Hitachi VT8000 Series VCRs
Low-cost Teletext Decoder Project
Interference Problems with VCRs
What Word Processing can do for You
VCR Fault Analysis • DX-TV
TV Fault Finding • VCR Clinic
**MANOR SUPPLIES**

**MKV PAL COLOUR TEST GENERATOR FOR TV & VCR.**

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
<th>Features</th>
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<tbody>
<tr>
<td>MKV</td>
<td></td>
<td>Test Demonstrations at 172 West End Lane</td>
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<td></td>
<td>BACKED BY TWENTY YEARS EXPERIENCE &amp; STAFF OF TECHNICAL EXPERTS</td>
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**PAL COLOUR BAR GENERATOR (MK4)**

- **Output at UHF**, applied to receiver aerial socket.
- **In addition to colour bars R-Y, B-Y etc.**
- **Cross-hatch, grey scale**, peak white and black level.
- **Push button controls, battery or mains operated.**
- **Simple design, only five i.c.s on colour bar P.C.B.**

**PRICE OF MK 4 COLOUR BAR GENERATOR MK£0.00. CASE £8.60, BATT HOLDERS £4.20. MAINS SUPPLY KIT £4.20. (Combined P&P £2.20).**

**MK 4 (BATTERY) BUILT & TESTED £58.00 + £2.20 P & P.**

**VHF MODULATOR (CH 1 to 4) FOR OVERSEAS £5.75. EASILY ADAPTED FOR VIDEO OUTPUT & C.C.T.V.**

**THORN TX9 MK2, TX10, teletext**

- Mullard Decoder panel + Interface £35.00 p.p. £1.80
- Mullard Units VM 6230, 6330 plus Line Coupler & Interface £38.00 p.p. £2.50

**EXTERNAL TELETEXT ADAPTOR**

- (RADOFIN) with cable remote control. Fully tested. £150.00 p.p. £3.90. Plugs into aerial socket of any TV.

**TELEVISION DEMONSTRATIONS AT 172 WEST END LANE**

**MANOR SUPPLIES**

**TV SERVICE SPARES**

**BACKED BY TWENTY YEARS EXPERIENCE & STAFF OF TECHNICAL EXPERTS**

<table>
<thead>
<tr>
<th>Part</th>
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<tr>
<td>L0TPx</td>
<td>TRIPPLERS, PANELS, TUNERS, SELECTORS ETC</td>
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<tr>
<td>SPECIAL OFFER</td>
<td>Mullard/Philips quality UHF/Colour Bar Generator (video &amp; audio input) ex</td>
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<tr>
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<td>new equipment £5.00 p.p. £1.00</td>
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<tr>
<td>G91</td>
<td>6 position touch tune channel selector units £16.00 (4) p.p. £1.80</td>
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<td>(can replace earlier mechanical selector unit)</td>
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<td>G41 PANELS (tested)</td>
<td>Power, frame, IF, decoder £18.00 each p.p. £2.00. Scan Panel £20.00 p.p. £2.80.</td>
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<tr>
<td>G41 PANELS (rental)</td>
<td>Power, frame, IF, decoder £18.00 each p.p. £2.00. Scan Panel £20.00 p.p. £2.80.</td>
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</tr>
<tr>
<td>HANDSETs</td>
<td>Ex rental, Teletext, Untested. KT3, K30, CTX, KT4, K33 etc. £5.50 p.p. £1.80.</td>
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<tr>
<td>G41 PANELS (tested)</td>
<td>Power, frame, IF, decoder £18.00 each p.p. £2.00. Scan Panel £20.00 p.p. £2.80.</td>
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<td>G41 HANDSETs (test)</td>
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<td>THORN TX9 PANELS</td>
<td>THORN TX9 Remote &amp; tuning control panel (1515) £10.50 p.p. £1.90</td>
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<td>SPECIAL OFFER Mullard/Philips quality UHF/Colour Bar Generator (video &amp; audio input) ex</td>
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<td>new equipment £5.00 p.p. £1.00</td>
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<tr>
<td></td>
<td>(RADOFIN) with cable remote control. Fully tested. £150.00 p.p. £3.90. Plugs into aerial socket of any TV.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Chequeboard.</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>40 different patterns and variations.</strong></td>
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<tr>
<td></td>
<td><strong>Broadcast transmission accuracy (fully interlaced sync pulses with correct picture blanking).</strong></td>
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<tr>
<td></td>
<td><strong>EBU colour bars, BBC colour bars, white rasters &amp; split bars (specialy useful for VCR service), white, yellow, cyan, green, magenta, red, blue and black.</strong></td>
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<tr>
<td></td>
<td><strong>Chequeboard.</strong></td>
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<tr>
<td></td>
<td><strong>Mono outputs with border castellations, cross hatch, grey scale, vertical lines, horizontal lines and dots.</strong></td>
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<tr>
<td></td>
<td><strong>UHF modulator output plugs straight into receiver aerial socket.</strong></td>
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<tr>
<td></td>
<td><strong>Additional video output for CCTV &amp; VCR.</strong></td>
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<td></td>
<td><strong>Facilities for sound output.</strong></td>
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<tr>
<td></td>
<td><strong>Easy to build, kit, standard parts. Only 2 adjustments.</strong></td>
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<td></td>
<td><strong>Mains operated with stabilised power supply.</strong></td>
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<td><strong>All kits fully guaranteed with back-up service.</strong></td>
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<td><strong>Also available with VHF Modulator.</strong></td>
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<td></td>
<td><strong>Price of Kit</strong></td>
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<td></td>
<td>Case (10'×6'×2'×1') app.</td>
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<td>Optional Sound Module (6MHz or 5.5MHz)</td>
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<td>Built &amp; Tested in Case including Sound Module</td>
<td>£108.00</td>
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**Telephone 01-794 8751, 794 7546**
December 1986

Vol. 37, No. 2

Issue 434

On sale November 19th

this month

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104 The Ins and Outs of Word Processing
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OUR NEXT ISSUE DATED JANUARY WILL
BE PUBLISHED ON DECEMBER 17

TELEVISION DECEMBER 1986
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We cannot advertise our complete range of products. Please ask if you require something which is not shown here, or looks similar to the above. This is not intended to be a comprehensive list of all the components available. Prices subject to change without notice. VAT cannot be claimed on such items. Please ask if you are required to add VAT to your order.

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**VARICAP TUNERS**

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**RECTIFIER TRAYS**

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**SWITCHES/ACCESSORIES**

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**EQUIPMENT**

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**AERIAL EQUIPMENT**

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<tr>
<td>Philips 340</td>
<td>9.50</td>
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<th>Item</th>
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<td>GEC SOLID STATE</td>
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<td>GEC STARLINE</td>
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- Removal of shorts and leakage between
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- Covering FM and all TV bands (UHF/VHF) including CATV freq.
- Digital tuning display (3 digits)
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- Accurate 10 turn tuning potentiometer.
- Built-in loudspeaker enables
monitoring of sound in AM/FM.
- Meter measurement in voltage
and db from 20µV (26dB/µV).
- Continuity test 0-500 ohms.
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- PAL I.
- Audio Output

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- Battery life 2 years
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- Frequency Range 2KHz to 200MHz
- Resolution 0.1Hz
- Sensitivity 10µV

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both TTL and CMOS circuits. TP1 can show 14 different circuit conditions and can detect pulses down to typically
10ns. TP2 can inject a signal directly into a circuit without
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Price £23.00 + £4.85 V.A.T. each

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- Super rejuvenation with manual control.
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LA13652.45
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4.30
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TDA10357
TDA440
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TBA950
TRA820
TBA750

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1.85
1.15
70
5.35

TDA4600
TDA2541

1.15
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TDA2653A
TDA2611A
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UPC1185H
UPC136C
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John A. Reddhough

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COVER PHOTO
This month's cover photograph shows an Hitachi VT8300 VCR with the top cover removed. See servicing article on page 96.

HELD OVER
Due to shortage of space in this issue the concluding article in our series on electric motors has had to be held over till next month.
**Teletopics**

**TV BROADCASTING**

The Home Office has commissioned CSP International, a consultancy that specialises in telecommunications, to produce a report on how the Peacock Committee’s ideas on using subscription TV systems to replace the BBC’s licence revenue could be put into effect. The consultancy has been given six months to produce its report, which will consider the present state and cost of subscription technology and public attitudes to its introduction. Dr Charles Jonscher, CSP International’s managing director, holds the view that TV is “hopelessly under-financed” in the UK. He points out that TV costs the viewer two-three pence per hour while far more is spent on videocassette entertainment. He intends to “produce a detailed picture of the broadcasting environment in the early 1990s and see how subscription TV fits in”. The consultancy is also at present preparing a report for the Department of Trade and Industry on the possibility of commercial pricing for the use of radio frequencies. Meanwhile the government has decided to extend the current ITV franchises for two years, till 1992, while the future of broadcasting is being considered – the IBA had asked for a four-year extension. A Post Office crackdown on licence fee evasion has increased the number of TV licences by some 300,000. Prosecutions during July-September were fifty per cent higher than a year ago and are expected to reach 180,000 for the whole year.

A joint high-definition TV development programme has been announced by Bosch, Philips, Thorn and Thorn EMI. The aim of the project, which is backed by the EEC’s Eureka high-technology initiative, is to develop a compatible system based on the IBA’s MAC technology. It’s expected that the European broadcasting authorities and universities will become involved in the project in addition to the research departments of the companies concerned. A starting date of some time in 1995 has been suggested for European HD-TV transmissions.

**SAMSUNG’S UK PLANT**

South Korean manufacturer Samsung Electronics is to invest £17 million over five years in a plant atBillingham, Cleveland. By the middle of next year the plant, which will be producing 120,000 VCRs and 150,000 microwave ovens a year. If this initial phase is successful the plant will be extended to produce colour TV sets. By 1990 CTV production could be running at the rate of 300,000 sets a year. Products will initially be assembled from parts imported from Korea but UK sourcing is expected to follow. Samsung already has a joint-venture CTV plant in Portugal, some of whose output is exported to the UK.

**CES 87**

The 1987 Consumer Electronics and Technology Show (CES) will be held at the West Brompton Hall, Earls Court, on May 17-20th. A major feature will be a display of satellite TV.

**ZENITH’S FTM TUBE**

A new type of colour tube has been announced by Zenith in the USA. The FTM (flat tension mask) tube has the flattest and most square screen yet and will be initially introduced in an ultra high resolution 14in. version for computer monitor use. The flat shadowmask is glass sealed under tension directly behind the tube’s faceplate, making it immune to deformation at high beam currents. Versions for domestic receiver use are expected to follow.

**STEREO TV SOUND SYSTEM APPROVED**

The government has approved the joint BBC/IBA specification for a digital stereo sound TV system. The system uses a digitally modulated carrier at 6-552 MHz above the vision carrier and is at present undergoing experimental testing at the Crystal Palace BBC-2 transmitter. During the next few months the tests will be extended to the BBC-1 transmitter. No date for the introduction of a full service has so far been announced.

**VISION-SOUND RATIO CHANGED**

The BBC and the IBA are at present altering the vision-sound power ratio at all their transmitters – the change over should be complete by the end of the year. The adjustment is being made to improve transmitter efficiency and save electrical power, and is also a necessary step in preparing the transmitter network for the introduction of a digital stereo TV sound service. Traditionally the vision-sound power ratio has been 5:1. Extensive tests have shown that reception is not affected by changing this to 10:1, the ratio that has been used for the last two years at the BBC-1 and BBC-2 Crystal Palace transmitters and has for many years been used over much of Europe. The dates on which individual transmitters change over will be shown on Ceefax page 195 and Oracle page 597.

**4mm VIDEO SYSTEM**

Samsung showed their recently developed 4mm video system at this year’s S. Korean Radio Show. The system consists of a camcorder with built-in TV tuner and viewfinder/colour monitor. Weight is 1.15 kg with dimensions of 104 x 214 x 136 kg. The cassette measures 50 x 33 x 8.2 mm and has a playing time of 80 minutes. A liquid crystal display is used for the viewfinder/monitor. The version on show, the Viteca Model SV-C41, uses the NTSC colour system and tunes through the US v.h.f./u.h.f. bands. The camera section’s minimum light requirement is 10 lux.

**AMATEUR TV**

A European amateur television organisation called EATWG (European Amateur Television Working Group) has been formed to promote and protect the interests of ATV operators. Its tasks will include dealing with government licensing authorities and the International Amateur Radio Union. The aim is to secure a fair deal for TV amateurs. Other work will include the coordination of bandplans and technical standards, and running contests on an international basis. The group claims a healthy financial base and a strong organisation that covers all active European ATV groups. There will be an annual meeting and regular newsletters. Thirty five representatives from the UK, France, Belgium, Holland, Italy, Austria, Germany and Switzerland attended the first meeting which was held in Basel, Switzerland on September 20th-21st. EATWG is represented in the UK by the BATC: enquiries should be sent to Andy Emmerson, 71 Falcutt Way, Northampton NN2 8PH.

Contents of the latest issue of the BATC magazine CQ-TV (No. 136, November) include a simple video
enhancer, a 10GHz transceiver, a wideband optocoupler, a sync processor and a tunable sound demodulator for satellite TV reception. There are several articles on satellite TV subjects. Details of membership of the British Amateur Television Club can be obtained from Dave Lawton, "Grenehurst", Pine Road, High Wycombe, Bucks HP12 4DD (0494 28 899).

AMSTRAD'S TELEVIDEO
Amstrad have introduced a combined CTV/VCR, Model VTR1, for only £399. The comprehensive specification includes infra-red remote control. There's also a new VCR, Model 4600, which offers two-speed operation, HQ circuitry, infra-red remote control and a 14-day, 4-channel timer at just £329.

CATALOGUES AND COURSES
Tandy's latest full-colour, 136-page catalogue features over 2,600 items and is available free from the 360 Tandy stores and authorised dealers throughout the UK. The Doncaster Metropolitan Institute of Higher Education (Waterdale, Doncaster DN1 3EX - 0302 22 122) is offering a 6-day course, starting in January, entitled Satellite Communications. The course will cover both satellite TV and weather satellites and will include a large element of practical work. It will be held on Tuesday evenings and will last for twelve weeks.

GERMAN DBS AGREEMENT
Agreement has been reached between the West German state governments on the allocation of the four DBS TV channels to be provided by the TV-Sat craft. Launch of the satellite could be next May - the second flight when the Ariane programme is resumed has been booked. Two of the channels will be operated by the W. German public service broadcasting organisations ARD and ZDF, the other two being commercially operated. There have been seven applications to operate the commercial channels.

TV BRANDS
A range of Zenussi manufactured TV sets is to be launched next year under the Selecto brand name: the brand name is widely used on the Continent for Zenussi sets. Selecto UK's address is Orchard House, Chesham, Bucks HP12 4DD (0494 28 899).

Sentra Consumer Products (Wood Street, Brighouse, West Yorkshire HD6 1PW, 0484 714 353) has added a Korean sourced VCR and a Hong Kong sourced 14in. colour set to its range. Two small-screen monochrome sets, one with built-in radio, have been added to the Ellfote range (Ellfote Electronics Ltd., 4 Beresford Avenue, Wembley, Middx HA0 1YZ. 01 902 6222).

Our thanks to a couple of readers who answered our request for information on Wye monochrome portables. The firm that handled these sets is the Wye Winding Company, 27 Station Road, Brimington, Chesterfield, Derbyshire S43 1JJ.

SATELLITE TV
The one-day technical courses on satellite TV being run by Salora were mentioned in Teletopics last month. The booklet issued free to those who attend the courses is also available from Salora at £10 plus £1 post and packing. Order from Salora (UK) Ltd., Techno Trading Estate, Swindon, Wilts SN2 6EZ. The book runs to 58 pages, is

TELEVISION DECEMBER 1986
VCR Fault Analysis

Steve Beeching, T.Eng.

The purpose of this new column is to analyse in greater depth than is usually possible in VCR Clinic various examples of VCR fault conditions. The aim is to outline how the causes of fault conditions can be tracked down.

Panasonic NV366

The fault report with this machine was of a tracking error half way down the screen. As a first step a known good tape was played - half an hour of test card or a film recorded on a new VCR serves the purpose well. The results obtained did not point conclusively to a tracking error. For a start the white noise was not as intensive as that produced by a tracking bar. The top half of the picture was perfect, but from about half way down the picture was covered in white noise spots and there was a slight flickering. Static problems could be ruled out as the spots didn't have the characteristic "tadpole" shape, and anyway the earthing spring and carbon brush were in good order and making contact.

To test for a tape path error it's best to bias the tape down gently with your finger, by lightly pushing down on the top edge between the entry and exit guides. This made matters worse, producing a number of tracking crossover bars. Luck can play a part in VCR servicing: our decision to measure the replayed f.m. signal as the next step probably cut out a lot of headscratching. We found that one head was producing a full f.m. signal throughout the scan while the other one produced a signal only during the second half of the scan. Now the NV366 has four heads, the main two being designated L and R. Mounted at 90° to these are two other heads, R' and R", which are used for still pictures and picture search. Both sets of heads use the same preamplifiers, with relays used for switching. In this case it could be proved that one of the relays was suffering from contact problems, which is not unusual in very low signal level circuits. The clue was in the half picture. Fig. 1 shows the head switching circuitry. If say the L side was o.k., it would produce a full f.m. signal during the scan. If the other relay was switching to the R" head, 90° from the L head, it would produce an output for only half a track.

A red herring in this case was that the picture didn't show any severe jumping or flicker as the effect was hidden by the spots. A similar effect can be seen with the recording made on the machine in record or the programme plus or minus button is stepped on. Grundig VCRs there's no output signal unless the machine is in record or the programme plus or minus button is stepped on. Checks soon revealed however that not only was there no E-E signal, there was no recording on the tape either (cross-checked with another VHS machine). The screen was clean blank in the E-E monitor mode - no spots. A prerecorded film could be played back with no problems.

The purpose of this new column is to analyse in greater depth than is usually possible in VCR Clinic various examples of VCR fault conditions. The aim is to outline how the causes of fault conditions can be tracked down.

Grundig VS200

The problem with this machine was no E-E picture. This could have been a customer finger problem although on Grundig VCRs there's no output signal unless the machine is in record or the programme plus or minus button is stepped on. Checks soon revealed however that not only was there no E-E signal, there was no recording on the tape either (cross-checked with another VHS machine). The screen was clean blank in the E-E monitor mode - no spots. A prerecorded film could be played back with no problems.

The starting point is to check for video output from the tuner/i.f. module. Video was found to be present right up...
to pin 4 of IC810 (TDA3771) on the luminance panel. It emerged at pin 18 of this i.c. and went back in at pin 12. That's where it ended. There was no output at the record output pins 15 and 17 or the monitor output pin 6. So it seemed that the chip was faulty, or was it?

It pays to check around such signal i.c.s for pulse inputs. A lot of timing, clamping and gating pulses are used and are easily overlooked. Pin 9 should have been receiving mixed syncs but nothing was present here. Tracing back took us to contact 34 on the chroma panel. The mixed sync signal that should have been present at this point comes from pin 1 of IC1155 (TDA3750). There were no pulses here either. Video was present at pin 3 of this i.c., so it seemed likely that the sync separator within the chip had failed. Several peripheral components were checked, including C1154 (22µF) connected to pin 2 and the network connected to pin 4 – both these pins are connected internally to the sync separator part of the chip – but no fault was found here. Replacing the i.c. cured the fault. It would be reasonable to expect some ripple at pins 2 and 4. For future reference pin 2 is at 7V d.c. with an 0.3V p-p a.c. ripple on it at 20msec periods. Absence of ripple at this point tended to confirm that the i.c. was faulty.

**Hitachi VT33**

A similar fault caused much more trouble with an Hitachi VT33. The symptom was that of head failure – spots with a picture of sorts underneath, flickering vertically. In fact the dealer who’d sent it to us had written “suspect video heads” on the fault report. I decided to try new heads and when doing so was made suspicious by the fact that the wires had been removed previously. New heads didn’t provide any improvement so the originals went back in. The next step was to check the f.m. waveform obtained from the preamplifiers – pin 12 of IC202 (HT4238) would do for this purpose. A good waveform was present here, with no gaps and plenty of f.m. from each head. Back to square one, with the heads apparently eliminated.

Closer scrutiny of the picture showed that there was a lot of colour noise. So the colour was muted by connecting pin 10 of IC203 (HT4239) to chassis. The spots then went away, leaving a clear monochrome picture which was bouncing vertically – so much so that a line of text showed double. This was down to the video heads: someone had moved one of the tips so that they were no longer 180° apart. The bounce was produced by the two heads replaying different fields. New heads cured this and a good monochrome picture was obtained. So far so good.

When the colour mute was disconnected the noise reappeared, giving the impression of head failure. It could be deduced only that something within IC203 was creating the noise, but the fault persisted when a replacement was fitted. It was eventually discovered that there was no sync pulse input at pin 22 of the i.c. This had the effect of putting the a.f.c. loop out of lock. The sync pulses come from pin 27 of IC202 and were not present here either. Since the sync separator in this i.c. appeared to have failed a new chip was fitted, finally restoring normal operation.

So what were the red herrings that led us astray in this case? First the fault symptom was identical to that produced by head failure. Someone had obviously messed about with the heads. Secondly there were reasonable monochrome record/playback pictures with the colour channel inhibited: there were no signs of any luminance problems that could have been caused by lack of clamping or a.g.c. failure. This example illustrates that all is not always what it seems, and that the fault symptoms can be very misleading when timing pulses are missing.

**Rediffusion Mk. 5 Chassis**

This set was dead but no fuses were blown. A check on the voltages in the switch-mode power supply revealed that 300V was present at the collector of the chopper transistor Q701 but its base and emitter voltages were at zero. Problem: was the fault in or after the power supply? As suggested in the manual, we shorted between the collector and emitter of the chopper transistor and ran the set with a mains input of 80V a.c. This produced a picture but no sound. Good: the set was o.k., the fault being in its power supply. All the transistors and diodes in the power supply proved to be o.k. when tested. Resistor checks then revealed that R717 (120kΩ) in Q701’s base circuit was open-circuit – it’s part of the start-up arrangement.

**Thorn TX10 Chassis**

This set was dead with the BU208B chopper transistor TR701 short-circuit. We replaced the chopper transistor and checked to see whether there were any obvious reasons for its demise, then switched on. The set worked and after soak testing for two days it returned to the owner. A fortnight later we were called back and once more TR701 had gone short-circuit. Return to the workshop, replace TR701 and once again everything seems to be o.k. We had a niggling doubt about the focus unit, which was of the original type. A very close inspection – for the second time – gave no reason to suspect it however. Anyway we darkened the workshop, turned the brightness down and the e.h.t. up (because of no beam current). No glows or arcs. Repeat exercise two days later and find a very faint glow in the body of the focus unit. A replacement was fitted and we assumed we’d solved the problem. A month later the set was back again – with TR701 short-circuit.

This time many hours were spent soak testing the set after replacing TR701. At last we were rewarded with a splutter and partial line collapse. A careful inspection with a magnifying glass then revealed two fatigued solder joints under the red cover over part of the chopper transformer – at pins 2 and 3. At last we had won!}

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Reports from R. Crookit, Jim Rainey Philip Blundell, Eng. Tech. and Michael Dranfield

**TV Fault Finding**

**Skantic Model 5661**

This set was dead with a buzzing noise coming from the switch-mode power supply (Siemens self-oscillating type, discrete component version). The outputs were disconnected and a 100W bulb was connected across the 160V line. Still no 160V. Out came the back issues of *Television*
where, in the January 1982 issue, this power supply was covered in some detail. As suggested RQ17 (1MΩ) on the mains input module was checked — it’s part of the start-up circuit. It was high in value but a replacement didn’t produce any improvement. DN03/4/5/6 were then checked out of circuit: they tested o.k. but replacing them brought the power supply back to life!

P.B.

GEC C2087 (Hitachi NP81CQ Chassis)

We’ve had this fault on a number of occasions now: the set trips after ten seconds but the likely causes (high h.t. or e.h.t.) are not present. Try replacing the crowbar thyristor Q703 — if it’s only slightly leaky it will trigger itself.

P.B.

Mitsubishi CT2227

Some quickies on this set:
1. For a small picture with the 115V line low at TP91, check whether R904 (470kΩ) is open-circuit.
2. Set dead with no 15V at the cathode of D372 — check whether R371 (2-21Ω) is open-circuit.
3. Set dead with no 140V at F902 or 5V at IC7A2 on the ETS module — check whether R7A0 (1-21Ω) is open-circuit.

Note that all these resistors are safety types.

P.B.

GEC C1408

Most power supplies respond to the use of a 100W bulb as a dummy load — but beware, this one doesn’t! A 100W bulb gives a ticking noise and a very low output. A quick read through the circuit description revealed that R920 (2-21Ω, 15W) is switched into circuit in standby to prevent the output voltage rising. So to test the power supply disconnect the lead linking the 110V to the main chassis and wire R920 in circuit all the time.

P.B.

ITT CVC1202 Chassis

The problem with this set was intermittent change in the line phasing. The fault seemed to be independent of heat variation or vibration. Voltage checks around the TDA1940F line generator chip were inconclusive as they all seemed to vary — as in fact did the 12-6V supply. D751 (1N4148) in the 7812 12V regulator’s earth connection was intermittent.

P.B.

ITT CVC8 Chassis

The colour was stuck at full saturation, the control voltage checks around
the colour control circuit and D24 in the colour control circuit restored normal operation.

M.D.

Thorn 8800 Chassis

Some of these sets are fitted with a recycling trip, and in this one it was operating. A scope check revealed that the h.t. was rising well above 220V. R724 (120kΩ) in the set to 168V - the maximum voltage obtainable was 150V. The culprit turned out to be R604 (270kΩ, 0-5W 2%) which read approximately 500kΩ. As a result the voltage at the base of Tr602 was high and the firing of the regulator thyristor TY600 was being delayed.

J.R.

Grundig CUC220 Chassis

No blue was the fault reported on this set. While making voltage checks in the blue output stage we noticed that the blue would occasionally flash on for a few seconds then go off again. Dry-joints were suspected, but resoldering all the joints in the blue output stage made no difference — neither did heat/freezer checks. We finally got around to removing the transistors in the blue output stage and found that T2566 (BF671) had an intermittent emitter connection.

M.D.

Thorn 9000 Chassis

The job ticket said “big bang then dead”. Removing the back revealed that there had certainly been a bang. After clearing up the mess an empty electrolytic can was found at the bottom of the set. It turned out to be the 90V supply smoothing capacitor C715 (22µF). As no obvious fault could be found the capacitor was replaced and the set was switched on. It tripped and continued to do this with the e.h.t. tripler disconnected. A check on the fuses revealed that F4 was open-circuit. This led us to the EW modulator driver transistor VT702 which had an open-circuit collector junction. Replacing these items failed to stop the tripping which was eventually cured by replacing the special diode W702 in series with the syclops transistor.

M.D.
300 Mixed Resistors
300 Mixed Capacitors
150 Mixed Electriclys
100 W/ Resistors
20 Mixed Conv Pots
40 Mixed Pots
20 Mixed Sliders
40 Mixed Presets
20 Mixed VDR & Thermistors
100 Mixed Ceramic Discs
100 Mixed Valve Bases

300 Mixed Resistors
300 Mixed Capacitors
150 Mixed Electriclys
100 W/ Resistors
20 Mixed Conv Pots
40 Mixed Pots
20 Mixed Sliders
40 Mixed Presets
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THICK FILM RESISTOR UNITS
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4000 Th (Pin Connection) video
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75/215 Py (Pin Connection)

FUSES
50MA 10 for 100 50MA
250MA 10 for 100 250MA
500MA 10 for 100 500MA
1.35A 10 for 100 1.35A

INTEGRATED CIRCUITS
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VCR Clinic

Ferguson 3V38/JVC HRD110

The problem with this machine was intermittent failure of the front buttons to operate. During one of the rare occasions when the fault was present we found that Q223's base voltage was high — so was the voltage at diode D225. The cause of the trouble was that Q208 was turning on very intermittently — but why? There was a partial short in the audio DIN socket, between the earth pin and the remote data pin.

Intermittent Erasure

When the problem is intermittent sound erasure, which may be accompanied by no sound recording, you may also notice colour flutter due to incomplete erasure of the video tracks. If the machine is a Toshiba V65, a JVC HRD140/150 or a Ferguson 3V44/45 look for C23 on the top right-hand panel and solder a 5.6nF Mylar capacitor across it. If the machine is a Ferguson 3V31 or a JVC HR7650/7655 replace the bias oscillator module with the later type and change both relays.

Sony SLC6

Failure of Q01 in this machine removed the E-E 12V supply and thus the E-E signals.

Head Cleaning

This can apply to any machine, though the two in question were both Fergusons — a 3V31 and a 3V29. The fault was described as picture rolling, with the tracking control not working. A noise bar moved up through the picture and the head switching point was visible in the bottom third of the picture. Use of a scope revealed that the head switching point wandered from approximately thirty lines early right through to the field sync, but this was happening on only one channel. The cure? Clean the video heads — a piece of oxide was causing misalignment of the tape path.

Ferguson 3V31

The complaint with this machine was intermittent speed variations when warm. Checks were made around the AN6341 capstan servo chip IC6 when the fault occurred. A replacement chip failed to provide a cure: all the inputs were correct however, as was playback of a test tape. Following you confusion, if you have the same trouble the symptoms are as follows: clock o.k.; through signal from aerial to TV set o.k.; E-E signal has bad hum bar; eject and load the machine off. R.R.

Fisher FVHP715

As soon as this machine was plugged in a hum bar appeared on the monitor screen. A scope check revealed a 2V p-p hum ripple on the 9V supply to the combined r.f. modulator/splitter/booster unit — when this was unplugged the supply line ripple disappeared. Having had similar symptoms with a 3V16 I checked the r.f. modulator by substitution. No difference! To cut a long story short — about changing voltage regulator i.c.s etc. — I eventually arrived at the full-wave rectified 16V line. Each rectifier diode is fed via a separate fuse, one of which was open-circuit. The result of this was that the 16V supply was half-wave rectified.

Philips VR6660

The job card read “clock display faulty”. In fact the bottom right and bottom grids (cA and dA) on the display were continuously on. Replacing IC2 (SN75518N) cured the fault.

Sony SLC7

This machine is well known for its slow rewind and the modification kit to correct this. I've had a machine that developed the same fault again some time after fitting the kit however. The solution seems to be to remove the rubber tyres on the idler wheel (and the drive motor if the modification has not been carried out), turn them inside out and replace them. This has even obviated the need for the modification with two SLC7s.

Sanyo VTC5000

The reel drive motor used in this machine has a tendency to run slow with the result that tapes get tangled. Motor replacement is obviously advised but is neither cheap nor easy. I've found that a single drop of high-quality watch oil applied to the upper bearing, which is just accessible with the cover removed, can double the life of the motor.

Salora SV8200/Mitsubishi HS303

Although the machine was a Salora SV8200 we found a Mitsubishi HS303B underneath the covers. It took several seconds for the drum servo to lock: the picture wobbled and the audible note of the drum motor had a harsh tone. Monitoring the sample and hold at TP4A showed that it was fluctuating up and down. C4B8 turned out to be 100µF instead of 47µF.

Toshiba V65

The 2A fuse in the power supply failed but, unexpectedly, the machine continued to work after a fashion. To save you confusion, if you have the same trouble the symptoms are as follows: clock o.k.; through signal from aerial to TV set o.k.; E-E signal has bad hum bar; eject and load o.k.; selection of play, rewind, fast forward etc. switches the machine off.

ITT P4833/Ferguson 3V24

One of these portable VHS machines had a fault in the E-E and camera modes. The video signal was badly distorted, with washed out and smerey whites, weak sync and bad vision buzz on sound. The colour content was correct however, as was playback of a test tape. Following through the video input signal path brought us to IC2...
Tiny Tim's Nightmare

Les Lawry-Johns

Tim felt very sad as he sat at his desk, swinging his little feet under his stool - as he had done some two years ago, hoping for a new pair of shoes. He had got some shoes then. Now it was a different matter. The half yearly clutter of bills demanded his attention: hundreds of pounds that would put him back in the red again, and he had only just got out from under the last lot, at a cost.

"Why didn't these people realise who they were demanding money from? He fought his one man battle against inflation with extreme dedication. He didn't charge a lot for his services, much the same as he had done years ago. Then he had been rich and could dine out several times a week and drink the best wine. Now he couldn't afford to go out at all, not even once a week at Sunday lunchtime.

He and Tinker Bell used to pop into the pub for an hour or two on Sunday and spend his whole week's wages. Now his wages buy a couple of bottles that have to last himself a lot more than they love the fellow who just stands around. I wonder what he gets paid for? Tim wondered whether anyone would pay him to stand around while...

The Collection

Just then a lorry pulled up outside. It had a load of junk in the back and Tim guessed who it was. Tim the Tinker had come to collect his small portable. He came in and Tim handed it to him.

"What was wrong with it then?"
"I've written it all down on the bill sir."
"I can't read."
"Tim's mind (our Tim) raced. If he couldn't read, the bill could be upped a bit. Instead of eight pounds fifty he could charge fifty quid.

"Ten pounds" he said.
"It says eight pounds fifty down here."
"Just testing your reading, just testing you see."
"I can read money, don't you worry about that" said Tim the Tinker.

So he paid his eight pounds fifty and walked out. Tim heard him say to the other chap in the lorry "tried to con me, the twisting old B...". Tim felt ashamed of himself. What a nasty fellow he was.

Visit from Keith and Alex

Keith and Alex had come up from Portsmouth mainly to bring me a set of scan coils - you remember the CVC32 (October)? I was so grateful, though I didn't actually need them. I'd already got over the trouble by replacing the scan coupling electrolytic which I'd previously shunted as an inadequate test. As the faulty one was leaky it had to be taken out and a new one put in. Silly me.

Keith gazed around and Alex gazed around the other way.

"Just as we imagined it would be. Beyond belief."
"Sorry, very sorry" I apologised.
"No, we didn't mean it's old fashioned or anything like that. It's just that it all fits into place. The awning outside where Zeb jumped out and earned undying fame, and the inside with all the bits and pieces. It's nice really."

Keith was the one who wrote that first letter (June) about the lack of test cards.

"You'll have to get up earlier" I suggested.
Alex was admiring our till. "Right out of Coronation Street" he commented.

"It's easy to fiddle" I said, "and I like it."

A chap came in for a universal tripler and Keith showed me where to find it on the shelf. The chap wanted to know how to fit it in an ITT CVC32. I explained how to connect the leads, joining the diode and earth leads together and soldering them to one side of the focus control. The chap went out with the diagram I'd drawn for him and Keith commented that it wouldn't last long with the leads joined. I wondered why he said that. I always join them. Am I doing something wrong? When I say always, I mean in the ITT and similar sets.

Anyway they departed in high spirits and I wonder if I'll see them again. All the best. Keep the flag flying and all that sort of thing!

The Siemens Set

A 26in Siemens set came in the other day and I couldn't make head or tail of it. A new line output transistor was required and the chopper circuit had been tampered with. The line output transistor is a BU600S, which I didn't recognise at all. I tried a BU208A but this didn't work and the open-circuit tracks to the chopper unsettled me. I suggested to the chap that he took it up to Geoff. He did, and Geoff had to suffer too.

Next day Geoff phoned to tell me not to send any more lunatics up to him. He also told me that the correct replacement would have been a BU208D. I keep these in stock and kicked myself for not having tried one.

The joke is that another set of exactly the same type came in an hour later and I was able to oblige my friend...
by fitting a BU208D in a couple of minutes, with complete success — the resultant picture was superb. Nice sets these, though the chopper circuit does frighten me a bit. I should read the magazine more thoroughly.

**The Cummin of Keith**

As I was busily shovelling up what the dogs do in the garden (concrete) I heard Tessa barking her loud, deep bark in the shop. Zeb doesn’t seem to bark so much now that the bossy female has taken control. I went in with the shovel of you know what and found a man standing in the shop.

“Won’t be a second” I said, “I’ll just bung this lot down the toilet then I’ll be with you.”

“Don’t worry Les, you look as though you’ve a lot on your hands.”

I knew that voice, and the Casablanca image. It was Keith Cummins himself.

After I’d disposed of the er stuff we had a chat about this and that and whilst he drank the coffee H.B. had made him (sugar, no milk) he told me about the job he was engaged on. Some sort of secret service matter, which is why he told me all about it. Thanks for calling Keith.

**Whatever Happened to Tiny Tim?**

Sorry I’ve been rabbiting on about myself as usual. Actually Tim was put to the test this last Saturday afternoon. He was standing behind the counter talking to young Phil, who pops in on Saturdays to pick up a few tips and dodges. A smart young couple came in and asked Tim if he would mind looking at their set. Tim said he didn’t mind looking, went outside to their car and did just that. It was a Grundig set of the 5010 variety. A big 26in. monster. Phil came out to help, and they all struggled in with it.

“There’s sound but no picture, and some things have burnt up in the bottom.”

Armed with this information, Tim removed the rear cover and swung down the chassis. He noted two burnt out resistors at the bottom right. They appeared to be connected to the tripler. Tim’s ice cool brain began to function, under the gaze of the young lady whose amused smile showed that she didn’t think Tim knew what he was doing. Tim held his neon near the line output transformer and it lit weakly. He switched off, removed the feed to the tripler, and switched on again. This time the neon lit brightly. Tim announced his opinion.

“The tripler has failed and has burnt out the resistors in the beam limiter circuit.”

The circuit was folded up inside the set. Tim removed it and gave it to Phil to check on the resistors. He then went over to the shelf and selected a universal tripler.

“Do you want me to fit this and replace the resistors?” he asked.

The girl still smiled. “Do you think that will do it?”

“Yes dear, with a bit of luck, and provided the transformer hasn’t been damaged” said Tim as he fought off the urge to smack her bottom.

“O.K. then” they agreed. Tim fitted the tripler carefully and wired it up. In the meantime Phil had found the resistors and Tim fitted these as well. He switched on and a lovely picture appeared on the screen. The girl’s smile faded and Tim was glad.

“Pay up and take the thing away” he said crossly.

They did and Tim and Phil drank their coffee, relieved that the Grundig hadn’t wanted more doing to it.
Servicing Hitachi VT8000 Series VCRs

Derek Snelling

The Hitachi VT8000 series of VCRs comprises models VT8000, VT8300, VT8500 and VT8700. Similar models were released under the Granada name: in addition the mechanics were used in the Fidelity VTR1000. They were amongst the first "electronic" type VHS machines released in the UK, being on sale during the period 1980-2, and have proved to be very reliable. The VT8000 is the basic model, with a one-event, ten-day timer, visual search, freeze frame and frame advance (the noise bar is automatically shunted to the bottom of the screen), audio dub and a ten-function wired remote control system (some early machines had two-function only remote control, but the later units will work with them). The VT8500 was the "luxury" model, with a four-event timer, half and double speed playback without noise bars, a tape index system and infra-red remote control. These two initial models were subsequently replaced by the VT8300 and the VT8700 respectively. Apart from cosmetics, the main differences with these later machines are a redesigned bottom board to incorporate an improved power supply and the various modifications introduced during the production run of the earlier models, a flashing play light during search, and continuous frame advance while the button is kept depressed. While on the subject of boards, it's worth noting that the component reference numbers on the board and those on the layout diagrams in the manual can differ – in fact the numbers on the top and bottom of the panel for the same component can differ. If in any doubt, it pays to check with the circuit diagram.

Access

Access for servicing is as follows. The top is secured by four screws, three along the back and the other one under

<table>
<thead>
<tr>
<th>Pin</th>
<th>Active Function</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>—</td>
<td>Sync pulse to IC902</td>
</tr>
<tr>
<td>2</td>
<td>L</td>
<td>Activates 15V and not-PB12V lines when pin 41 is set high</td>
</tr>
<tr>
<td>3</td>
<td>L</td>
<td>Sets servo system to search mode</td>
</tr>
<tr>
<td>4</td>
<td>L</td>
<td>Capstan motor reverse</td>
</tr>
<tr>
<td>5</td>
<td>L</td>
<td>Loading operate</td>
</tr>
<tr>
<td>6</td>
<td>L</td>
<td>Unloading operate</td>
</tr>
<tr>
<td>7</td>
<td>L</td>
<td>Fast forward</td>
</tr>
<tr>
<td>8</td>
<td>L</td>
<td>Rewind</td>
</tr>
<tr>
<td>9</td>
<td>L</td>
<td>Slow reel motor drive to avoid tape slack when unloading</td>
</tr>
<tr>
<td>10</td>
<td>L</td>
<td>Reel and loading motor braking</td>
</tr>
<tr>
<td>11</td>
<td>L</td>
<td>Take-up reel braking</td>
</tr>
<tr>
<td>12</td>
<td>L</td>
<td>Main brake operate</td>
</tr>
<tr>
<td>13</td>
<td>L</td>
<td>Main brake off</td>
</tr>
<tr>
<td>15</td>
<td>H</td>
<td>Reset</td>
</tr>
<tr>
<td>21</td>
<td>—</td>
<td>5V supply</td>
</tr>
<tr>
<td>22</td>
<td>H</td>
<td>Auto rewind at tape end on supply side</td>
</tr>
<tr>
<td>23</td>
<td>H</td>
<td>Timer recording operate</td>
</tr>
<tr>
<td>24</td>
<td>H</td>
<td>Forward end sense: detects supply side tape end and stops after unloading</td>
</tr>
<tr>
<td>25</td>
<td>H</td>
<td>Rewind end sense: detects take-up side tape end and stops after unloading</td>
</tr>
<tr>
<td>26</td>
<td>H</td>
<td>High when safety tab present</td>
</tr>
<tr>
<td>27</td>
<td>H</td>
<td>Set by arrival of pause stand-by instruction</td>
</tr>
<tr>
<td>28</td>
<td>H</td>
<td>Set at completion of unloading to stop mechanism</td>
</tr>
<tr>
<td>29</td>
<td>H</td>
<td>Set at completion of loading to stop loading mechanism</td>
</tr>
<tr>
<td>30</td>
<td>H</td>
<td>Set to stop drum after unloading</td>
</tr>
<tr>
<td>31</td>
<td>H</td>
<td>Set to stop reels after unloading</td>
</tr>
<tr>
<td>32</td>
<td>H</td>
<td>Cassette holder: clears memory when pin 30, 31 or 33 is high during a timer recording</td>
</tr>
<tr>
<td>33</td>
<td>H</td>
<td>Set when dew detected or bulb fails: stops after unloading. Stop indicator will flash at 3Hz</td>
</tr>
<tr>
<td>36-9</td>
<td>H</td>
<td>4-bit data</td>
</tr>
<tr>
<td>40</td>
<td>H</td>
<td>Key signal AD conversion</td>
</tr>
</tbody>
</table>

Table 1: System control IC pin data

VT8700 respectively. Apart from cosmetics, the main differences with these later machines are a redesigned bottom board to incorporate an improved power supply and the various modifications introduced during the production run of the earlier models, a flashing play light during search, and continuous frame advance while the button is kept depressed. While on the subject of boards, it's worth noting that the component reference numbers on the board and those on the layout diagrams in the manual can differ – in fact the numbers on the top and bottom of the panel for the same component can differ. If in any doubt, it pays to check with the circuit diagram.

Access

Access for servicing is as follows. The top is secured by four screws, three along the back and the other one under
the clock set flap. The bottom is secured by six screws. The front is secured by three screws along the top, revealed when the top is removed, and three screws along the front, two behind the tuner flap and one behind the memory switch flap. Removing these three items will give access to most of the machine. Note that the operate board is screwed and clipped to the front, so take care when removing this.

The audio board on the left-hand side of the machine is secured by two white nylon clips along its top edge. When these clips are released the board can be hinged down for service. The two panels sandwiched together at the rear of the machine are the visual search board (the smaller, outer one) and the luminance-chroma board (the larger, inner one). The visual search board is fixed to the other one by a white nylon hinge: just undo the two screws that secure its upper edge to the chassis and hinge it down to work on it. The luminance-chroma board is held in place by two nylon clips along its top edge, in a similar manner to the audio board, and can be hinged down in the same way. To the right of the machine are the tuner and i.f. boards, which are fairly inaccessible, and to the right of them there's the small rectifier board. Underneath there's the large servo/system control board. Access to this is by removing the four fixing screws located near each corner, then hinging the board up and rearwards. When refitting this board take care not to trap any of the wiring or distort the board too much. This leaves just a small panel tucked away to the left of the i.f. panel. This contains two regulator transistors in the VT8000/VT8500 and a large regulator i.c. in the VT8300/VT8700. The VT8500/VT8700 have an extra panel on the left-hand side of the bottom board — this is the remote receiver panel.

Booster and RF Lead

We'll start at the r.f. end. What sort of problems can you expect? Well, I've never had a booster fail on these machines and the sockets are of a robust construction which the manufacturers of many more recent machines would do well to copy. The r.f. lead supplied with these machines has a built-in isolator which often gives problems. Repair is a simple matter however: just undo the two screws and resolder the isolating capacitors to the cable.

Tuner, IF and Converter Sections

The tuner and i.f. sections rarely give trouble. The tuners occasionally go low gain at one end of the band or suffer from dry-joints which are made more difficult because of the number of thick-film type components used in the construction of the unit: replacement is usually necessary. The only problem with the i.f. section seems to be dry-joints at the earths where the case is soldered to the print, usually near the centre of the board, though I have had a couple of cases of dry-joints on the larger electrolytics. This board cannot be worked on in situ and has to be removed. I find that the best way of doing this is to remove the fixing screw and nylon clip from the top of the panel, open up the bottom board, then unsolder it from the small mother board it shares with the tuner. The alternative is to remove the tuner/i.f. assembly complete then remove the i.f. module from the board.

The r.f. converter (u.h.f. modulator) is reliable though I have had a couple of cases of no signals at the output. The range of the sound coil is sufficient to change from 6MHz to 5.5MHz — in fact if you get one from Hitachi it may be a German one with instructions to retune it to 6MHz.

Video-chroma Board

Most of the circuitry on the video-chroma board at the rear is contained in three hybrid modules — IC201 for the f.m., IC202 for the video and IC203 for the chroma. Be careful here when reading the circuit diagram: the individual components within the hybrid modules and their values are shown although they are not repairable — in fact the area covered by a particular hybrid circuit is not immediately obvious. Faults on this panel tend to be confined to IC203 giving no/intermittent colour. Other failures I've had include IC202 giving no video and failure of various filters giving colour or luminance problems, also one case of no playback due to failure of IC201. I've never had to adjust any of the presets on this board although the record chroma current control should in theory be set when the heads are changed.

Visual Search Board

The visual search board performs several functions. It shunts the noise bar off screen in pause, times how long the machine is in the pause mode, switching pause off after about ten minutes, and provides VD pulses during the various non-standard speeds. These are artificial field sync pulses that are necessary to prevent the picture rolling in the non-standard play modes. This board differs slightly from model to model. The VT8500/VT8700 have additional components for half and double speed playback. The VT8300/VT8700 have continuous frame advance while the frame advance button is depressed, unlike the VT8000/VT8500 which advance only one field until the button is released and then pressed again. The circuitry consists entirely of various logic chips so if you like these fault finding should present no problems. As yet I've not had a fault on this board. There are three or five adjustments on the board. With the VT8000/VT8300 there are controls for the speed of the frame advance (set for about one frame per second) and for the position of the noise bar (set for off screen at the bottom). Remember to advance the frame after each adjustment to check the effect. The third control is for VD pulse timing adjustment. Set this for minimum frame jitter in pause.

The VT8500/VT8700 have these same three adjustments plus two extra VD pulse timing adjustments for halt and double speed. The VD pulse adjustments are accessible through the rear of the cabinet, being behind a rubber plug. Different settings may be required with different TV sets.

Audio Board

The audio board on the left of the machine contains all the audio circuitry with the exception of the microphone input amplifier which is on the bottom board. In addition, in the VT8500/VT8700 it includes the tape index system. This superimposes the SW25 pulses on the full erase head during lace-up in record. The pulses thus put on the tape can be detected during fast forward or rewind by the tape index head fitted to the end of the tape tension arm. Faults on this board seem to be confined to the relays. There are two, one for audio dub and the other for record/playback. The “rest” position for the latter is in

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Operate Board

The operate board at the front contains the various operation switches, LEDs and associated resistors, and in addition in the VT8300/VT8700 there's a transistor and diode to make the play light flash in visual search. A trouble-free board. With the VT8300/VT8700 however a problem sometimes encountered is failure of one of the hinged buttons on the front. Luckily these are part of a separate detachable unit that can be bought and fitted without the need to replace the whole front.

Clock-timer Board

The clock/timer board differs completely between the VT8000/VT8300 and the VT8500/VT8700. With the latter models there's a battery back-up and an extra -30V supply is required for the display. Faults on these panels are confined to the microcomputer chip or the various setting switches. A customer problem can arise on the VT8500/VT8700 due to the 50/60Hz switch: if this is put in the 60Hz position nothing happens until the machine is unplugged, whereupon next time it is connected the clock will assume 60Hz mains and lose time accordingly. This can sometimes happen due to a spike down the mains. In this case the cure is to unplug the machine, count to ten.
Power Supply Arrangements

Most of the faults with these machines occur in the power supply. This is spread over three boards. First the board which contains the rectifiers – three in the case of the VT8000/VT8300, four in the case of the VTB500/VTB770 and the smoothers. Secondly the power transistor or regulator board, which with the VTB8000/VTB850 contains the 9V and 15V series regulator transistors and with the VTB8300/VTB870 contains an encapsulated 9V/15V regulator, also the bulb feed resistor and open-circuit detector. The rest of the power supply circuitry is on the bottom board, mainly along the left-hand edge. Fig. 1 shows block diagrams for the two versions of the supplies. When dealing with a power supply fault remember that most of the lines are derived from other supplies so check for the highest missing voltage and sort this out first – the others will then usually be O.K. Common power supply faults with the VTB8000/VTB850 are as follows. R054 (1.5kΩ, 0.5W) goes open-circuit or high in value, giving no switched 15V or derived supplies. R069 (1.5kΩ, 0.5W) goes open-circuit or high in value, removing the non-playback 12V supply. Q051 or ZD051 faulty gives no switched 15V or derived supplies. ZD055 faulty results in no microcomputer chip 5V supply. R081 (2.2kΩ, 0.25W) open-circuit gives no 10V supply for the reel or loading motors – this resistor was replaced with a potistor in the VTB8300/VTB8700 to overcome the problem. In addition, to these common faults I've had most of the zener diodes fail at one time or another and a colleague had a faulty bridge rectifier which had the effect of extinguishing the clock display whenever play was selected. The different power supply arrangements in the VTB8300/VTB8700 result in much greater reliability. IC651 on the regulator board can sometimes fail, removing the switched 15V and 9V supplies. R669 (2.2kΩ, 0.5W) on the same board can fail with the result that the cassette lamp is without a supply although the machine will continue to operate because of the nature of the detection circuit.

When the switched supplies are missing I usually check first at the microcomputer chip (IC901) to make sure that the power control pins 41 and 2 (13 and 2 with the VTB8300/VTB8700) go up and down with the operate switch. If pin 2 does but pin 13/41 doesn't, the i.c. could be faulty but the problem is usually with one of the associated components. Check all voltages carefully, referring to Table 1.

Servo and System Control Circuits

The rest of the bottom board is occupied by the system control and servo circuits. The servo circuits are essentially the same on all models although the layout differs and the VTB8500/VTB8700 have a few additional components for the two extra capstan speeds and a slow tracking control. Faults are usually confined to failure of the tracking control to operate correctly, caused by either the HA11711 chip or slight misadjustment of the drum servo. Capstan faults are usually due to the motor.

System control is largely carried out by two chips, IC901 and IC902. The smaller one (IC902) is the same throughout the range but there's a different version of IC901 in the later models. There are also two versions of the system control circuit for the VTB8000. Faults here are usually caused by the various diodes, especially the 5V zener diode previously mentioned (ZD055), or IC901. Failure of the index system was in one case traced to Q917. IC905 or IC906 can fail, giving no loading motor or reel motor operation respectively.

IR Remote Control Receiver Board

The VTB8500/VTB8700 have an extra board next to the bottom main board. This is the infra-red remote control receiver board. Faults in this area are confined to dry-joints/cracks – also check for dud batteries in the handset.

Solenoid Drive Board

The only board not mentioned so far is a small one present in the VTB8000/VTB8500. This is the solenoid drive board containing the drive transistors for the two brake solenoids – these transistors are on the main board in the VTB8300/VTB8700. Failure of the brakes was in one case traced to Q54.

The Mechanics

We now move on to the mechanics. As previously mentioned the capstan motor is a source of trouble, the usual symptom being wow on sound. The video heads give very little trouble even though some machines are now approaching five years old. The audio/sync head does wear however, giving low, muffled sound or varying sound level. There was at one point a bad batch of heads bearing the number 671. They produced vibration which affected both the sound and picture. Most other faults are usually confined to failure of the index system was in one case traced to Q917. The audio/sync head does wear however, giving low, muffled sound or varying sound level. There was at one point a bad batch of heads bearing the number 671. They produced vibration which affected both the sound and picture. Most other faults are usually confined to failure of the eject damper mechanism – the nylon cog tends to fall in half. This is the same mechanism as fitted to the Ferguson 3V29/30. Failure to complete loading can also occasionally be caused by incorrect setting or failure of the two loading switches located to the rear of the mechanics.

Modifications

Finally, don't forget the various modifications that were introduced on this range. Though they've been mentioned in VCR Clinic we are repeating them here for the sake of completeness.

As previously mentioned the capstan motor is a source of trouble, the usual symptom being wow on sound. The video heads give very little trouble even though some machines are now approaching five years old. The audio/sync head does wear however, giving low, muffled sound or varying sound level. There was at one point a bad batch of heads bearing the number 671. They produced vibration which affected both the sound and picture. Most other faults are usually confined to failure of the eject damper mechanism – the nylon cog tends to fall in half. This is the same mechanism as fitted to the Ferguson 3V29/30. Failure to complete loading can also occasionally be caused by incorrect setting or failure of the two loading switches located to the rear of the mechanics.

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A hum bar on record with the VTB8500/VTB8700 – it can sometimes be seen in the E-E mode – can be cured by fitting a low-voltage (Mylar type suggested) 0.1µF capacitor across C760 on the tuner board and cutting the pink lead (chassis connection) between the tuner board and the tuning preset board.

The brake modification applies to all models. The problem is tape damage after rewind, caused by the fact that the supply spool brake comes on fractionally before the take-up spool brake, or the latter slips slightly, when the machine stops after rewind. The result is a tape loop which gets trapped in the cassette flap when the cassette is removed. There are two modifications for this, a mechanical one and an electronic one. The former consists of filing
Long-distance Television

Roger Bunney

September 1986 was an extremely rewarding month for long-distance TV reception in the UK and western Europe generally. Sporadic E conditions were active, with several periods of really strong signals, and from mid-month an almost stationary high-pressure system produced magnificent tropospheric propagation. The collated UK SpE log is as follows:

5/9/86 TSS (USSR) chs. R1, 2; MTV (Hungary) R1, 2; TVP (Poland) R1; NRK (Norway) E2, 3, 4; SR (Sweden) E2, 3, 4; DFF (East Germany) E4; RAI (Italy) IA; TVE (Spain) E2, 3.

6/9/86 TVE E2, 3, 4; TVE-2 E2; RTP (Portugal) E2; RUV (Iceland) E4.

7/9/86 TVE E2, 4; CP+ (Canal Plus – France) L3; ARD (West Germany) E2; ORF (Austria) E2a; RAI IA, B; MTV R1; CST (Czechoslovakia) R1, 2; TSS R1, 2; NRK E2, 3.

8/9/86 TVE E2; TVE-2 E2.

9/9/86 TVE E2; +PTT (Switzerland) E3.

10/9/86 TSS R1.

11/9/86 TSS R1, 2; MTV R1; TVP R1; JRT (Yugoslavia) E3; RAI IA; EPT (Greece) E3; TVE E2, 3, 4; RTP E2, 3; SR E3.

13/9/86 SR E2; TVP R1; TVE E2.

14/9/86 TVE E3; RAI IA, B; JRT E3; NRK E2, 3, 4; SR E3, 4; RUV E4.

16/9/86 TVE E2, 3, 4; TVE-2 E2.

17/9/86 NRK E2; RAI IA; TVE E2.

20/9/86 TSS R1, 2; TVP R1, 2; CST R1, 2; TVR (Rumania) R3; ORF E2a, E4; ARD E2, 3, 4; +PTT E2; RAI IA, B, C; JRT E3, 4; TVE E2, 3, 4; TVE-2 E2; RTP E3; NRK E2.

25/9/86 TSS R1, 2; NRK E2, 3; SR E2, 3, 4; ARD E4.

2/10/86 TVE E3.

The Italian ch. IC reception on the 20th was RAI-1 from Torino at 16kW.

Auroral activity was noted in Scotland on the 15th, 16th and 26th (evening), with Scandinavian Band I signals putting in an appearance. Good MS (meteor shower) activity was logged on the 16th.

Tropospheric Reception

Improved tropospheric propagation became evident from about the 19th, when a virtually stationary high-pressure system became established across southern UK. Although the conditions lasted for many days there were two specific peaks. Greatly enhanced reception occurred over the 19th-22ndnd, with E. German Band III signals, Swiss Band III/u.h.f. signals and the usual multiplicity of W. German Band III/u.h.f. signals. In the south/south east Dutch/Belgian stations provided signals of excellent entertainment quality daily! For many of those inland, as far as the Midlands, RTL+ (Luxembourg) provided good signals on ch. E7. Naturally the various French TV services, from Canal Plus in Band III through to TV5 and TV6 at u.h.f., provided consistently strong signals throughout the period.

The second, possibly more intense peak occurred on September 30th/October 1st. Danish Band III signals on chs. E5 through to E11 were received as far west as mid-Wales, together with DFF (E. Germany) ch. E6. Cyril
Willis managed a rather rare logging, Plzen ch. R10 (Czechoslovakia), while those on the east coast received fair quality signals from Norway on various Band III channels.

Dieter Scheiba (Belgium) noted a mystery signal on ch. E10 – a standard FUBK pattern with identification "NDS". This is being investigated. W. German SSVC (formerly BFBS) u.h.f. signals were also noted at reasonable strengths during the openings. RTE (Ireland) was well received over much of central/southern UK and the west country.

In all then a very encouraging start to the autumn! Unfortunately I had no access to cable feeds from the 24th due to building works at home, so loggings after this date are entirely from correspondents. My thanks to the following for sending in reports: Ryn Muntjewerff (Holland), Bill Cotterill (Tipton), Iain Menzies (Aberdeen), Simon Hamer (Powys), Dave Shirley (Hastings), Roger Fussell (Torpoint) and Cyril Willis (Norfolk).

Reception of scrambled vision/sound late at night from Crystal Palace, on ch. 26, was mentioned in this column last month. We understand that the tests were for the evaluation of a decoder for domestic use. It has also been suggested that the tests were for a future business data transmission service that could be operated outside normal broadcasting hours. Can anyone provide further information?

New EBU Listings

France: La Roche-Sur-Yon ch. L 12W horiz.; Quimperle L4 1W horiz.; Mulhouse L5 300kW horiz.; Metz L5 33kW vert.; Niort L6 400kW vert.; Dieppe L9 300W horiz.; Strasbourg L10 20kW vert. These transmitters are all used for the TDF-4 service – the first two should be "possibles" via SpE.

Jordan: A third service (JRTV-3) is now in operation, though with relatively low powers from u.h.f. transmitters. The Suweilih ch. E3 and E6 transmitters are to be closed – the former has been well received in Europe via SpE.

Sweden: Stockholm ch. E38 1,000kW e.r.p. (this may relay Finnish YLE-1 programming); Vislanda SR-1 ch. E39 1,000kW e.r.p. Polarisation horizontal in both cases.

Syria: Salkhad ch. E4 640W; Abou-Kmal E3 increased to 200kW; Nabi-Saleh E3 increased to 100kW; Hassakeh E4 increased to 200kW. All polarisations horizontal.

News Items

UK: Broadcasters are beginning to use a Sony Broadcast radio-microphone system that operates in the u.h.f. TV spectrum, giving six audio channels per 8MHz channel bandwidth. Granada (Liverpool) and HTV (Cardiff) are already using the system, which is at present restricted to broadcasters. The 175-180MHz spectrum has traditionally been used for radio-microphones but increasing interference has led to the adoption of this u.h.f. system.

Digital stereo TV sound is now operational with the BBC, the aim at present being staff familiarisation and decoder development in conjunction with the setmakers. For further details see Teletopics September (page 709). The DTI is evaluating the use of the 30-60GHz spectrum for fixed terrestrial radio use.

Gibraltar: A review of broadcasting is under way – various interests would like to use the location as a transmitting base to cover the region, especially the Costa del Sol.

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New Zealand: The BCNZ is opposing plans to take part of its v.h.f. allocation for use by a commercially operated third TV channel: it claims that all v.h.f. channels are of its v.h.f. allocation for use by a commercially operated New Zealand: The BCNZ is opposing plans to take part through 270°. Interference from 27MHz CB operators in fortunate in being at a site 550ft a.s.l. with a clear take-off front-end replaced to improve the noise performance. The possible refinement has been incorporated in the system, giving 1V p-p video output to a 12in. monitor. Every uses commercial modules arranged on a single PCB, tor (BFR34a) design for u.h.f. His current receiver system uses m.o.s.f.e.t. (3SK88) design for v.h.f. and a bipolar transistor (BFR34a) design for u.h.f. His current receiver system uses commercial modules arranged on a single PCB, giving 1V p-p video output to a 12in. monitor. Every possible refinement has been incorporated in the system, including switched selectivity, variable sound offset tuning ±7MHz of the vision i.f., and with the devices in the front-end replaced to improve the noise performance. The aerial system consists of a combined Band I/III array and a large home constructed log-periodic u.h.f. array. Ray is fortunate in being at a site 550ft a.s.l. with a clear take-off through 270°. Interference from 27MHz CB operators in Band I has gradually decreased, the main problem now being illegal 49MHz cordless phones.

Ray mentions that the Philips G8 chassis a.f.c. module (U700) can be used as an extremely sensitive tuning/signal strength meter (see Fig. 1). The unit contains a high-gain, single-stage i.f. amplifier with some selectivity and a discriminator circuit which produces an output across pins 7 and 8. This output can be used to drive a small, high-resistance 100µA f.s.d. meter (the module’s output is of high impedance). Connect the input pin (2) via a 5-10pF capacitor to a point in the later stages of the i.f.strip, prior to detection (in the G8 chassis the connection is to pin 7 of the U300 vision gain/detector module). In sets other that the G8 this could cause some slight detuning. The module’s output has a logarithmic S-meter characteristic, i.e. weak signals produce a large change in the meter needle deflection but the strongest signal will not drive the needle to the end stop. Receiver noise will produce a few µA of needle deflection. A series potentiometer of say 220kΩ can be added to give variable meter sensitivity. Alignment is simple: tune to a weak, non-fading signal then adjust the two cores accessible through the top of the can for maximum deflection – don’t tune on receiver noise. Ray uses a meter with a 100µA, 1-kΩ movement. Our thanks to Ray for passing on this extremely useful information – the U700 module is available from Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH.

Hugh Cocks, who is now living in the Algarve, Portugal, writes that he is erecting a 12m mast with a five-element Band I array, an eleven-element wideband Band III array and a 90-element wideband u.h.f. array. Using just the Band I array (fixed) he receives Izana, Canary Is. chs. E3 and E10 daily at 750 miles when the pressure is high. Moroccan ch. E4 and M11 signals are similarly received in the evening during tropospheric openings. RTM-2 chs. 21, 25 and 26 have at times been seen on test but never on programme. SpE reception produces ch. E3 signals from Sokoto, Nigeria and ch. E3 and E4 signals from Ghana. Algeria ch. E6 is commonly received before a local RTP transmitter comes on air. One mystery reception occurred on August 27th when the old 1956 RETMA card with no identification was seen on ch. E2. During the summer, cordless UK phones were received via SpE using an SX200 scanner. With no local Band I transmitter (or interference) the Algarve sounds like a good place to be!

Following an article in the US satellite magazine STV Frank Lumen of Denver, Colorado has been inundated with letters from North American 4GHz TVRO owners seeking more information on international TV signals and reception potential. Quite a number of expatriate UK viewers receive ITN News via its trans-US linking onwards to the Australian TV station TCN9. During the recent hijacking crisis the Pakistan test card appeared.

Quick Commercial

The familiar white two-way indoor signal splitter of Taiwan origin is now available from your friendly aerial supplier in an aerial switching version. There’s a single male output, the switch selecting between the two female input sockets. Very compact and cheap at approximately £2.95. It’s listed as the “Ant/Game switch EU-AB17”.

405-line Corner

Terence Burnett (Lee on Solent) is seeking a 405-line (or 405/625 line) solid state camera for use with his collection of 405-line equipment.

H. McKinnon (Southport) has for disposal to a good home a Murphy Model V659X monochrome set dating from the fifties.

H. V. Bennett (Portsmouth) has for disposal to a good enthusiast home a 405/625-line Bemex crosshatch/dot pattern generator (Bemex Instruments Ltd.).

If you are interested in any of the above, please write in with a stamped s.a.e. Your letter will be passed on. If you are thinking of throwing out any old 405-line equipment, pause – then write in!
Interference Problems with VCRs

J. LeJeune

Whilst the domestic VCR is undoubtedly a bargain, for some users the purchase soon turns sour when the results are spoilt by patterning on the picture, loss of servo lock or interference breakthrough on sound.

The domestic VCR is unfortunately prone to interference pickup from nearby radio transmissions in a band of frequencies from 200kHz to over 30MHz when in the playback mode. Interference between 200kHz and around 14MHz causes patterning: at higher frequencies the interference may affect only the operation of the servo systems. Before the interference can be neutralised it's necessary to make checks to discover where and how the unwanted signals are entering the machine and the part of the circuitry most vulnerable.

The source of the interference can occasionally be an amateur radio transmission. With very few exceptions amateurs operate strictly within the relevant regulations, their signals are monitored, their equipment is available for examination by the appropriate regulatory body and they show no wish to allow their hobby to inconvenience others. To eliminate interference from a radio amateur's transmissions successfully his/her co-operation must be sought. Interference can generally be eliminated without calling upon the Department of Trade and Industry who will charge the complainants £21 to tell them what you can tell them for little or nothing! The DTI should however be brought in where the regulations are being broken or a flagrant violation of the law, e.g. pirate operation, is discovered. Otherwise a few intelligent questions and a logical approach are the best approach to solving the problem.

VCRs are prone to interference in the playback mode because the machine is then in its most sensitive condition. The chrominance, luminance, audio and sync track signals read from the tape will be at levels of only a few hundred microvolts at the heads. A high degree of amplification is required to produce usable signal levels.

Types of Interference

Chroma interference is characterised by diagonal coloured lines, frequently green and magenta, which disappear when the recorder is switched to monochrome playback or the viewing receiver's colour control is turned to minimum. The interfering frequencies are usually in the range 200kHz to 1.5MHz.

Luminance interference is characterised by patterns that vary from the herringbone type to what can only be described as small hoops or interlocked circles. The effects cannot be removed by switching to monochrome and occasionally appear at only certain times of day. The interference frequencies are in the 1.8-14MHz range.

Experience has shown that only hi-fi machines are subject to audio interference from transmissions in the upper end of the medium waveband, from 1.4MHz to 3MHz. The linear sound track is not affected but the hi-fi sound on one channel may be marred by "birdy" noises or the modulation of the unwanted signal.

Servo interference is much more difficult to diagnose but is characterised by intermittent loss of synchronism during playback. It may be accompanied by picture patterning but due to the loss of servo action this will not be seen. Unwanted signals of sufficient strength to cause blocking of the circuits reading the sync track or direct entry of r.f. into the servo printed circuits, motor leads, etc. are the most common causes. Frequencies over the range 200kHz to 30MHz, including CB transmissions, can cause trouble.

Initial Tests

Much diagnostic time can be saved by carrying out some simple checks when a suspected case of interference is reported. The outer braid of the u.h.f. aerial lead will act as a long-wire aerial and present low, medium and high frequency signals at the machine's rear connector panel. Most modern machines are fitted with a metal wrap-round case and a connecting bottom screen but leave the front and rear panels unscreened. Check number one therefore is to disconnect the aerial from the rear of the machine. If the interference ceases it's likely to be entering the machine via this route. The best solution is to fit a braid-breaker in the aerial lead to attenuate all signals below 400MHz on both the outer screen and the inner conductor. Although braid-breaker filters may appear to be simple enough to make, and one or two empirical designs are in circulation, the use of these requires care as they may have a poor voltage standing-wave ratio and the resultant mismatch between the feeder and the machine's input circuit will cause teletext corruption with sets equipped for teletext reception.

A second useful check is to rotate the VCR through 90°. A null-point can frequently be found when this is done and will to some extent indicate the direction from which the unwanted signals are coming. Disconnect the aerial for this test.

Additional Screening

Once you've established that disconnecting the aerial doesn't clear the trouble the covers should be removed from the machine. The most vulnerable places for interference pickup are the head drum, the rotary transformer, the signal leads to the preamplifier box and the preamplifier itself. It should be said right away that effective screening is the only real answer to this problem. Traps have sometimes been inserted in the relevant signal paths within the machine but unless very great care is taken over the design of such rejectors there'll be a marked effect on the luminance-chrominance timing, with resultant misregistration.

Some engineers suggest that earthing the machine is a useful way of removing interference. It generally doesn't work unless a screened earth is used, and even then it's rarely 100 per cent effective. Unless they are already there, don't go to the bother of drilling holes in window frames to install an earth wire - the odds are against this doing any good.

The screening material used should provide magnetic as well as electrostatic shielding, so aluminium baking foil won't do. The easiest material to obtain and use is sheet tinplate, such as that used in packaging instant coffee, fruit in syrup and some vegetables. The tinplate can be
It's difficult to learn. You can lose half a day's work if you press the wrong button. It can give you eye strain. And it's far too expensive. These are some of the comments one hears when the subject of word processors is discussed. There's some truth in all these comments though the problems are not as bad as they sound. But what exactly is a word processor?

A word processor basically does the same job as a typewriter. It doesn't compose the text for you - you have to do that. But you can manipulate, rearrange, copy, delete, insert, edit, layout and do a whole lot more to your text before you ever load a sheet of paper in the printer. Furthermore mechanical operations such as page numbering, returning the carriage at the end of each line, centring titles, locating specific passages in a long manuscript, inserting oft-repeated phrases, rearranging text after an alteration and many others are done automatically.

The word processor itself is a simple program that can be run on any suitable computer. You need a computer with keyboard, a VDU, a disc drive and a printer. If you already have some or all of these all you need are the items you lack and the software to run on them. There are many word processing programs, each with its own particular features: some examples are New Word, Word Star, Wordperfect and LocoScript.

The various commands for carrying out word processing are initiated by using combinations of letters and signs on a standard computer keyboard. A dedicated word processor is a computer that's been specifically designed for word processing, though it will also work as a normal computer. The advantage is that it has a number of keys which provide specific word processing functions and are more convenient to use than the combinations required with the non-dedicated variety.

Learning

Before going further let's deal with the objections mentioned at the start. Is word processing difficult to learn? If you can use a typewriter - and most prospective word processor users probably can - much of the keyboard will already be familiar. Also familiar will be such functions as tabulation, shift and shift-locks, margin setting and line spacing. The basic functions are no more difficult to perform than with a typewriter - in fact some are easier. After loading the software and getting into the mode for creating a new document, as described in the system's instruction manual, you're ready to start. A small, flashing rectangle the size of a single character, called the cursor, indicates where the next character you type will appear - the cursor can be moved about the screen by using four keys. Also on the screen will be a ruler at the top and bottom, indicating the margins and tab stops.

The first thing you notice when you start typing is that the cursor automatically jumps to the next line when it reaches the end of a line. If you're in the middle of a word the whole word is transferred to the next line. So you can forget about end-of-line carriage returns and split words, the bane of manual typewriters - it's all done for you.

A "return" key is pressed to start a new paragraph, to introduce a line space or to reparagraph text if desired. When this is done the text is automatically reshuffled. As you work down the page the text scrolls upwards and off the top of the screen, leaving the last twenty or so lines displayed. Page endings can also be forgotten - the processor will start a new page and insert the number according to a preset paper size. If you object to having just one or two lines of a new paragraph at the bottom of a page some processors will automatically transfer them to the next page if told to do so in advance. Split paragraphs can be avoided in the same way.

Erasure of any text is simple, either one character at a time or by defining the beginning and end of the unwanted passage then eliminating it with a single keystroke. The rest of the text is automatically relayed to close the gap. Similarly, extra text can be inserted at any point, the rest opening out to accommodate it. There's no limit to the number of changes that can be made. That's far easier, quicker and cheaper than using correcting fluid on paper - and the result looks a whole lot better!

So the basic functions are easier to perform than with a
manual typewriter. A word processor will make life much easier for anyone who produces or organises words even if only these basic operations are used. Learning is quite painless, though the full capabilities may take a while to master. As with an electric typewriter the keys need little pressure.

**Expense**

Word processors have been expensive in the past but if you already have a computer, VDU, disc drive and printer you can get into word processing by purchasing software costing £50 or less. A TV set with a modulator can serve as a VDU, though it may not have adequate resolution. But the price objection has been well and truly overcome with the advent of the Amstrad PCW8256. This complete word processor consists of a VDU with built in disc drive, a high quality matrix printer and the keyboard, along with the LocoScript program on disc. In addition CP/M Plus with utilities and Logo software are provided so that the instrument can be used as a powerful computer. At a price of £399 plus VAT it costs less than many typewriters.

While it has some deficiencies and snags the system can hold its own against many that are several times the price. It has some features that are lacking in higher priced models. So for most prospective users the choice has become something of a one-horse race. Our comments in the rest of this article will therefore be based on the Amstrad PCW8256.

**Eye Strain**

Any VDU can produce eye strain. Being somewhat long-sighted I suffered from this to start with, so I tried increasing the viewing distance by pulling out a shallow drawer at the front of my desk and operating the processor with the keyboard resting inside the drawer. This extends the effective desk width and enables me to view the VDU at a distance of some four feet. I've had no further trouble since, but this might not work for others. Not staring at the screen for too long and keeping the brightness fairly low can also help.

**Losing Work**

As to losing work before it's printed, this possibility is the most serious snag with word processing. At the end of a working session the work is recorded on disc. While working the text is stored in a volatile internal memory and will be lost if the processor is switched off or the mains power is otherwise interrupted. Precautions can be taken: avoid loose mains wires and fuses and badly fitting plugs! With earlier versions of LocoScript the most likely way of losing the text is when the disc is too full to accommodate it. An attempt to record produces a "fault" message on the screen, then pressing any key makes the text scroll off the screen and disappear for ever. More recent versions (V1.20) allow you to erase some unwanted file from the disc to make room for the new one. More on this later.

Another way of losing material is to erase it from the disc accidentally. An erase command is always followed by a screen request for confirmation however, showing the title of the document. Even if you change your mind after erasure it's not too late. The text is sent to limbo, where it remains until the space is taken by new material. Provided it's not left there too long it can be reclaimed. So accidental erasure is not a major hazard.

**Further Features**

So much for the objections and the basic functions which can be quickly mastered. The word processor can offer many other features which may take some time to absorb – not because of their complexity but because of their number and extent. It's these that probably give word processing the reputation of being hard to learn. Try mastering them one at a time so that you extend your skills as you use the machine. Some of these extra facilities are as follows.

**Copy:** Any section of text can be defined at its beginning and end, then copied as many times as required into any other positions in the text or saved for use in other texts.

**Move:** Same as copy but the original portion of text is deleted.

**Phrase storage:** Frequently used phrases or sentences can be permanently stored and recalled when required by a single keystroke plus the phrase code letter.

**Find:** A word or phrase can be typed in when this mode is selected: the cursor searches through the current document and stops each time the given phrase is recognised.

**Exchange:** Similar to find. Two phrases are typed in, the first being the one in the document and the other the text with which it is to be replaced. The processor will either replace the text every time it occurs or will stop each time for a command either to replace or go on to the next one.

**Template:** Templates can be laid out for each of many types of document, say business letters, private letters, memos, invoices, reports, etc. Details can include margin positions, type style, tabulation, line spacing, line justification and paper size. When a new document is started in any of these categories the appropriate template is automatically selected. Thus no resetting is required when going from one type of document to another. Template details can be changed at any time if required.

**Layouts:** Different layouts can be set up within each template, with different margins, tabulation etc., each readily selected as required. This enables different types of material, such as text and columns of figures, to be easily combined in one document.

**Proportional spacing and right justification:** With type-written script the spaces occupied by letters are all of equal width, so that the letter i occupies the same space as w. Word processors can also print in this manner but proportional spacing can be selected if desired. With this mode each letter takes only the amount of space it needs. This can be further enhanced by right justification – words at the right-hand end of each line are aligned vertically.

**Print style:** Different width, italic, half-height or bold characters can be selected. They can be mixed in one document with no trouble. The Amstrad processor provides many Greek letters and accented letters as well as the dollar and yen signs. Various mathematical signs are provided – but not, strangely enough, the square root.

**Underlining:** Whole sentences or paragraphs can be underlined by defining the start and end with the cursor. There's a choice of complete underlining or underlining each word separately.

**Storage and Indexing**

The index, termed the disc manager, appears as soon as the system disc is loaded. It displays all the documents on the disc side, arranged alphabetically in groups. Each
document is placed in the appropriate group by the user, the processor carrying out the alphabetical order. Space used and available are also shown. A document is selected for revision or printing by placing the cursor over it then pressing the appropriate key. Documents can be copied or moved to another group or disc, and both groups and documents can be renamed. Each disc side has its own index which can be inspected by loading the disc and pressing the disc-change key.

Word processing thus enables you to keep tidy, systematic and compact file copies. They are always in alphabetical order, none get lost or mis-filed, and are much easier to manage than a load of carbon copies. Any number of print-outs can be made of any one at any time.

Sensitive or confidential material need not be recorded on disc if a copy is not required. It can be created and printed using the internal memory facility. All traces then disappear when the processor is switched off. Alternatively it can be created normally, using the disc, then immediately erased along with its “ghost” in limbo.

Obsolete documents can be erased to make room for new ones, or a disc can be kept until most of the material is obsolete then bulk erased after transferring any active items to another disc.

The capacity of the three-inch discs used with the Amstrad processor is 180 Kbytes per side: 7K is used for the index and 173K is available for storage. With single side letters and invoices averaging 2-5K this gives up to 70 items per side, 140 per disc. An optional extra disc drive can be fitted for 3-25 or 5-25 inch discs with 720K capacity per side. The latter are half the price of the three-inch discs and are compatible with the IBM format. This is a worthwhile extra for larger businesses.

**Spelling and Mailing**

Some word processors incorporate a built-in dictionary that checks spelling. It compares each word in the text with its many thousands of entries and if it doesn’t find the word points this out and suggests one with the nearest spelling. Thus “necesary” would produce “necessary”. Words not contained in the dictionary can be added by the user so that they become part of the lexicon. This facility is useful even for good spellers: it spots typing errors, which are easier to make with a sensitive keyboard.

A dictionary isn’t included with the Amstrad LocoScript but one can be added. There are several available including Word Plus, Tas-spell and Prospell. The latter is available in disc or ROM form and has a 32,000 word vocabulary expandable by the user. It checks up to 2,000 words a minute and costs £29.95.

Another useful feature for the business user or club secretary is Mailmerge. If a standard letter and a list of names and addresses is supplied to the processor it will print out copies with individual addresses and salutations. LocoScript does not have a Mailmerge facility but the Amstrad machine will run software that does have this facility. Some of these are Tasword 8000 and Word Star. New Word and Superwriter have both spelling checkers and Mailword. Tasword 8000 costs £24.95, the others £49.95.

**Printing**

The two main types of printer are the daisywheel and matrix types. The daisywheel gives the higher quality but is less versatile than the matrix type which can mix various styles of type in the same document. The PCW8256 uses a matrix printer that gives very good quality printing – you need a magnifying glass to distinguish it from daisywheel printing. Printing speed is twenty characters per second but it will also print a draft quality at 90 c.p.s.

**The Amstrad Printer**

Unlike many printers the PCW8256 doesn’t bristle with controls. Apart from the internal pressure adjustment the only controls are for feeding in the paper. Emphasis, style and all the other printer control commands are embedded in the LocoScript text and the printer can be stopped and put on standby from the main keyboard. Another useful feature for busy people is that work can proceed on one document while the printer is printing another one. This is not a common facility even amongst word processors that cost several times the price of the PCW8256.

**Snags**

It would be miraculous if any product, especially one as technically complex as a word processor, had no snags. Despite its many good features and excellent value the PCW8256 and LocoScript combination have their share.

One concerns the printer. In common with many others it doesn’t like envelopes. It will print on them but refuses to move them up so that all lines are superimposed. Now I know you’re supposed to use labels for addressing, but to set up a roll of labels and adjust the printing parameters then tear them off and stick them on the envelopes for the sake of half a dozen letters or less takes far more time than typing the addresses directly on the envelopes. The cause of the problem is insufficient pressure on the ball bar that holds the paper against the roller. This could be increased by fitting a stronger spring but I wouldn’t recommend this as it could place undue stress on the associated plastic parts. A simpler solution is to apply slight finger pressure at both ends of the bar while the envelope is being addressed. This is not a major inconvenience as the addressing takes only seconds. Alternatively go into the direct-print mode: in this you can type a line at a time, moving the envelope up manually as you would with an ordinary typewriter.

Another snag is that you have to set the paper size twice, once in the template for the document group and again when the document is printed. If you forget to set the printer and you are using a longer size than A4 the printer will stop before the end of the page, leaving a blank area.

A limitation with early versions of LocoScript (V1:0) was inability to select pages to be printed. You could abandon the printing at any stage, or reprint the current or the previous page if the printing went wrong, but you couldn’t select any one or more pages of a document if that was all you wanted. So if you wanted to change something on one page after printing you had to reprint everything up to that page. This has been corrected with the latest V1:20 version: any one or more pages can be selected for printing.

Text preparation with LocoScript has the disadvantage that you can’t change capitals to lower case or vice versa (you can with some other word processors). If you decide to capitalise a word or sentence you have to erase and retype it. This isn’t a major problem as the option isn’t often required, but it could be useful at times.
It's desirable to be able to see on the screen exactly what the printer will print, italics, bold type etc. appearing as such on the screen. With LocoScript however the style being used is indicated in the header to the page as the cursor passes over the relevant portion of the text. Once the cursor has passed on and the style has changed the header shows this new style. There's a keystroke that makes the style code visible at the beginning and end of a section of text but you normally work without displaying embedded codes as they muddle up the appearance and change the display from what's actually being printed. The danger with this is that a particular style could be set for a passage then not cancelled. The screen would look the same but the unwanted style would persist to the end of the print-out. So you should always check the header when you go into or leave a new style. If you make a habit of this you shouldn't get any surprises when the work is printed.

The PCW8256 instruction manual warns of the danger to a data disc of switching the processor on or off with it in the drive. Though you take care to avoid doing this a moment's inattention could be disastrous. It would have been easy to arrange a mechanical link to prevent the power switch being operated with a disc in place.

**Full Disc Work Loss**

Back now to work loss with a full disc. If you are creating a new document you can proceed up to the remaining length available as indicated by the disc manager. If you are editing an existing document however you need twice that space. It appears that the new edited version is recorded then the old one is discarded so that both are on the disc for a few moments. As a result you get a "disc full" notice on the screen when attempting to finish and record your edited version even though you thought you'd plenty of space for it.

When a disc is nearly full it's best to create and complete a new document rather than partly finish one and go back to it later. As there's no running total of document length in the header (another unfortunate omission) it's easy to exceed the available space even with a new document.

So what do you do if the screen displays "disc full" when you exit from creating or editing a document? This is where you need to be careful. A wrong step and you lose all you've done in a session. If you have the V1-0 version of the LocoScript it's already too late – with this version you must always ensure that there's enough space. The more recent V1-20 version displays a menu which suggests that you return to the disc manager. Press the enter key but don't touch cancel or your text is lost. Having summoned the disc manager you can make space in one of two ways. The first is simply to erase an unwanted document of sufficient length. Alternatively if you want to keep the recorded material move one document into the M drive. This is a section of the internal memory for temporary storage – like the working memory, its contents disappear when the processor is switched off. Then go back to your new document by pressing "exit". It will now be recorded on disc. When completed, replace the disc with a suitable one to hold the document you put in M drive and press key £1. Then move it from M drive into an appropriate place on the disc in the usual way.

I've dealt with this process in some detail because, although the instruction manual gives detailed instructions on how to fit the mains plug, it's completely silent about avoiding work loss when a disc is full!

**Write Protection**

There's another manual shortcoming that could be baffling to beginners (it baffled me). The LocoScript disc supplied is write-protected to prevent accidental erasure of the program. You're advised on the disc case to make a copy to work with and to store the original safely. There's no mention of this at the start of the manual however.

Having bought and set up the outfit you probably haven't got a spare disc, so you use the original in the "first twenty-minute" exercises described in the manual. All goes well until you try to print out the result – and find that the printer won't work. Instead a meaningless (at this point) message comes up on the screen "error in drive to A". I eventually deduced that the machine records your text before it prints the text: if it can't record because the disc is write-protected it won't print. In the absence of a recordable disc you could use the M drive and get a print out, but the manual says nothing about this.

**Ruler Calibration**

Ruler calibration can be rather confusing. Each division represents one character in the twelve characters per inch mode, the standard character pitch. Proportional spacing also averages out to this figure. When 10, 15 or 17 c.p.i. is used however the ruler markings in the header remain the same. This isn't too bad because the line endings adjust, so that the screen layout is what is printed. The confusion arises when one tries to correlate the ruler with the markings on the paper bail bar. This is calibrated in tenths of an inch and thus bears no relation at all to the ruler markings. Any attempt to set up the margins or tabs using the bail bar as a guide, or to use it for precise print positioning on the paper, results in inaccuracy. It would have been a useful guide had it been calibrated in twelfths.

**Summing Up**

These then are the main features of word processors in general and the PCW8256 in particular. Readers should be able to judge from this whether such a machine has a place in their home or work.

Apart from the features that physically aid word production there's a more subtle factor. When you use a typewriter you compose your prose carefully because you know that alterations can mean a messy page or a retype. You're inclined to use standard phrases and the result is likely to be rather stilted. Second thoughts or minor improvements will probably be ignored provided the original is passable. The work has to be really bad to justify revision and retyping. Any such inhibitions are lost with a word processor since anything can be changed at any time up to printing. Writing is faster and freer and you can rearrange and polish the result at will. The result is a generally higher standard of work.

Finally, although this is beyond the normal use of a word processor a considerable amount of software that can produce graphs, pie-charts, graphics, diagrams, extended print fonts (up to sixteen different ones in one case), pictures from video signals and magazine page composition is available. You can even produce a complete magazine with text and graphics or posters in sections.
Low-cost Teletext Decoder

Part 1

Peter Marlow, B.Sc. (Hons.), C.Eng.

Whilst browsing through the advertisements in Television recently I noticed that the Mullard VM6101 teletext decoder module could be purchased from Sendz Components for only £10. It occurred to me that this could form the basis of a simple, compact, low-cost, "no-frills", set-top teletext decoder. Ready-built set-top teletext adaptors have been on sale but are quite expensive at around £150. The aim I set myself was to produce a unit costing £50 or so, with the setting up operations reduced to an absolute minimum.

The VM6101 board contains the standard Mullard teletext chip set with a one-page memory. The individual chips have been described before in these pages—see for example Mike Phelan's articles in the January–April issues earlier this year. Suffice it to say that the board requires a 2-4V peak-to-peak video input and IBUS data signals for control (see below). The red, blue and green video outputs are open-drain field-effect transistors which can be pulled up to 5V for TTL interfacing. Power consumption is 5V at 350mA and 12V at 100mA. The input circuitry is factory aligned, thus avoiding the need for complicated test equipment and setting-up procedures.

Preliminary thoughts about the interfacing circuits required to drive the VM6101 board revealed a number of problems. The first was to find a suitable video/teletext signal source. Tuner and t.f. strips are expensive, so I decided to try using the auxiliary video output from my video recorder, switched to receive u.h.f. transmissions. It was a good use for the VCR, which seemed to spend most of its time lying idle. The auxiliary output was found to be a standard 1V peak-to-peak signal at 75Ω. A few enquiries revealed that all VCRs incorporate such an output via either a BNC or a phono socket. The bandwidth of the signal didn't appear to be limited to exclude the teletext information, and it later proved to be entirely satisfactory. To interface with the teletext board a simple voltage amplifier with a gain of 2-4 was required.

The next problem was to control the teletext decoder by generating the correct IBUS signals (see Fig. 1). These consist of a switched 62.5kHz clock line called DILIM and a seven-bit serial data line called /DATA. Each data bit lasts for two clock periods and must be valid on the rising edge of the second clock cycle. The /DATA signal consists of numbers and commands. Those relevant to the teletext mode are listed in Table 1: the list includes instructions (identified by an asterisk) that are not required in a teletext only receiver—they are included in the list for the sake of completeness.

Mullard manufacture a remote control chip set that produces the IBUS signals required. The chips are the SAA5000 keyboard encoder/transmitter and the SAA5010 or SAA5012 receiver/decoder (described in the September issue, page 729 on). I thought that I might be able to use this system by picking up a remote control handset reasonably cheaply and using the SAA5012 receiver. But the TX9/10 handsets cost about £18, which was rather a large chunk of my £50 budget. After thinking long and hard about the input requirements it occurred to me that a keyboard mounted on the unit would be quite adequate, requiring just a little more effort to operate than remote control. I programmed an 8748 microcontroller chip to scan the keyboard and provide all the basic IBUS functions and "recall last page". The microcontroller provided a "one chip" solution that saved a great deal of PCB space.

The 8748 is a self-contained microcontroller chip from Intel, second-sourced by NEC. It's a member of the 8048/9 family which are used as supervisory controllers in many TV receivers. It has 1K of program memory (EPROM), 64 bytes of data memory (RAM), a timer, two eight-bit ports and a bidirectional data port. Its instruction set is similar to most other eight-bit microprocessors. Software

Table 1: Decoder control signals.

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
<th>Data code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reset (on)*</td>
<td>b7 b6 b5 b4 b3 b2 b1</td>
</tr>
<tr>
<td>2</td>
<td>Mute*</td>
<td>1 0 0 0 0 0 0</td>
</tr>
<tr>
<td>3</td>
<td>Standby*</td>
<td>1 0 0 0 0 1 0</td>
</tr>
<tr>
<td>4</td>
<td>TV on*</td>
<td>1 0 0 0 1 0 1</td>
</tr>
<tr>
<td>5</td>
<td>Status*</td>
<td>1 0 0 1 0 1 0</td>
</tr>
<tr>
<td>6</td>
<td>Hold</td>
<td>1 0 0 0 1 0 1</td>
</tr>
<tr>
<td>7</td>
<td>Reveal</td>
<td>1 0 0 0 1 1 0</td>
</tr>
<tr>
<td>8</td>
<td>Text cancel</td>
<td>1 0 0 0 1 1 1</td>
</tr>
<tr>
<td>9</td>
<td>Analogue 1+</td>
<td>1 0 0 1 0 0 0</td>
</tr>
<tr>
<td>10</td>
<td>Analogue 1*</td>
<td>1 0 0 1 0 0 1</td>
</tr>
<tr>
<td>11</td>
<td>Analogue 2+</td>
<td>1 0 0 1 0 1 0</td>
</tr>
<tr>
<td>12</td>
<td>Analogue 2−</td>
<td>1 0 0 1 1 0 1</td>
</tr>
<tr>
<td>13</td>
<td>−*</td>
<td>1 0 0 1 1 1 0</td>
</tr>
<tr>
<td>14</td>
<td>−</td>
<td>1 0 0 1 1 1 1</td>
</tr>
<tr>
<td>15</td>
<td>Timed page off</td>
<td>1 0 0 1 1 1 0</td>
</tr>
<tr>
<td>16</td>
<td>Timed page on</td>
<td>1 0 0 1 1 1 1</td>
</tr>
<tr>
<td>17</td>
<td>Number 1</td>
<td>1 0 1 0 0 0 0</td>
</tr>
<tr>
<td>18</td>
<td>Number 2</td>
<td>1 0 1 0 0 0 1</td>
</tr>
<tr>
<td>19</td>
<td>Number 3</td>
<td>1 0 1 0 0 1 0</td>
</tr>
<tr>
<td>20</td>
<td>Number 4</td>
<td>1 0 1 0 0 1 1</td>
</tr>
<tr>
<td>21</td>
<td>Number 5</td>
<td>1 0 1 0 1 0 0</td>
</tr>
<tr>
<td>22</td>
<td>Number 6</td>
<td>1 0 1 0 1 0 1</td>
</tr>
<tr>
<td>23</td>
<td>Number 7</td>
<td>1 0 1 0 1 1 0</td>
</tr>
<tr>
<td>24</td>
<td>Number 8</td>
<td>1 0 1 0 1 1 1</td>
</tr>
<tr>
<td>25</td>
<td>Number 9</td>
<td>1 0 1 1 0 0 0</td>
</tr>
<tr>
<td>26</td>
<td>Number 0</td>
<td>1 0 1 1 0 0 1</td>
</tr>
<tr>
<td>27</td>
<td>Full Page</td>
<td>1 0 1 1 0 1 0</td>
</tr>
<tr>
<td>28</td>
<td>Top</td>
<td>1 0 1 1 0 1 1</td>
</tr>
<tr>
<td>29</td>
<td>Bottom</td>
<td>1 0 1 1 1 0 0</td>
</tr>
<tr>
<td>30</td>
<td>Viewdata on*</td>
<td>1 0 1 1 1 0 1</td>
</tr>
<tr>
<td>31</td>
<td>Superimpose (mix)</td>
<td>1 0 1 1 1 1 0</td>
</tr>
<tr>
<td>32</td>
<td>Teletext on</td>
<td>1 0 1 1 1 1 1</td>
</tr>
</tbody>
</table>

*See text.
can be hand-assembled or developed on a microcomputer system (IBM and BBC computers have software available for this). Fig. 2 shows the 8748's inputs and outputs.

The last problem was the interface with the TV set. I didn't think the decoder needed the superimpose, timed page or subtitle functions: the display of teletext data on a spare TV channel would be quite adequate and reasonably cheap to realise using a straightforward PAL encoder and a modulator. The modulator's output would be tuned to a spare TV channel and mixed with the VCR's output (on channel 36) before being fed to the TV set's aerial input socket. I decided to use a modulator with a sound channel (Astec UM1287) to eliminate the "buzzing" of text video normally associated with microcomputers. If desired a sound signal could be piped from the VCR to accompany the teletext picture. A cost reduction could be achieved however by using a vision only modulator (Astec UM1233) – see later.

Fig. 3 shows the connections between the various items forming the complete system.

Design of the power supply was easy. A 10VA mains transformer used in a conventional circuit produces 5V at 450mA and 12V at 150mA.

The complete decoder unit is housed in a standard plastic box.

Having worked out the initial design I could at last get to work with pencil (and rubber) and a soldering iron. The idea was to produce a PCB about the same size as the VM6101 board to contain all the necessary interfacing circuitry and the power supply. This interface PCB would reside in the top of the case with the VM6101 board in the bottom. The keyboard would be fixed to the outside top of the box, with input and output connectors and the mains input on the rear panel. The front panel would contain just the on/off switch and a LED indicator.

The case chosen for the design is the Vero Apollo (size 5) which measures 146 x 206 x 74mm. Fig. 4 shows the circuit of the interface panel and the connections to it.

**Table 2: Keyboard functions.**

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
<th>Key</th>
<th>Function</th>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No. 1</td>
<td>7</td>
<td>No. 7</td>
<td>A</td>
<td>Top</td>
</tr>
<tr>
<td>2</td>
<td>No. 2</td>
<td>8</td>
<td>No. 8</td>
<td>B</td>
<td>Bottom</td>
</tr>
<tr>
<td>3</td>
<td>No. 3</td>
<td>9</td>
<td>No. 9</td>
<td>C</td>
<td>Full page</td>
</tr>
<tr>
<td>4</td>
<td>No. 4</td>
<td>0</td>
<td>No. 0</td>
<td></td>
<td>Last page</td>
</tr>
<tr>
<td>5</td>
<td>#</td>
<td></td>
<td>Hold</td>
<td></td>
<td>recall</td>
</tr>
<tr>
<td>6</td>
<td>*</td>
<td></td>
<td>Reveal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Circuit Operation**

Operation of the circuit is as follows. The 1V peak-to-peak video signal from the VCR's auxiliary output enters...
Components list

<table>
<thead>
<tr>
<th>Resistors:</th>
<th>Capacitors:</th>
<th>Semiconductor devices:</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1 270Ω</td>
<td>C1 33p ceramic plate†</td>
<td>IC1 8748 (preprogrammed) ★</td>
</tr>
<tr>
<td>R2 680Ω</td>
<td>C2 33p ceramic plate</td>
<td>IC2 4040</td>
</tr>
<tr>
<td>R3 680Ω</td>
<td>C3 1µF 63V el. radial</td>
<td>IC3 TEA2000 ★</td>
</tr>
<tr>
<td>R4 270Ω</td>
<td>C4 1,000p ceramic plate</td>
<td>REG1 7812</td>
</tr>
<tr>
<td>R5 33k</td>
<td>C5 100µF 6-3V miniature el. radial</td>
<td>REG2 7805</td>
</tr>
<tr>
<td>R6 12k</td>
<td>C6 4,700µF 25V el. radial</td>
<td>Tr1 BC558</td>
</tr>
<tr>
<td>R7 75Ω</td>
<td>C7 0.47µF polyester</td>
<td>Tr2 BC548</td>
</tr>
<tr>
<td>R8 36k*</td>
<td>C8 0.22µF polyester</td>
<td>D1 1A 50V bridge</td>
</tr>
<tr>
<td>R9 1k</td>
<td>C9 0.22µF polyester</td>
<td>D2 BY88C5V1</td>
</tr>
<tr>
<td>R10 910Ω</td>
<td>C10 1,000p ceramic plate</td>
<td>5-V 400mW zener</td>
</tr>
<tr>
<td>R11 39k</td>
<td>C11 100µF 16V el. radial</td>
<td></td>
</tr>
<tr>
<td>R12 680Ω</td>
<td>C12 100µF 16V el. axial</td>
<td></td>
</tr>
<tr>
<td>R13 2.2k</td>
<td>C13 10µF ceramic plate</td>
<td></td>
</tr>
<tr>
<td>R14 2.2k</td>
<td>C14 10n ceramic plate</td>
<td></td>
</tr>
<tr>
<td>R15 2.2k</td>
<td>C15 5-6p ceramic plate</td>
<td></td>
</tr>
<tr>
<td>R16 820Ω</td>
<td>C16 5-6p ceramic plate</td>
<td></td>
</tr>
<tr>
<td>R17 470Ω</td>
<td>C17 330p ceramic plate, 1% or 2%†</td>
<td></td>
</tr>
<tr>
<td>R18 680Ω</td>
<td>C18 100µF 6-3V miniature el. radial</td>
<td></td>
</tr>
<tr>
<td>R19 100k</td>
<td>C19 100µF 16V el. axial†</td>
<td></td>
</tr>
<tr>
<td>R20 100k</td>
<td>TC1 2-2p trimmer</td>
<td></td>
</tr>
<tr>
<td>R21 100k</td>
<td>† See text</td>
<td></td>
</tr>
<tr>
<td>R22 100k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plus 4.7k required on VM6101 board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All CFR 0-3W 5% except R8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
* 2% metal film
† See text

Miscellaneous – hardware:

Keyboard – 4 x 4 Membrain (Rowland Automation, Verospeed 259-41380C)
Video input – BNC panel mounting socket (75Ω)
Audio input – 5-way, 180° DIN socket
Keyboard input – 10-pin header (0-1n. pitch) cut to 8
(Verospeed 901-71320A)
Connection pins – 0-2in. pitch pins (4 x 2-way, 2 x 3-way, 1 x 5-way)
Switch S1 – Double-pole paddle switch
Heatsinks for REG1 and REG2
40-pin socket for IC1
PCB ★
Apollo case size 5 (Verospeed grey 75-38119A, beige 75-3924A)
Pillars: self-adhesive boss (Verospeed 75-38126H, pack of 10) with self-tapping screws
Nuts and bolts for heatsinks, 2 countersunk 6BA 1\%in. bolts and nuts for board support, 6 Veropins for REG1 and REG2 wiring, miniature coaxial cable, stranded wire
Splitter and cabling (external to units)

Availability:
Parts marked ★ can be obtained from Video Interface Products Ltd., Charlton House, 32 Charlton Lane, Cheltenham, Glos., GL53 9DX (0242 581383). Other parts available from suppliers mentioned and usual dealers.
Video Interface Products Ltd. can supply parts/kits as follows:
8748 microcontroller only (programmed) £10
PCB only £7.50
Parts indicated by ★, i.e. IC1, IC3, modulator (UM1287), L1, L2 and PCB £28
PCB plus parts kit (including 4 x 4 keyboard and heatsinks – no decoder) £52
PCB plus parts kit as above, built and tested £65
Complete kit (including splitter but not video cables) £85
Complete kit as above, built and tested with guarantee £105
Add VAT to above prices at 15% plus £2 post and packing.
Access accepted.

the unit at PL2 and is terminated by R7. Tr1 and Tr2 are connected as a simple two-stage voltage amplifier to increase the signal amplitude to 2.5V peak-to-peak (the maximum is 3V). The output is delivered direct to the VM6101 module’s video input – a 1µF input coupling capacitor is already present on this board but its polarity must be reversed (see later for details).

The keyboard and IBUS interfacing is done by the 8748. The four-by-four keyboard is scanned by the low-order bits from port P1, the keyboard output being read via the data bus. A 6MHz resonator (X1) is used as the timing element, to reduce cost – an ordinary 6MHz crystal can be used, but the values of C1 and C2 then have to be reduced to 22pF. As the 8748 is too slow at 6MHz to produce the DLIM clock by software means alone a 4040 counter (IC2) is brought in to help, dividing down the 2MHz output from T0. A 62.5kHz clock is thus generated, being turned on and off by the P14 line. The data is inverted and serially clocked out at P20 in the order /b7, /b6, /b5, /b4, /b3, /b2, /b1. Provided the two series 470Ω resistors in the DLIM and /DATA lines are shorted out (see later for details) the 8748 can be connected directly to the VM6101 module.

The 8748 is available from Video Interface Products Ltd. (see parts list) with the software already programmed in. The mode of operation is that the microcontroller

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sends page "100" at power up to get the decoder into the teletext mode. It then scans the keyboard for a valid input, decodes it, reviews a look-up table and sends the appropriate command. Page numbers are stored on an eight deep stack to allow page recall. The reveal command (key *) is sent continuously until the next command. Table 2 lists the keyboard functions.

The PAL encoder circuit uses the recently introduced Mullard TEA2000 chip. The chip's colour inputs allow for intensity by providing four levels on each. These inputs are digital, so two binary input lines per colour are required. There is only one output level from the VM6101 board, so I experimented to observe the picture quality at different input levels. Use of R1, G1 and B1 with R0, G0 and B0 connected to chassis seemed to give the most pleasing result. Because the outputs from the VM6101 board are from open-drain f.e.t.s the inputs are pulled up to 5V by the 2.2kΩ resistors R13-15. The sync input is provided by the /AHS signal from the SAA5020 chip on the VM6101 board. This is brought across to the PCB via a connector. As the R, G and B signals from the VM6101 board are already blanked the CBLANK pin (17) is connected to chassis.

An external 8.867238MHz crystal fine tuned by TC1 sets the colour subcarrier frequency. Chrominance filtering is accomplished by the combination L1, C13 which acts as a 4-43MHz tuned filter with connection to pin 10 via the blocking capacitor C14. This filter helps to remove the observable beats between the line frequency and the subcarrier (moving diagonal lines on the picture). The coil should have a Q of 100 but the only part I could find is a Toko coil with a Q of only 80. This turned out to be satisfactory. Use of the chrominance filter means that a 270 nanosecond delay line (Philips DL270) must be incorporated. To save money it's possible to run the circuit without the filter and delay line but the results are not too good. If you want to experiment with this option, omit L1, C13 and C14, link across the delay line and change the value of R9 to 1.2kΩ and R10 to 1kΩ.

R8 and C17 are the colour burst timing components. The data sheet specifies close tolerance components here – two per cent and one per cent respectively. The best ceramic plate capacitor I could find (Mullard) had a tolerance of two per cent but didn't seem to give any problems. If colour stability is poor, try changing C17. The chosen u.h.f. modulator is the Astec UM1287. This includes a sound channel, without de-emphasis, which can be connected to the VCR's auxiliary sound output via the DIN socket PL6 or earthed. In either case the annoying buzz associated with low-bandwidth computer graphic pictures is eliminated. In computer systems the sound can be turned off, but with TV the sound would normally be left on. If desired some money can be saved by using the Astec UM1233 modulator which does not have a sound facility. In this case change R16 to 510Ω, R17 to 430Ω and omit C19. The sound and vision signals can be fine tuned using the adjustment cores provided (see later). To avoid digital interference appearing on the picture the modulator is powered from the 12V line, not the digital 5V supply.

The power supply is conventional, using a 10VA PCB mounted encapsulated mains transformer (T1). This supplies 5V at 450mA and 12V at 150mA. The 7805 and 7812 regulators are mounted on the rear panel (aluminium) of the case on flying leads. Heatsinks are attached to the regulators on the outside of the rear panel to aid heat dissipation.

**Coming Next Month**

Constructional and board details will be given next month.
TELETEXT DECODING ERRORS

Recent correspondence on teletext decoding errors led me to look back at the results of my research in 1978 into the effects of teletext on TV receiver design. I find that I experienced similar data errors on first acquisition of a page, often page 100 and often on BBC-1 (ch. 50). XM11 decoders were more prone to the problem than the XM12 or VDP12 (Prestel set) or an early Mullard decoder. I also noted that excessive signal strength could produce as many errors and reduced eye-heights as an inadequate signal. Use of a u.h.f. attenuator showed that for zero errors and best eye-height the optimum input signal level was around 1-1.5mV. Increasing the signal to 3-5mV produced almost the same results as reducing the signal to 600µV.

At first different effects were experienced on all channels. This was found to be due to the fact that the signals were arriving from different beam headings despite originating from the same transmitter site only fifteen miles away. Signal refraction or perhaps tree effects were assumed to be the cause. This effect makes it difficult to optimise a fixed beam heading, particularly when trying to cover chs. 50-66.

The large-signal errors suggested receiver overloading. The problem was investigated using three different makes of receiver, all with forward a.g.c. It was found that the −6dB i.f. response (skew symmetry point) drifted by almost 500kHz as the input signal level varied over the range 600µV to 3-5mV. The cause of this was taken to be the variable damping effect of the i.f. amplifier transistors on their tuned load circuits as the a.g.c. action varied the collector currents. Applying the full input signal to the receivers via a 6dB line attenuator improved the position considerably.

I’ve often thought I should repeat this exercise with modern receivers that use i.c. i.f. amplifiers and SAW filters to see if anything has changed, but to date time has defeated me. I hope someone may find these observations of help.

Geoff Lewis,
Canterbury, Kent.

TELETEXT SERVICES

L.D. Sears made some very pertinent points on the Ceefax/Oracle services in his letter in the October issue. After reading it I reached for my handset and started to think about them. Having selected BBC-2 I called up page 150 and lo and behold the newsflash appeared. It seems that the BBC has taken notice and that here in London at least the development is to continue.

The fact that the hum bar could be made to come and go on a portable TV set by moving it is puzzling. If the set was used with its integral aerial the varying signal strength may have been affecting the set’s immunity to mains hum via the action of the a.g.c. system.

Stephen Walker,
Orpington, Kent.

FERGUSON 3787/NORDMENDE 8180

Here’s another fault I’ve come across recently on one of these sets (see servicing article in the October issue). The symptom was an apparently blank but dim picture at the top of the screen. Closer examination revealed that this bit (about half an inch) was actually the bottom of the field. The height and linearity controls had some effect, as did the field hold control, but the picture stayed off-screen. A study of the circuit diagram provided the answer: if the field scan coupling capacitor CM30 (1,000µF) goes short-circuit the output will sit on a 10-5V bias which will shift the picture off the screen! This turned out to be the cause, a new electrolytic restoring normal results.

Colin Boggis,
Woking, Surrey.

UNUSUAL HUM PROBLEM

I was most interested in Mr. Sparks’ hum problem with a set using the Rank A823 chassis. It’s likely that there was a loose connection somewhere in the ring main (the ring was also broken at one point). The power supply in the offending G8 takes its current in huge “gulps” on every positive half cycle of the mains supply. This would modulate the supply to some of the sockets, probably in the form of a regular “kink” in the waveform. Closing the break in the ring would bypass the loose connection — it would be a good idea as a safety precaution to remove each socket in turn and check its connections to the ring main.

The fact that the hum bar could be made to come and go on a portable TV set by moving it is puzzling. If the set was used with its integral aerial the varying signal strength may have been affecting the set’s immunity to mains hum via the action of the a.g.c. system.

S. Pearson,
Chipping Norton, Oxon.

DEFECTIVE RING MAIN

Here’s a possible explanation for J. C. Sparks’ problem (October) of magnetically induced hum caused by a Philips G8 set via the mains wiring. As the ring main was not complete, with probably only the live or neutral wire looping round to complete the ring on one side and both live and neutral connected to the other side (see Fig. 1), a
net current would flow around the ring main circuit. In the Philips G8 this current is drawn as 12.5A unidirectional spikes with a duration of about 1.2msec, repeated every 20msec. This would cause a pulsating 50Hz magnetic field to be radiated by the faulty house wiring, with hum induced in nearby TV sets. It’s not surprising that the electricity supply industry dislikes thyristor power supplies of the type used in the G8.

Inserting an 0.47Ω resistor in the neutral wire will enable the current drawn to be measured. Use a scope to monitor the voltage drop across this resistor. You’ll get a reading of about 6V peak drop, which is equal to a peak current of 12.76A.

M. J. Edis, G4RPT, Broughton, Northants.

FAULTY MAINS SUPPLY

Mr. Sparks’ letter (October) on an unusual hum problem reminded me of a struggle I had with a G8 one Saturday morning a few years ago. The symptom was a small, pulsating picture. All the usual checks – except for one vital test! – were made on the power supply to no avail. Even a replacement panel produced the same results. A great deal of time was wasted on various receiver checks.

By chance a small boy was helping out with the housework. He plugged a vacuum cleaner into the mains socket across the room and switched on. The TV fault then cleared! I asked him to switch off for a moment – and the fault returned! A check on the mains supply revealed that it was fluctuating wildly between 150-240V. Moral: always make sure that the mains input is up to standard.

Malcolm Burrell, Maldon, Essex.

TEST CARD TRANSMISSIONS

I’ve been following the correspondence in recent issues on the lack of satisfactory test card transmissions by the BBC. On the suggestion of Keith Hamer I wrote a letter of protest to the Head of BBC Presentation and would urge other dealers who, like myself, are frustrated by the day in, day out waste of air time devoted to teletext information to do the same. More pressure should be brought to bear to produce at least a 50/50 split of air time between teletext information and the test card.

The point to emphasize is simple. The BBC wants its public to enjoy its programmes, and for many years the TV trade has struggled to do its best to assist in this respect. Why shouldn’t the broadcasters assist us in endeavouring to maintain the high standards of television performance that have always been associated with the UK? Surely after ten years most people in this country know about teletext and what it has to offer?

I also agree with Keith Hamer that the music standard has fallen – particularly in the last few years.

I do hope that something will be done about this, and should mention that I wrote to the BBC in the early seventies when the hours of test card transmissions were cut. Let’s hope we see some results from the current campaign.

C. J. Churcher, C & S Electronics, Gosport, Hants.

PANASONIC TC202G

With reference to J. K. Potts’ problem of teletext lines on the Panasonic TC202G (letters, October), we’ve had similar difficulties with a number of these sets. The cause has in each case been deterioration of C412 (3.3µF), sometimes to such an extent that the body of the capacitor can be plucked from the board.

If channel eight instead of channel one is present at switch on C53 has probably dried up – it’s on the front control panel.

When working on this chassis it’s worth resoldering all the line output transformer pins.

Ray Dunleavy, Raphoe, Co. Donegal.

SERVICING SCENE

Here are a few recent incidents that might be of interest to others. A VCR came in with a fairly straightforward tuner fault. On playing a test tape however there was a regular band of noise every six seconds or so. It looked vaguely like a capstan servo fault, but switching to record showed that it was also present in E-E. No source of interference could be found either inside or outside the workshop, but while driving home along the seaford that evening the cause suddenly became clear. Next morning the shipping forecast improved and the oil tanker left – taking its radar with it.

A customer reported that his Sanyo VTC5300 VCR worked well but wouldn’t make timed recordings. Since he’d just acquired the machine we confidently asked him to pop round so that we could show him how to set the timer. Surprise, surprise: the machine stopped after about two seconds, as if the reel rotation sensor was faulty, though non-timer recordings were faultless. As we’d a second machine in the workshop we swapped the timer panel complete, but the fault remained. Sanyo were consulted but couldn’t suggest anything. We eventually found that replacing the tape counter/reel sensor panel cured the fault, which turned out to be due to a low-strength magnet giving a reduced output from the magnetoresistive element – but why did it affect only timed recordings?

Finally, if you think you have trouble with nutty customers, just listen to this! On calling to install a colour set I carefully placed it on its side to fit the stand.

“That’s not the set I asked for” she squawked.

“Which one did you ask for?” I enquired, checking that the model number on the set was the same as that on the job sheet.

“The one I wanted had a wider picture than that one.”

Trying hard to keep a straight face I picked up the set, still on its side, took it out to the van, turned it upright and brought it back in.

“Yes, that’s the one I ordered” she said.

Beat that one Les!

Phil Ireland, Servatron Ltd., Paignton, Devon.
SONY KV2704UB
and 67) resets the remote control chip IC001 (M58485P) and the momentary contact in the mains switch (wires 66 immediately. when the sound and vision usually behaves perfectly except on very rare occasions before everything comes on. Once powered up the set depressed three-four times, with an interval between, doesn’t always power up. In fact the switch has to be light comes on until the switch is released but the set comes on immediately and there is no effect on the picture. It usually occurs only once, at different times after switch-on and there is no effect on the picture.

This sort of thing is often caused by bad joints on the c.r.t.’s electrodes velocity modulation of the scanning beam is possible. This is a ringing effect on the scan current and could be due to the line output transformer itself.

ITT VC200 CHASSIS
The problem with this old monochrome set is faint vertical pillars of shading across the screen, gradually decreasing in intensity from left to right. The pillars number about six and are each about an inch wide. We’ve tried the official modifications of transistor change and emitter resistor value increase in the video output stage without success.

First make sure that the linearity coil damping resistor R162 is correct in value (1-5kΩ) and that the line output valve’s screen grid decoupling capacitor C136 is present and correct. Check C64 (100µF) in the a.g.c. circuit, then D11/R167/R164/C139 – ringing waveforms can sometimes reach the tube’s cathode via this blanking circuit (disconnect the coupling capacitor C139 as a check or use a scope). If six times line rate ripple cannot be monitored at the c.r.t.’s electrodes velocity modulation of the scanning beam is possible. This is a ringing effect on the scan current and could even be due to the line output transformer itself.

FERGUSON 3V23
There are display faults on this machine. When it’s in the off position only the word clock is shown. When it’s switched on only the word clock and the channel number are shown. The machine records and plays back all right but there’s no counter available on the display. I’ve tried the wet finger test along the display connections and they glow at random. In addition the cassette won’t eject fully.

The display fault is commonly due to failure of either or both of the ceramic filters CF1 and CF2 on the tuner/ timer control board (not the upper panel connected to the display itself). The modified and improved filters should be ordered (part no. 01X0-033-974, two off). At the same time change R13 to 560kΩ, C1 to 120pF, C2 to 470pF and C3 to 120pF. Roughening the surface of the cassette rollers will usually cure the poor eject operation.

PHILIPS G11 CHASSIS
The problem with this set is a loud pop from the speaker. It usually occurs only once, at different times after switching on, and there is no effect on the picture.

This sort of thing is often caused by bad joints on the legs of the audio output transistors Tr5048 and Tr5052. Check all the joints in this area. If the trouble persists try changing ono and there is no effect on the picture.

At switch on, using the receiver’s on/off switch, the channel light comes on until the switch is released but the set doesn’t always power up. In fact the switch has to be depressed three-four times, with an interval between, before everything comes on. Once powered up the set usually behaves perfectly except on very rare occasions when the sound and vision cut out then on again immediately.

At switch on the power supply comes into operation and the momentary contact in the mains switch (wires 66 and 67) resets the remote control chip IC001 (M58485P) to “on” and “ch. 1” by applying a pulse to pin 1. Check that the pulse is present at switch on and that the chip immediately receives its 12V supply at pin 14. If so check the “standby” line at pin 20 of the chip and its routing via Q001 to switching transistor Q804 on board D.

ITT CVC20 CHASSIS
The problem with this set is a very annoying buzz or hum that seems to vary according to whether the chassis is hinged up or down. The noise is much worse with the chassis in its up position. I understand that the i.f. panel’s top fixing screw can cause an earth loop and should be insulated from the print. Doing this decreased the buzz a bit but it’s still far too prominent – sometimes almost unbearable. I’m told that the chassis is particularly prone to this problem.

This chassis does suffer from buzz which is due to field-
The modern TV technician is expected to be able to deal with much more than just TV sets! VCRs, cameras, disc players and even audio equipment are all likely to come his way. So by way of a change this month we've got a camera conundrum for you. Not too sophisticated a camera, and not such a complex fault that it would be necessary to consult the service manual to arrive at the solution. The camera was a Sharp XC30, a very basic (and not too new) camera with none of the "bells and whistles" fitted to expensive, modern cameras. The XC30 has a 2:1 zoom lens and a fixed-focus optical system. No monitor tube either — the viewfinder is of the optical through-the-lens type. The reported fault was "no picture". Could anyone ask for an easier introduction to camera servicing?

The camera was powered up on the bench and tested via its partnering Sharp VCR. What we found was that the sound channel worked fine and that the camera produced sync pulses and a burst. A locked, clean raster was displayed on the monitor. It was virtually free of noise and shading, though a small amount of colour shading was visible with the monitor's colour control turned up fully — similar (but "noisier") to the effect on a white raster of slight impurity in a TV tube.

The camera's covers were off in almost no time. A close examination of the works (we've found that many camera faults are due to physical defects and impact damage) failed to reveal anything obvious. Time to start with the multimeter then. Our first theory was that the vidicon's heater was out. But the heater was seen to be glowing — if you turned out the workshop lights and peered from just the right angle. Theory number two was that the line timebase had failed, robbing the vidicon of its operating voltages — as in a TV set these are all derived from the line output transformer. The most accessible points — the voltages — as in a TV set these are all derived from the line. Theory number two was that the line heater was out. But the heater was seen to be glowing when the scope's prod was touched on the inner (preamplifier) end of the coil but absolutely none (surprise!) when the prod was touched on the target end. What was the trouble? Normal picture will be resumed next month...

**ANSWER TO TEST CASE 287**

— page 48 last month —

The Rediffusion Mk. 3 chassis that was featured in last month's test case has a thyristor line output stage and a reverse-current thyristor regulator arrangement. The symptoms indicated that the regulation circuit wasn't operating, and this was proved by running the set via a variac. At about 60 per cent of normal mains voltage the set would work, though an excessive degree of picture "breathing" was evident.

The circuits that generate the trigger pulse for the regulating thyristor were found to be working normally. What was significant however was the fuzziness of the scope trace at the gate of the thyristor. When the scope's sweep rate was reduced to 10ms/div it could be seen that a great deal of 100Hz hum ripple was present. The same waveform — a mixture of line-rate pulses and 100Hz ripple — was also present at the thyristor's cathode. This was why the thyristor was not being triggered: with identical pulses at its gate and cathode no gate current was flowing. The normal route for the thyristor's triggering current is via the h.t. smoothing capacitor 6C15 (220µF), 6R1C (2-7Ω) and the device's cathode-gate junction. The problem was that 6C15 was virtually open-circuit, which accounted for the high 100Hz ripple as well as the lack of regulating action. A replacement electrolytic — and a new resistor in the slow-start circuit (6R3, 10kΩ) since this overheats when the regulator fails — puts matters to rights.
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<td>SPECIAL OFFER</td>
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a.c. I; 3mA, 30mA, 100mA, 1mA, 5µA, 3mA, 10mA, 100mA, 1mA, 10µA, 100µA
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HITACHI VHS COLOUR CAMERAS
Mains Only Tested/Working

VHS VIDEOS
FERGUSON
3V00, 3V22, 3V23, 3V16, 3V29,
3V30, 3V31, 3V32, 3V35

NATIONAL PANASONIC
NV8600, 8610, 2000, 7000,
370, 333, 2010

SHARP
620, 630, 640, 2300 H T/P

BETAMAX
SANYO VTC 9300, 5000, 5300
SONY C5, C6, C7, C9
and SL F1UB T/P
Also Bush, Toshiba, Hitachi and Blau Punkt

PLUS

17” 18” 20” 22” 26” Hybrid/Solid State CTVs
Remote Control & Teletext Discount for Quantities
Complete loads delivered from pick up point

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GALLOWS INN,
ILKESTON
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TELEVISION DECEMBER 1986
BRITAIN'S LARGEST SUPPLIERS OF 
EX-RENTAL TV AND VIDEO

SPECIAL OFFER

VHS VHS VHS

HITACHI FERGUSON

3V22

£60

Makes inc. PHILIPS, GEC, HITACHI, ITT, BUSH, PANASONIC, SONY, DECCA, FERGUSON, GRUNDIG etc.

COLOUR TV from £5

CALL & SEE OUR SELECTION
DELIVERY ARRANGED FOR BULK PURCHASES
LOAD DIRECT FROM SOURCE AT VERY KEEN PRICES

FRANK FORD
(TV TRADE DISPOSALS)
SCHOOL LANE GUIDE
BLACKBURN, LANCs
TEL: 0254 64489

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with our D.I.Y Polishing Kit

The Kit includes everything you need to polish large Ø tubes to a high standard. Detailed instructions on how to do the polishing. All you require is an Electric Drill.

Kit Price £57 inc P&P and VAT. Available from Luton only.

5% DISCOUNT ON TUBES COLLECTED FROM LUTON
Quality, High Temperature Reprocessing

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All tubes sold with 1 or 2 year guarantee, with optional extension by extra 2 years.
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W. T. D. Ltd., Wembley, Middx. Tel. 01-670 4449.
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Why not telephone Terry Smith on Uxbridge (0895) 55800, to discuss your requirements?

WE ARE LOCATED IN
UXBRIDGE
At probably the most accessible part of S.E. England. The nearest junction of the M25 is only about 1 mile away and we are less than 10 minutes from the interchanges on the M25/M3, M25/M4, M25/M40.

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TABLE OF SEMICONDUCTORS:

2SB-772 2SB-562 2SB-557 2SB-527 2SA-1060 2SA-992
2SA-893 2SA-794 2SA-771 2SA-769 2SA-765 2SA-748
2SA-546

(PRICE LIST OF SEMICONDUCTORS:)

2SD-718 2SD-288 2SC-2320 2SC-1567 2SC-1454

THORN 8800 *********************£25 THORN 8900 ********************£30
THORN 9000 (remote) ******************£35 THORN 9600 ********************£40
THORN 9600 (full feature remote) ********************£45

PHILIPS G11 ********************£55

(Subject Availability)

PRICE LIST OF RUBBER BELTS:

VIDS: Ready Stock
AKAI VS-10 0.52

THORN 8800 *********************£25
THORN 9600 TELETXT ******************** from £75

THORN 9600 ITE TEXT ******************** from £75

NO DEALER TOO LARGE OR SMALL. SINGLES SOLD

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No 1 for Quality TVs & Videos 100s of V.H.S. Videos in stock

Large Quantities of Late Model Thorn TVs. All with first class cabinets.

TELE-TEXT/ULTRASONIC/INFRARED/REMOTES

Also Philips G11/Pye G11/Basic/Remote/TELE-TEXT

Some examples of QUALITY working TVs

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THORN 9600 (full feature remote) ********************£45

(Prices quoted are based on quantity)

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Brand New Remote Control Hand Sets Available for the majority of British & European TV sets.

1000s of UNTESTED Colour TVs

I.E. DECCA 30s, GEC 2110, GRUNDIG, TABERGUS, G8s 520s-550s, THORN 3500/8000/8500, TT, PYE, ETC.

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ALL AT LOW LOW PRICES

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TELEVISION DECEMBER 1986

131
**HOCKLEY DISCOUNT TELEVISIONS**

**SPECIAL TRADE ANNOUNCEMENT**

LARGEST STOCKS OF EX-RENTAL ‘THORN’

COLOUR TVs & V.H.S. VIDEOS

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>8800 R/C</td>
<td>3V00</td>
</tr>
<tr>
<td>9000 R/C</td>
<td>3V16</td>
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<tr>
<td>9200 R/C</td>
<td>3V22</td>
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<tr>
<td>9600 R/C</td>
<td>3V23</td>
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<tr>
<td>9600 TTX</td>
<td>3V29</td>
</tr>
<tr>
<td>TX9/TX10</td>
<td>3V35</td>
</tr>
</tbody>
</table>

Cabinet 9600 with Brand New Hand Sets

Prices start from £6, or working sets from £12

**ALSO UNLIMITED SELECTION OF**

BUSH T20/24    DECCA 80/100
G.E.C. SOLID STATE & STARLINE
HITACHI    ITT CVC30 & CVC45
PHILIPS G8, G11 & KT3 R/C
REDIFFUSION MK 1 & MK3
REDIFFUSION MK 4 & TELETEXT

**TV & VIDEO STANDS IN STOCK**

Lorry Loads Delivered from Source

DON’T HESITATE TO CONTACT US

FOR FRIENDLY SERVICE TRY US – YOU’LL LIKE US!

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OPPOSITE CITY FOOTBALL GROUND, 5 MINS FROM M4

FERGUSON VHS VIDEO £65

MANY ELECTRONIC VIDEOS IN STOCK
MANY TOP QUALITY REMOTE CONTROL WORKING TVs

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PRICES SUBJECT TO VAT

OPENING HOURS:
MONDAY - FRIDAY 9.00 - 5.30; SATURDAY 9.00 - 1.00

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**TUNERS + TUNERS**

★ If you repair sets regularly – phone us today and we will dispatch immediately – no need to send cash ‘up front’.

★ All tuners dispatched by first class post for receipt by you the next day.

★ All popular tuners/tuner repairs supplied ‘off the shelf’.

★ Unusual types repaired same day as received (subject to spares availability).

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- **Line Output**: 14.00
- **Power**: 8.00
- **Converge**: 5.00
- **Frame**: 8.00
- **Video**: 3.50

**Thorn 3000/3500**
- **IF**: 2.00
- **Tuner Decoder**: 5.75
- **Gross Decoder**: 4.00
- **Output**: 8.00
- **Power**: 8.00
- **Converge**: 5.00
- **Frame**: 6.00
- **Video**: 5.00

**GEC 2110**
- **IF**: 10.00
- **Tuner Decoder**: 5.00
- **Output**: 12.00
- **Power**: 6.00
- **Converge**: 5.00
- **Frame**: 5.00
- **Video**: 5.00

**Pye 731**
- **IF**: 10.00
- **Tuner Decoder**: 10.00
- **Output**: 18.00
- **Power**: 10.00
- **Converge**: 7.00
- **Frame**: 8.00
- **Video**: 4.50

**Bush 2718**
- **IF**: 7.50
- **Tuner Decoder**: 6.50
- **Output**: 24.00
- **Power**: 3.00
- **Converge**: 5.00
- **Frame**: 14.00

**Bush 12/20**
- **IF**: 7.50
- **Tuner Decoder**: 6.50
- **Output**: 19.00
- **Power**: 19.00
- **Converge**: 5.00
- **Frame**: 14.00

**Philips G11**
- **IF**: 14.50
- **Tuner Decoder**: 14.50
- **Output**: 19.00
- **Power**: 19.00
- **Converge**: 5.00
- **Frame**: 11.50

**Decca 80**
- **IF**: 12.00
- **Tuner Decoder**: POA
- **Output**: 12.00
- **Power**: 10.00
- **Converge**: 14.00
- **Frame**: POA

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**Post Off Your Cheque Now! And Your Panels Sent By Return of Post!!!**

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**FOR RECENT MODEL TELETEXT TV'S**

**AND ELECTRONIC VCR'S**

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Most makes from £19

**SHARP 2300 H VHS, MAINS PORTABLE VCR's from £60**

**Access**

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**N.G.T. COLOUR TUBES**

First Independent Rebuilder with

**B.S.I. CERTIFICATION**

**DELTA – IN-LINE – PIL – BONDED YOKE**

including

AXT Series, DZB series 20AX - 30AX

A56 610/611 610 series, A51 570/580/590X

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- **Rebanded with new adhesives**
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**Phone: 01 208 2063**

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**Television December 1986**

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**Television December 1986**

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**Television December 1986**

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**Television December 1986**

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**Television December 1986**
TELEVISION

No other consumer magazine in the country can reach so effectively those readers who are wholly engaged in the television and affiliated electronic industries. They have a need to know of your products and services.

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ALSO AVAILABLE DIRECT LORRY LOAD
RING - 021-772 2733
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(Next Door to UNCLE'S DISCOUNT STORE)
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"STOP PRESS"
NOW IN STOCK ELECTRONIC VIDEO'S AT UNBEATABLE PRICES

WOODDASLE COMPONENTS
RANK BUSH MURPHY

TRANSFORMERS
Line Output
Z718 (T703A, T706A)
New (Complete) £15.00
T20, T22 (T705A)
T26 (T705B) £11.00
TDA2190 Plug-in Replacement module suitable for Bush T22/26 and any set using same device £6.00
Switch Mode
T114A £6.00

Genuine RBM Units.
Prompt Postpa Service P&P Paid.
DISCOUNTS FOR QUANTITIES.

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WE SPECIALISE IN LATE MODEL TELEVISIONS AND V.H.S. VIDEOS.
T.V.'s:
G11's, KT3, K30, K35, CTX.
Other makes available.
VIDEOs:
Nat Pan 2000, 2010, 33S.
Hitachi, Mitsubishi - various models.
All items fully serviced and ready for sale or rent in excellent condition. Free delivery for sensible size orders (petrol only charged).
Phone today for prices and availability to:
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VHS VIDEO'S FROM £50 inc VAT
FERGUSON 3V22 £50.00

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PANASONIC 366, 7000, 7200, 2010;
HITACHI 8000, 8300;

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FERGUSON 3V22 £100

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MAKES AS ABOVE

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RECONDITIONED HOOVER JUNIORS £27 inc VAT

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NO DEALER TOO LARGE OR TOO SMALL

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Unit 7, Arkwright Court.
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Very End of M55 left at roundabout.

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THORN 8800 PHILIPS G11
8800 R/C G11 R/C
9000 G11 TTX
9000 R/C GEC S/S
9600 R/C JVC 20"
9600 TTX MONO's 20" + 24"
AND MANY MORE
TRADE WORKERS TO ORDER
PHONE BLACKPOOL (0253) 64413
NEW STOCKS ARRIVING DAILY

“SPECIAL XMAS PRICES”
WORKING TVS AND VIDEOS
ON SHOW.

H.P. REPOS AND EX. RENTALS
COLOUR TV'S AND VIDEOS

Refurbished TV's

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>BUSH T20/T26</td>
<td>£45</td>
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<tr>
<td>G11</td>
<td>£50</td>
</tr>
<tr>
<td>PYE KT3</td>
<td>£65</td>
</tr>
</tbody>
</table>

Others done to order.

DISCOUNT FOR QUANTITY

EX-EQUIPMENT PANELS
NO EXCHANGE REQUIRED
IF DE- LINE PowerFrame
decay scan
T20/T26 X 14 18 17 14
T26 X 16 20 17 X
ALL PRICES INCLUSIVE OF
POSTAGE BUT PLUS VAT
CHEQUE WITH ORDER PLEASE

Annual Clearance
Rock Bottom Prices

<table>
<thead>
<tr>
<th>Model</th>
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</tr>
</thead>
<tbody>
<tr>
<td>PYE G11 EXC</td>
<td>£50</td>
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<tr>
<td>CAB</td>
<td>£40</td>
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<tr>
<td>GEC 2213</td>
<td>£30</td>
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<tr>
<td>BUSH T20/26 CH</td>
<td>£35</td>
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<tr>
<td>THORN 3000</td>
<td>£7</td>
</tr>
<tr>
<td>HITACHI 191</td>
<td>£20</td>
</tr>
<tr>
<td>GRUNDIG G415/4206</td>
<td></td>
</tr>
</tbody>
</table>

(HOT T.D.E.R.
Etc.) £65 over 2000 in stock

GEC 2010 £20 (90% of our TV’s
Switch on)
PYLE 222 £20
PHILIPS 550 £15
BUSH 718 £20
BUSH 2 CHIP £5
GRUNDIG 5010 £10

From Source.

Video

<table>
<thead>
<tr>
<th>Brand</th>
<th>Price</th>
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<tbody>
<tr>
<td>SHARPS 7300, 8300, 9300</td>
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</tr>
<tr>
<td>HITACHI, VT11, FERGUSON 3V29</td>
<td></td>
</tr>
<tr>
<td>SANYO, SONY, BETA</td>
<td></td>
</tr>
</tbody>
</table>

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LAUREL STREET, LEEDS ROAD,
BRADFORD, W. YORKSHIRE BD3 9TP.
5 MINS FROM MOTORWAY

100’s PX
HOOVER JUNIOR VACS
All models in stock

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OPEN 6 DAYS SAT 9-5.30
WE ARE CLOSED DEC 25th & 26th, JAN 1st
SWITCH ON TO PROFITS WITH

G11 PYE AND PHILIPS 22" £20
ITT REMOTES £35 OFF
G11 TEXT PYE/PHILIPS £55 THE PILE
KT3 £50 PRICES
VIDEOS £10 PRICES

ALSO ON STOCK

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VHS VIDEO ELECTRONIC AND ALL WORKING, GOOD CASES. STANDARD TO FULL i/R REMOTE CONTROL. BY PANASONIC 2000, 2010, 366, 7200. MITSUBISHI, SHARP, GEC 4001-4108. HITACHI VT9, 8300, 8700. JVC 2200 PORTABLE, 7200, 7300, 7700. AMSTRAD, DECCA DK7200 AND MANY OTHERS.

2000 SYSTEM – SWITCH ONS £20
2020-2021-2022. GRUNDIG 2x4 – 2x4 SUPER CLEARANCE COLOURS CHEAP 10 SETS £80 AND SOMETIMES EVEN LESS. SLOT METERS AVAILABLE – ASK. ALL PRICES BASED ON QUANTITY. ALL PLUS VAT.

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UNION STREET DONCASTER, SOUTH YORKS. 0302-49583 CASH NO CHEQUES ONLY 2½ MILES FROM (AIM) FOR M18-M1 10am to 5pm DAILY

TELEVISION DECEMBER 1986
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special announcement

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If so, read on . . .

READY FOR RESALE – VHS RECORDERS FULLY SERVICED
(ie new belts, clutches, heads)

ALL MACHINES SUPPLIED TO A VERY HIGH STANDARD COMPLETE WITH
INSTRUCTIONS AND LEADS AND REMOTES. EVERYTHING YOU NEED INCLUDING OUR
OWN FULL GUARANTEE
(delivery to any UK destination)

Makes include
Thorn · Hitachi · Sharp · Panasonic · Philips · Akai · Mitsubishi

Please note we do actually keep the above stock, we do not just advertise it.

FOR A NO FUSS SERVICE, CONTACT:

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CLEARANCE SALE OF
EX-RENTAL COLOUR TELEVISION
SETS AND VIDEO's
Colour TV's working from £20.00 + VAT
Off the pile £12.00 + VAT (batches of 10)
T.V. Stands from £3.00
GOOD DISCOUNTS FOR DIRECT LOADS
Open 9am to 5pm Monday to Friday
10am to 4pm Saturday – Sunday by appointment
THE TRADING POST, UNIT 13, SAVILLE ROAD,
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TEL. 0733 261500

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Whilst prices of goods shown in classified advertisements are correct at the time of closing for press, readers are advised to check with the advertiser both prices and availability of goods before ordering from non-current issues of the magazine.
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A NEW CONCEPT IN EX-RENTAL T.V. & VIDEO

WORKING TV & VIDEO
ENGINEERED TO THE HIGHEST SPECIFICATION READY FOR YOUR SHOWROOM

NON WORKING
GUARANTEED COMPLETE AND UNCANNIBALISED GOOD CABINETS AT LOW LOW PRICES
ELECTRONIC, REMOTE, FRONT LOADER VIDEOS

NAT PAN, JVC, HITACHI, TOSHIBA, SANYO, SONY, ETC, ETC.
K30, KT3, G11, TEXT, REMOTE AND BASICS
ITT, GEC, BUSH, JAPS., DECCA, ETC.

PHONE BOB BEAN ON:
0268 728966
AND DISCUSS YOUR REQUIREMENTS

THE DOMESTIC VIDEO RECORDER SERVICING BOOK
THE ENGINEERS BIBLE
WITH CHAPTERS ON HI FI, DIGITAL SERVOS, LUMINANCE AND CHROMINANCE SIGNAL CIRCUITS. FAULT GUIDES AND CONNECTION DATA.
A MUST FOR ALL VIDEO REPAIRERS AND STUDENTS. THE COMPLETE REFERENCE TO VIDEO RECORDER CIRCUITS
ORDER YOUR COPY NOW
FOR ONLY £16.95 inc. P&P
OTHER TITLES AVAILABLE
SEND S.A.E. FOR LIST DIRECT FROM GROVE FARM, LONG LANE, BARNBY IN THE WILLOWS, NEWARK, NOTTS.
CHEQUES AND PO'S PAYABLE TO D. BEECHING

THE HOME SATELLITE TV INSTALLATION TROUBLESHOOTING VHS TAPE AND MANUAL
A 40 minute videotape and 313 page manual, produced in USA, describes all the practical advice a TV engineer will need to earn a living in the future. Includes everything from the site survey to adjusting a polar mount. Send SAE for full list of books available ex-stock on Satellite TV.

MANUAL £22
VHS PAL COLOUR VIDEO TAPE £27
Send cheque, COD, Access
J. VINCENT TECHNICAL BOOKS,
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Tel: 0734 414468 (Answerphone)

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MHA186 - UHF Gain 27dB, NF 1.9dB, RF shielded - Frequency 470-860MHz £17.50
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PS386 - PSU 12V/80mA, 2 outputs £12.55
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S.A.E. for full catalogue

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Large or small distribution systems. Equipment and/or consultancy by post or on site. Catalogue (full of trade know-how and trade equipment) £1 (refundable).
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Macdonalds Price £24.30
OUR PRICE £22.50
Two or more
Full set of 10
£21.00 each
£199.00
Prices include delivery
U-VIEW, 29 Warmworth Road, Doncaster, Yorkshire DN4 8RP,
Tel. 0286 855017, Callers ring first

MACDONALDS RADIO & TV SERVICING BOOKS, NEW 74-75, 75-76, 75-76, 76-77, 77-78, 78-80, 80-81, 82-83, 83-84, 84-85, 85-86
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Full set of 10
£21.00 each
£199.00
Prices include delivery
U-VIEW, 29 Warmworth Road, Doncaster, Yorkshire DN4 8RP,
Tel. 0286 855017, Callers ring first
**Euro-Sat**

Parabolic Dish Antennas
Parent company est in TV communications since 1969
SATELLITE TVRO ANTENNAS
TOP QUALITY SOLID GLASSFIBRE DISH ANTENNAS
TRADE PRICES

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
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<td>1.2m Dia</td>
<td>£93.00</td>
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<td>1.6m Dia</td>
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<td>1.8m Dia</td>
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<td>2.0m Dia</td>
<td>£228.10</td>
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<td>2.3m Dia</td>
<td>£248.10</td>
</tr>
<tr>
<td>2.4m Dia</td>
<td>£271.00</td>
</tr>
</tbody>
</table>

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<td>£43</td>
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<td>22&quot;</td>
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<td>26&quot;</td>
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<td>Sony Tubes</td>
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<tr>
<td>Bonded Coils</td>
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<td>30 AX (540 x)</td>
<td>+ £7</td>
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<tr>
<td>Delta tubes</td>
<td>£30</td>
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<td>GS Tuner VCap, New</td>
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<td>GS Tuner Unit</td>
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<td>VCap, UHF-272/7/10</td>
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<tr>
<td>VC20 &amp; VCap 272/7/10 Unit</td>
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<td>NEW GS Tuner VCap</td>
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<td>T2N6109 Push Button Unit</td>
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<td>GE6A 6 Push Button Unit</td>
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