNB supply voltage is correct, and what happens when the receiver is swapped over with a known good one.

Finally, the best way to contact me is by e-mail. "No computer" is no longer an excuse - you don't need one. You can obtain from Satellite Scene in Derby (01332 812 588) a simple internet box that plugs into your TV set and offers free internet for just £399.

**Matsui RD600**

Window cleaners seem to chuck in a case of "have lad-der, will climb" I think. I've seen some of their work, and am not impressed. Harry, my local glass polisher, has kept his business going however. I let him clean my windows more out of pity than because they need it. Anyway, last week he brought me his Matsui RD600 "to have a look at".

It's based on a Grundig chassis. Occasionally sets that use these chassis seem to kill off their special STV type chip, or damage it so that it won't pass the video from the decoder section. I thought this was the problem in the RD600 receiver, because there were no decoder messages.

The channel names were "hopping" sideways every second or so however. It looked like a sync problem, so I chased my tail for half an hour before replacing the PTV115 chip. This cured the fault. Note that it's more common for the decoder's PTV110 chip to fail. If you can't get one from a scrap panel, try Wilf at Calder Components (01924 411 089).

Harry was so happy with his receiver that he volunteered to clean my gutters - something he'd previously refused to do, even for money!

**Caller Dismay**

In common with many people, some months ago I bought one of those "caller display" units that show the telephone number of the person calling. I subsequently kept a mental note of the time wasters. Nearly all of them withheld their telephone numbers. So now I ignore the call whenever the display says "withheld". This saves me about half an hour a day.

Here's my definition of a time waster: someone who calls you for expert advice then spends the next twenty minutes telling you why you are wrong.

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**Test Case 430**

At one time a lightning storm would have relatively little effect on TV sets. If there was a direct strike that reached the aerial or the mains wiring, then yes you may have had to replace the fuse and a few other bits. The situation is now so different that the consequence of a storm in the district is a whole crop of damaged equipment, with faults that are often obscure and difficult to diagnose.

The most recent storm around here produced a dozen or so assorted casualties. A relatively modern JVC set, Model C21ET1EK, was amongst them. It didn't work at all, and its mains fuse F901 was very black inside. An ohmmeter test showed that the 2SD1545 chopper transistor Q904 was short-circuit. Not only that, it had a little burn hole in it. In addition R914 (0-33Ω), which is in series with its emitter, was open-circuit. The mains bridge rectifier BR901 seemed to have held out. It had obviously been overloaded however, so we added this and its 4-7Ω surge limiter R901 to the spare-parts order. There were no discernible problems elsewhere in the power supply or the line output stage. The rectifier diodes connected to the chopper transformer's secondary windings and the line output transistor seemed to be OK when checked with an ohmmeter.

We fitted the replacement parts carefully when they arrived. Two resistors, the bridge rectifier, the fuse and the chopper transistor. At switch-on the set worked perfectly well, though there was a little hesitation about powering up. The technicians involved didn't know this chassis particularly well, and assumed that this was a characteristic of its design. After a bit of setting up with the test-card pattern the picture was nicely centred with correct colouring. So it was sent on its way. Then we realised that while all the other storm-damaged gear had come from the Westmere and St. Peter's districts, the JVC set lived in the village of Crowdown, out of the path of the storm on that dramatic night a week before. But funny things can happen with rural electricity distribution systems, can't they?

An indication that lightning might not have been the cause of the breakdown came a week or two later, when the JVC set bounced back into the workshop. It had once again died. We were told that the failure occurred a second or two after switch-on. There had been a "grumbling" noise that culminated in a bang and a flash from within the set. This took place on a calm, sunny evening. So Zeus and his thunderbolts could not be blamed this time. Neither could the village electricity supply...

When we checked inside we found that the mains fuse had once more failed in a big way, while the new chopper transistor had suffered the same fate as its predecessor. Its series resistor R914 still functioned, but had gone a very funny colour. The mains bridge rectifier and its surge-limiter resistor had survived. But this time one of the transistors in the chopper transistor's switch-off circuit, Q902 (2SB744), was found to be leaky. The failed items were all re-ordered, but a question mark hung over the job which, this time, had to be done free of charge. What was really wrong with the set? If only the workshop wallies had known! For the solution, turn to page 901.
Michael Maurice devised this portable PC/printer system for use when carrying out repairs at customers’ homes

For some time I had been thinking about updating my business, in particular to keep accurate records. I have to admit that administration has not been my strong point in the past.

Most of the servicing I do is carried out at customers’ premises, either homes or offices. So what I needed was a portable computer system with a portable printer. The software selected would include a dedicated program which would serve as a database.

Hardware
The hardware I chose was a Compaq Pentium laptop computer and an Olivetti JP90 printer. The computer was purchased second-hand. Laptop computers of this quality cost around £2,000 new but, like all electronic equipment, they are coming down in price. The printer was chosen after much searching and many phone calls: it’s a truly portable one that can run on ten AA batteries (a holder is included), metal hydride rechargeable batteries or a nicad battery.

Batteries are not included with the printer – they are available as an optional extra. The mains adaptor that comes with it can be used to recharge the batteries. The printer is colour compatible, though a colour cartridge will have to be obtained. Something else that will have to be obtained is a centronics-to-D connector.

Software
With any computer system the most important part is the software. My laptop came preloaded with Windows 95 and Office 97. The latter is a powerful word processor, spreadsheet database etc. I find the word processor useful for writing reports, e.g. for insurance purposes, away from the office.

The Compaq computer has a modem that plugs into it. I have also installed Eaziview, which when used with the modem turns the computer into a Viewdata terminal. In this way suppliers’ computers can be accessed to check on prices and availability, and you can order spares on the spot. But take care not to reveal your account numbers and passwords. I also suggest you keep your buying price to yourself. If you intend to return a few days later to fit the parts, it’s best to ask the customer for a deposit – parts ordered can seldom be cancelled.

The Service Program
The dedicated service program is by far the most important feature of my set-up. After some searching I decided on Servicebase Lite from PC Control Systems. David Botto reported on what is now known as Servicebase Professional in the April 1994 issue of Television. While this program is ideal for the busy retail/rental outlet, it would not suit most small repair businesses. And it isn’t cheap at about £399 + VAT.

To overcome the problem PC Control Systems devised Servicebase Lite. It doesn’t have retail or rental modules, and doesn’t include mail merge.

Servicebase Lite assigns to each job a new job number, and enables you to enter the customer and equipment details. It lists spares, provides an initial fault report and allows for engineer’s and invoice notes. From this it will produce an invoice for you.

The program enables you to set up and manage trade accounts. It has powerful search routines: you can type in a job or invoice number, a customer’s name and address, a manufacturer and product type, or a serial number.

Demo Version
A demonstration version of Servicebase Lite is available from PC Control Systems. For thirty days you can try the program out to see whether it fulfils your requirements. After thirty days it locks out and you have to purchase the full program if you want to continue using it. The demo program also locks out when thirty jobs have been logged in, though there was no mention of this in the letter that came with it. As a result I was involved in
an unexpected dash up the M1 to Nottingham on a
Friday afternoon! Servicebase Lite is at the time of writ-
ing on special offer at £49 plus VAT.
Installing the demonstration version of Servicebase
Lite is easy. Read the installation notes before you
attempt to load it. You will have to adjust your con-
figuration to FILES=255, otherwise the program will not
run. You may have to alter your printer configuration if
you wish to be able to print. The demo version does not
come with an instruction book, but the full program
does. There's an excellent technical back-up department
to deal with any problems you may encounter. My
queries and problems (mainly to do with the printer)
were sorted out quickly and efficiently.
Working with the demo version allows you to see for
yourself how easy it is to use Servicebase Lite and book
jobs into the system. You can keep a check on how the
job is progressing, from booking it in to ordering and
receiving parts then completing the work, compiling an
engineer's report for the customer (if required) and pro-
ducing an invoice together with collection/delivery and
payment notes. You can see at a glance which jobs have
been completed, which jobs have been delivered/re-
ceived and any that haven't been paid for.

The Full Program
If the program impresses you - it certainly impressed
me - you will want to purchase the full version. Either
phone PC Control Systems or return the slip together
with your payment. You will then be sent the full pro-
gram discs together with an instruction book. You will
also be given a serial/licence number.

If you want to keep the data on jobs booked in on the
demo version, you will have to make a back-up copy
before you install the full package. If you don't, this
data will be lost.

After successfully installing the program you will be
asked to register with PC Control Systems Ltd. by enter-
ing your details and the serial/licence number. Once this
has been done you can customise the program to suit
your requirements.
Servicebase Lite is a DOS program that runs either
through Windows 95 or MS-DOS 3.1. Because it's a
DOS program you can't use a computer mouse. This is
no hardship: simply use the four arrow-keys to move
around the menu.

Printing
The fact that Servicebase Lite is a DOS program can
cause problems with printers and the printer set-up. The
program has been designed to suit four different types of
printer: dot matrix, generic, laser and Panasonic.
There's also a facility to turn the line feed on or off.
If you are using an inkjet printer, set the default print-
er to 'laser' and the LF to ON. The system works best
with HP emulation printers. Other emulations such as
Epson and Canon may require the parameters to be
changed or may not work at all. Guess how I found out!
You can print out a receipt for a customer when taking
equipment away for service, and you can print out an
invoice. Your name and address head the invoice. It will
show customer and product details and the method of
payment, also a fault description, a list of all parts used,
labour charges, a sub-total, the VAT and the final total.
The result is very professional. Customers who have
seen the print-out from my Olivetti JP90 have com-
mented on this.

The VAT rate can be altered - Servicebase Lite comes
with the rate set at 17.5 per cent. If you are not regis-
tered for VAT, set the rate at zero.

General Observations
One feature that I would have liked is a search by
model/chassis number. This would enable you to refer
to previous repairs, providing a fault database, without
having to know the job number, customer name or seri-
al number. Let's face it, you can't remember all the
faults you've had!
It's worth mentioning that the software is year 2000
compliant.
The printer is used by British Gas engineers. As the
ink cartridge is small, it can be used only thirty-four
times. So it's worth carrying a spare. The part no. is 278
2078 (pack of six).
Remember that under the Data Protection Act you will
have to register the fact that you are using a database of
this type - the Act covers any computer system that
holds names and addresses. Taken literally, anyone who
uses a computer with a wordprocessing package that
stores names and addresses is required to register.

Acknowledgements
May thanks to Joseph Berry, sales manager, and his
technical support team at PC Control Systems for their
invaluable help while setting up and generally running
the program, and to Lisa White, sales manager at
Olivetti, who supplied me with essential information on
the JP90 printer.

Sources
Servicebase Lite can be obtained from:
PC Control Systems Ltd.,
Hamilton House,
66 Palmerston Road,
Northampton NN1 5EX.
Telephone: 01604 601 677,
fax: 01604 601 678.
E-mail: pcccontrol@msn.com

The Olivetti JP90 can be obtained from computer
retailers or direct from:
Olivetti Lexicon,
Featherstone Road,
Wolverton Mill,
Milton Keynes MK12 5RF.
Telephone: 01908 220 111,
fax: 01908 203 483.

Please mention Television when ordering from either
PC Control Systems Ltd. or Olivetti Lexicon.
Purity
Despite many years' experience as a TLO it still surprises me how many sets are returned under the 30-day warranty period because of purity problems. Manufacturers are surely shooting themselves in the foot by not stressing to the user the importance of turning a TV set off at the mains switch or disconnecting it from the mains supply completely.

Instead, the customer gets the impression that the standby mode can be used permanently, without ever switching the TV set off. Obviously the degaussing circuit then never comes into operation, and an increasing degree of screen impurity develops.

The EU is now making the point to manufacturers that power consumption in the standby mode should be reduced. This will compound the problem, as users will get the idea that the mains switch is totally unnecessary.

Mini neck (22mm) CRTs are much more susceptible to purity errors than standard neck (29mm) tubes.

Every effort should be made to tell customers to switch off the mains supply to a set whenever it's to be out of use for more than a quarter of an hour. Otherwise colour purity will not be maintained.

Denis G. Mott,
NEI, Leeds.

The Grundig G1000 Chassis
I very much enjoy reading Don Bullock's What a Life! column. In the August issue he mentions finding that the efficiency diode (D304) in a set fitted with the Grundig G1000 chassis was short-circuit. To get the set going he fitted a BY127 as a replacement, but he didn't tell us whether he left the diode there or replaced it with the correct BY133. A BY127 is a standard mains rectifier, not the fast-recovery type normally used in this position. The set might work for a while with a BY127, but the diode is almost certain to fail prematurely.

E.M. Beddow,
Milton Keynes.

Tap Changers
What a delight it was to read Pete Roberts' comprehensive article on the power supply system (July issue). In the section on tap changing however he says that to avoid short-circuiting the windings the contacts must be of the break-before-make type. This is only partly true.

Automatic tap changers have a contact arrangement that works as follows. The main contact breaks from the old tap, leaving a minor contact with a series resistor still carrying the load. A second minor contact with series resistor then connects the new tap. At this point the load is supplied by both minor contacts: the windings between the two taps are to some extent short-circuited, but the two resistors limit the current. The first minor contact next breaks, and the main contact makes with the new tap. This sequence takes about fifty milliseconds, or two and a half cycles, to complete.

I have obtained this information from the ABB Components web site. There are many variations on the theme: some use non-linear resistors, others use additional windings.

Of interest to TV enthusiasts is a new electronic tap changer design rated at 16.5kV, 50MVA. It uses thyristors that are triggered by infra-red pulses supplied via optical cables. These units can respond to either under- or over-voltage conditions within one cycle, and control each phase separately.


South African Scene
I found Colin Knight's article (June issue) on servicing in South Africa most interesting. In the paragraph relating to a Tedelex set however he mentions a "2SC5028" line output transistor, and says there would be "no chance" of obtaining a replacement. I have to point out that this transistor type is not listed for any of our model ranges.

Tedelex has been in the audio, TV, VCR, microwave and appliance industry in South Africa for over fifty years, supporting Blaupunkt, Sony and other major brands. The company's Cape Town factory has been in operation since the start of TV transmissions here in 1975.

Spares are not a problem. We aim to give excellent customer service!

Jack Osher,
Tedelex Service Division,
Fax no. 27 11 683 3004.

Radio Hams
It's always a pleasure when a camel train arrives with my copy of Television. The last one brought me the June-August issues. In this rather remote part of the Middle East, with the nearest tarmac road 100km away, terrestrial television is not an option. TV has been available only since satellite transmissions started. But you need a man-sized dish rather than the puny dustbin-lid type used in the UK.

So I go to the Satellite Notebook and Satellite Workshop columns first. Imagine my shock when Jack Armstrong jumped out of his column in the June issue to kick me where it hurts - in his reference to "dabblers".

I'm a dabbler and admit it. From being a TV engineer/technician in the UK I now dabble in fibre optics, microwaves, VHF/UHF repeaters, PMR, digital telephone...
switching, data, solar power, battery plant and whatever else it needs to keep the job going. Now, with the advent of SDH technology, I’m having to get to grips with using a laptop computer for servicing rather than the Avo/Simpson multimeter of the past. But I’m still a dabbler.

My change in life’s direction came about partly through my hobby of amateur radio. I would guess that a fair proportion of TV engineers have had some interest in amateur radio at some stage in their past. The City and Guilds Radio Amateur exam is no great problem for the average TV engineer. I took mine in 1966. Electronic basics don’t change, whatever the subject.

This introduced me to work on transmitters. The era was just arriving when you could buy a transmitter, but for anyone on a TV engineer’s wages this was out of the question – you had to build your own. But the experience gives you an invaluable understanding of how things work. It’s not only the building but trying, sometimes in great frustration, to persuade the thing to work. The same applied to any test equipment required. Digital electronics had to be learnt the hard way!

The final result of all this was that seventeen years ago, in 1981, I ended up in what had previously been a hobby plus sideline – looking after PMR equipment as a full-time job, overseas.

Jack Armstrong should have thought about it a little more before deriding “Geoff” and his fellow dabblers. In one way Geoff may be dabbler. In one way Geoff may be a good product being spoiled for a poorly cleaned component leads and jumpers. Some of the jumpers lie under the ICs and provide earthing to ground planes. I used a separate link to earth the IC and adjoining components, and all has been well since.

The rest of the chassis is remarkably robust. It seems to be a case of a good product being spoilt for a ‘ha’p’orth of tar’. Alan Short, London.

Editorial note: We understand that the Akura technical line mentioned in our original report is no longer available.

The Minoka MK1498N
In the August TV Fault Finding column A.J. Roberts mentioned a dead MK1498N, the cause of the fault being on the digital daughter board. Over the past year I’ve had two of these sets (1498N and 1498T types) that presented the same symptoms described in the August TV Fault Finding section. These sets provide very good picture quality and good sound and teletext at a very good price. They are therefore worth fixing.

Reports on the internet suggest that dry-joints develop on the digital daughter board. My experience confirms this. After much resoldering in the first set, I discovered that there was a faulty earth connection at IC703. Because of this there was approximately 3V on the reset line. Many functions were inhibited, as there was no line drive – the supplies for the field output and sound stages, the tuner etc. are derived from the line output stage. The cause of the dry-joints appears to be poorly cleaned component leads and jumpers. Some of the jumpers lie under the ICs and provide earthing to ground planes. I used a separate link to earth the IC and adjoining components, and all has been well since.

The Robens report is dynamite for the TV trade. The danger to your spine cannot be emphasised enough. Harry Todd, 12 Oakhurst Close, Snaresbrook, London E17 3PZ.

Painting Dishes
In the May issue Hugh Allison brought up the subject of painting satellite dishes. I’ve had some experience of this.

The first occasion was when a black mesh dish had to be fitted on a white-rendered chimney and the owner asked if it could be painted. I tried car primer white and noted no noticeable losses. The customer was advised to coat the dish with matt varnish, but I don’t know whether he did.

Another customer had a legal problem about installing a dish and wanted it painted to hide it from view. I decided to check with our local friendly car spares shop, where I was offered a German-made, lead-free matt-finish spray paint called Belton deco-spray. The UK supplier is Auto-k-Paint, Peter Kwasry Ltd., Daventry, Northants NN11 5QI. It’s available in most colours. This paint was tried on a dish which was then tested and found to be OK. But it didn’t solve the legal problem!

I have also tried a transparent dish face, which I bought at a rally and fitted to an old Amstrad dish in place of the white-coated face. This worked for four years without any problems. Then the signals became weak. The dish face had focused the sun’s rays onto the LNB, whose cover had melted.

I have sprayed a 48cm dish with car white primer only. It continues to give sparkle-free pictures in the Midlands area.

These have been my dish painting experiences to date. Pete Haylor, Billesley Satellite, Billesley, Birmingham.

Back Injury
My previous lawyers are now being sued for negligence regarding my TV trade back injury case against Radio Rentals (Thorn).

The last letter from me published in Television has started the ball rolling again, with letters from those injured, wanting advice and asking for copies of the Robens Institute Report on why you should not lift a TV set unaided. I can supply a copy of this report for £5 plus a large stamped, addressed envelope.

Thanks to all who have written. Don’t be afraid to speak up if you are asked to lift sets alone. The law is on your side if there is any threat of the sack or victimisation.
Testing Polarisers

Pete Haylor, G6DRN, has developed a couple of simple circuits for testing magnetic and mechanical satellite signal polarisers

In an article in the August 1997 issue of Television I presented a portable, battery-operated motorised-dish tester design. It seemed logical to follow up with modules for testing magnetic and mechanical polarisers. These are the subject of the present article. They can be added to the original unit singly or together.

Each module is self-contained, with a separate on/off switch. This saves battery power when the module is not in use.

Magnetic Polariser Module
Fig. 1 shows the circuit of the magnetic polariser test module. The circuit is very simple and the original was built on Veroboard. It was designed for use with a polariser that takes 50mA. VR1 provides adjustment if required. SW1 is the on/off switch while SW2 alters the polarisation.

The components required can be obtained as a kit from MODE Components (see later) – ask for kit ref. BILSAT1. If you want to obtain the components individually yourself, you will require access to Farrell or CPC for some of them. The transistor is a general-purpose npn power type – any similar device will do.

Mechanical Polariser Module
Mechanical polarisers, which use a servo motor to rotate the position of the signal pick-up probe, are more troublesome and less common. They require a pulse drive. Fig. 2 shows the circuit of the mechanical polariser test module. IC3 is used to generate the pulses – VR2 sets the pulse width.

The components required can again be obtained from MODE Components (kit ref. BILSAT2). There are two points to note. IC3 must be type LMC555: this is the CMOS type, and is used because of its low current consumption. The on/off switch SW3 is a biased-off switch. It will enable the polariser to stop when you want it to. The original was built on Veroboard.

Development was done using an old Echostar polariser. Movement was a little jerky, but as the module is used for only short periods while testing or setting up a dish this doesn’t matter.

General Points
While the original modules were built on Veroboard, the simple circuitry means that production of PCBs would not be difficult. Figs. 3 and 4 show suggested layouts. The switches are not soldered to the board, being connected by short wires instead. This makes installation easier than using a PCB switch, and dry-joints are less
likely to develop. You could fit knobs to the small variable resistors, but this would be only for the sake of appearance.

If the 12V supply is derived from the original circuit, take it from across battery B2, not across the two batteries – the regulators would get very hot if they had to drop the excess voltage.

MODE Components is moving from the present address at Unit 19, 60 Regent Place, Birmingham B1 3NJ, but post and orders will be forwarded. The company’s phone number is 0121 551 4191. Kit BILSAT1 costs £5.46, kit BILSAT2 £6. These prices include post and packing.

### Parts list

<table>
<thead>
<tr>
<th>C1-3</th>
<th>10nF</th>
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<tbody>
<tr>
<td>C4</td>
<td>10µF, 25V</td>
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<tr>
<td>C5-6</td>
<td>10nF</td>
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<td>D1-2</td>
<td>1N4148</td>
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<td>8V, 1A reg.</td>
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<tr>
<td>IC1</td>
<td>5V, 1A reg.</td>
</tr>
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<td>IC3</td>
<td>LMC555 timer</td>
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<td>25kΩ linear, Farnell 614-129</td>
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<td>SW1-2</td>
<td>DPDT Farnell 273-363</td>
</tr>
<tr>
<td>SW3</td>
<td>DPDT (biased) Farnell 607-435</td>
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**Servicing Books**


This is an ambitious project: to cover TV, video, satellite, audio and radio servicing within the confines of a modestly sized pocket book. So the question is how well have the authors succeeded in their task? The answer is surprisingly well. They have the benefit of considerable experience, both practical and in compiling clear technical information.

You won’t find specific information on particular models: that’s not the intention. What you so often need, with the current complex technology, is explanations of how systems work. The book provides this. It also provides sound guidance on basic fault-finding procedures, workshop practice and so on. Such subjects as safety may appear to be a bit dull, but you could be sorry if you don’t have appropriate information to hand.

There’s a great deal of handy reference material – basic units and formulae, equations, dB measurements etc. Workshop organisation and test equipment receive appropriate coverage. Information on the operation of most basic circuits is included. In fact there’s good general treatment of all relevant topics, going as far as TV distribution systems.

A great deal of useful information has been squeezed into the pages of this book, making it a worthwhile addition to the workshop bookshelf.


This new book fills a gap in the range of servicing publications available. The format is the same as that used by the well-known VCR (Steve Beeching), CD Player (Ken Clements), TV and Video (Eugene Trundle) and Audio/hifi (same author) servicing guides. It’s a worthy addition to the series, providing an expert introduction to all aspects of satellite equipment servicing. The fault-finding coverage includes not only receivers but dishes, depolarisers, actuators and positioners and so on.

Receiver circuitry is dealt with section by section, with well-chosen circuit diagrams to provide practical examples. There’s a particularly interesting and helpful section on decoders and descramblers. Digital satellite TV is briefly but adequately covered, since we’ve yet to get experience of the problems that may arise in practice.

Nick’s practical know-how is evident in the section on repair techniques, which amongst other things provides guidance on dealing with dry-joints, liquid spillage and surface-mounted components; on the anti-static precautions necessary with certain types of devices; and on the use of variacs, bulbs and dummy loads.

There’s a useful appendix that lists manufacturers and spares/equipment suppliers’ addresses. In all it’s a helpful, well thought-out and nicely presented publication.
Simple CCTV Monitor Conversion

Keith Cummins describes how to go about converting an old monochrome portable for use as a CCTV monitor

Small monochrome portable TV sets that are past their sell-by date can often be easily adapted for monitor use in a CCTV system. The simple modification described in this article involves fitting a switch to select TV or monitor operation and the provision of a 75Ω BNC socket to accept a standard 1V peak-to-peak positive-going video input.

Power Supply
Most older monochrome portables incorporate a transformer that isolates the chassis from the AC mains supply. This is an essential feature if a set is to be converted to monitor use. So, before you do anything else, check that the set has a mains transformer that provides isolation.

Portable TV sets can often be run from 12V DC as well as the AC mains supply. Since the small camera modules currently available also require a 12V supply, this makes it possible to assemble a mobile camera/monitor combination at minimal cost.

The Video Signal
Fig. 1 shows a typical video detector arrangement. The video and intercarrier outputs are developed across the load resistor R, the chassis side of which is biased positively to set the operating point for the following stages, which frequently employ DC coupling. There is usually a buffer stage followed by the output transistor.

As a typical video detector provides about 1V peak-to-peak of positive-going video, it’s possible to break the circuit at this point and connect the raw output from a video camera here.

The tube is generally driven by a negative-going video signal at its cathode. So the video output transistor will require positive-going video at its base. If you don’t have a circuit diagram, find the video output transistor by tracing the circuit back from the tube’s cathode lead. Then, using a scope to observe the video polarity, amplitude and DC level, check back from the base of the video output transistor to the earlier stages. Without a circuit diagram, you may find it necessary to remove screening plates to follow the circuit. Note that the break point chosen for insertion of the signal from the camera must precede the take-off to the sync separator stage.

Having broken the circuit, check whether you’ve upset the biasing. If everything is OK, insert some components – see Fig. 2 – to feed in the camera signal and prove that the modification works. If all is well, a permanent modification can be implemented.

Differences between receiver designs may introduce complications, but the general arrangement outlined above should suit most sets. A circuit diagram is helpful – it will save time and increase confidence – but is not essential: a scope serves as a very effective means of discovering what’s going on stage by stage.

There are two main possible snags in the video section, as follows:

1. In breaking the circuit you may upset the video biasing arrangement. It may be necessary to add a potential divider across the main 11/12V rail and chassis as a new source of bias.

2. If the video signal is negative-going at the only suitable break in the circuit, you may need to invert the signal from the camera. A suitable unity-gain inverter stage is shown in Fig. 3.

Practical Implementation
Many small TV sets have a pair of loop-aerial terminals in addition to the usual coaxial aerial feeder socket. You can remove these terminals and enlarge the vacated holes to accommodate the TV/video switch and the BNC socket. It’s then just a matter of wiring, after which the job is done. The basic circuit is shown in Fig. 4.

The use of unscreened leads to the switch will minimise the stray capacitance present and any video response degradation. If the set is to be used exclusively as a monitor, the switch can be dispensed with.

Finally, if the set is fitted with a two-core mains lead it’s advisable to fit a three-core lead instead, using the third wire to earth the chassis. This will provide solid BNC socket earthing, and safety will no longer depend on the transformer isolation alone.
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**TELEVISION October 1998 863**
Feedhorn Problem
The owner of a Pace MSS100 receiver connected to a 1.2m prime-focus dish was having problems with sparklies on some channels. In this part of the world (Portugal) there are pronounced differences in the signal levels from the four analogue Astra satellites. 1B's horizontal channels are worst - they include UK Gold and Sky Sports 3. The vertical channels (CNN, Disney, VH1, Sports 1 and History) have always been strong. Later in the evening the horizontal channels become even weaker for a few hours, as the satellite footprint wobbles slightly.

After peaking the dish alignment - it had been fractionally off beam - UK Gold and Sky Sports 3 were on the edge of sparklies during an afternoon with a clear sky. An LNB change didn't help much. What was left?

I noticed that the prime-focus scalar feedhorn was an unusual type, with a relatively wide-bore tube - approximately 25mm. Most 11-12GHz feed tubes are less than this, 20mm being nearer the mark. If the tube is too wide the signal doesn't propagate down it very well and can even start to rotate, causing interference to signals of the opposite polarity.

The fact that the scalar feed rings were flush with the front of the tube, and were non-adjustable, probably made matters worse. With some feedhorns the rings are movable, locked in place with a grub screw. Best results are usually obtained with the rings a few mm back from the front of the tube.

I was familiar with the type of dish and its focal point. The feedhorn was in the correct position. It's usually best for the focal point to be about 5mm inside the front of the tube, about where the scalar rings normally sit. The scalar rings even out the imbalance between the electrical and magnetic components of the signal as it enters the round feed tube - it's best to consider the rings as a signal matching device.

I replaced the feedhorn with a prime-focus type made by IRTE. This produced a dramatic difference, curing the problem. It usually comes with a plastic polariser device in the tube. Remove this before installation, using a pair of long-nosed pliers. Otherwise strange effects will be seen - it's included to depolarise circularly-polarised signals.

To prevent humidity build-up I make a small hole at the bottom of the plastic cover at the front of the tube. Humidity can lead to the formation of aluminium oxide inside the tube, with a dramatic reduction in signal levels.

A good way to check for signal strength in the living room without recourse to a meter is to go to the receiver's tuning menu and note the higher frequency at which white sparklies appear - this is usually the same point at which the graphics begin to jitter slightly. Repeat the procedure at the low-frequency side, where black sparklies appear. With a Pace receiver there should be at least 10MHz between the two frequencies where the graphics hold steady and not a sparklie is seen. The centre tuning position is of course the middle between the two frequencies. This is a useful test where dodgy cable is suspected of causing poor reception on some channels and you don't have a spectrum analyser to hand.

Dish alignment should always be done with a meter. You can do it with a TV set, noting the points where the graphics become jittery, but I'm not recommending this as an installation method. H.C.

LNB Trouble
A recent digital installation gave me a headache. The analogue signals were fine, but the digital ones were very poor - despite the fact that the receiver's installation signal-strength meter said the signal was good. This is normally just an AGC reading however.

The Nokia receiver concerned has a small bar on the front panel display, alongside the name of the received station, to indicate digital signal 'goodness'. The bar was barely elevated, which means very poor incoming signals.

No amount of LNB internal cover tightening (see September issue, pages 772-3) helped. Don't overdo this, as the screws may break! There were good signals once a new LNB had been installed. H.C.

Pace PRD and MSS Series
With these receivers there is always a very tight fit between the UHF modulator's RF output connector and the coaxial lead to the TV set. While this is all to the good from the RF performance point of view, impatient owners who want to disconnect the lead don't always see it that way! Several receivers in which the connector has been wrenched out of the back panel have come our way recently: the socket's PCB connection gets broken off in the process. More often the body of the coaxial lead connector parts company with its
moulding when the owner decides to start a tug-of-war with the unfortunate piece of equipment. We’re seeing more of this problem now, as these receivers have been around long enough for owners to move them about when decorating, moving house, etc.

Rather than try to solder a connector back in place, I prefer to fit a coaxial lead through the hole used by the socket and terminate it outside. There is then nothing for the frustrated owner to wrench out. Lead length is not too critical: I use about 30cm. To reduce strain on the lead’s soldered connection to the PCB, I apply a small amount of hot glue where the lead exits from the box.

The aerial input socket isn't quite such a tight fit, and rarely gives way when unplugging the lead.

H.C.

Pace PSR800 Plus Sound Problems

This model is a non-decoder PRD800 Plus, with 199 channels. It’s quite a rarity in the UK, but the following fault note could apply to any PRD series model: for ease of reference, I’ve used PRD component reference numbers.

The receiver came to us from a dealer farther down the coast, with a no-sound complaint. Could we fit a new UHF modulator sound coil (L7)? I suspect that the dealer had twiddled the coil and destroyed the ferrite screw slot, but he won’t admit to this! The receiver had apparently never been used – the look of the PCB confirmed this.

I fitted a replacement coil from a scrap panel. Care is required when you remove L7 from a panel: the legs are very fragile, and easily part company with the body if excessive heat and force are used. When the coil was adjusted – gently – there was excellent sound and vision from the modulator. I reinstalled the PCB in the receiver’s case and put the cover on. Time for a final test.

The picture was OK, but the audio output from either the scart socket or the modulator consisted of hiss. A tap on the case restored the sound briefly. Then all channels suddenly displayed the QVC German home-shopping programme, with just a hiss for sound! Time to look inside again. At least the PCB’s plastic securing rivets came out easily – they’d not suffered from being heated in use. The fault came and went when the board was flexed. But there were no signs of any hairline cracks. It began to dawn on me why this receiver had never been used!

I carried out a scope check, while bending the board, to see what happened to the 4MHz reference signal that should be present at pin 1 of the sound chip U11. Not an easy task! This established that when the fault was present there was no 4MHz signal here. There was no 4MHz signal at pin 12 of the Nicky chip U9 either. These inputs both come from Q98. It’s connected to pin 2 of the microcontroller chip U2, where the 4MHz crystal is also connected.

Once I’d got to Q98 the cause of the fault was obvious: its base connection had never been soldered to the PCB – the contact area was bare copper, having never been tinned!

Normal operation was obtained when this connection had been soldered. H.C.

Pace MSS200

There was no decoding and no “please insert card” message. The first thing to do is to check the contrast setting, which was OK. So there was clearly a decoder problem. As none of the decoder chips are available, there’s not a lot you can do in this situation. I decided to check the sync pulse outputs from IC U302, line sync at pin 12 and field sync at pin 15. These must both be present for the decoder to work. As they were missing I checked at the ceramic resonator X301 (pin 17), which provides the reference signal for the phase-locked loop. This signal was also missing. A replacement resonator restored the decoding. P.G.

Pace SRD800

This receiver wouldn’t decode the scrambled channels but was otherwise OK. I checked the AD and DA converters by linking test point TS2 to chassis while a clear channel was being received. If all’s well, the picture should remain. It did.

So the cause of the problem was somewhere in the digital section, for which parts are not available. Before giving up I decided to check the supply voltages. Some odd readings around U28 and U25 suggested that a 5V supply was missing. But it took me some time to find the cause.

The supply was correct at L24, which supplies the on-screen graphics chip. I eventually discovered that C257, a 1,000µF capacitor at the front of the panel, between LEDs 3 and 4, had leaked a small amount of electrolyte that had rotted away a plated feedthrough (between the top and bottom side of the PCB) for the 5V supply. P.G.

Pace PRD Series

I’ve recently had a number of these receivers with complaints such as weak/no signals, whistles (time dependent) and taking ages to come on. The cause of the latter symptom will be well-known to anyone with experience of these receivers – the two 10µF electrolytic capacitors C7 and C8 and the 22µF one C5 on the primary side of the power supply. These capacitors are often the cause of power supply failure. They are now causing other symptoms as the voltages on the secondary side of the power supply rise because of poor regulation. For example the 13V LNB supply can be nearer 18V: the result is incorrect polarisation! The whistles also come from the primary side of the power supply.

These capacitors are replaced when you fit a repair kit to get a blown-up power supply working. But note that they can also be responsible for these non-destructive faults. I was amazed to come across a number of receivers in which the original electrolytics were still present – I didn’t think there could still be any out there!

It’s sensible to replace the reservoir electrolytics on the secondary side of the circuit as well when one of these receivers comes in for repair. They are now causing many problems, as several contributors to these pages have mentioned. N.B.

Pace MSS200

The sound and vision and the menus were fine, but the receiver wouldn’t decode VideoCrypt transmissions. There were no messages (“please insert card” etc.), and in addition the on-screen graphics present over vision (as opposed to the menus) floated gently from left to right and from top to bottom, i.e. they were not synchronised.

The output from the energy-dispersal clamp seemed to be avry, but no specific fault could be found. When I bypassed the VideoCrypt section the OSGs were synchronised. The PTV110 chip U8 in the decoder was faulty. I was able to obtain a replacement from a scrap machine. N.B.
Reports from
Philip Blundell, AM/IEEelec
Maurice Kerry
Giles Pilbrow
Pete Gurney, LCGI
David Smith
C.J. Guy and
Michael Maurice

Philips CP110 Chassis
If the set appears to be dead but the mains fuse and the BUT11AF chopper transistor are both OK, one possibility is that the mains bridge rectifier’s reservoir capacitor C2656 (150µF) is open-circuit. If the voltage across C2656 is in the region of 215V DC, its capacitance is certainly very low.

For an intermittently dead power supply, the chopper transformer could be going open-circuit intermittently. P.B.

Sharp 37AM12H
Poor picture and sound were the complaints with this colour portable. When I tried the set I got the impression that there was an IF fault — there was a rushing noise on the sound and the colour was noisy. When retuning was tried the tuning menu was found to be locked.

As the only 37AM12 I'd seen previously had an NVM (non-volatile memory) fault, I selected the service mode and checked the AGC and AFC settings. They were both set to FF. I don't know what the recommended settings are (the manual doesn’t say), but maximum didn’t seem likely! Setting them at half way improved the results, so a new pre-programmed NVM (part no. CH-IX1463CJHC) was fitted. Once the tuning, the picture geometry and grey-scale had been set up all was well. P.B.

Toshiba 140R4B
If one of these sets refuses to come out of standby, check resistors R811 (100kΩ) and R812 (120kΩ). They tend to go open-circuit. P.B.

Ferguson ICC7 Chassis
If there’s a Venetian-blind effect of horizontal lines superimposed on top of the picture, the electrolytic capacitors in the IF module are suspect. In one case recently C123 (4.7µF) produced a low-capacitance reading when it was removed and checked with a bridge. To be sure of a lasting cure I replaced all five electrolytics in the module. P.B.

Bush 2857NTX
The symptoms were no sound then, after a short time, the set shut down — as when there’s no signal. A check at pin 29 of IC601 showed that the amplitude of the ident signal was low at 4V. The cause was C135 (0.02µF) which had a 130kΩ leak. When a replacement capacitor had been fitted the ident signal rose to 8V and the set worked normally. M.K.

Mitsubishi CT28AV1BD (EE3 Chassis)
After about a minute the picture had crushed whites. When a grey-scale from the pattern generator was tuned in only the first few bars up from black could be seen: the rest were white. A scope check showed that the video waveform was clipped above the dark-grey bar. This could be observed at pin 20 of the scart socket.

When I looked at the circuit diagram I saw that this ruled out the CRT drive and colour decoder/timebase generator ICs, as the video signal first goes to the switching chip IC202: this feeds the scart socket and the colour decoder chip. IC202’s supply was found to be low because the collector of the 8V regulator transistor Q952 was dry-jointed. Resoldering this cured the fault. The set used the modified arrangement with a larger transistor in the Q952 position, mounted on a heatsink in the centre of the main board. M.K.

Sharp DV5161H (4BSA Chassis)
When this set had warmed up there was field foldover and a bright raster with flyback lines. After a short while a rattle was heard from the LOPT, followed by collapse of the raster from the sides to a squiggle, then shut-down.

A scope check at pin 12 of the jungle chip IC801 showed that the line drive started to break up when the raster did, suggesting that IC801 might be faulty. But the cause of the trouble was the fact that the 26V supply was low at 19V. When the 26V rectifier D501 (DX0511BM) had been replaced the voltage was correct and the set worked normally. The low supply voltage had obviously upset the operation of IC801. M.K.

Sanyo C25EG95 (EC3-A25 Chassis)
Patterning in the background, similar to cross-modulation, can be caused by interference on the brightness control line. On several occasions I’ve found that C211 (0.01µF) wasn’t fitted, though there’s a position for it on the PCB. This capacitor decouples the brightness control line at pin 17 of the IF/colour decoder/timebase generator chip IC101. M.K.

Onwa K9228
This set wouldn’t switch to standby properly: a bright raster was left. The cause was Q903, which failed
to turn off the HT switching transistor Q902. When I get this problem I replace both Q903 (2SA1013) and Q902 (2SD1545).

Another standby fault involves Q904 (2SD1015) and Q906 (2SD804) in the 27V supply to the sound section. The symptom is hum from the speaker in the standby mode. It’s not always noticed in the workshop. M.K.

**Sony KVX2562U (AE2 Chassis)**
The message “teletext not available” appeared when text was selected. In addition the on-screen displays and menu screens were shifted to the right. Resistor R38 (750kΩ) on the text (V) PCB was found to be open-circuit. G.P.

**Hitachi C1714T**
There was no on-screen display because the field pulse at pin 27 of the microcontroller chip was incorrect. It’s derived from the sandcastle pulse, which was found to be of excessive amplitude and wrongly shaped because D703 in the line output stage was open-circuit. G.P.

**Sony KVZ92915U (AE2B Chassis)**
There was an intermittent rushing noise on satellite sound. The cause was traced to a dry-joint at crystal X3001 on the satellite (S) PCB. G.P.

**Sharp DV5132H**
At switch on a bright white raster displayed. This was followed by a shut down. I found that there was no 200V HT supply at the CRT base panel. The cause was traced to a 100PF ceramic capacitor (C857) which had developed leakage. As a result the safety resistor R632 had gone open-circuit. G.P.

**Sony AE2 Chassis**
This set would occasionally shut down. Just before it went off, the picture became a broken up mass of lines while the LEDs at the front of the set would flash thirteen times. This indicates that there’s a field protection problem. The cause of the trouble was found to be dry-joints at the field output chip IC1501. G.P.

**Toshiba 218D9B**
The cause of poor field linearity - the raster was stretched at the top - was capacitor IC303 (2.2uF). It’s mounted very close to the hot-running field output IC, and had developed leakage despite being a high-temperature type. I also replaced C313 and C317. G.P.

**Hitachi C2114T**
At switch on the EHT could be heard to come up. Then the set returned to standby. These sets have field protection that puts the set in standby if a short is detected across the 27V rail. The cause of the problem was the TA8427K field output chip IC601. G.P.

**Philips GR1-AX Chassis**
The chopper FET Tr7610 had gone short-circuit. In addition the two 1Ω resistors R3616 and R3680 that are connected in series with it had, as usual, failed. Replacing these items didn’t restore the set to life however: the 10V zener diode D6610 in the FET’s drive circuit was leaky, though it read OK. G.P.

**Ferguson C51N (ICC8 Chassis)**
The cause of no colour turned out to be a defective switch (SE50) on the text board. It looks like a preset potentiometer, and is accessible through a small hole in the back of the cabinet. G.P.

**Toshiba 2140TB (C4 Chassis)**
This set appeared to be stuck in standby. The power supply was working, but there was no line drive. A large, 52-pin chip, IC501 (TDA8361), carries out all the video/chroma processing and generates the timebase drive signals. When I checked this chip I found little at any of its pins. There are two supplies. One is derived from the line output stage. The other, at pin 36, comes from the chopper circuit via the 9V regulator transistor Q870. This obviously has to do its job for the set to get going. Q870’s base voltage is set by the 10V zener diode D878. There is also a shunt transistor here, Q871, to switch the regulator on and off. The zener diode had failed, with the result that Q870’s emitter voltage was just 1.2V instead of almost 9V. P.G.

**JVC C14E1**
This 14in. portable, which is fitted with an Onwa chassis, refused to power up. At switch on the relay chattered for a second or two then the set shut down. A check to see if there was a short-circuit across the secondary side of the relay cleared this possibility, but the reading at the input side was 500Ω. There is not much to check here.

I soon found that C402 (4.7nF) in the snubber network across the HT rectifier D905 had become resistive. It’s rated at 500V. I fitted a more substantial capacitor rated at 2kV.

When servicing these sets make sure that, in the interests of HT stability and safety, the power supply and over-voltage trip upgrades have been carried out. Refer to the February and September 1998 issues for further details. P.G.

**Philips GR1-AX Chassis**
“Half a picture” was the complaint with this set, and the effect was indeed quite strange. The scan appeared to start about half way across the screen and wrap round, so that what should have been the centre of the scan just started on the left-hand side.

A few scope checks around the TDA8305 chip IC7020, which contains the timebase generator circuitry, showed that the line section of the sandcastle pulse was missing at R3529. The input to this resistor is routed around the outer edge of the PCB. There was a hairline crack in the print at the corner – I suspect that the side of the set had been knocked. A small wire link cured the problem. P.G.

**Sanyo CBP2180A (A5 Chassis)**
The customer said this set was dead. In fact it reverted to standby about five seconds after switching on. Suspecting a protection fault, I checked the voltage at pin 19 of the main microcontroller chip IC701. My initial thoughts were confirmed by the fact that there was only 2.9V here instead of 5V. The voltage at this pin can be pulled down by either over-voltage protection or the absence of any of the numerous supply lines.

Checks in the power supply before the set tripped produced largely correct readings, the HT voltage being spot on. Five seconds is not much time to look for missing voltages so, having proved that the cause of the trouble wasn’t excessive voltages, I decided to disconnect the HT feed to the line output transformer (pin 3) and connect a lamp here as a load. This will prevent mishaps in the line output stage and show whether the power supply will run stably under load.

To enable the power supply to operate, short-circuit the base of the standby switching transistor Q570 to its emitter.

When this had been done all the
supplies except the 12V at the front panel assembly were found to be correct. The latter was at only 2.5V. The source of this is the 78M12 regulator IC552 which had failed, producing an output of only 3V. F.G.

Panasonic TX2112 (USN Chassis)

Intermittent loss of the picture, sound OK was the complaint. It was an extremely intermittent fault – the set would work for days or weeks then fail. The slightest tap would then restore the picture. The fault couldn’t be instigated by tapping or freezing: it had to occur spontaneously.

The set had received previous attention for the fault, and virtually the whole of the signal panel had been resoldered to no avail. When the fault occurred, gently removing the back generally cleared it without providing any chance for measurements to be made.

Eventually the fault lasted just long enough for voltage readings to be carried out on the timebase board. This showed that some of the line output transformer-derived LT supplies were very low or missing. Scope checks then revealed that the cause of the trouble was high-resistance joints between the through-board rivets to which the line output transformer’s pins are soldered and the print. The soldered joints looked perfect when examined using a magnifying glass, with the rivets soundly fitted in the print. But the scope showed AC at some pins and nothing at the print. The problem was cured by cleaning the print and complete resoldering. P.G.

Granada CS1EZ5

This set produced a white raster with flyback lines. Routine checks on the supply line voltages failed to reveal anything amiss. So the CRT base panel was examined with a magnifying glass. I found minute hairline cracks in the print to the first anode connector and in the print that connects R6 to R24. Repairing them restored the picture. D.S.

Nikkai Baby 10

A new type switching regulator was fitted. They are very efficient and produce less heat. But when the set was switched on there was an almighty screeching racket. The cause of the problem was the RF choke in the regulator, with the tin screening plate acting as a diaphragm. All was well when the choke was relocated away from the plate. D.S.

Waltham 1410

If the picture is dark and lacks width, replace R812 (150kΩ, 0.5W). D.S.

ITT CP3126 (Monoprint B/MN Chassis)

The cause of no sound was eventually traced to the 470µF Philips electrolytic capacitor C304 which is connected to pin 5 of the TDA8196 audio control chip IC301. It had gone short-circuit. I was helped by the little LM386 outboard amplifier I use for audio hunting! D.S.

Bush 2059NTX

Although the HT supply was present this set remained dead. The cause was soon traced to R919 (0-68kΩ) which was open-circuit, removing the LT supplies. It appeared to be intact, with no burn marks. The usual power supply upgrade to this Onwa chassa was carried out. D.S.

Tatung TN1901 (190 Chassis)

Incorrect operation of the front panel controls with this set, and others I’ve come across, was cured by replacing the HD401220A02S microcontroller chip IC702. The Tatung part no. is 19-8315-6. D.S.

GoldStar CI14A80

This set reverted to standby a few seconds after being switched on. It seemed that the microcontroller chip was sinking because the EEPROM chip wouldn’t talk to it. A new 24C04 EEPROM cured the problem, after returning and resetting the PP values – this set doesn’t need a preprogrammed EEPROM. C.J.G.

Sharp DV51083 (D3000 Chassis)

Tripping, which was at first intermittent, was caused by C715 (2,200µF, 16V). It’s one of the LT reservoir capacitors on the secondary side of the chopper power supply. Oddly its ESR was OK. It was just low at about 50mΩ. C.J.G.

Ferguson ICC7 Chassis

There was no blue in the display. Unusually, RT66 (1kΩ) which is in series with the tube’s blue cathode had become open-circuit. C.J.G.

Bush 2020 etc (Indiana 100 Chassis)

As these sets age it’s becoming quite common for customers to complain that the picture takes a long time to appear. This is caused by the tube’s emission being too low for the auto grey-scale circuit to operate. The cure is to fit a 100kΩ resistor between the ‘Auto’ and 12V pins on the CRT base panel. The picture then is as good as ever. C.J.G.

Ferguson ICC5 Chassis

Loss of blue drive was caused by failure of the TEA5040 video processor chip IV21. Earlier sets need to be modified when IV21 is replaced. Details of the modification come with chips obtained from Willow Vale. C.J.G.

Sony AE1A Chassis

When I first went to repair this set I got the impression that someone had been playing with it. The EHT cable was not located properly, and other parts of the wiring looms had become playing about rather than being tied up as they should be. The convergence, width and EW settings were also out.

As none of the controls would adjust the width and EW correction, I replaced the TEA2031A EW driver chip IC1501 (on board J1) and set up the picture.

A couple of weeks later the customer complained that the set went off intermittently. A check on the HT voltage revealed that it was alarmingly high – 175V instead of 135V. The cause was R522 (100kΩ) in the HT sensing circuit. It had risen in value to about 140kΩ. After replacing R522 and resetting the picture parameters the set worked normally. M.M.

Philips Anubis A Chassis

There was no audio output from this 17in. portable. It was in permanent mute because the BC848 transistor Tr7156 was leaky. A replacement restored the sound. M.M.

Nokia N Chassis

The picture varied in size and the degree of EW distortion depending on picture content. Turning down the contrast and/or brightness had the same effect. As a first step I checked the HT voltage, which was stable and correct at 150V. I then replaced the MC4400 digital junk chip IF01. This made no difference. I checked and double-checked all the relevant outputs from, and feedback lines to, this chip.

Finally I did what I should have done at the beginning: I removed the circuit that connects R6 to R24. Routine checks on the supply line voltages failed to reveal anything amiss. So the CRT base panel was examined with a magnifying glass. I found minute hairline cracks in the print to the first anode connector and in the print that connects R6 to R24. Repairing them restored the picture. D.S.
and checked all the capacitors and diodes in the line output stage.
Ch04 (27nF) turned out to be open-circuit. A replacement put things right.

The set was actually a Finlandia Model CS12J2. M.M.

Matsui 1496
Apart from the buzz from the degaussing coils at switch on this set was dead. The 5N90 chopper and Q101 had the circuit while R108 (2201(51) read always pays to check the high -TDA4605 chopper control chip. It power supply uses the well-known IC101 (TDA4605) and Q101 had been replaced the set came back to life. M.M.

Daewoo DMQ2057
This set, which came to me via the customer's first complaint was about field bounce and intermittent loss of colour. I resoldered some dry-joints at the 5V regulator: this cured the field bounce, but didn't cure the very intermittent loss of colour.

Some time later the customer reported that there was sound but no picture. After some chip swapping (they are mounted in sockets) I discovered that the cause was the TPU2732 teletext processor chip. This item and the 17-734475MHz crystal were replaced, but there was still no colour.

The service manual explains how to use the remote control unit to make adjustments, but the original one wasn’t available – the customer was using a Philips type. By experimentation I was able to discover which button was used to select the chroma phase and, more importantly, how to store new settings.

Once this had been done there were no further problems. M.M.

Sony KV27XRTU (SX Chassis)
A rental engineer doing a bit of work on the side told the customer that there had been a burn-up and that a new power supply was required. A chopper transformer burn-up is not unknown in these sets, but is very uncommon. When I called I found that there had been no burn-up. In fact if the 135V connector was unplugged the power supply ran with a light bulb as the load. The faulty item was the line output transformer. Once a replacement had been fitted the set came back to life. Incidentally the power supply PCB is not longer available from Sony. M.M.
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/for disposal: Require camcorder viewfinders, colour or black-and-white, working or not, for student project. Have for disposal a large quantity of TTL and memory chips – call for lists/prices. Mike Goddard, Samia, Cemetery Road, Rhs, Wrexham LL14 2BY. 01978 843 547.

Manuals for sale: Ferguson FV10, FV11 FV13, FV14, FV21, FV26, FV30, 3V24, 3V29, 3V30, 3V32, 3V42, 3V44, 3V48 and 3V59. All complete and in very good condition. Also manuals for the Ferguson TX10, TX100 and TX300 chassis and various Philips manuals. All priced at £3 each plus postage. David Forfar, 65 Ormskirk Road, Old Skelmersdale, Lancs WN8 8TR. 01695 725 132.

Wanted/for disposal: Require mains transformer for the Pye 691/693 chassis; power supply for the Saisho VR1600/Hinari XL4 VCR; power supply for the Akai V55EK VCR; power supply for the JVC HRD750EK VCR; complete loading assembly for the ITT VR3906K VCR; complete working chassis for the Hitachi Model C2558TN TV with Fastex and Nicam sound, also remote control unit; complete working chassis for the Dynatron 26 7475SK/05 teletext TV, also remote control unit. Have for disposal many Sony C7 and C5 VCRs for parts or repair, some complete; reel-to-reel tape recorders in various states; Philips G8 TV with spares; Decca 140 chassis CTV; box of Thorn 3000 chassis panels; Sony C20 and spare machine working; two NEI PV744E VCRs; two JVC HR3660 VCRs; three Baird 8922 VCRs; an Hitachi VT33E VCR for spares only; three working VHS VCRs; many late TV panels etc. List available. Offers please. Buyers collect. Many 405-line LOPTs and old TV valves available. Philip Gay, 80A Milton Brow, Weston-Super-Mare, North Somerset BS22 8DE.

Wanted: Circuit diagram for the Bush Model 1500A with PCV 190-921303-03 – it's completely different from the -01 version shown in the service manual, with 42-pin ICs MN152451GWA and AN5601K and an AN56324-pin chip. Alternatively the pin connections for these ICs would help. There's an intermittent colour saturation fault. Laurie Watkinson, Telesonic, Week St. Mary, Holsworthy, Devon EX22 6UJ. 01288 341 254.

Wanted: Service manual or circuit diagram (photocopy OK) for the Sharp PC6641 notebook computer. A. Neilson, 23 Lydgate Road, Droylsden, Manchester. 0161 285 1984.

Wanted/for sale: Require a LOFT for the Fair T302 computer monitor, part no. TLF052-01-01, 2Y25, or a scrap set. Have for sale or exchange computer hardware 112 copies of Television 1985-96 plus manuals and books £130; Muter BMR95 CRT analyser/reactivator £440; Hameg HM303-4 scope £240. David Smith, 12 Rufus Gardens, Totton, Southampton SO4 8TA. 01703 870 051.

Wanted: Apologies to everyone who tried to contact me about a head motor for a Panasonic NVHD100B and a power supply for the Ferguson GV71LV. We have had to change our phone number. Please contact Andrew Osbourne on 01777 839 252.

Wanted: Circuit diagram or service manual (photocopy OK) for the Sharp PC6641 notebook computer. A. Neilson, 23 Lydgate Road, Droylsden, Manchester. 0161 285 1984.

Wanted: Service manual or circuit diagram (photocopy OK) for the Sharp PC6641 notebook computer. A. Neilson, 23 Lydgate Road, Droylsden, Manchester. 0161 285 1984.

WANTED: Power supply/distribution board for the Panasonic NVMS50B.
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<td>VCR1100</td>
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<td>VCR1500</td>
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**REPLACEMENT IDLERS & PULLEYS**

<table>
<thead>
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**REPLACEMENT IDLER TYRES**

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<tr>
<td>VCR1500</td>
<td>50p</td>
<td>VCR1600</td>
<td>140p</td>
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**Price:**

- 100p: $1.00
- 180p: $1.80
- 100p: $1.00
- 90p: $0.90
- 70p: $0.70
- 50p: $0.50
- 30p: $0.30
- 20p: $0.20
- 10p: $0.10
## PINCH ROLLERS

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## TELEVISION VIDEOS

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<th>Price</th>
<th>Model</th>
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## TELEVISION LampS

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<tbody>
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## TELEVISION Models

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<td>VCR7000</td>
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### Audio Control Heads

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<tr>
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<tbody>
<tr>
<td>PACE MSS200/300 APPOLL</td>
<td>SATPSU9</td>
<td>900p</td>
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<tr>
<td>PACE MSS500/1000</td>
<td>SATPSU10</td>
<td>1230p</td>
</tr>
<tr>
<td>FERGUSON SRD4</td>
<td>SATPSU11</td>
<td>650p</td>
</tr>
<tr>
<td>ECHOSTAR SR5500</td>
<td>SATPSU12</td>
<td>1600p</td>
</tr>
<tr>
<td>ECHOSTAR 6500/7700/8700</td>
<td>SATPSU13</td>
<td>2750p</td>
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<tr>
<td>AMSTRAD SRD600</td>
<td>SATPSU14</td>
<td>2600p</td>
</tr>
<tr>
<td>MIMTEC (Surensen)</td>
<td>SATPSU15</td>
<td>700p</td>
</tr>
<tr>
<td>AMSTRAD SRD700, SR950, SRX100, 301, 501, 502, 1002, 2001, SRD2000 SAT250</td>
<td>SATPSU16</td>
<td>650p</td>
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### Satellite PSU Repair Kits

<table>
<thead>
<tr>
<th>MAKE &amp; MODEL</th>
<th>CODE</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PACE PRD8000/PRD900</td>
<td>SATPSU1</td>
<td>600p</td>
</tr>
<tr>
<td>PACE S9S0900, 9200, 9210, 9210, 9220</td>
<td>SATPSU2</td>
<td>550p</td>
</tr>
<tr>
<td>AMSTRAD SRD510, SRD520</td>
<td>SATPSU3</td>
<td>600p</td>
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<td>AMSTRAD SRD500</td>
<td>SATPSU4</td>
<td>600p</td>
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<td>AMSTRAD SRX240, SRX345, SRX350</td>
<td>SATPSU5</td>
<td>600p</td>
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<tr>
<td>PAC D100/150</td>
<td>SATPSU6</td>
<td>650p</td>
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<tr>
<td>CHURCHILL D2MAC</td>
<td>SATPSU7</td>
<td>650p</td>
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<td>PACE MSS100</td>
<td>SATPSU8</td>
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### Satellite Tuners

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<tr>
<th>MAKE &amp; MODEL</th>
<th>CODE</th>
<th>PRICE</th>
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</thead>
<tbody>
<tr>
<td>PACE PRD8000/MISS200 2GHz (221-2077062)</td>
<td>TUNER01</td>
<td>1400p + VAT</td>
</tr>
<tr>
<td>PACE PRD9000/MISS1000 2GHz (221-21770112)</td>
<td>TUNER02</td>
<td>1400p + VAT</td>
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### Switch Mode Transformers

<table>
<thead>
<tr>
<th>MAKE &amp; MODEL</th>
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<tbody>
<tr>
<td>PACE 9000</td>
<td>PACE9000</td>
<td>800p</td>
</tr>
<tr>
<td>PRD8000/PRD900</td>
<td>Prd800</td>
<td>550p</td>
</tr>
</tbody>
</table>

### Satellite

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

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

### Replacement TV Switches

<table>
<thead>
<tr>
<th>MAKE &amp; MODEL</th>
<th>CODE</th>
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</tr>
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<tbody>
<tr>
<td>KV1612, KB1612, KV1614, KV2052, V2056</td>
<td>KV2062</td>
<td>130p</td>
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<tr>
<td>KV2067, KV2212</td>
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<td>130p</td>
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<td>KV1400, KV1440, KV2040, KV2060</td>
<td>KV2010</td>
<td>130p</td>
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<tr>
<td>KV2072</td>
<td>KV2075</td>
<td>110p</td>
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</tbody>
</table>

---

**Notes:**
- **Audio Control Video Head:** for National Panasonic
- **Video Cleaning Sticks:** Price £17 each 15p each pack of 10pcs
- **Universal Head Extractor:** Hand tool designed for extracting hard to remove heads without damage to either the head or the mounting assembly. Adjustable so as to suit various heads.
- **Video Maintenance Tools:** Set of 8 Allen keys packed in a plastic wallet.
- **Video Tools:** TRANSPARENT REPAIR/ADJUSTMENT CASSETTE This transparent videocassette replaces a normal videotape during measurements, adjustments and inspection. The mechanical parts come into sight and become accessible.

---

**Back Up Batteries**

- **Ferguson**
  - Part No: 00E6 - 067 - 001 1.2V 100mAh
  - Order Code: BB03
  - Price: 90p

- **Philips**
  - Part Nos: 138 - 101138, 138 - 10313 1.2v 90mAh
  - Order Code: BB01
  - Price: 70p

- **Philips**
  - Part Nos: 138 - 10229, 2.4v 100mAh
  - Order Code: BB02
  - Price: 135p

---

**Vcr Alignment Kit**

- **CONTAINS:** SET OF 7 HEAD & TAPE PATH ALIGNERS
- **RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS
- **RCA TYPE BACK TENSION TOOL**
- **TENSION ADJUSTMENT TOOL FOR VARIOUS USES**
- **VCR ADJUSTMENT TOOL**
- **SPRING HOOK**
- **MICRO SCREWDRIVER**

---

**Vcr Head Extractor**

- **CONTAINS:** HEAD & TAPE PATH ALIGNERS
- **SET OF 8 ALLEN KEYS**
- **RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS**
- **RCA PRESET TOOL**
- **RCA TYPE BACK TENSION TOOL**
- **TENSION ADJUSTMENT TOOL FOR VARIOUS USES**
- **VCR ADJUSTMENT TOOL**
- **3 REVERSIBLE SCREWDRIVERS**
- **SPRING HOOK**
- **MICRO SCREWDRIVER**

---

**Hand, Granada, Hinari, Marquany, Omega, Proxey, Schneider, Seg, Sentra, Shentom, Tashiiko, Tatung, Towada, Universum**

---

**Hand Tool** designed for extracting hard to remove heads without damage to either the head or the mounting assembly. Adjustable so as to suit various heads.

- ** Order Code: TOOL 8, Price 600p**

---

**RCA Type Back Tension Tool**

- **CONTAINS:** HEAD & TAPE PATH ALIGNERS
- **SET OF 8 ALLEN KEYS**
- **RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS**
- **RCA TYPE BACK TENSION TOOL**
- **TENSION ADJUSTMENT TOOL FOR VARIOUS USES**
- **VCR ADJUSTMENT TOOL**
- **3 REVERSIBLE SCREWDRIVERS**
- **SPRING HOOK**
- **MICRO SCREWDRIVER**

---

**Rca Adjustment Tool for Tape Guide Posts**

- **CONTAINS:** HEAD & TAPE PATH ALIGNERS
- **SET OF 8 ALLEN KEYS**
- **RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS**
- **RCA TYPE BACK TENSION TOOL**
- **TENSION ADJUSTMENT TOOL FOR VARIOUS USES**
- **VCR ADJUSTMENT TOOL**
- **3 REVERSIBLE SCREWDRIVERS**
- **SPRING HOOK**
- **MICRO SCREWDRIVER**

---

**RCA Type Audio & Control Head Positioning Tool**

- **CONTAINS:** HEAD & TAPE PATH ALIGNERS
- **SET OF 8 ALLEN KEYS**
- **RCA ADJUSTMENT TOOL FOR TAPE GUIDE POSTS**
- **RCA TYPE BACK TENSION TOOL**
- **TENSION ADJUSTMENT TOOL FOR VARIOUS USES**
- **VCR ADJUSTMENT TOOL**
- **3 REVERSIBLE SCREWDRIVERS**
- **SPRING HOOK**
- **MICRO SCREWDRIVER**

---

**Mode Switch**

<table>
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<tr>
<td>SW10</td>
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<tr>
<td>SW11</td>
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---

**Video Maintenance Tools**

- **Set of 8 Allen keys packed in a plastic wallet**
- **Order Code: TOOL 9, Price 125p**

---

**Video Cleaning Sticks**

- **Price £17 each 15p each pack of 10pcs**
- **Price £17 each pack of 15pcs**

---

**Socket Replacement Switches**

- **SONY**
  - USED ON: KV1612, KB1612, KV1614, KV2052, V2056, KV2062, KV2067, KV2212
  - Order Code: SW5
  - Price: 130p

- **SONY**
  - USED ON: KV1400, KV1440, KV2040, KV2060 (POWER SWITCH 25mm)
  - Order Code: SW12
  - Price: 110p

- **SONY**
  - USED ON: KV2020 (POWER SWITCH 21mm +Remote)
  - Order Code: SW6
  - Price: 130p

---

**Universal Head Extractor**

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

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**all the above prices are for packs of 10 fuses**

### Fault Finding / Comparison Books

**Satellite Fault Finding Guide Issue 1.**

- Listing about 1,000 faults for over a range of 24 different brands.
- Order Code: BOOK05.
- Price £8.50 – No VAT.

**Video Recorders Edition 5 1997**

- Over 300 pages packed with more than 5500 faults for different brands.
- Price £15.00 – No VAT. Order Code: BOOK01

**TELEVISION Edition 6**

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

**Satellite Repair Manual Edition 4**

- A comprehensive guide to receiver reviewing, featuring stock faults and installation tips.
- Price £15.00 Only No VAT Postage 100p
- Order Code: BOOK03

### Service Aids

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<td>Switch Cleaner</td>
<td>125ML</td>
<td>SP02</td>
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**I.C. Protectors**

- ICPT10, ICPT15, ICPT20, ICPT25, ICPT38, ICPT50, ICPT75
- ICPS, ICPS10, ICPS20, ICPS25, ICPS38, ICPS50, ICPS75

**Price: 30p each only**

### Can't Find What You're Looking For?

Ring us...as this is only a selection of the items that we stock.

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**GRANDATA LTD**

Tel: 0181 900 2329  Fax: 0181 903 6126

---

**TELEVISION October 1998**
**TELEVISION October 1998**

**CASSETER DC MOTORS**

**CD PICK UPS**

- **AOE**
  - Code: K35051A
  - Price: 190p
- **ARTEC**
  - Code: K35322A
  - Price: 190p
- **CHIANGINI**
  - Code: K35322A
  - Price: 190p
- **CITEL**
  - Code: K35051A
  - Price: 190p
- **COLEMAN**
  - Code: K35051A
  - Price: 190p
- **DION**
  - Code: K35051A
  - Price: 190p
- **EMERSON**
  - Code: K35051A
  - Price: 190p
- **EURONIC**
  - Code: K35322A
  - Price: 190p
- **EURONIC**
  - Code: K35051A
  - Price: 190p
- **GOLDSTAR**
  - Code: K35051A
  - Price: 190p
- **GRUNDIG**
  - Code: K35051A
  - Price: 190p
- **HITACHI**
  - Code: K35051A
  - Price: 190p
- **JVC**
  - Code: K35051A
  - Price: 190p
- **KORENDO**
  - Code: K35051A
  - Price: 190p
- **KRAMER**
  - Code: K35051A
  - Price: 190p
- **MARANTZ**
  - Code: K35051A
  - Price: 190p
- **MINI HEAD**
  - Code: K35051A
  - Price: 190p

**REMOTE CONTROLS**

8 way Preprogrammed Universal Remote Control

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

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- **PRO ART**
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  - Price: 190p

**AUTO REVERSE HEAD**

- **PRO ART**
  - Code: K35051A
  - Price: 190p

**STereo HEAD**

- **PRO ART**
  - Code: K35051A
  - Price: 190p

**Rocking HEAD**

- **PRO ART**
  - Code: K35051A
  - Price: 190p

**MONO HEAD**

- **PRO ART**
  - Code: K35051A
  - Price: 190p

**PHILIPS**

- **PRO ART**
  - Code: K35051A
  - Price: 190p

**SONY**

- **PRO ART**
  - Code: K35051A
  - Price: 190p

**TECHNICS**

- **PRO ART**
  - Code: K35051A
  - Price: 190p

**SONY**

- **PRO ART**
  - Code: K35051A
  - Price: 190p

**TECHNICS**

- **PRO ART**
  - Code: K35051A
  - Price: 190p

**TELEVISION October 1998**
REPLACEMENT LINE OUTPUT TRANSFORMERS

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<tr>
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SPECIAL OFFERS!!

CD PICK UPS

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<th>Brand</th>
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<th>New Price</th>
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<td>KSS 240A</td>
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<td>OPTIMA 6S</td>
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<td>OPTIMA 5</td>
<td>£39.00</td>
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8 WAY UNIVERSAL REMOTE CONTROL

A single remote control to operate Televisions, Videos and Satellite Receivers... plus an Auxiliary option

<table>
<thead>
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<th>Brand</th>
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<td>FURGON</td>
<td>RCUN09</td>
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<td>Mitsubishi</td>
<td>RCUN05</td>
<td>Grundig</td>
<td>RCUN10</td>
</tr>
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Normal Price: £5.00 + VAT Special Offer: £7.50 + VAT

GRANDATA LIMITED
K.P. HOUSE, UNIT 15, POP IN COMMERCIAL CENTRE, SOUTHWAY, WEMBLEY, MIDDLESEX, ENGLAND. HA9 0HB
Telephone: 0181 900 2329 Fax: 0181 903 6126 E-Mail: grandata.ltd@btinternet.com
OPEN Monday to Friday 09:00 - 17:30 Saturday 09:00 - 14:00

882 TELEVISION October 1998
camcorder. Malcolm Pugh, 25 Lindbergh Close, Gosport, Hants PO13 8EU.

Wanted: 8in. speaker with 400Ω
speech coil for the JVC 4TR-99U(M)
radio. Geoff Davies (Radio), 13
Bowan Road, Rugby CV22 8LF.
01788 574 774.

Wanted: Sony SCL9UB VCR or an
SR11UB power supply module for it.
Alan Stubbins, 7 Church Road,
Saxilby, Lincoln LN1 2HH. 01522
583 373 days, 01522 702 601
evenings/weekends.

Wanted: Nicam board for the B&O
8902 TV. Call Chris on 01707 892
842 (Hatfield, Herts).

Wanted: Any field timebase modifi-
cation details to remove teletext lines
in the top half of the screen with a
Sony KV1340UB. D.H. Kidston, 102
Fergus Avenue, Livingston, W.
Lothian EH54 6BG. 01506 433 371.

Wanted: Chopper transformer for the
Philips/Fye Model 10CX1120/25
WX112. R. Anderson, 33
Broadmanor, North Duffield, Selby,
N. Yorkshire Y08 5RZ. 01757 288
660.

For disposal: Radio and Television
Servicing vols. I, II, III, IV and
1953-4. All ten for £30 plus car-
rriage. F. Neda, 40
Brynhfryd, Glympt, Neath SA11
5BA. 01639 720 429.

Wanted: Service manual/circuit dia-
grams for the B&O 7102 colour TV.
Brian Nield, 21 Sandrock Road,
Brynhyfryd, Glynneath, Neath SA1
1842 (Hatfield, Herts).

Wanted: Power supply transformer
for the Alba 6700 VCR, part no.
LVF971 and a Panasonic NVG21
VCR. I need them for spares. Sam TV
Studios, 117 Francis Avenue, Ilford,
Essex IG1 1TT.

Wanted: Power supply transformer
for the Alba 6700 VCR, part no.
TPW4167D. Would also consider
complete power supply or VCR.
David Holdsworth, 61 Windhill
Avenue, Mexborough, S. Yorkshire
S64 0DW. 01709 509 329.

Wanted: Circuit diagram for the BPL
Model KLR9402. B. Milne, 22
Alwyth Place, Blackburn, Lancs
BB1 9QG. 01254 246 127 or 0973
510 295.

Wanted: Scan coils for a Matsui 14in.
portable. Marked DSE1422.
Circuit diagram/service manual for the
Finlandia CD602JZE and Sharp
VCT510HM. RC handsets for the
Toshiba V423B and Amstrad UF30.
Chopper transformer and RC handset
for the Mitsubishi CT21A2STX.
Advance TV, 88 Newark Road,
Lincoln LN5 8QA. 01522 513 013.

Wanted: User instructions, circuit
diagram and service data for the
Infotec 6012 fax machine.
Photocopies OK. Douglas Biggar, 27
Audley Road, Beith KA15 2DA.
01505 502 118.

Wanted: RC handsets for the
Ferguson VF31R/VF32L VCRs.
Working or not - required for spares.
Steve Burgess, 2 New Copcote,
Woking, Surrey GU21 1US. 01483
480 263.

Wanted: Head drum for the
Panasonic NVFS1SB VCR or a scrap
deck/VCR with working drum. New
replacement too costly for economic
repair. Ed Cocks, 86 St. John's Road,
Hedge End, Southampton, Hants
SO50 4DF. 01489 782 885.

Wanted: Circuit diagram (photocopy
OK) for the Technics SU7100K
stereo amplifier. T.P. Cook, 27a
Riverside, Driffield, E. Yorkshire
YO25 6PA. 01377 252 498.

Wanted: AC adaptor for the
Panasonic NV1008B VCR or details of
the adaptor multipin connector. R.
Hanani, 21 Kilmaurs Road,
Knockenlither, Kilmanock, Ayrshire
KA2 0DA. 01563 531 559.

For disposal: Working vintage Bush
BC1122 colour receiver (A823 chas-
is) in walnut veneer cabinet. Also
similar non-working model in white
cabinet. Service manual and spare
PCBs available. H. Baker, 11
Bluebridge Avenue, Brockmans Park,
Herts AL9 7RY. 01707 646 604.

Wanted: Circuit diagram for the
Apricot 14in. SVGA monitor Model
XJ52178. W.E. Halliwell, 54 Moore
Drive, Haydock, St. Helens,
Merseyside WA11 0NG.

Wanted: Circuit diagrams for the fol-
lowing computer monitors: Opus
CM1438, Samsung CMV4967PL, and
Quem QM835. Geoff Southern, 27
Eldred Road, Childwall, Liverpool
L16 8NZ. 0151 281 2184.

For disposal: Telecogeg D54
10MHz, double-beam scope in good
working order (very little use). Offers
around £40. Large selection of TV and
VCR manuals at £3 each plus postage.
Phone for details. Television from
1978 to present, 180 copies in all,
some issues missing, £30 the lot plus
carriage. TAP will be sent to sort out the problem - at no cost
to the householder.

The TV TAP will not be contacting householders in transmitter areas where no interference to existing TV reception is expected. But there is a very small risk that the test broadcasts in these 'low-risk' areas may affect some TV sets. If local TV retailers or service technicians receive reports of digital interference to reception, they should pass the details to the special trade-only Freephone number below. Arrangements will then be made to send out a technician from the TAP.

The terms of the Digital Terrestrial Licences do not require the TV Transmitter Adjustment Programme to deal with possible digital interference on the outputs from VCRs and satellite decoders. Thus any householders that experience this particular difficulty will need to arrange for the necessary adjustment to be carried out by a suitable TV retailer or service technician.

Note that the TV Transmitter Adjustment Programme can deal with only TV picture problems caused by the test transmissions, also that the presence of digital interference does not necessarily mean that a householder will be able to receive satisfactory digital TV broadcasts once the set-top decoders become available.

To begin with, test transmissions run typically from 9 a.m. to 7 p.m. daily. The test period will be extended to 24 hours a day later. More details about the TV Transmitter Adjustment Programme are available at the ITC's web site: www.tvtap.mcmail.com

Details of the digital TV channel allocations are available at the ITC's web site:
www.itc.org.uk/divisions/eng div/dtt freq plan/

For trade enquiries only, the TV Transmitter Adjustment Programme can be contacted on Freephone 0800 092 0080.
Reports from
Eugene Trundle
C.J. Guy
Andy Barkley
Ronnie Boag
David A. Chaplin
Paul Hardy
Mike Orr and
Chris Watton

Hitachi VTF645E
The picture was intermittently corrugated, with a whine or squeal that came from within the machine. This could happen in either the record or the play mode, in the former case leaving a permanent record of the fault symptom on the tape. The usual cause of this is a vibrating sleeve on one of the tape guides, but in this case the back-tension pole was responsible. Its part no. is KX11531. E.T.

Daewoo V22
If the cassette intermittently jams while front loading it is likely that the little tension spring has disappeared from the flap-opener trigger in the FL cradle. It's item 11 in the exploded view diagram in the manual, part no. 97S 3001 700. It is vital to ensure that the escaped spring is not lying loose on the PCB, where it could cause havoc – especially in the power supply section! E.T.

Philips VR312
The fault report read "failure to record sound". As the machine worked all right on test we returned it to the customer and asked him to provide us with a tape that showed the fault next time it occurred. In due course the machine came back with a tape whose sound track was completely silent, suggesting failure of the bias/erase oscillator. In addition there was an odd 'hunting' effect on the picture. Our recording over it didn't produce this effect, and the sound was OK.
We then discovered that changing channel produced the fault effect on the E-E picture, while the sound muted until the machine was switched off then on again, after which the fault cleared. The cause of the trouble turned out to be an open-circuit track along the right-hand edge of the PCB. It carries the AFC signal from the IF chip to the processor. C.J.G.

Sharp F360E
This machine would drop out after a few seconds in the play/record modes. The cause was a layer of grease on the take-up reel optical sensor. As a result, the control system thought the reel wasn't rotating. This particular machine seemed to have been well endowed with grease, either during manufacture or a previous repair. A.B.

Daewoo V22
There were almost no signs of life except for a brief head spin at power up. Checks showed that the reset pin of the front-panel mounted microcontroller chip was at about 1V. The cause was C703 (0.01µF), which was leaky. It appears to be the same infamous type of capacitor used by Panasonic, so watch for this one! C.J.G.

Matsui VXAI100
This machine appeared to be dead, but there was 3V on the 5V line. Where it came from I never fathomed out, since ICP501 in the 5V feed on the secondary side of the power supply was open-circuit. A replacement restored normal operation. C.J.G.

Amstrad VCR6100
This machine had wowy sound. The phantom 'repairman' had fitted the flywheel belt so that it ran on the wrong part of the motor pulley. C.J.G.

Sharp VCA39
Our customer returned this machine a few days after we'd fitted a new upper drum. He complained that the machine behaved erratically – it would stop at random for example. We had forgotten to replace the small (5mm x 2mm) spring that provides earth continuity to the drum. Replacing it cured the problem. It fits in the untapped hole in the brass bush on the drum assembly. Before you drop it in, make sure that the equally small carbon brush is already there. A.B.

Sharp VCM29
There was no E-E picture and the playback picture was in black and white. We found that crystal X501 wasn't oscillating. Resoldering it cured the fault. R.B.

Akai VSG745
Tape was intermittently left out of the cassette on eject. There was also intermittently no fast forward or rewind. A new mode switch cured the problem. R.B.

Toshiba V854
This machine wouldn't accept tapes. We found that the cam lever beneath the main cam was broken. A replacement lever and mode switch cured the fault. R.B.

Sharp VCMH64
Playback was marred by intermittent background hiss. The cause was a dry-joint at pin 4 of plug AU on the main PCB. R.B.

Ssangyong SVR101
This VCR is very like the Amstrad VCR6000 etc. The initial fault was no E-E or playback output. On investigation I discovered that the test pattern switch in the RF converter had been mutilated. I removed the RF unit, took out the damaged switch and wired across it to omit the test pattern. Once the RF unit had been refitted there was normal reception most of the time, but the
signals disappeared intermittently. After much testing I found that a track to the RF unit, on the main PCB, occasionally went open-circuit. This was discovered by using a scope – I couldn’t see the break, even with a magnifying glass after narrowing its position down to a half inch of track. D.A.C.

**Ferguson 3V35/39 etc**

One of these machines wouldn’t accept a cassette. On investigation I found that protector CP1 (0.6A) was open-circuit. So I removed the cassette carriage and tested the loading motor, which drew about 850mA off load. Under the same conditions a new motor draws about 25mA. Once the motor and fuse had been replaced cassettes loaded normally. D.A.C.

**Hitachi VT120E**

There was a cassette that couldn’t be ejected in this machine, and none of the other deck functions worked. Checks in the power supply showed that the 12V output at pin 7 of the STK5471 chip IC851 was missing. A replacement chip restored normal operation. D.A.C.

**Panasonic NVG40**

The cause of severe patterning on the E-E and playback pictures turned out to be C19 (330µF, 10V) in the power supply. It had fallen in value and in addition had been leaking physically. D.A.C.

**JVC HRJ400**

When this machine was switched on a slight squeak came from the power supply then it shut down. Zener diode D40 (5.1V) in the power supply was short-circuit. It had failed because Q2 was dry-jointed. After resoldering the transistor and replacing the diode I gave the machine a good soak test. This proved that the fault had been cured. D.A.C.

**Sony SLV270UB**

This machine failed to work. The customer said that it had been all right until the local electricity company had done some work – he thought this had caused damage. Fortunately this was not the case. All that was necessary was to replace C1325 and C1326 in the power supply. P.H.

**Goodmans GVR3450**

There was a fully loaded tape in this machine and the loading motor had jammed – it seemed that the motor had failed to stop on completion of the loading sequence. As there was no obvious break in the gear train and the timing was correct, the mode switch was suspect. This can be obtained from Daewoo, and comes complete with the loading motor, its loading bracket and a connection PCB. Unfortunately the connectors on the PCB were not compatible with the ones in the machine, so I had to transfer the mode switch on its own. This solved the problem. P.H.

**Panasonic FS888**

This S-VHS Nicam stereo machine wouldn’t accept a cassette. When a cassette was inserted it would immediately be ejected. The mechanism was found to be correctly timed, and worked when driven manually. The cause of the trouble was a sticking eject button on the control door. P.H.

**Ferguson FV81LV**

This machine was supposed to be dead. In fact if it was left on long enough the display would appear. Then, some time later, the machine would initialise. All this took about half an hour, after which the machine worked normally. Capacitors CP007 and CP008 in the power supply were both low in value. P.H.

**Philips VR6290**

This VCR needed a mechanical rebuild, which had been declined by the customer initially as he thought he could do it himself. He made a start then thought better of it. I found that a Philips service kit had been fitted, but at power up the deck immediately tried to take in the cassette housing even though there was no tape present. It accepted a cassette when operated from an external 5V supply, and worked when driven manually. So the deck was OK. As the power supply is easy to change I tried another one, but the mechanism continued to misbehave.

I then found that the microcontroller IC7140 was very hot, with only 2.5V at pin 40 though there was 5V at the other side of L502. When a replacement chip had been fitted the machine accepted a tape but the threading operation was intermittent and, when the tape was fully loaded, there was only temporary capstan rotation. A scope check at the L293B motor control chip’s supply pin revealed that significant hash was present. The cause of the trouble was traced to C2003, which was open-circuit – it decouples the supply to the chip.

This was not the end of the matter. Playback was very snowy, though the machine’s recordings played back all right via another one. The playback head amplifier board was faulty. One from a scrap machine completed the repair. P.H.

**Hitachi VTF150E**

There was a slightly misleading symptom with this machine. The capstan motor was noisy, and the noise could be stopped by touching the motor. But a replacement motor made no difference. Checks on the various rails showed that the 12V supply dropped to 10V when the capstan motor was turning. The cause of the problem was C12. M.O.

**Toshiba V110B**

There was no display and none of the functions worked. This can be caused by a faulty microcontroller chip, but its 5V supply was missing. It’s not easy to find the source of this supply. 12V is fed to pin 11 of IC46, whose 5.5V output at pin 10 is fed to the 5V switch transistor TT32. The cause of the trouble was dry-jointed connections to this transistor. We’ve had the fault on several occasions, so it could be a common problem. M.O.

**Mitsubishi HS827**

There was poor video response, with a jumping picture, in the E-E mode. Playback was OK. The video signal at the PCB output and at pin 8 of IC2A1 was normal. At pin 6 of IC2X1 it was crushed. The cause was C2X2 (10µF, 50V), a replacement curing the problem. M.O.

**JVC HRJ600**

The mains supply had been disconnected for a few hours, after which the machine wouldn’t start. C12 (2.2µF) in the power supply had deteriorated. C.W.

**Matsui VX2000**

There was no record colour, though playback colour was fine when a test tape was tried. Fortunately we had a circuit diagram, which made matters easier. A scope check at the head amplifier module pin marked REC-C produced a good waveform. We then traced along to the IC and found that the waveform was lost at the wiper of potentiometer REC-C, which was open-circuit. As we had no electrical adjustment guide we set the replacement by trial and error, ensuring that while the colour locked it didn’t overload in heavily saturated areas of the picture. C.W.
**Servicing the Panasonic Euro-1 Chassis**

John Coombes on possible fault conditions with this chassis, which was used in the first Panasonic sets to feature digital signal processing

The Panasonic Euro-1 was the first TV chassis from Panasonic to feature digital signal processing. It went into production in 1993. Most of the standard circuitry (power supply, line and field output stages etc.) is arranged on a mother board at the base of the cabinet: the digital signal processing circuitry, which includes generation of the timebase drive signals, is on a separate vertically-mounted panel at the rear of the chassis.

The following Models use this chassis: TX25A3, TX25W3, TX28W3, TX29A3 and TX29W3.

**Power Supply Problems**

The chassis uses a chopper circuit based on the TDA4601 control chip (IC611). Fig. 1 shows the circuitry on the primary (non-isolated) side of the chopper transformer T639, Fig. 2 the circuitry on the secondary (isolated) side.

If the mains fuse F6101 (3-15AT) has blown or blows intermittently, the degaussing posistor R6102 is suspect. Check it by replacement.

Other causes of a blown mains fuse are a short-circuited bridge rectifier (D613, type RBV408), chopper transistor (Q624, type S2000AF) or control chip (IC611, type TDA4601). Shorted turns in the chopper transformer T639 is another possibility.

If the TDA4601 control chip doesn’t start up, check whether one of the start-up feed components R621 (4.7kΩ, 2W) or posistor R622 is open-circuit. Alternatively C622 (100µF, 25V), the reservoir capacitor for the

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**Fig. 1: The circuitry on the primary side of the power supply. See Table 1 for semiconductor device types.**
chip's supply, could be either short- or open-circuit. Another possibility is R628 (470kΩ) which can go open-circuit.

The start-up circuit supplies pin 9 of IC611. A low voltage (less than 12V) suggests that C622 is open-circuit. If the voltage is less than 7.5V there could be an overload on the secondary side of the circuit. If there are no obvious shorts in the line output stage, disconnect coil L651 and connect a 60W bulb across the HT reservoir capacitor C651 (47µF, 250V). If the bulb lights up, the power supply is working correctly. If it doesn't light up, check the over-voltage diode Q651 (TFD312S) which could be short-circuit and the HT rectifier D651 (RU4) which could be open-circuit. If there are no 150V HT supply faults, check the LT lines on the secondary side of the circuit.

If there's no 12V supply, check fuse F661. This will blow if C662 (470µF) is short-circuit. Alternatively, the 12V supply will be missing if IC666 (TL431A) is short-circuit. See also the note on standby switching later.

If still in trouble, check for dry-joints at the chopper transformer T639. Poor connections here can cause intermittent cutting out or just no results.

Failure of the TDA8175 field output chip IC561 will also produce the no results symptom.

For a buzzing or whistling power supply Panasonic suggests changing the value of C632 from 100pF to 1,000pF. This capacitor is between pins 2 and 3 of IC611. In addition, add a 1,000pF capacitor between pins 3 and 6.

The cause of failure to start or no results can be in the control circuit or elsewhere on the digital board. Pin 62 of the microcontroller chip IC1801 (CCU3000) should go low when the remote control unit is used to switch from standby. When this happens Q697 (2SA1309AATA) should switch on, in turn switching on Q663 (BUZ71A) via R667. The 12V supply then appears. If Q663 is faulty or Q697 open-circuit there will be no 12V supply. If pin 62 of IC1801 doesn't go low, check the chip by replacement. This must be done with care, using appropriate equipment.

Loss of the 10V supply on the digital board will produce the no results condition. This supply is produced by the regulator transistor Q1011 from the 12V line. Q1011 (2SC3940) could be faulty, its base bias zener diode D1012 (MA8110) could be short-circuit or its feed resistor R1012 (4-7Ω) open-circuit.

Failure of the multisound processor chip IC1401 (MSP2401) on the digital board can be responsible for no or intermittently no results. This can obviously be a difficult fault to locate. For a clue, monitor the 5V supply at pin 14 and the 5V standby supply at pins 10, 17, 18 and 19. The line drive pulses are no pulses here the chip could be faulty, but first ensure the latter event check whether C521 (100µF) is short-circuit. The next step is to check for drive pulses at the base of Q526. These come from pin 13 of the DPU2553 deflection processor chip IC1501 on the digital panel. If there are no pulses here the chip could be faulty, but first ensure that the 5V supply is present at pin 14 and the 5V standby supply at pins 10, 17, 18 and 19. The line drive pulses pass from the digital panel via transistor Q1536 (2SD601) to the secondary side of the circuit.

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The Line Timebase
As with any chassis, line output stage failure will produce the no results symptom. If the 150V HT supply is missing, check as described above to find out whether the fault is in the power supply or the line output stage. Ensure that the feed resistor R531 (10Ω, 10W) is intact. If it's open-circuit, the S2000AF line output transistor Q534 could be short-circuit or the line output transformer T531 could have shorted turns. This capacitor is between pins 2 and 3 of IC611. In addition, add a 1,000pF capacitor between pins 3 and 6.

The cause of failure to start or no results can be in the control circuit or elsewhere on the digital board. Pin 62 of the microcontroller chip IC1801 (CCU3000) should go low when the remote control unit is used to switch from standby. When this happens Q697 (2SA1309AATA) should switch on, in turn switching on Q663 (BUZ71A) via R667. The 12V supply then appears. If Q663 is faulty or Q697 open-circuit there will be no 12V supply. If pin 62 of IC1801 doesn’t go low, check the chip by replacement. This must be done with care, using appropriate equipment.

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Failure of the TDA8175 field output chip IC561 will also produce the no results symptom.

For a buzzing or whistling power supply Panasonic suggests changing the value of C632 from 100pF to 1,000pF. This capacitor is between pins 2 and 3 of IC611. In addition, add a 1,000pF capacitor between pins 3 and 6.
which could be open-circuit. If it's necessary to replace IC1501 this must be done with great care.

The Field Timebase
The most common problem is field collapse, which can obviously be caused by the TDA8175 field output chip IC561. For replacement purposes there's a modification kit that consists of the chip and an MA2100 diode. This should be fitted in place of the line output BS1, with its cathode to pin 3 of the chip and its anode to pin 5. If the fault is intermittent, IC561 and/or its 27V supply feed resistor R561 (1-5Ω) is suspect. An alternative cause of field collapse is failure of the flyback boost capacitor C563 (220µF, 40V). (15C1) is suspect. An alternative cause of field collapse is IC561. For replacement purposes there's a modification kit that consists of the chip and an MA2100 diode. This activates the protection circuit in IC1501. It tends to go open-circuit.

If the receiver comes on with a blank raster, check whether there is a field flyback pulse at pin 6 of IC1501. The pulse may be missing because of a dry-joint at pin 3 of IC561. This activates the protection circuit in IC1501. If the receiver is working but the only result is teletext, replace IC561. The chip can also be the cause of top compression.

For intermittent increase in height, check the MCU2600 master clock chip IC651 by replacement. It's on the digital panel.

Digital Chip Faults
Fault finding on the digital panel is not easy. The chips can cause faults for reasons that are not obvious. The following notes summarise experience in this area. Chip replacement should be done with great care to avoid damage to the print and adjacent components.

If dark, shadowy parts of the picture become dotted, the DTI2223 digital transient improvement chip IC1661 is suspect. The fault can be very intermittent. This chip can also be responsible for a blacked out picture with the sound OK, and distorted, noisy colour.

The TPU2735 teletext chip IC1771 can be responsible for some odd faults. There may be a normal picture that flashes to a white raster; no teletext with just a blue screen; or loss of the on-screen menus with random numbers/characters instead. If the blue screen fault is not caused by the chip, check C1776 (47µF, 16V) which can go short-circuit.

The SAD2140 analogue-to-digital converter chip IC1601 can be troublesome. Here are some of the symptoms it produces when faulty: a monochrome picture that goes negative; a white raster; a dark picture with weak sync; an intermittently light raster with no sync; a solarised picture; a weak monochrome picture with poor sync.

The DPU2553 deflection processor chip IC1501 can be responsible for lines on the picture over teletext and a picture that intermittently turns to a white raster.

The ACVP2205 adaptive comb filter/video processor chip IC1631 can be the cause of a dark, blank raster. In addition to sound problems (see later) the MSP2410 multisound processor chip IC1401 can be responsible for a dark raster with no sound and for the line drive cutting out after a short period of operation.

Sound Faults
Many sound faults are caused by chips on the digital panel. If there's distorted sound and popping, the ACP2371 audio control chip IC1301 is suspect. Alternatively the 10pF capacitors C1332/3 could be the cause - check them by replacement. IC1301 can cause rustling and crackling on sound, also no sound. For the latter fault, first check that the 5V supply is present at pins 4 and 44 of IC1301.

The MSP2410 multisound processor chip IC1401 is suspect for loss of or distorted Nicam sound. Before replacing it, check for dry-joints and that the 5V supply is present at pin 39. If there is slight distortion with a Nicam transmission, check the 7pF capacitors C1423/4 by replacement. If the distortion is on one channel only, the relevant capacitor (C1423/4) could be dry-jointed.

Poor Nicam sound can also be caused by the AMU2481 audio multiplex chip IC1431.

Colour Faults
If there's loss of one colour, check for dry-joints at the transistors in the relevant output stage - Q3393/4/7 red, Q3383/4/7 green and Q3373/4/7 blue. The dry-joints could also be at the CRT tube base - pin 8 red, pin 6 green, pin 11 blue. Alternatively the relevant feedback resistor could be open-circuit or high in value. These are R3394 red, R3384 green and R3374 blue. The value varies with model - usually 91kΩ or 100kΩ.

For intermittent loss of colour check crystal X1656 (17-7MHz) on the digital board - its connected to pins 12 and 13 of the MCU2600 master clock chip IC651.

Remote Control
The remote control unit gives very few problems apart from the battery connections, which are a common cause of faults with all remote control units. Check for corrosion and bent connections, i.e. poor contact.

If necessary dismantle the unit and check for sticky button contacts because of grease from fingers.

No operation can be caused by the LED being dry-jointed or incorrectly positioned.

Diagnostic Interface and Memory Pack
The Panasonic LUCI diagnostic interface has been available for a couple of years or so. There are versions for the Euro-1, -2 and -3 chassis. It connects the chassis to a PC to enable adjustment and control to be carried out via the PC using a service remote control unit. The system is particularly helpful when dealing with intermittent faults. The minimum PC requirements are a 286 or higher processor, 4Mb of RAM, 500Kb of hard-drive free space and a COM1-4 serial port. The service remote control unit is part no. TZSZEK004.

In the service mode, all TV functions can be set up using the remote control unit and PC menu options. Various diagnostic tests show whether the data bus lines in the TV set are correct and check individual ICs. The most useful type of test is called a cycle test, which helps in the search for the cause of intermittent faults. It monitors the major ICs in the receiver and reports when a failure has occurred, with an elapsed-time indication.

There is also a memory pack, part no. TZSZEK002, that gives access to the set's memory. This facility enables tuning information, customer preferences and service data to be transferred to and from the TV set. The receiver has two 21-pin scart connectors. Use the lower one for copying: plug in the memory pack, then enter the service mode. When feeding data in, the screen will display PROGRAM EXTERNAL >> TV. Press the TV set's store button and the tuning information will be stored in its memory – the screen will display LOADING while this takes place. The process takes about three minutes, after which OK! is displayed. The same basic process can be used in reverse, the screen displays being PROGRAM TV >> EXTERNAL and STORING. To get out of the service mode, simply switch the receiver off. If a problem occurs the screen will display PROGRAM ERROR! In this event switch the receiver off and try again. If necessary, check the connections between the TV set and the memory pack or check the pack's 9V battery.
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"ALWAYS THE FRIENDLY PROFESSIONAL SERVICE"
With all the microprocessors, digital equipment, computers and the like that surround us today, I thought it would be interesting to wander back to a gentler age, when TV engineers were a revered race. God-like, almost.

The year is 1956, the year I left school. There was no real career training in those days, but there was virtually full employment. In fact there was more likely to be a shortage of manpower than. We were still in the post-war recovery era.

A Start
When I left school I had to find a job for myself. Having an interest in electronics, I naturally made a beeline for the nearest radio and TV repairer. As luck would have it, there was a notice in the window. "Improver required" it said. This meant that whoever got the job was expected to improve! It was a bit like an apprenticeship without the formalities. The training would of course be only as good as the engineer who provided it, and the amount of time he could manage to spend on it.

I got the job. The engineer who interviewed me was impressed with my basic knowledge, so that was it. I was taken on at the princely sum of two pounds ten shillings a week (£2.50 in modern money). I remember giving a pound to my mum, and living for a whole week or more on the rest. I should mention that I was paid cash-in-hand, so there were no deductions for income tax and the like. It was quite common then.

The Sets
An interesting point about the period was that one gained first-hand knowledge of pre-war, 1936-9 vintage sets, many of which were still in use. It was some weeks before I could work without supervision, but I was eventually left to get on with things.

One of the first jobs I had was to replace the tube in a Philips projection TV set. Yes, they had them then! It was a horrendous beast, all valves of course, and produced a 405-line black-and-white display. Because of the cost of tubes in those far-off days, TV pictures tended to be 9-12in. in size. Anything larger was expensive by the standards of the time.

The Philips set was a back-projection type. It produced, on a prismatic screen, a picture with a diameter of about 16in. The source was a 3in. Mullard MW6-2 CRT which ran at an EHT of 25kV. Viewing had to be in total darkness! It was a noisy set in operation. As it used the 405-line system the line timebase worked at 10,125Hz, just within the range of human hearing - and pretty audible if you were youngish. This was true of all the sets of the period. But this projection model had one other annoying feature.

In those days there were a number of ways of generating the EHT - not all sets used flyback EHT, though this was shortly to become standard. The Philips projection set used a 1kHz oscillator as part of the EHT generator section. With the noise of that, beating against the line oscillator, well you can imagine!

If one of these sets suffered from field or line collapse, there would be a bright horizontal or vertical line respectively. This would immediately burn the tube, which would require replacement. What, no protection? Well, there was a safety circuit of sorts. If I remember correctly, it used an EB91 double diode. The circuit worked, but cowboy engineers invariably removed the valve. This made fault-finding much easier!

Tube replacement was difficult to say the least. It was encased within the optical projection unit, a series of front-aluminised mirrors. There was a glass shroud around the tube's EHT connection. There was a glass shroud around the tube’s EHT connection. It made the EHT lead difficult to remove. Anyway, having eventually fitted a replacement, it was switch-on time. It took two minutes or more for the set to warm up. I waited expectantly. Then a fuzzy line appeared on the screen. I had a fit of horrors as I realised that in my enthusiasm to fit the tube I’d not dealt with the original fault. The result? Another burnt tube. The boss was not impressed.

I survived this setback, and subsequently had to replace another tube - I became quite good at doing this.
The set was a large, pre-war Marconi one. It had an Emiscope tube with a very long neck – so long that the tube had to be mounted vertically in the cabinet! There was a mirror in the cabinet top, which locked at an angle to enable the picture to be viewed. With Al’s help, I was able to stand on some steps to feed the new tube into the deflection coil assembly. After that it was plain sailing.

Incidentally we were able to replace the tube only because we had another one of these sets in the workshop. It had been damaged during an air raid, and I was told that it had been sitting there since the business resumed fully some time in the early Fifties. Fortunately its tube was intact.

Then there was the Philips Model 520A, a combined radio/TV set. Invariably the drive cord broke, so the radio couldn’t be tuned. In those days radios used variable capacitor or, sometimes, variable reactance tuning – definitely not the PLL arrangement. Somehow I muddled through and got my first one working. But it didn’t seem to have the original smooth tuning action.

Because CRTs were so expensive, the sets had quite small pictures. A way to make them larger was to attach a magnifier to the front of the set. It consisted of a plastic lens that was filled with liquid paraffin. Sometimes, through accident, a customer would lose the liquid paraffin. Guess who had the job of filling up again?!

**Band III**

One of the reasons why my boss had advertised was the advent of Band III TV. This was the start of commercial television, which became known as ITV. In the London area it used Channel 9. The additional channel per area meant that a lot of converting had to be done to enable older sets to receive a Band III signal as well. The converter units took many forms, and names like Brayhead and Cyldon come to mind. They were manufacturers of turret-type tuners that could be used to convert most types of receiver.

At that time there were still a number of TRF (tuned radio frequency) sets around. As there had originally been only one station (BBC) in each area, it hadn’t been necessary to produce superhet TV receivers. With the advent of the new channel we finally said goodbye to the TRF receiver.

The purpose of the Band III converter was to convert the frequency of the ITV signal to that of the local BBC channel. Anyone who wanted to view ITV with an older set would have to have a converter fitted. Our recent experience of Channel 5 beating with the output from VCRs etc. is similar to the sort of trouble technicians experienced in the Fifties with their “front-end” converters.

**Odd Devices**

There were some rather odd devices around at the time. One was the ‘converted oscilloscope’. You could get a kit which converted an early oscilloscope into a 405-line TV set, albeit with a green picture! These devices existed because the price of TV sets was beyond the means of the average person.

Prices were often quoted in guineas. The smallest type of set would be priced at around 59gns, which was £61-19-0d (£61.95p). Since wages were around £10 a week and TV was on only from late afternoon till about 10 p.m., buyers were not exactly beatiing a path to the door of the shop! But the converted oscilloscope made it possible for an average working-class family to sample the delights of the BBC-only service.

Oscilloscopes could be bought from the many government surplus shops that sprang up at about this time to offload no longer wanted war-time equipment. Some kits came complete with a scope and all the necessary parts. If you wanted the sound as well you could pick it up via a separate tuner designed for sound only, or from the medium-wave band. But you had to make the tuner yourself!

Another odd device that found its way into our workshop was a wire recorder. This device, which could record sound only of course, was used in some allied aircraft and by some support units, and probably had other uses during the war. It consisted of some very simple electronics, a large bobbin of wire that moved at a hell of a pace, and an electric motor. The wire would sometimes break. If it did, you just tied a reef knot in it and away it went. Maximum response was up to 5kHz.

**Radio Sets**

In those days radio sets were of the four- or five-valve superhet type. They were often designed for AC/DC operation – there was still quite a lot of DC around at the time. As the DC varied from area to area, either a drop-per resistor, with a series of taps on it to adjust for different input voltages, or a ‘line cord’ was used. The latter was a mains lead that had a given resistance per unit length. It could thus be cut to provide the required voltage drop to match the mains input to the receiver.

Because the line cord was used to reduce the voltage, it got warm. If hidden beneath a carpet, it could catch fire. Very often the owner would shorten the lead to make it neater. Next time the set was switched on all the valve heaters would blow! The line cord wouldn’t pass safety standards today.

Stereo radio had just recently been introduced. But I never saw a receiver until the early Sixties.

**Then and Now**

Back then we repaired anything and we enjoyed doing it. We were highly regarded as well. Yes, believe it or not, it was a prestige career in those days. Since then almost every aspect of electronics has changed.

The single most important development was the invention, in 1947/8, of the transfer resistor, or transistor as we know it today. It didn’t change things immediately: in fact I didn’t see a transistorised device until the early Sixties. But it made a tremendous difference, eliminating the power-hungry valve, reducing the size of everything very considerably, and paving the way for the microprocessor, without which there would be no computers.

Looking back, those days were simpler and quieter times. They are now fading into the pages of history.
This year the Tour de France started in Cork, Ireland. This signal is via the Telecom 28 satellite at 5°W.

Terrestrial DX and satellite TV reception and news. A useful preamplifier design for the TV bands. Roger Bunney reports

Terrestrial DX-TV reception during July hit an all time low. Those who have written in have all reported a flat month with little by way of encouragement. But, as I bang the keyboard on the evening of August 5th, Sporadic E propagation seems to have returned, with strong though ‘muddy’ signals from the Adriatic region across channels E3-4. The monthly report is a short read this time:

5/7/98 RAI (Italy) chs. IA and B; TVE (Spain) chs. E2, 3; NRK (Norway) E2, 3; PTP (Russia) R1; HRT (Croatia) E3; RTS (Serbia) E3.
15/7/98 RAI IA, HRT E4; TVE E3.
17/7/98 RAI IA, B; TVE E3; RTP (Portugal) E3; ARD (Germany) E2, 3.
18/7/98 HRT E4
27/7/98 SVT (Sweden) E2; NRK E3.
30/7/98 HRT E3, 4; RTL-Club (Hungary) R2.
4/8/98 TVE E3.

The late May-June period was very active, with some interesting reports of 50MHz amateur radio contacts. There was transatlantic reception on May 24th and June 4th, including the Canadian beacon VE8BY. On June 10th at 1800 hours the Cornish beacon GB3MCB was heard for ten minutes by VE1IW.

A reader has sent me a videotape that shows reception of digital TV test material transmitted from Crystal Palace on ch. E28. There’s an up-market promotion showing the good life with digital TV, multimedia operation, thousands of channels, interactive TV and so on. For me the best shots were those that showed TV activities at Alexandra Palace in the pre- and post-war 405-line era!

Satellite Sightings

The Orange marches hit the headlines from July 5th. SNG trucks started to roll in at Drumcree from around the 6th - the media had been allocated a road by the military to set up its uplink trucks and scaffold towers. On one side there was a potato field, on the other were the army, ambulances, tents and so on, obviously entrenched for a fair duration. The Orangemen’s camp was farther along the road, with banners and, rather incongruously, an ice-cream van in the middle.

There were inserts for national and regional news, the Telecom satellites at 3°E and 5°W being particularly active with outgoing feeds. The occasional camera shot during a scaffold tower rerig might show the neighbouring SNG truck/tower with reporter, floor manager plus camera and sound operators clustered together atop the small platform.

The Orange march through Belfast on the morning of July 13th was carried by Intelsat K. UKI120 and UKI76 were both busy with the marches, mainly on the 13th. A new uplink identification, UKI31 (ITN Mobile Edit), was seen via 3°E at 12-612GHz vertical with live two-way coverage from Drumcree.

On the 6th a new SNG truck, BBC-UKI234, was seen feeding a live insert from Aberdeen to the BBC Scottish magazine programme, again via Telecom 2C at 3°E, this time at 12-659GHz. The broadcast was to mark the 10th anniversary of the Piper Alpha oil drilling rig disaster.

A spectacular night-time concert from beneath the Eiffel Tower, Paris on July 10th was seen via Intelsat K (21.5°W), first with a caption that read “test for the three tenors concert”. The following performance was magnificent, with Pavarotti and the rest singing on an open-air stage. The lighting effects were fantastic, as were the shots of the Tower after the concert. The BBC transmitted the concert some nights later.

Sports predominated as usual during the summer months. There was plenty of golf, from Illinois via PAS-3R and via Telecom 2C with the Standard Life Loch Lomond and the British Open Golf tournaments. Interesting that TV Osaki took the latter from the start of play at 0900 hours via PAS-3R (UKI35) at 12-708GHz horizontal with NTSC colour.

We also had the traditional July
Tour de France, which this year started in Cork, Ireland on the 13th. UK1294 was used, with transmission via Telecom 2B at 5°W. The Tour is noted for dramatic OB coverage from the air, from cars and motor-cycles and from the kerbside. As ever the technical quality was excellent, with crisp pictures.

Roy Carmen (Sandown, Isle of Wight) comments on Libyan TV via NileSat-1 at 7°W. It seems to occupy as much transponder capacity as CNN. Col. Gaddafi is often seen via 7°W, 1°W, 16°E and 30°-35°E fronting the Peoples Revolution TV. That and Saddam Hussein’s sabre rattling (early August) provided news for those interested in Middle Eastern politics.

On a personal note I’ve just brought back into operation my old 1.5m dish, with a 17°K C-band LNB. This gives remarkable noise-free reception from Arabst at 26°E and fair mono quality reception of TV Mauritania at 30-35°E, using a 7dB threshold manually-tuned receiver. It proves that for reasonable band C results you don’t need a 20ft dish and a high-specification, low-threshold receiver. More on this next month.

Terrestrial News

Middle East: The ERP of the Syrian ch. E2 SRT-2 transmitter at Home is 80kW. All the Lebanese ch. E2 transmitters are now off air. Careful measurements in the Netherlands suggest that there’s a ch. E2 transmitter in operation at Tehran, Iran carrying the IRIB-2 service on the same location as the ch. E4 IRIB-1 transmitter. During recent SpE openings Ruud Brand measured two Iranian ch. E2 transmitters, at 48-2402 and 48-2606MHz, using an Icom R7000 receiver.

Equatorial Guinea: The ch. E2 Malabo transmitter has been received recently. Programmes are transmitted from 1445-2300GMT at 1kW ERP with horizontal polarisation and PAL colour. The transmitter is at 3km ASL at Pico Basile, south of Malabo town. The vision carrier frequency was measured and found to be 48-2504MHz. A logo, TVGE, is sometimes present at the corner of the picture.

Sri Lanka: The commercial Independent Television Network has been transmitting selected English-language programmes from the Deutches Welle satellite service for six hours weekly since July 14th. The feed comes via AsiaSat-2 as a digital signal. Spain: Terrestrial digital TV test transmissions have started - George Gaskin (Gibraltar) has been monitoring the ch. E29 signal, from an unknown transmitter, since early May. There are colour bars with the caption “Emision Experimental Prueba DTT” inlaid – prueba means test.

Australia: The government passed legislation in early July confirming that digital terrestrial TV and data-casting will start in January 2001. From that time all three commercial networks are expected to offer HDTV.

Taiwan: A public service TV channel has come into operation. The UHF transmissions must also be carried by cable services.

Botswana: A national TV service is to start next summer, in cooperation with the present single commercial station.

Switzerland: A new private, German-language TV channel is to come on air this October, called Tele 24.

Latvia: A majority holding in Station 31 has been bought by a Scandinavian broadcaster. The service is to be relaunched as TV3 Latvija.

UK: The Isle of Wight RSL station TV12 has yet to start its service. Frequency clearance is apparently being held up by the French. The Chillerton Down transmitter is likely to be used.

Satellite News

Eutelsat is still arguing over the 29°E slot, pointing out that SAASat at 28-29°E is also in breach of ITU regulations. A new satellite called RESSAT has been ordered from Matra Marconi Space to guarantee service continuity in the event of a launch failure of one of the new W series satellites – the first of these is to be launched next month (October). It will be delivered in December 1999 for use at 7, 10, 16 or 36°E. Based on the Hot Bird design, it will have 28 transponders.

Good news about AsiaSat-3, which went into incorrect orbit last December, becoming an insurance write-off. Hughes Space, in partnership with the insurance company, first attempted to recapture the HS601HP satellite last May, by firing on-board rockets then using the Moon to adjust its trajectory. The results were so successful that a second attempt was tried in late June. This resulted in the satellite achieving a satisfactory geostationary orbit. It’s now slotted over the central Pacific, awaiting clients. It also has a new name, HGS-1 (for Hughes Global Services). A remarkable operation.

Less happy news from Hughes. A ‘primary control processor’ aboard three different satellites, Galaxy VII (May 13th), Galaxy IV (June 13th) and DBS-1 (July 4th), has failed. Back-up systems have been launched in May, and ALIGNMENT and 16 June. This resulted in the satellite

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An analogue test pattern is required to align dishes for SkyDigital’s services.

enabled operations to be maintained. Satellites in production are being modified to overcome suspected causes of the problem.

World Television News (WTN) is likely to disappear as an on-screen log following WTN’s takeover by Reuters, leaving just APTV as a commercial rival. Reuters is increasing its daily news/media service to the West Pacific/Asian market. APTV has signed a deal with NHK Tokyo to supply news until 2001.

The economic problems in SE Asia are delaying satellite deliveries. Delivery of Telenor’s Thor-4 satellite (1°W) has been put back to 2000. Thor-3, at the same position, has adequate capacity for the present.

A new digital service has been started by Canal+ Polska and Polsat TV, in competition with Entertainment Wizja TV. It will broadcast from 13°E initially, with nine channels.

The three French digital TV services AB Sat, CanalSatellite and Television par Satellite now have over three million subscribers, exceeding the cable networks’ customer total.

Subcription turnover should exceed SUS250m this year.

Arabsat is to use Hot Bird 4 (13°E). The organisation’s receiving facility at Tunis will accept channels from North Africa/the Middle east and uplink the package to Hot Bird for free delivery to the Arabic community across Europe.

Intelsat 805 is now in operation at 55.5°W with three 52dBW Ku band and 28 41.5dBW C band transponders, giving direct links between Europe and the Americas.

The Howes SPA4 Amplifier

Various aspects of signal phasing to provide co-channel interference reduction have been discussed in recent columns. The Howes SP4A amplifier kit, which is relatively cheap, was used in one phasing system. It’s actually an ideal aerial-signal preamplifier design for TV/FM-DX or scanner applications. Provided the instructions are followed, you can’t go wrong.

The SPA4 kit consists of two ready-etched PCBs, all the components required and full instructions. One PCB is used for the head-end amplifier, which is powered at 12V via the coaxial downlead cable from the indoor interface PCB. The latter provides 12V DC injection, at 20mA, and switchable 0-10dB attenuation: the choice of a box in which to house it is left to the constructor.

The head amplifier PCB is small, just 40 x 28mm. Its housing is also left to the constructor. A section of 1.5in. PVC water pipe is suggested, though Howes can supply a weatherproof box as an extra.

My own need was for a couple of indoor preamplifiers. I housed them in a diecast box, using traditional Belling-Lee sockets, with switched DC supplies to each amplifier PCB. The accompanying photograph shows it all. I didn’t need the interface PCBs, which were discarded. Construction is simple, but take care to avoid splattering the IC amplifier with static.

My interests lie across the TV spectrum, from about 48MHz upwards. Previous experience has shown that a VHF choke should be fitted across the input to avoid MW/SW breakthrough and overloading from nearby transmitters. In this case I used the RS 1A type as I had access to some, but you could use say twelve turns of 20-26g enamelled wire wound on a ferrite core.

The amplifier design was modified slightly for indoor operation from an external DC power supply, but the changes make use of components supplied with the kit. Fig. 1 shows at (a) and (b) the original and modified design, using the Howes kit component reference numbers.

Once built, both amplifiers worked immediately. There were no problems and the results were impressive. Two accompanying photographs show before and after results using a Band I aerial for ch. 66 reception.

The gain figure quoted by Howes is 15dB minimum over the bandwidth 4-1,300MHz, “with useful results outside this range”. The

A weak ch. 66 signal received without the SPA4 preamplifier.

The same signal received with the SPA4 preamplifier in circuit.
noise figure quoted is less than 3dB rising to 3.4dB at 1,300MHz. I cannot measure noise figures, but the voltage gains checked out OK. I cannot measure noise figures, but the voltage gains checked out OK. The SPA4 preamplifier kit costs £15.90 plus £1.50 post and packing to UK destinations, VAT included. The address is C.M. Howes Communications, Eydon, Daventry, Northants NN11 3PT, telephone 01327 260 178. The company has a 1998 radio kit catalogue that’s available on request, but two 26p stamps should be included.

Having used other kits from Howes’ quite extensive though radio-oriented range successfully, I recommend the company’s products.

Fig. 1: (a) The basic Howes SPA4 preamplifier circuit for masthead use. Powering is via the downlead. (b) Modified circuit for use as an indoor TV preamplifier - component reference numbers are those for the actual kit. R7 could be replaced with L1 from the kit as supplied. See text for details of choke CH.
Reports from
Ian Field
Gerry Mumford
Adrian Spriddell
Russ Phillips and
Nick Beer

Fujitsu/ICL Ergo Pro 141V
There was a dim picture because the tube’s emission was low. I was able to cure this by reactivating the tube’s cathodes. The way I do this is to disconnect the control grid pin then advance the setting of the first anode control. Once the emission has recovered I leave the monitor for 24 hours on soak test with a peak-white test pattern to stabilise the cathodes.

After doing this I traced the heater lead back to the chopper power supply and replaced the two electrolytic capacitors I found here - to ensure that the heater supply was not degraded. I.F.

Compaq 420T
This monitor was dead. I discovered that brown glue had lead to tracking between the chopper transistor’s snubber network diode and R29 (10Ω) in its base drive circuit. Fortunately the only damage was to R4 (0.56Ω, 1W fusible) and burn marks on the PCB.

Once this damage had been repaired the monitor worked, but there was wildly erratic brightness. More brown glue, this time on the CRT base panel, caused leakage to the first anode connection.

I think the T suffix means that production was shifted to the place where they put brown glue on anything likely to track across! I.F.

Capetronic PMA1404
There was no display because the CRT’s heaters were out. The feed follows a roundabout path via the screened video output module, which is balled to one corner of the chassis. A flat cable between the main PCB and this module carries most of the connections to the CRT base panel, as in the AST LR14. The heater supply is at the fifth conductor from the rear of the monitor, working from the opposite end of the flat cable to the ‘pin 1’ red tracer. The feed from the chopper transformer is via R63 (0.22Ω, 3W), which was OK, and D64 (30DF) which had pulses at its anode but nothing at its cathode. This diode read OK when out-of-circuit, but was unable to pass sufficient current to light the heaters. A replacement restored the display. I.F.

CTX 1565D
The top few millimetres of the picture were very slightly expanded and liney. When the frame output waveform was checked with a scope, a small pulse burst could be clearly seen on the ramp. The frame output IC, the flyback boost capacitor and diode were replaced, but the cause of the fault was eventually found to be C808 (0.1LIF, 25V), which is part of the usual RC network in the frame scan circuit. It had become leaky. G.M.

Dell D1428HS
There was bad bowing and excessive width, neither of which could be controlled via the on-screen menu system. The cause of the fault was the 2SD1138 pincushion correction output transistor Q335 which was short-circuit. G.M.

Gateway 2000 CS1776LE
If one of these monitors is dead and clicking, check the 2SC4747 line output transistor Q109. You will probably find that it has gone short-circuit because C123 (1µF, 50V) in its base drive circuit has fallen to about half the correct value. It is also advisable to check the IRF740 PET chopper transistor Q116 and its 1Ω, 0.5W feed resistor R177. In about fifty per cent of cases a short-circuit line output transistor will destroy these components. G.M.

Dell D1526THS
As there was a virtual short across the HT line, this Sony-based monitor was dead with its power supply tripping. The cause was none of the usual suspects however. It was eventually tracked down to D204/5, two small-signal diodes on the video PCB! They are both unmarked, but two 1N4148 diodes solved the problem. G.M.

IBM 8512-002
When one of these monitors is dead you will usually find that the 2SD1739 line output transistor Q202 has gone short-circuit because its base drive coupling capacitor C222 (10µF, 50V) has dried up. For power but no EHT, check C226 (1µF, 200V) in the line output stage.

For bad EW bowing check C225 (22µF, 50V), which is also in the line output stage. G.M.

EMC EM1428
When this monitor had been on for about half an hour line tearing would start. It would then get progressively worse, until the picture would collapse completely. On investigation I found that the 7805 5V regulator IC502 was running very hot. It’s not mounted on a heatsink, so the 400mA it was supplying was obviously excessive. A few checks revealed that IC601 (74LS86) was drawing 300mA! A replacement cured the problem.

Note that this monitor is also badged MTC. G.M.

Samsung CQA4147L
Whenever one of these monitors comes in for repair, C609, C616...
and C618 in the power supply should be replaced. They are often the cause of a dead monitor. D407 in the line timebase has also been known to fail.

A word of warning however. Before plunging in and replacing things, take a good look at the green hybrid HV2 (IC402). You may find that there are dark brown patches on it. If so you will need a new IC in addition to anything else that has gone bang.

We know of no source of these ICs other than possibly Samsung. A.S.

**Idek MF5315**

This monitor’s line timebase was out of action because D946, type MTV32-400A, was short-circuit. As we were unable to find a source of an exact replacement we fitted a UF5408, which is available from Farnell. A.S.

**Viglen MT1428LE**

There was a very dim display with no contrast control operation. R475 (200kΩ) had risen in value to 3.3MΩ. R.P.

**AOC 4NIR**

If there’s flickering in the high-resolution mode, check C422, C419 and C432. It’s more likely that the cause will be dry-joints at P401 and Q708 however. R.P.

**V-Tech EM1430K**

This monitor was reported to be dead, but the fault was actually no vision. Although I didn’t have a circuit diagram, the general arrangement was fairly obvious. The power supply was working: there was an HT output, but this didn’t reach the collector of the line output transistor or pin 2 of the transformer. L508 in the feed was badly dry-jointed – as was much of the rest of the monitor. N.B.

### Notes

**Possible Faults**

No video: Check whether ZD402 is fitted. If not, add a 1kΩ resistor in this position.

Video jitter: Add a ferrite bead at J402 (use the one removed from location BC401).

Q414 and Q416 short-circuit, D418 and D419 open-circuit: Cause is defective T401. Replace all these items.

**Notes**

One of the problems with these monitors is that when some SVGA cards change modes they put out a very fast rise-time spike which kills the MJM16212 line output transistor. The cure is to add a ferrite bead at the transistor’s base connection.

In some of these monitors the line and field sync signals to IC107 from the 9-pin DIN video input socket at the back are reversed. The monitor will come on then tell you that the video signal is missing.

### Acknowledgement

The above information was provided by Bob Yount of MI Technologies Inc.
Curious faults and curious customers. Some TV sets and other items that have come Donald Bullock's way this month

I've done away with my Very Cruel Shocking Machine - it gave me more Vicious Shocks and dancing lessons that I've had from a lifetime in this trade.

The turning point came when Greeneyes screamed blue murder from the kitchen. I scrambled from my writing hut to help her, got tangled up in the wires yet again and finally tottered into find her standing on a chair gibbering at a spider.

The dogs nevertheless bring me compensations. Whenever they annoy me and I get stroppy Greeneyes makes me one of her excellent bacon and vegetable pies to sweeten me. To make sure that they work, I reach for my giant wineglass.

I've had a couple of these pies recently. One was presented to me a week or so after I'd struggled up our front drive with Father Docherty's TV set and trod in a huge dog-bowl full of water and fallen down. Father Docherty heard me bawl a Very Naughty Word. He crossed himself and clicked his tongue seven times before he scammed off.

An ICC7 Chassis
His set, which was dead, was a Ferguson Model B59F (ICC7 chassis). I soon found that the mains fuse had blown, so I checked for shorts, fitted a replacement and gazed intently at the chassis as I held my breath and switched on. There was a huge and instant EHT flashover between the tube's anode cap and its earthed Aquadag coating.

The cause turned out to be one of the tuning capacitors in the line output stage, CL21. Its value is 11.5nF, with a voltage rating of 1-6kV. The value varies with different tubes and with a voltage rating of 1-6kV. The put stage, CL21. Its value is 11.5nF, the tuning capacitors in the line output-earthed Aquadag coating. between the tube's anode cap and its huge and instant EHT flashover breath and switched on. There was a
told that you're a man who likes a good romp with his dogs, Mester Ballock" he said. "Well I likes dogs too. What would we do without them?!!"

It was another dead set. After ensuring that the bridge rectifier was developing 16V at the DC fuse F402, we bridged the relay switch RLY401 to pass the supply to the regulator IC402. The voltage fell to 11V, and IC402 could muster only 9V at its output.

The line output transistor was running hot but tested all right. Our checks on the supply to the line output stage brought us to the heavy-weight FR605 diode D410 which was dead short. It feeds pin 8 of the LOPT. A replacement cured the trouble.

It was the jovial Father O'Malley who came to collect the set. Greeneyes' dogs ran a friendly sortie around him. He spun around a bit then fell down.

"Oh, er - they've never done this to anyone before!" I faltered, feeling my thigh and hip as I helped him up.

"Makes no difference t' me" he said, "personally I hate dogs. Every I scanned the label and discovered that it was dog food. My accusations of attempted murder duly brought me another bacon pie.

When I returned to the workshop I found that Steven had replaced the chip. He switched the set on and it blew up again.

"Can't go on like this" he said, "we'll have to ring NEI - they've got a very helpful technical chap."

We were told that this does sometimes happen and that there's a power supply repair/modification kit. It costs about £20 - and did the trick.

Here's what you get: the NEI 2891FTXN Mrs Whiner asked me to bring in this monster set (another Nikkai chassis) from her car. She complained that the picture was slightly cramped and sometimes bounced. But when I plugged the set in and switched it on, in front of her, it exploded. This made her squeak a bit and dab at her eyes. But I managed to raise a false laugh and said that I'd have it right in no time. She pulled herself together and left.

I was almost afraid to take the back off but, being a stiff upper-lip type, I managed it. The top of the TDA8380 chopper control chip IC100 had blown clean away.

This was back in England, and Steven was hovering behind me. I turned to him. "Feel it's time for a cup of tea" I said, preparing to slink off, "do you?"

While in the kitchen I felt peckish and cut myself a slice from a huge polony-type thing I found in the fridge. It tasted horrible and was gritty. I scanned the label and discovered that it was dog food. My accusations of attempted murder duly brought me another bacon pie.

When I returned to the workshop I found that Steven had replaced the chip. He switched the set on and it blew up again.

"Can't go on like this" he said, "we'll have to ring NEI - they've got a very helpful technical chap."

We were told that this does sometimes happen and that there's a power supply repair/modification kit. It costs about £20 - and did the trick.

Here's what you get: the TDA8380 chip IC100; the TCDT1101 opto-coupler IC101; the SGSIF344 chopper transistor TR100; the 5-1V zener diode D104; R109 (13-7kΩ); R102 (0.22S2); C107 (13.7kΩ); R102 (0.22S2); C107 (10nF, 50V); C108 (33pF, 50V); C122 (22µF, 100V); also a 3-3µF;
Another Matsui 209T
Just then a chap ambled in carrying a 20in. Matsui set - Model 209T. He plonked it down on my hand. I tried my fingers: they still worked. "By the way" he said, "the picture's faulty."

"Name?" I asked, drawing over a job card. "Matsui" he replied. "By the way, the picture's faulty."

I wrote "Mr Prat" on the card. "What's wrong with the picture?" I asked.

"Ah, it's faulty" he said. I waved him out and pulled the set on to the bench. The picture was cramped, with foldover. The field output stage uses a pair of transistors, and I saw at once that C303 (3.3g, 160) was bulging and ready to burst. The circuit diagram says that C303 is a 10pF, 50V capacitor to replace C109, which was originally 2.2g.

"That'll cost a few quid to put right." I said, backing away a bit.

She looked at me and grinned. "Okey-dokey matey" she said. "I ain't mad, mind."

As I moved the set over she prodded out. The set was a TVR141, which is a combined TV/VCR unit. Steven found that it had a fault in each section.

The screen would intermittently flash to peak white, with flyback lines across it. We traced the cause to a poorly crimped wire at connector CP803 on the tube base panel. It provides an HT feed.

Paul took over to deal with the VCR fault. When a cassette was inserted it went in an inch then the deck reverted to standby. After switching on again the cassette travelled in another inch. If you repeatedly switched the machine back on the cassette would eventually disappear inside and play normally. The cause of this curious behaviour was the mode switch, which was dirty. It's under the deck, and is quite easy to take out and clean.

The Ann Hodder that came to collect it was the back-street one - until she'd paid and picked up the set.

"Good-bye and thank you very much, gentlemen" she sang. "Aim veray grateful."

A Monitor
An Eco Scan 15 VGA monitor, Model AL5064PD, was sent to us by the local sollicitors Dewey, Squeezem and Howe. It was made by Mitac International. We were told that the display had gradually become darker and darker over the past year. This was another one for Steven.

"Most monitors are set to work at full contrast to produce a sharp image at low brightness" he commented, as he pulled it on to his bench. "Bright screens can cause headaches and migraine. This one's four years old. I reckon the tube might be flat."

But when he switched it on there was no blue in the display. The blue bias preset on the tube base had no effect. A further check showed that it had no connection to chassis. R714, a 51kΩ, 0.25W resistor, was open-circuit. Simple fortunately. A replacement put an end to the problem.

Ribby Ellis
Ribby Ellis likes a good laugh - at the expense of others. "Who ran into your car?" he asked, jerking his thumb in the direction of the door. "That'll cost a few quid to put right." I ran out, fearing the worst. But the car was perfectly all right. I returned to find Ribby creased up with laughter.

"OK Pratty" I said, "what brings us the pleasure of your company this time?"

He fetched a GoldStar RQ205 VCR from his car. It looked new. "Doesn't play right" he said. "Seems jerky and inconsistent, and switches to standby when it gets warm. Then it won't start again till it cools down."

There's a separate power panel on the left inside this machine. The KIA7806 6V regulator (IC101) on this panel provides the 6V always supply, which is very critical. When it falls slightly the microcontroller chip shuts the machine down.

We soldered a wire to the 6V always supply, boxed the machine up and ran it with a DC voltmeter connected between the wire and chassis to monitor the voltage. Sure enough as the machine warmed up the voltage fell and the tape transport faltered in sympathy. After a while the machine switched to standby. A replacement KIA7806 regulator cured the fault.

With manuals at today's prohibitive prices, we don't have the luxury of a comprehensive stock of them. Our suspicion is that in this model the capstan motor depends on the 6V always supply. Anyway we keep a few of these regulators in stock, as we've had them play up before in these machines.
Auto-focus Lenses
The subject of auto-focus lenses came up in this column recently (Sanyo VMEX280P, August). There's rather more to it than was suggested.

The lenses used in early video cameras and camcorders were quite long, with the focus elements at the front and the zoom elements at the rear. Zoom/focus tracking, which determines the quality of the lens, was set optically during manufacture.

To achieve a wider zoom range and faster auto-focus operation with a small overall length, more modern camcorders use an 'optical block' with the focus elements at the rear and the zoom elements at the front. Optical zoom/focus tracking is not possible, and is therefore set by a microcontroller/EEPROM arrangement. For this to work, the optical block includes encoders that sense the position of the zoom and focus elements. The zoom encoder must never be undone: the focus encoder should not be undone unless you have the software to set it again. These encoders usually consist of variable resistors, but LED/optical or Hall-effect devices may be used. The latest digital camcorders have a linear focus motor that moves along two shafts: its position is sensed by a Hall-effect variable resistor.

The zoom encoder sends information on the position of the zoom elements to the microcontroller chip, which then adjusts the focusing in accordance with a zoom/focus tracking curve (see Fig. 1) that's held in the EEPROM.

There's a set-up facility for correct tracking in the manual mode. It has nothing to do with auto-focusing. The set-up involves obtaining correct focus at each end of the zoom/focus curve, wide and tele, plus some adjustment along the curve. The latter (centre tracking) can be adjusted either by moving the focus encoder then readjusting the values at the wide and tele ends, or by storing software data values - by testing the tracking against a reference curve. What all this means is that no two optical blocks are the same, nor is the data stored in the EEPROM.

To check the manual tracking the auto-focus must be turned off. Select an object at infinity, say a tree 20m or more away, though across the room is OK for test purposes. Zoom in to tele, focus on the object manually, then zoom out. The chosen object should remain in focus throughout the zoom. Small focus corrections can sometimes be seen as the microcontroller chip adjusts the focusing to correspond with the zoom/focus curve stored in the EEPROM. The curve is much steeper at the tele end, so the errors will be greater here - an error will show up if there is one. At the wide-angle end the back focus may in particular be incorrect, the whole scene going out of focus.

If the auto-focus is off, it will try to correct for tracking errors. If these are present it will work much harder than it should do. You might think that the optical block is OK, as focusing is maintained. But this may not be so. In such a case the zoom/focus tracking errors will cause auto-focus delays - with some scenes the system will struggle and take longer than normal to settle. If the back focus is too far out, the correction may never be right at the extreme wide-angle end of the curve.

As zoom ranges increase (we are not talking about digital zoom of course), alignment becomes more critical, particularly the x10 and x16 ranges. Auto-focus won't cover up for swapped EEPROMs.

Some camcorders are difficult and fiddly to set up. With other models I fit a collimator with an infinity Siemens star, hit the computer's start button and have a cup of coffee while the software sets up the optical block and stores the values in the EEPROM. S.B.

### Panasonic NVM7B
This machine would play back only in black-and-white: the E-E camera picture was OK. The cause of the fault was traced to the chroma amplifier transistor Q8006. A replacement and service restored the unit to normal working order. D.C.W.

### Sony CCDF450E
One of these popular camcorders arrived with a report that said "poor playback colour; intermittent, weak E-E colour". The cause of the problem was four faulty capacitors, C310, C311 and C263 on board VA46P and C411 on board VS67. Unusually, there were no other faulty capacitors. D.C.W.
It wasn’t lightning that had killed the JVC TV Model C21ET1EK – the local storm was just a little diversion thrown in by Zeus to confuse the issue. As if our workshop technicians weren’t confused enough already by the increasingly difficult problems that come our way and the very taxing matter of trying to reach correct diagnoses.

In fact the cause of the blow-ups and breakdowns with the JVC set arose from problems within the set, specifically failure of the electrolytic capacitors C909 and C911. The former is the reservoir capacitor for the feedback supply on the primary side of the chopper circuit, while the latter is the chopper transistor’s drive coupling capacitor. To make our difficulties more embarrassing, it turns out that this is a well-known fault. It is to us as well now. It shows how useful it is to check with the setmaker’s technical department, look through technical bulletins – or, of course, pay proper attention to the contents of Television!

When these capacitors are defective the power supply regulation is impaired: the output voltages can rise dramatically, stressing the power supply, the line output stage and other parts of the circuitry.

For this specific problem there are parts kits to improve the reliability of the power supply – different kits for the 21 and 14in. versions of the chassis. They are available from JVC and from component distributors. In addition to the troublesome electrolytics, the kits contain several other components – and a sticker to put on the back of the set once you’ve fitted them all. It’s as well to replace a couple of zener diodes as well, as Cliff Martin pointed out last month. As I write this the sky is darkening and it’s as well to replace a couple of zener diodes as well, as Cliff Martin pointed out last month. As I write this the sky is darkening.

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Early days perhaps, but it’s never too soon to get to know how to tackle new technology. This introductory article by K.F. Ibrahim outlines the ways of testing the various sections of a digital TV receiver/decoder. Essential reading!

Review: The JBC Advanced Soldering Station
The latest consumer electronics products, especially digital, use high-density PCBs. This means problems with soldering – unless you have the right equipment. The JBC Advanced Soldering Station is a third-generation design that uses a new method of soldering iron tip temperature control, enabling a very small tip to deliver plenty of heat. Steve Beeching explains what’s involved and how to use the system.

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Answer to Test Case 430
- see page 855 -

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<th>1+ PRICE</th>
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<td>TWINSPEED VHS</td>
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<td>CD MICRO, MIDIS + MINIS</td>
<td>£35</td>
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