

THE LEADING UK CONSUMER ELECTRONICS TECHNOLOGY MAGAZINE

TELEVISION

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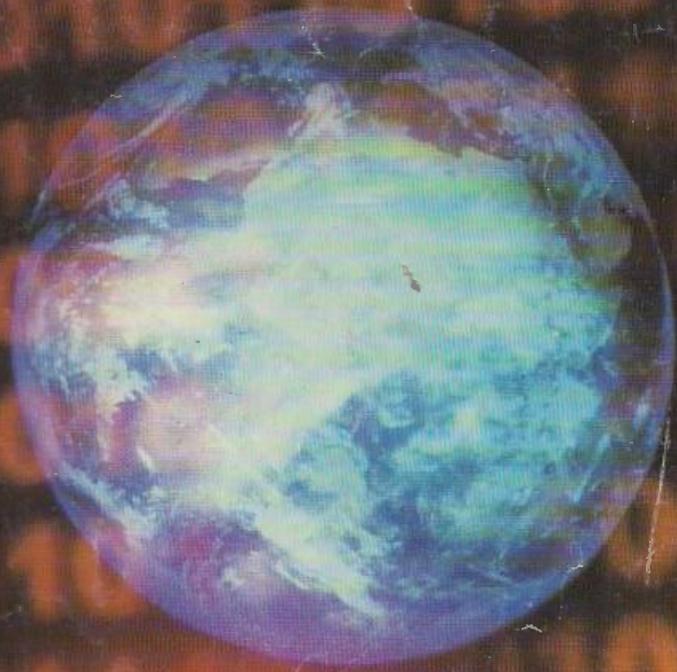
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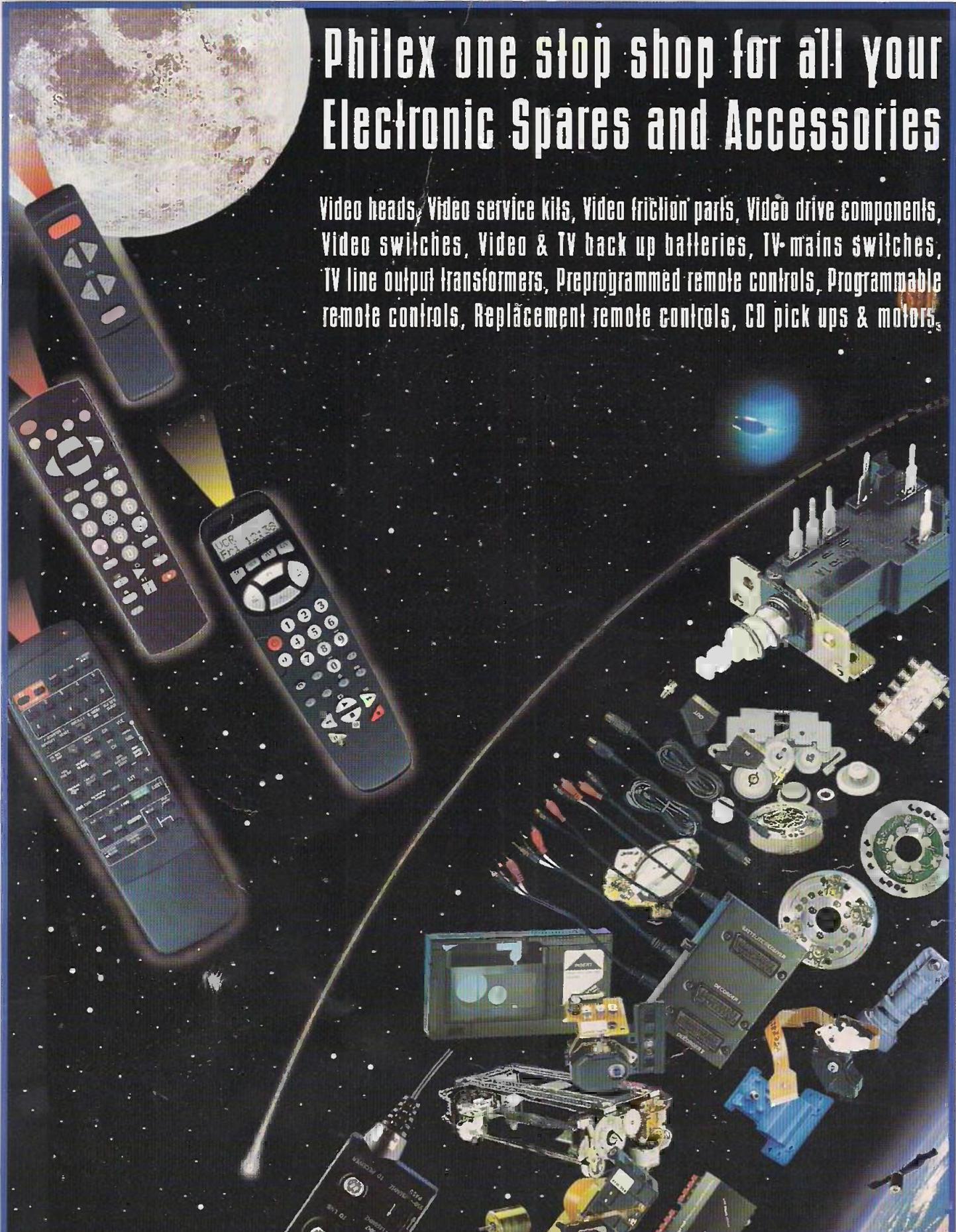
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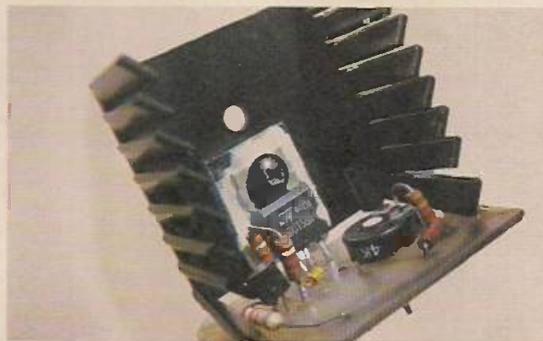
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The Maxcom MX9300 is a four-function multi-instrument featuring:

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5V 2A fixed outputs
Normally, this instrument costs £399 excluding VAT and delivery, but Vann Draper is making it available to *Television* readers at the special price of £399 – fully inclusive – and this price includes a free hand-held digital multimeter.

See page 205 for ordering details.



A Digital World

We are used to standards battles in the TV/video field. How many lines in a frame, how to encode colour, how to insert data signals in the vertical blanking interval, whether to use MAC or PAL Plus, what parameters to set for video tape and so on. This could amount to nothing compared with what might lie ahead now that digital TV is creeping up on us. The computer industry has also had its battles over the years, with systems falling by the wayside. When the two industries come together, things start to get really complicated. And the trend, as digital technology takes over, is for the TV/video, telecommunications and computer fields to overlap more and more and evolve joint products. We have had a foretaste of what could be in store for us with the DVD debate. Agreement over the standard was held up for a long time by the conflicting requirements of the video, entertainment and computer industries.

The computer/TV/video standards debate is in a different league however. We can get an inkling of what might lie ahead from the debate in the USA over a new standard for TV broadcasting in the digital age. The debate is an extension of the one, going back many years, about HDTV. There have been profound arguments about how to transmit HDTV signals. Eventually the Federal Communications Commission (FCC) drew up a list of the conditions it wanted to be met and left it to the industry to come up with solutions. A lot of effort was put into this by several consortia. Early last year the FCC announced that agreement had been reached. Then the computer industry intervened.

The FCC is now about to approve a technical specification for digital TV after

"an eleventh hour agreement" between TV manufacturers, broadcasters and representatives of the PC industry. Reading between the lines, it seems that agreement is the one thing that hasn't been reached – unless it's an agreement to differ! Obviously the TV broadcasting industry has to have a transmission standard, otherwise there won't be any digital TV services. But the specification appears to have been left wide open in certain respects.

By early 1996 the US TV industry had reached agreement on a standard. As this was about to be approved by the FCC, objections were raised by the PC industry. Most of the main companies in this field – including Microsoft, Intel, Apple, Compaq and Dell – were involved. They asked for modifications to suit the requirements of computer-based digital TV. The FCC seems to have accepted the validity of their interest in the TV field, and their lobbying went right to the top – apparently the Clinton administration interceded on behalf of the PC industry.

There are major stakes here of course: as the technology develops, those whose standards and systems are accepted will gain substantial financial rewards. What the FCC seems to have done is to decide that it can't be seen as standing in the way of progress. So it has agreed to a framework and will let industry get on with it.

The key to this is the fact that the 'agreement' does not lay down a standard video format – the one thing you would expect it to do! According to one commentator, "the market will establish a de facto standard". That fair takes the breath away. Are we about to see a further VHS/Beta type battle on the grand scale? What the PC manufacturers want is a

standard that will make TV transmissions compatible with PC technology – so that the PC can be used for TV purposes as well. Integrating TV and PC use is an obvious way to go, and has a certain inevitability about it at this time. Users should eventually benefit, but who will benefit industrially? Will the PC industry take over TV or vice versa, or will the two just fuse, with some major industrial mergers? The Americans clearly see this as a way of getting ahead of the pack internationally, hence the curious agreement on a standard that isn't for digital TV broadcasting. One feels that major battles lie ahead as the falling cost of digital signal processing makes more technology and systems feasible for consumer applications. It's certain that the TV/PC world will be very different in say ten years' time. Whether the Americans, the Japanese or the up-and-coming Koreans will dominate it will be interesting to see. Somehow there doesn't seem to be much scope for the European industry.

One can't help wondering whether the UK might have had a better chance of playing a role in the digital future had the BBC and the ITC retained their substantial engineering divisions. After all the IBA as it then was pioneered digital TV with its work on standards conversion, while both the BBC and the IBA developed digital techniques such as teletext and sound-in-synchs, with the associated transmission standards. They were always in the forefront of technology, and could possibly have kept the UK in the race. Unfortunately this is now idle speculation.

We wish all our readers a happy Christmas and a prosperous New Year.

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INDEXES AND BINDERS

Indexes for Vols. 38 to 45 are available at £3.50 each from SoftCopy Ltd., who can also supply an eight-year consolidated index on computer disc. For further details see page 215.

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

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TELETOPICS

Digital Video Disc Update

Industry discussions on a DVD copy protection system have, as mentioned in this column last month, resulted in provisional agreement. But there is still some way to go. The DVD Copyright Protection Technical Working Group, which consists of representatives of the computer, consumer electronics and music industries, has proposed a data encryption system. The basics of this are as follows.

A DVD film title would be encrypted using a key known as the Title Key. This would in turn be encrypted by a second key known as the Disc Key. The scrambled Title Key and scrambled version of the Disc Key are hidden on the disc. When a disc is played, the player decrypts the Disc Key which in turn decrypts the Title Key, enabling the audio and video data

to be unscrambled. For DVD-ROM drives an additional authentication code is used to ensure that the disc is being used in a DVD-ROM drive and not some other digital playback device such as a hard disc. The encryption system uses a 40-bit key, which is less secure than other keys on the market but does not infringe export bans on powerful data encryption technology.

The original system proposed by Matsushita scrambled all the data, but IBM and Intel pointed out that this would require a lot of processing power. With the latest technique, only fifty per cent of the material is encrypted. It is also proposed that a system known as Macrovision version 7.0 is used to prevent analogue copying, but this has yet to be tested in PAL form. There are also questions about whether such systems could be

used in Germany, where consumers pay a tape levy for home recording.

The Working Group is now developing copy protection systems for music DVDs and content transmitted into the home. It is also lobbying the US Congress for a law to ban the manufacture of use of technology designed to get round DVD copy protection systems. An independent body to manufacture, licence and distribute keys has not yet been established – Matsushita is currently carrying out this operation on behalf of the industry.

Toshiba and Matsushita have now launched the system in Japan, but there are very few prerecorded DVD titles – there were fewer than ten at the launch. Toshiba has postponed its US DVD launch until the new year.



Mitsubishi has introduced a new top-of-the-range TV model with many interesting features. Model CT29BV1BD is fitted with a dark-tint, super-flat tube that has an Invar shadowmask. It incorporates dynamic white control to improve detail in the brighter areas of the picture, scan velocity modulation for enhanced picture sharpness, colour temperature control which enables the viewer to select a warmer or cooler looking picture, and RGB colour control to enable the picture quality to be optimised for signals from digital TV sources or video games consoles. On the sound side there's Nicam and Dolby Pro-Logic.

Satellite DTV Delay

The start of digital satellite TV services for the UK could be delayed by rules just proposed by the Department of Trade and Industry and their interpretation by the telecoms regulator OfTel. BSkyB has been planning to start services next autumn, with up to 200 channels, and was also thought to be about to place an order for 900,000 digital receiver-decoder set-top boxes.

The long-awaited "near final" DTI rules for subscription digital TV are intended to ensure that all broadcasters have access to the 'electronic gates' in the set-top boxes used by subscribers on "fair, reasonable and non-discriminatory terms". The problem is that establishing exactly what OfTel will allow could take some time.

Don Cruickshank, director-general of OfTel, has stated that the issues he will

want to consider include what "fair and reasonable access" should be, rules on electronic programme guides, the use of own subscription cards by broadcasters, and the extent to which set-top box subsidies to get the market started might be allowed.

The DTI's draft rules, which were drawn up with Mr. Cruickshank's guidance, are designed to ensure that market dominance is not allowed to become "market abuse". The question of subsidised set-top boxes, proposed by BSkyB, is to be considered to ensure that this is not "a distortion of competition".

The trade had been hoping for an autumn launch in order to take advantage of the pre-Christmas selling season to maximise initial sales of digital satellite TV equipment.

US DTV Standard

It seems that the Federal Communications Commission is about to approve a new advanced standard for digital TV transmission and reception. Agreement over the proposed standard had been held up by differences between the TV and PC industries. As it is, the standard turns out to be a "flexible" one, without a fixed video format – according to one PC industry spokesman, "the market will establish a de facto standard". The first digital TV sets are expected to go on sale in 1998, at prices in the region of £900-£1,800. It is likely to be five or so years before most US broadcasters start digital transmissions.

Trade News

RL Electronics, Mandale Mill, Beacon Road, Wibsey, Bradford, W. Yorkshire BD6 3DQ has taken over Electrotechnik and is now the source of spares for pre-1990 Sentra branded products. Phone/fax number is 01274 693 331. The company is also involved in computer monitor servicing.

CHESS, the Charles Hyde and Son Ltd. Express Spares Service viewdata system, is now available to all viewdata-using CHS account holders. It follows the same pattern as the CD-ROM version of the CHS Customer Stock File, enabling customers to find the parts they need in four different ways – by CHS part code, by manufacturer's part number, by manufacturer's model number and circuit reference, or by make, model and product description. There is no handling charge on orders above £10 placed on CHESS. To get on to the system or for further information on it phone 01759 304 457. CHS is now an authorised distributor for Nokia TV, VCR and audio spares.

CPC of Preston is now an ISO 9002 registered company. The quality award was made after a detailed on-site assessment of CPC's operational systems at its Preston headquarters.

Philex plc has acquired a new 48,000 sq ft warehouse at Bedford, enabling a much higher level of stock to be carried than previously. Enquiries should still be directed to 0181 202 1717 (fax 0181 202 0014).

The Norweb retail business, which consists of 81 out-of-town outlets and 57 high street shops, has been taken over by Comet. Most of the high street shops are to be closed.

SEME is carrying a new range of

high-quality tools from Kamasa. All items are available from stock and are listed on SEME's sales office computer at Melton Mowbray (phone 0166 465 392, fax 0166 463 976). SEME is also stocking Philips' IR cordless stereo headphones with rechargeable batteries.

The *Electrical Retailing Show '97* is to be held at the NEC, Birmingham, from 23rd-25th March 1997. For further details phone 01737 768 611.

New Dolby Systems

Dolby Laboratories has developed a new Surround sound system called Virtual Dolby Surround. It creates the effect of extra Surround channels while using just two speaker systems. The left and right Surround channels are fed into a virtualiser, which uses digital signal processing to create phantom centre, left and right channels.

The system is designed for use with multimedia PCs, DVD players, audio systems, satellite and cable set-top boxes and TV sets. Several existing two-speaker systems have been accepted as meeting the specification. They include JVC's 3D-Phonic and Matsushita's Virtual Sonic. There is also a digital version, Virtual Digital.

Interactive TV Trial

Westminster Cable, which is part of British Telecom, has started a large-scale interactive vision-on-demand cable TV trial that could involve up to 1,000 households. It follows a small-scale technical trial that was



Polar Instruments has introduced the PFL780 Windows '95-based PCB fault locator, which enables staff with very little experience of electronics to test and repair PCBs. The basic idea is to be able to change from the 'board-swapping' approach to component-level repairs, with consequent cost saving. For further details contact Polar Instruments Ltd., Garenne Park, St. Sampsons, Guernsey, Channel Islands GY2 4AF (01481 53 081).

held earlier in the year. The system enables viewers to select up to 350 hours of programming provided by companies that include Columbia, MCA, the BBC, Carlton, Thames, Granada, EMI, Sony and Polygram.

Those taking part in the trial use a remote control handset and on-screen menu to select the programmes, which cost between 10p and £4. Server computers store the programmes in MPEG-1 video form, converting them to analogue form for distribution to subscribers. Thus the only additional equipment the viewer needs is the special remote control unit. Viewers are also given extra viewing time, to enable them to pause, rewind or move fast forward. The trial is to last until this spring.

Video News

Sharp unveiled some interesting technology at the Comdex computer show at Las Vegas in November. This included a MiniDisc camera, Model MD-PS1, which can store up to 2,000 images on a mini disc and in addition offers sound recording. Digital music and voice recording are also possible. No price details were released. The Sharp 32C-PC1 Internet TV receiver is designed for use with the Japanese InterTV Internet service. It's a widescreen TV model with a built-in modem and web browser. Users press a button on the remote control unit for access to the Internet.

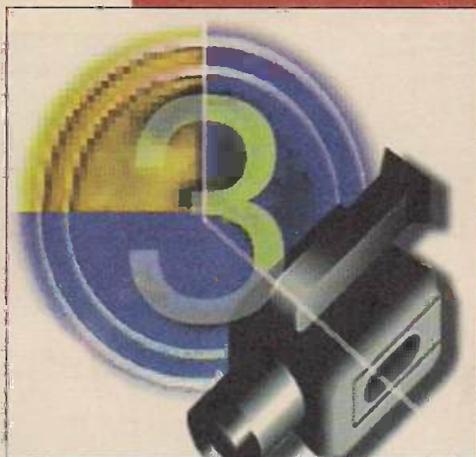
Kohap, a leading Korean company, has taken over BASF's worldwide magnetic tape business. The BASF brand name will continue to be used.

Sony and Sharp have both launched digital camcorders that incorporate colour LCD viewfinder/playback displays. Sony's model

is the DCR-PC7 while the Sharp camcorder is Model VLDC1. Both have a suggested price of £2,000.

NEC plans to launch a camcorder that can store 8.2Gbytes of data on a 120mm diameter re-writable disc, giving two hours of MPEG-2 encoded video plus audio. The disc has nearly twice the capacity of a DVD type disc – its storage technique is not compatible with the DVD system. A professional version of the camcorder is planned for later this year, with a consumer version expected to follow in 1998.

Toshiba has developed a new CRT for mixed TV and computer display use. It provides either a 30 per cent increase in brightness or a 25 per cent reduction in power consumption. This is achieved by using a clear instead of a semi-tinted glass faceplate, with the light reflection problem being resolved by adding red, green and blue 'Microfilters' in front of the phosphors. Beam deflection power is reduced by using a narrower tube neck (22.5mm). Because a narrow neck makes focusing more difficult, an improved focusing system has been developed and incorporated.



Reports from
Simon Bodgett
Brian Storm
Nick Beer and
David C. Woodnott

Sharp VLC73

There was no power. On investigation we discovered that C927 had leaked and corroded the print beneath it. After print repairs and replacement of C927 we found that the chopper control chip IC901 and transistors Q909, Q910 and Q914 had also been damaged. Everything worked correctly once they had been replaced. **S.B.**

JVC GRAX10

This camcorder produced an over-exposed picture. Our initial diagnosis was a stuck iris. This turned out to be wrong, very wrong. Checks showed that the video waveform was clipped: the peak white level at pin 38 of the HA118618MA chip IC3 was flat and compressed, though it was OK at pin 34. After fitting a new chip, using the correct soldering equipment as it has 58 legs, we set up the various levels. **S.B.**

Ferguson 3C03

This one had a retailer's service department worried. Circuit protector CP3 kept blowing and the DC-DC converter was suspected. Fortunately the cause of the problem was cables shorting to the camera head screening can. They needed insulating. **S.B.**

JVC GR323

The dew light was permanently on. We have been told that the cause of this fault is a connector problem and that the dew sensor wires

Camcorner

should be soldered to the board. This is not good practice. The dew sensor should be replaced. This also applies with Models GRAX7, 9 and 10. **S.B.**

JVC GR303

The cause of intermittent capstan motor operation with this camcorder proved to be particularly difficult to locate. Filter FT101 had a faulty connection. **S.B.**

JVC GR45

Intermittent AV audio output and a poor picture were amongst the many complaints with this camcorder. All were caused by dried up electrolytics. C306 was leaky, and there were dry-joints at the CCD image sensor HD drive sub-assembly. C203 and IC5 were replaced to remove ghosting on the camera pictures, though C203 was the main culprit. **S.B.**

Panasonic NVS20

There were two fault symptoms with this VHS-C machine. It would sometimes power down when a cassette was inserted. And it would sometimes refuse to play a tape that it had accepted. Nearly all such problems with this model are caused by the mechanism mode switch, which is part no. VXG0029. Unfortunately it's located in the depths of the mechanism, a partial strip down being required to replace it. **B.S.**

Panasonic NVMC20

There was no capstan motor operation with this VHS-C camcorder. Checks showed that the supply to the capstan drive chip was missing. The cause was the 2SB956 regulator transistor Q1101 in the power supply – it was open-circuit. **B.S.**

Sony CCDTRV30

This camcorder has a built-in colour LCD monitor as well as an electronic viewfinder. As it had been dropped, there was some cabinet damage. There were also some faults: no playback sound, no remote control operation, and no playback chroma. The cause of the

first two symptoms was dislocation of the audio PCB at its plug-socket connection to the main VCR PCB. Similar trouble caused the third symptom, this time with the little PAL jog PCB PJ70, which is positioned across the front of the camcorder beneath the lens – I suspect that the plug and socket will give rise to dry-joint problems in the years to come. **N.B.**

Sharp VLC650

Playback was OK but there were no E-E pictures – just a white screen, as the customer said. The cause was absence of the camera 9V supply, which is produced by the main DC-DC converter. Although the circuit is shown in the manual, it is difficult to remove the PCB from its metal screening can. Refitting the PCB can be even more difficult – some bending is usually unavoidable. I find it best to obtain and fit a new unit. When we did this we found that there was no excessive load on the previously missing 9V supply. **D.C.W.**

Panasonic NVS5B

All functions worked but there was no colour in either the E-E or the playback mode. The cause of this was traced to the chroma processing and encoder chip IC8001 on the main VTR PCB. As this IC is on the underside of the board, we could have had problems – we don't have the extension lead kit for this model. But for checking purposes it's possible to work on this area of the PCB if the edge-connected ribbon cables to the deck are left attached. **D.C.W.**

Sony ACV60 Adaptor

We had to replace the 1.25A mains fuse, the opto-isolator IC101 and PCB assembly CT31, which houses the chopper drive chip and associated circuitry, to get this unit to work. Strangely, the chopper transistor itself was OK. **D.C.W.**

Sony ACV30 Adaptor

There was no operation. The 2A ceramic fuse PS201 was open-circuit while Q205 was open-circuit base-to-emitter. **D.C.W.**

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GRUNDIG 2922010	1600p	LOT09
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ITT COMPACT B1	1450p	LOT27
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ITT 3546 EQ	1500p	LOT30
LUXOR 5810110	1600p	LOT31
SABA 849380920	1600p	LOT32
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FE TX100 110 D	1500p	LOT34
HANTAREX 28021	1600p	LOT35
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PANASONIC TLF14686F	£15.00	LOT40
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TX2112, TX2162, TXC22		
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TP400	RC 401	675p	RC5352	RC 5352	750p
TP590-600	RC 600	750p	RC5375	RC 5375	750p
TP390, TP610	RC 610	750p	RC5 STANDARD	RC 5534	850p
TP621	RC 621	800p	RC5901	RC 5901	850p
TP630, TP650	RC 650	750p	RC5903	RC 5903	700p
TP660	RC 660	750p			
TP661	RC 661	750p	SABA		
HITACHI			T6772	RC149	900p
CLE800-CLE830	RC 140M	700p	TC319-320	RC 328	800p
A617402/655602	RC 192	800p	TC356	RC 356	800p
A512120/230	RC 900	750p	TC358	RC358	800p
A514790	RC 901	750p	TC360	RC 360	750p
AS088470	RC 902	800p	TC365	RC 365	750p
A518612	RC 903	750p	SALORA		
SCL002	RC 904	750p	SERIES L	RC 190	750p
C2096	RC 905	800p	86173	RC 882	750p
A511940	RC 906	750p	SANYO		
655602H	RC 907	800p	RC218, RC222, RC228, RC238	RC 140M	700p
ITT			JXGE	RC 878	800p
IFB13, 14, 15	RC 143	800p	JXDE	RC 884	750p
FS4	RC 148	750p	VHR2300	RC 890	750p
RG305	RC 305	675p	RC628	RC 865	900p
RG306	RC 306	750p	SHARP		
FS9/1-10/1	RC 307	750p	G0121CESA, 123CESA, 204, 251	RC 140M	850p
VS5 RUK	RC 308	750p	SIEMENS		
VS4-1	RC 310	750p	FC616	RC 130	850p
MULTICONTROL (17C20)	RC 311	750p	FC631	RC 132	750p
KORTING			FC742	RC 164	750p
18279, 18396, 18460, 18521 SE	RC 108	750p	SONY		
40540 VTS	RC 108	750p	RM604, RM605, RM606	RC 140	700p
LOEWE			32 CHANNEL	RC 140M	700p
DC11	RC 146	800p	RM613	RC 141	750p
MATSUI			RM632, RM636	RC 160	675p
010270601	RC 889	750p	TATUNG		
VX770	RC 892	750p	FXA	RC 877	750p
METZ			RC70	RC 883	750p
JAVA COLOR (6890)	RC 166	800p	FX70 FASTTEXT	RC 894	750p
COLOR (7156)	RC 183	800p	TELEFUNKEN		
JAVA (7180)	RC 184	800p	FB632	RC 632 ST	750p
DAIICHI			FB 639	RC 639 ST	750p
DAIICHI			THORN/FERGUSON		
3939P/03607, 939P/03609	RC 140M	850p	3V35-42	RC 342	650p
NOKIA			3V31-32	RC 344	750p
SATELLITE	RC 550	750p	3V57-58	RC 628	750p
NORDMENDE			TX10 TEXT	RC 732	575p
TC2336	RC 351N	750p	TX10 STEREO TEXT	RC 738	575p
CMC1, TC3519	RC 356	800p	TX9-90-100	RC 740	675p
OCEANIC			3V55, FV11	RC 783	750p
390C9500	RC 339	750p	TX100 FASTTEXT	RC 785	650p
ORION			TX100 STEREO FASTTEXT	RC 789	650p
RC53	RC 892	750p	PROFESSIONAL	RC 790	650p
PANASONIC			TOSHIBA		
EUR51200	RC 200	800p	CT937	RC 950	750p
TC2200	RC 201	850p	CT9117	RC 951	750p
VS00357/NV730	RC 202	750p	201R4B	RC 952	750p
TNQ1621	RC 203	750p			
PHILCO					
CARVEL, CONCORDE,	RC 108	750p			
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TC10	RC 152	900p			
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RC5002.5154	RC 134	750p			
KT3 NON TEXT	RC 135	750p			
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400mA	FUSE 04	75p	FUSE 20	60p
500mA	FUSE 05	75p	FUSE 21	60p
630mA	FUSE 06	75p	FUSE 22	60p
800mA	FUSE 07	60p	FUSE 23	60p
1A	FUSE 08	60p	FUSE 24	60p
1.25A	FUSE 09	60p	FUSE 25	60p
1.6A	FUSE 10	60p	FUSE 26	60p
2A	FUSE 11	50p	FUSE 27	60p
2.5A	FUSE 12	50p	FUSE 28	60p
3.15A	FUSE 13	55p	FUSE 29	50p
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5A	FUSE 43	100p
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10A	FUSE 40	100p
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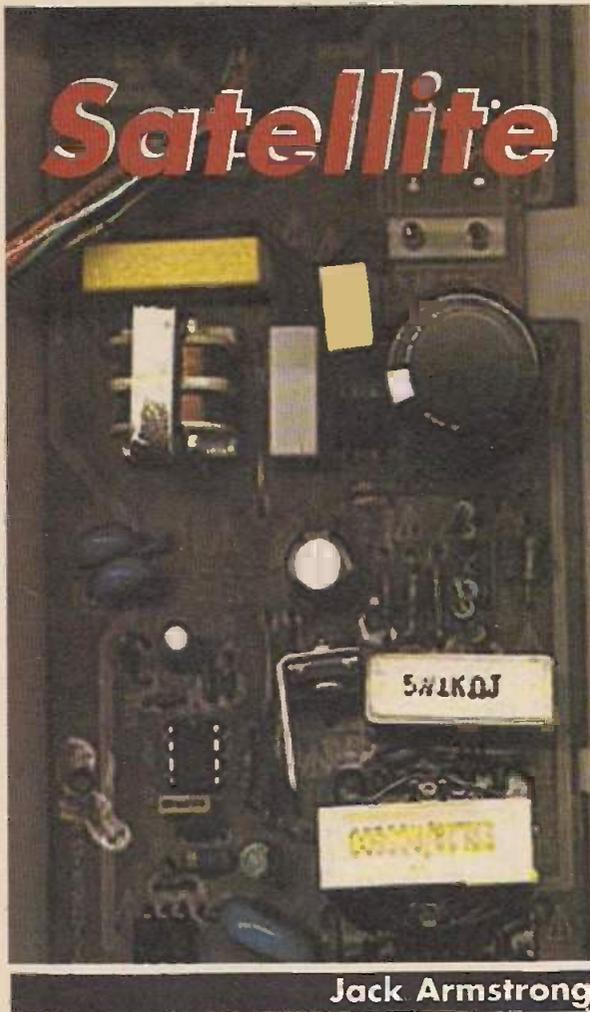
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Jack Armstrong

Once upon a time I repaired CB radios. I was never surprised to find them full of straw, because farmers used them in their tractors. But the mind boggles when confronted with a satellite receiver that's full of straw. Lying in the hay and watching the Sky takes on a whole new meaning!

The receiver was an Amstrad SRD510. When I switched it on the red and green LEDs flashed simultaneously. This usually means that the LNB voltage is low. So I removed D4, which senses shorts across the LNB supply. The situation remained the same. D4 is connected to pin 8 of the microcontroller chip IC5, where the voltage reading was correct at 5V. If the LEDs flash when the voltage at this pin is correct, it usually means that IC5 is faulty. But a replacement made no difference.

Suspecting a serial data line fault I disconnected the tuner's SDA pin. This stopped the lights flashing, but a replacement tuner made no difference! After some headscratching and peering at the

WORKSHOP

circuit diagram I traced the cause of the fault to R24 (4.7kΩ), which connects the SDA line to the EEPROM chip IC4.

The straw puzzle was solved when the receiver's owner came to collect it. He had sent the receiver to a repair shop which had been unable to fix it. It had been returned packed in straw. Well, this is farming country!

Grundig Grumble

I've had a Grundig GRD150 receiver in the workshop for seven weeks. It's driven me almost to tears. The symptoms were that after a warm-up period of several hours the on-screen decoder messages would disappear and the receiver would no longer unscramble the pictures.

I replaced every IC on the decoder board before I realised that the decoder was actually working but the STV signal processing chip was bypassing it and feeding still scrambled signals directly to the output sockets. It took several weeks to obtain the SVT chip from Germany. I then managed to remove the suspect device from beneath the board by using a paint-stripper heat gun (I'm not recommending this method!). An hour later I had soldered all 64 pins of the new one, but it took another twenty minutes to retouch the dry-joints that initially prevented it from working.

Anticipating success, I left the receiver on test while I had a nice hot bath. Upon my return to the workshop however the fault was still present. I finally traced the culprit – the microcontroller chip – by using freezer spray and a hairdryer.

A few more weeks passed before the new microcontroller kit arrived from Germany, minus instructions. A quick call to a friendly Grundig agent clarified matters however, and five minutes later the GRD150 repair was finally completed.

I've repaired a number of these Grundig receivers in the past. You need a good working knowledge of

the signal paths. Faults do occur in the decoder chips and, occasionally, the STV type signal processing chip. This circuit is in fact very similar to the one used by Cambridge in the ARD200 and the clones made for BT, JVC and others. I've even seen a Grundig receiver that used one of these large chips with a Cambridge ICCS part number on it.

One of these receivers would occasionally produce a blank screen with encoded channels only. The cause of this was traced to L11, which is in series with the output from the VideoCrypt decoder. A coil is not something you'd check first of all!

My GRD/Minerva service manual from Grove Farm Publications (01636 626 327), mentioned in a previous column, has now paid for itself several times over.

Cambridge Calamity

A small number of Cambridge ARD200 receivers seem to kill the series 10 Sky card for no apparent reason. The card might last for a week or two, after which the "card invalid" message will appear. Simply scraping the black spot off the card cured the problem, which was intermittent, with one receiver I had in the workshop (this course is not recommended by Sky). With other receivers however the card really does die.

Last week I received a call from a lady in distress. Her fifth Sky card had been invalidated, and she had been advised to buy a new receiver. Could I repair her ARD200 so that it no longer killed the cards?

I agreed to have a look at the receiver, which produced the correct "expired" message with an old series 07 card and an 08 one. It was with some trepidation that I tried a new series 10 card, but it worked perfectly. The customer had explained that a new card could last for a week, then fail without warning.

Now I'm not a card 'hacker' and

I know nothing about the inner workings of these cards, but I tried an experiment. The card receives a 5V supply when it is inserted. There is also provision for increasing the supply to 12.5, 15 or 21V, under micro chip control. As the 15 and 21V lines don't seem to be needed, I decided to inhibit them by short-circuiting the base and emitter of both Q45 and Q46. These are surface-mounted transistors that sit directly beneath the PCB. If the circuit had been switching these higher supplies to the card intermittently, this would stop it.

Only time will tell whether this has cured the problem. I suspect that pay-per-view may no longer work, and advised the customer to save up for a new receiver.

Since the original Cambridge satellite company no longer exists, there is no technical helpline for these products. The SVS200 is a British Telecom clone of the ARD200, and I understand that BT spares and technical information are held by Tele Aerial Satellite, which is now part of the Sky group. Unfortunately it doesn't seem possible to obtain any

information about decoder faults, so we are left guessing.

ADX Connections

When Astra 1D began transmissions it was possible to make a little profit by selling Global ADX frequency converters. All that changed when Sky offered these units to subscribers for just £9.99. We independents are left to sort out the ensuing problems however, since the information leaflet supplied with the ADX unit is hardly comprehensive.

I was having a quiet pint last night when my neighbour approached me with an ADX in his hand.

"Do us a favour Jack. Can't get it to work. Come across and fix it for us termorra?" With that he plonked the unit in my hand and departed. I was so bemused that I accidentally paid for the round!

This morning I got my own back by waking him at 8 a.m. His receiver is a Pace SS9210, which is a two-input model. The tuner uses IEC instead of F connectors. I made a short adaptor lead, using CT100 coaxial cable, and ensured that the IEC plug was soldered.

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

jackarm@netcentral.co.uk

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

With a TV aerial you can get away with simply poking the inner wire into the plug, but as an LNB requires current the connection must be good.

Once I'd demonstrated the working of the unit and explained that Sky Movies Gold has to be tuned 500MHz higher than its listed frequency my neighbour was a happy man. So happy that he gave me 50p.

Thank you Sky. Without you I'd be out of business!

Test Case 409

Of all the fault symptoms that are likely to be encountered in the TV repair workshop, "sound OK but no picture" should be one of the easiest to diagnose. That's what Technocrat was thinking at any rate as he bore a Ferguson 59K7 (ICC5 chassis) from the awaiting repair rack to his bench. If the sound was present the power supply section and much of the other circuitry must be up and running he mused, including the line output stage since in this chassis the varicap tuning voltage is derived from it. Probably loss of the tube's first anode voltage or something similar he decided. This view was supported by the crackle and rustle of EHT voltage build up when he switched the set on.

Technocrat's face fell when a picture appeared on the screen. Not another intermittent fault! He already had four sets running on test. As he watched however all the features in the picture began to smear to the right. The highlights became 'flat' and limited at the same time, then the picture began to darken. Soon it had faded away altogether. The sound remained, also the EHT which bristled the back of Technocrat's hand when he held it up to the screen.

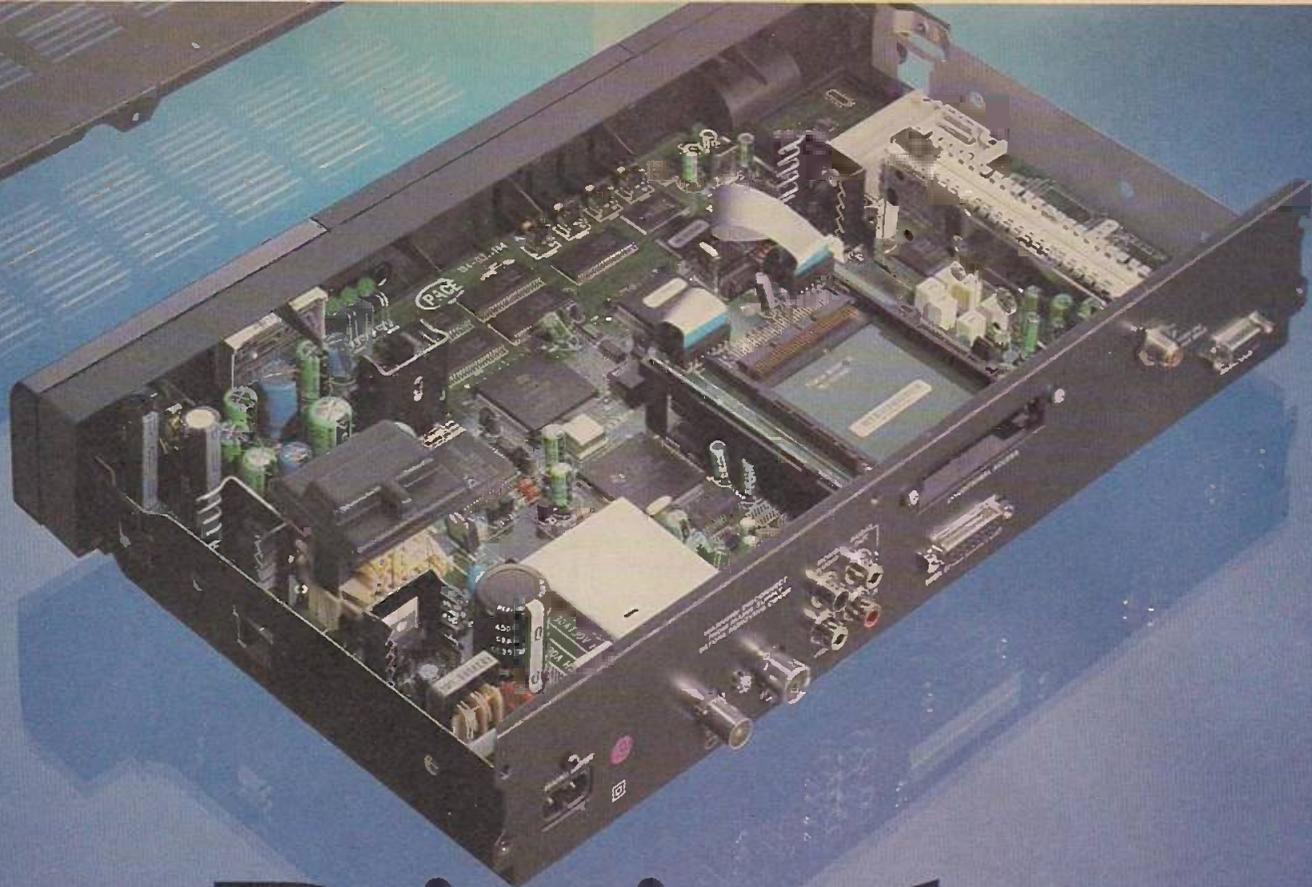
TC carefully removed the set's back, brushed a heavy layer of dust off the tube base panel and got busy there with the voltmeter. The tube's electrode voltages all appeared to be normal as far as he could tell – the big sheet of provisional service information gives no voltage readings here. The tube's first anode was at 670V, its grid (strange name for a metal cup!) a bit negative with respect to chassis, while the cathodes were at 120V. Nothing strange here. Nothing at all in fact, because a glance in the mirror showed that the picture was back!

OK, decided TC, we're no strangers to such coyness. He left two meters connected: one at the red input to the tube's base panel (pin 4 of connector BV02) where the reading was 3.8V, the other at the tube's red cathode (pin 8) where the reading was about 125V. Off then to brew some coffee. TC was not going to be fazed by this telly or its intermittent fault.

When TC returned the picture had gone again and the meter readings had changed. The tube's red cathode voltage had fallen to 50V, while the red input at pin 4 of BV02 had risen to 6.5V. Maybe there was something wrong with the 200V supply to the CRT base panel? No: there was about 190V at both ends of the 10Ω feed/decoupling resistor RV82 which, incidentally, can be a trouble-spot in the ICC5 chassis. The RGB output stages were obviously doing their job: an increase in the drive voltage was pulling down the tube's cathode voltages. But hang on a moment: with reduced voltages at its cathodes the tube should surely be conducting more heavily, not cutting off. Could it be that the tube was conducting so heavily that it was mopping up the EHT voltage? No, the EHT was still present and able to bristle.

At this point the picture came back again. As TC watched, the meters indicated a return to normal voltage conditions at the red input and cathode – 3.8V and 125V respectively. It seemed that the tube was working in the opposite way to what you expect. It had turned theory on its head, hadn't it?

In fact no. There was a perfectly rational explanation for this strange behaviour once the real cause of the fault became known. It wasn't far away from the tests conducted so far. TC tracked down the cause of the trouble soon after. What was it? For the solution, turn to page 215



Digital Discoveries

Hugh Cocks has been trying out one of the first digital satellite receiver-decoders, the Pace Model DVR500. His report covers setting up, installation, off-air upgrades and reception quality

Once the Dutch channels via Astra changed from analogue to digital transmission it took only a short while for our first customer from Holland to appear with a digital receiver-decoder under his arm. We had prewarned him that it would have to be left with us for some "testing". Fortunately this wasn't a problem for him, as he was due back in Holland. He said he'd be returning in about a week, and could we install it at his house in the meantime?

I thought I'd get it going within a few minutes, then do the actual installation as late as possible before his return. This would enable me to gain as much experience as possible of digital signal reception. But things never turn out quite as one imagines, do they?

The IRD

The digital integrated receiver-decoder was a Pace Model DVR500, all the way from Pace's factory in Yorkshire. It has an 'MSS' front and is housed in a PRD-series sized case. The first thing one notices is how heavy it is in comparison with its analogue cousins. When the top is

removed you immediately see the reason for this. The box is packed with a very large quantity of electronics, and the tuner is huge in comparison with current analogue types. The power supply, though familiar, has been beefed up to cope with the current requirements of all those digital processing ICs.

The striking feature of the rear panel is the complete absence of scart sockets – there isn't room inside to house one. Four phono sockets provide a video output, a mono audio output and stereo audio outputs. A scart-to-phono lead is thoughtfully included in the carton.

The modulator and mains connections are conventional, but three other things aren't. The main one is the 'conditional access module', which is best thought of as the digital decoder. There are different ones for different world markets – the Dutch one is made by Irdeto. This module is housed in a metal can and pushes into a multiway connector that's recessed into the top middle of the rear panel. A Multichoice smart card to authorise viewing of the premium channels slots in at the front of the receiver, under a flap – as in the MSS200.

The other two connectors at the back are a 9-way RS232 D socket and a 'high-speed data port', which the manual shows connected to a PC. Unfortunately the manual (part no. 502 2102410 if you should want to order one) is entirely in Dutch, but from what I can make out the PC is used to upgrade the decoding software, which is also done 'off-air' (see later).

An unusual feature is the fact that the UHF modulator's range is only from ch. 28 to ch. 69. Presumably the

spectrum below ch. 28 is avoided because it's within the IF range of the tuner, with the possible danger of data corruption/interference from the analogue modulator.

The remote control unit is physically identical to that used by MSS series receivers, though the buttons have different functions of course. There are buttons on the front panel for standby switching and programme up/down selection.

The price of the receiver, in Holland, is about 1,600 Dutch Guilders – some £600.

Testing Time

We fitted a universal LNB to the workshop dish. This is essential for reception of digital transmissions: the LNB has low local oscillator phase noise and covers both the existing Astra analogue band and the 11.7-12.5GHz used for digital transmissions from Astra 1E and 1F.

Why is local oscillator phase noise important? Imagine it as tape flutter: the resultant degradation of a data stream of zeros and ones coming from the demodulator would be disastrous. The digital output from the demodulator has to be as 'clean' as possible: low oscillator phase noise and low frequency drift are essential. Any problems here and the result could be no pictures.

Time to switch on. I applied power ("inschaken van uw decoder op de stoomvoorziening" according to the book) and connected the phono-to-scart lead to a monitor. After a few seconds, "DL" appeared in the front display, then a "1", with the seven-segment display next to this lighting up sequentially, producing a clockwise type rotation effect. The monitor displayed "Searching for the default frequency" (fortunately all the on-screen messages are in English). The front display then changed to "RA" and finally settled down with two horizontal bottom display segments flashing (the manual helpfully says "Knippert", which I think is "flashing" in Dutch!).

The monitor said that there was "no signal", and no matter what was done the receiver wouldn't respond to any remote-control commands. Repeatedly connecting and disconnecting the unit from the mains supply produced the same results. Not surprisingly, a major sinking feeling set in at this point – along with a number of dark thoughts.

Was all that I'd read about digital reception true? Is it really hypercritical? Maybe the LNB phase noise was too high. Perhaps the coaxial cable wasn't digital-signal compatible. Where can I get a Dutch dictionary fast, further to decode the manual? Page 39 looked like the one to go for – "Problemen Oplossen Tijdens De Installatie" it said. I decided to take a break and return, refreshed and ready to attempt to cross the digital frontier, next day.

Attempt No. 2

I changed the LNB, but the results were still the same. Then I checked the remote control unit. It operated Pace analogue receivers all right, so I assumed that it was OK. The LNB was receiving power, and a 22kHz tone was present to make it switch to Astra high band. Could the receiver be scanning the band, not finding its "default frequency" and refusing to come on because of this?

I was rapidly coming to the conclusion that the digi box would have to undertake the long journey whence it came. With the help of another Dutch customer I ploughed through the manual and found nothing that hadn't been done. But the receiver's menus should be working, which they weren't.

By chance another Dutchman rang up to tell me that he'd bought a Pace DVR500 and a universal LNB and they worked – he's a bit technically inclined. Did I want to have a look at it? I dashed off like a shot, armed with the digital IRD and remote control unit, to see the functioning digital wonderbox.

To cut a long story short, the wrong remote control unit had been put in the carton. Despite being labelled "digital", it must have been for a slightly different model. Some of the labels for the keys differed, and the correct unit had "RC14" at the bottom – there was no indication at all on the one I'd been trying to use. In addition the correct unit won't work analogue receivers, which is sensible if you are using both an analogue and a digital receiver.

I returned the incorrect remote control unit to Holland, and in the meantime programmed a learning remote control unit from the correct one. The receiver then happily responded to remote-control commands. It just shows: take nothing for granted, especially if your 'digital' remote control unit works your analogue receiver!

Results at Last

Once I'd seen the receiver in operation, getting it to work in the workshop was a relatively straightforward affair.

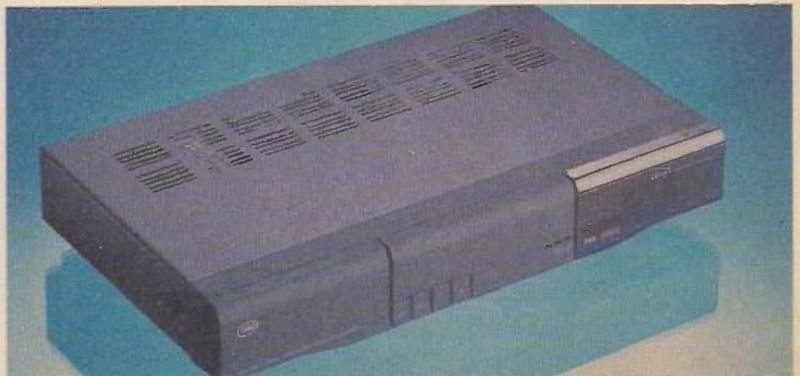
The reason that no pictures were seen without the remote control unit to help was that the "Default Frequency" hadn't been entered. When they come from the factory these receivers are programmed for 11.953GHz with horizontal polarity. This is the transmission frequency for Multichoice Nordic. We are outside this signal's footprint (the receiver would probably not have displayed pictures anyway, being intended for Benelux transmissions). Had the Dutch frequency (12.012GHz with vertical polarisation) been entered, the receiver should have come on without a remote control. After finding its beloved default frequency the set goes to standby and can be switched on via the front panel button – standby is indicated by one horizontal line, as with the MSS200.

The menus differ from what I've seen from Pace up to now – they look more PC-based visually. To get into the installation menu you press 'menu' on the remote control handset. "Main Menu" is then displayed on the screen, with "installation" being option 6. You then have to enter a pin number (9949 seems to be preset) – this prevents accidental entry into the installation mode. If anything is incorrectly set, more than likely "searching for the default frequency – no signal" will appear.

Once you get the installation menu you need option 4 – "Manual channel tuning". There are sub-options 1-5 – 1 frequency, 2 symbol rate, 3 polarisation, 4 forward error correction and 5 "retune with these settings". You press 1 and key in the frequency (you cannot go up and down scan style, as with analogue models). This is 12012 for the Dutch package. Option 3 then has to be set to vertical (from horizontal). Option 5 is next pressed and confirmed with the remote control unit's OK button. After that the receiver exits the installation mode and, if you are lucky, it may come to life. There seems to be no way of telling whether you are on the correct frequency while in the installation mode.

Options 2 (symbol rate) and 4 (forward error correction)

The Pace DVR500 digital IRD.



are set at 27,500 and 3/4 respectively. These mustn't be touched or, even if you are on 12,012GHz vertical polarity, "No Signal" will be proclaimed by the TV set. All right, so I did try a symbol rate of 27,501 and it worked, but 27,600 didn't! Apparently these two parameters are standardised with Astra but not with some Eutelsat transmissions.

Other main installation menu options are 1 LNB settings, 2 signal-strength menu (this seems to come to life only when the receiver has found its default frequency) and 3 UHF modulator frequency adjustment – two white bars on a black background are used as a test signal, together with the UHF channel number and the actual frequency in MHz.

On-screen Results

There are up to twenty channels in the Benelux package (not all are running yet). When you change channel, graphics at the bottom of the screen give the channel name, programme title, a brief description and the finishing time. For premium channels a smart card and the conditional access module are required, otherwise the screen goes blank – apart from a polite message to insert both items. At the moment, current 'free' channels such as RTL4 and 5 will work without the card or module, but apparently this may change.

The radio mode provides up to 26 CD-quality channels that cater for a wide range of musical tastes. These are at the moment free of charge and not all are in use.

I'm not so enthusiastic about the pictures. The most annoying thing is that sound and vision are often not completely synchronised. They may be only fractionally out, but the eye and ear are very sensitive to this – especially with studio shots such as a newsreader. Rapid motion judder is seen with say a football match, but this pales into insignificance in comparison with the lip sync problem. Some channels seem to be more 'jerky' than others, the best being RTL4 and 5. It's possibly to do with the transmitted data rate on a particular channel in the package.

I noticed the same effect with the other receiver I saw. Maybe the digital circuitry does more image 'averaging out' when the signal strength is lower. Unfortunately there were no rain storms while I had the receiver on test, so I couldn't check on low-signal results.

On the plus side, a lot of the chroma noise you see with analogue transmissions has gone, though flesh tones sometimes look a little strange. The overall quality can best be described as a sharp NTSC-converted image.

I've not seen a teletext transmission yet, which is a shame. The old analogue RTL4/5 services had large test magazines.

The receiver runs fairly warm in use – but probably not as warm as a MAC one. Be sure not to leave the large Dutch manual on top of it.

Decoder Updating

The decoder software can be updated automatically over the air. According to the manual, this is done in the early morning hours and can take up to half an hour to complete. The update will still take place when the receiver is left on standby.

You can check manually whether a software upgrade exists by going to main menu option 4, IRD settings, followed by option 4 in this menu – IRD S/W Upgrade. You will then be told if an upgrade is available or not. If one is available, the time required to carry out the upgrade will be shown (the receiver cannot be used for normal reception during this period). Should you wish to continue, press OK and wait for the finish message.

When I tried this facility the receiver told me that no upgrade was available at the moment.

Decoder E Codes

Codes from E01 to E65 are displayed on the screen when a problem exists or the pay-per-view facility is used. The

following are some typical examples:

- E04 Please insert smart card.
- E06 Smart card failure.
- E12 Conditional access module failure.
- E42 Parental control lock.
- E64 LNB overload detected.

My favourite – all this comes from the manual – is in the PPV section: E26, 'Event for Sale – Cheap'. Might the IRD have a special slot for inserting cash when this message is seen? So far nothing has been found!

Other Transmissions

Not much success in this respect. I first attempted to look for the German ARD/ZDF Astra package at 12.168GHz vertical. As far as I know this is unencrypted MPEG-2. Keying in this frequency produced no pictures. The receiver knew that something was present, as the 'search mode' (the rolling seven-segment display at switch on) continued but wouldn't stop. No on-screen message was seen. If nothing else, this is an improvement on "Searching for the Default Frequency"! Similar results were obtained lower down the Astra 1E band, at 11.8GHz.

When I changed over to Hot Bird at 13°E I came across the 'Viacom Multiplex', but the decoder produced the E65 code ("No audio or TV channels available"). Fortunately the signal-strength menu provides identification, giving the name of the service provider (the Dutch one is Nethold).

An E65 message was again seen when I tried Intelsat 601 at 27.5°W, this time from something called "DM" (for those interested, located just below the Travel channel, at 11.135GHz with horizontal polarity).

It's difficult to look for channels when you don't have definite information, because the exact frequency has to be keyed in then the menu exited before anything can be seen.

I suspect that the model I had will receive only Nethold Dutch signals, as an IC in it had "Benelux" stuck on it.

Final Installation

Our customer from Holland wished to continue to receive the analogue as well as the digital signals from Astra, using his Pace MSS100 for the former. I found that the easiest way to do this is to use a two-way IF splitter, with DC power passes at both ports connected to the universal LNB.

The MSS100 has a channel which is preset to "external AV" and is labelled "Digital". It's set to vertical polarity, low LNB voltage, this being done so that the digital receiver can command low or high LNB voltage. The digital receiver's scart lead is then connected to the MSS100's 'decoder' scart socket. Switching the MSS100 to this channel and changing over to the digital remote control unit gives you reception of the digital channels. The digital receiver then sends its 22kHz command tone up the cable to change over the LNB's local oscillator frequency. The digital receiver must be switched off when you use the analogue one.

As the two remote control units are identical in size our customer found it handy to stick them together back-to-back, using a piece of double-sided tape. They sit in the hand reasonably well, and it's visually obvious which one is which. I hope he won't have too much trouble prising them apart when he tries to replace the batteries!

Epilogue

All in all it was a very interesting 'learning experience'. I've installed another receiver since, with no further problems but with the same picture results. It seems that the DVR500 has a 'block' on reception of clear MPEG transmissions, restricting its use to the Dutch channels. Has anyone any further information on this?

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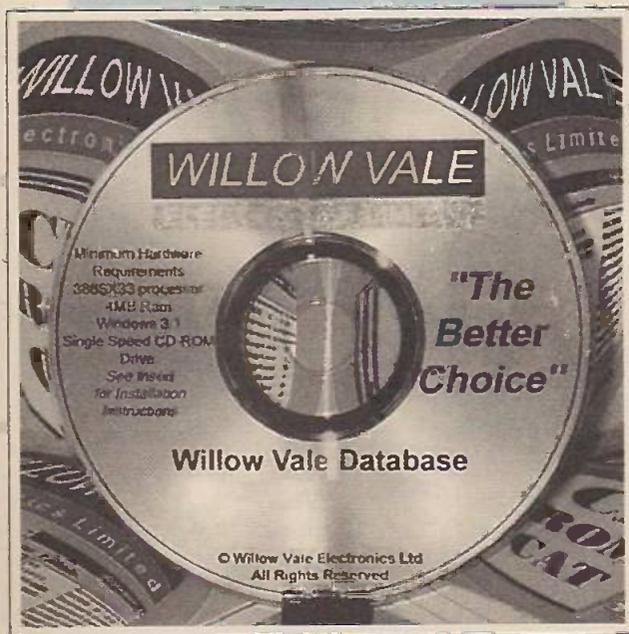
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INTERNET MATTERS

Last month we considered some uses of the Internet, concentrating specifically on e-mail. An Internet connection provides much more than a low-cost mail system however. A software program called News Reader for example gives you access to USENET news groups. These are like electronic bulletin boards, but each one is 'mirrored' by computers worldwide. There are thousands of news groups, each dealing with a different subject.

There's a significant American bias. Thus the news group called alt.home.repair deals mostly with repairs to American homes. The news group rec.video.satellite.europe however deals mostly with English and European satellite TV matters. Sci.electronics groups have an American bias, but with an increasing number of English participants.

You can use news groups to obtain information simply by posting a question. If another user knows the answer he will reply with a follow-up message to the news group or, if you prefer, by e-mail direct to you. Some news groups allow a limited amount of advertising.

Blatant advertising by dealers is generally not accepted however. It is better to post useful information to attract readers who will contact you for prices and ordering information. You should also mention your 'Web Page' address, of which more later.

Some news groups are 'moderated' and some are not. With a moderated group, any offensive or inappropriate messages are removed. Few such messages are posted however, because the sender would be likely to receive hate mail (called "flames") from other users.

Very few Service Providers can commit enough computer space to 'mirror' every single news group. Thus you

will find that less well known news groups may not appear via your local server. The only way to reach them is to send a request to your Service Provider to 'mirror' the news groups that you need. If this is not possible, you can try changing your subscription to a different Service Provider.

CompuServe Forums

With CompuServe the news groups are called Forums. CompuServe is separate from the Internet, using its own interlinked world-wide computer system. This system has access to the Internet but, although e-mail can travel in both directions, Internet users cannot use CompuServe Forums at the present time. On the other hand CompuServe subscribers have access to most of the Internet news groups.

Thus global computer systems such as CompuServe and America Online are in effect mini-internets, the major difference being that their entire computer networks are owned by one company.

All CompuServe and America Online Forums are 'moderated'. In other words obscene or inappropriate messages are removed from public view. This is not necessarily so with Internet news groups. But even so you have to look quite hard to find truly offensive material on the Internet. Thus you needn't be unduly worried.

No matter where you take your computer in the civilised world you can plug it into a telephone line, dial up the nearest CompuServe connection point and obtain your own e-mail and reach all the available Forums.

With the Internet, each computer is owned by a different company or university. Thus no one actually owns or controls the Internet in its entirety. When you change location you need to pay a different Internet Service Provider for the privilege of being connected to the Internet.

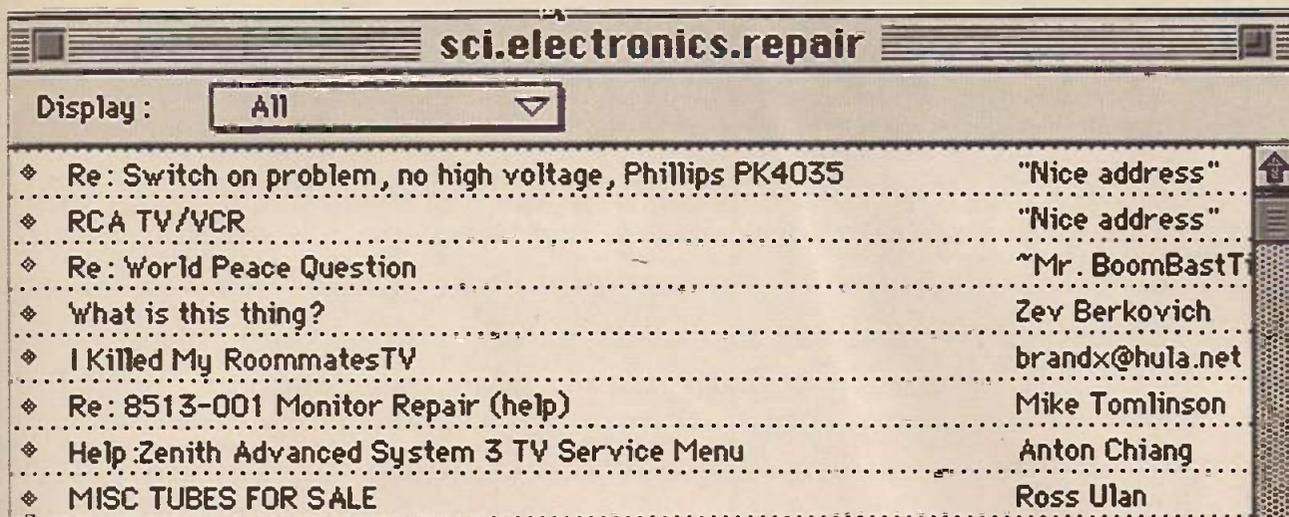
If you tend to travel and need access to e-mail wherever you go, CompuServe or America Online will work best for you by providing local access. In some countries 'local' could mean the nearest big city. Access to news groups is currently restricted on CompuServe however (some are not available at all), so an Internet Service Provider may be better if news groups are what you want and you don't intend to travel.

The World Wide Web

The World Wide Webb (WWW) is another aspect of the Internet. The most significant differences are as follows. USENET news groups do not provide on-screen pictures - only text or picture files that you can download and

Is it a fad for computer whizz kids, or could it be as essential a tool as the telephone?
Martin Pickering helps you to decide for yourself. . .





view later. The WWW supports both text and pictures however, so it's much more like looking at a magazine page on your computer screen.

USENET news groups enable you to post messages which are then available for viewing and downloading by other users. These messages tend to disappear over a period of days or weeks as they are replaced by more recent ones. In contrast, the WWW does not generally provide message posting. It acts mainly as a repository for information which you can view or download – in fact it's like an enormous library.

Most Service Providers (including CompuServe) will give you a free web page if you are a home user. If you are a business, you will probably have to pay £10 per month or more for the privilege. A web page consists of one or more files which you keep on the Service Provider's hard drive. The 'Home Page' file can refer to other associated files which, for your own web page, are most conveniently stored in the same directory on the disc. You get them to your Service Provider either on a floppy disc or by sending the files as an e-mail 'attachment.'

Many companies and individuals now earn money by designing and producing web pages for clients. It's not complicated however. The file that you use for a web page is basically a text file. It can include various commands in a language called HTML. These commands are page layout instructions that allow any Web Browser software (such as NetScape) to set out the text and pictures on the computer screen. The most basic commands are those that define a line break (end of line and carriage return) and a new paragraph – the end-of-line command is
, while the paragraph command is <P>. The command for "draw a horizontal line" is <HR>.

So you can see that it's all very simple. You can make words appear bold (blackier) by typing before and after any word to be made bold. You can also type commands that make the program put a picture in a specific place on the page. It's also possible to make pictures rotate in a three-dimensional fashion.

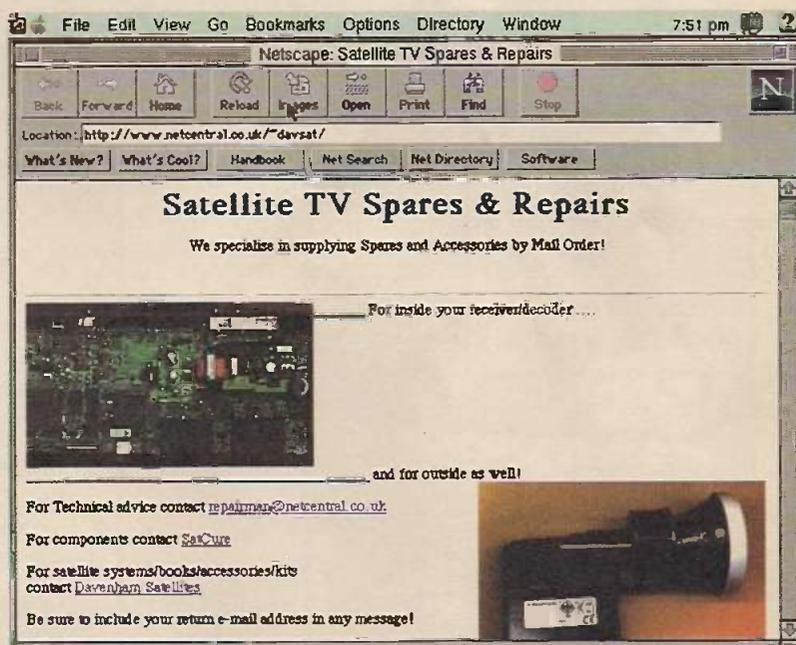
You don't even have to learn the commands. Software programmes that do it for you are available. You simply type in the text and decide where you want the pictures, click on a few 'buttons' and the job is done. I use a Macintosh Shareware program called WebWeaver to generate web pages. This and similar programs, for both Macintosh and Windows computers, can be readily obtained by mail order or via the Internet.

On the right is an example of what a typical web page looks like.

Most web pages contain 'links' that appear as blue coloured text. These links give easy access to other related web pages or, alternatively, enable you to send e-mail to the web page owner. You simply click on the link words and the Web Browser software produces the associated new web page or presents you with a screen in which you can type an e-mail message.

A web page provides a wonderful means of storing information for immediate access. There are probably hundreds of thousands – possibly millions – of web pages in existence, all providing free information for your perusal. Some of the information is in the form of product catalogues. Some is provided by governments and local authorities to encourage tourism. There are pages devoted simply to telling you about the individuals who created them.

With so many pages of information out there, all stored under strange, cryptic addresses such as "http://www.netcentral.co.uk/~davsat/", your chances of finding the information you need are virtually zero. They are in fact a lot worse than finding the proverbial "needle in a haystack", because you don't even know where in the world even the haystack is! But there are things called 'search engines'. A search engine is a large, powerful computer system that stores 'key words' from every web



page in existence. In return for your tolerating a small amount of advertising, these search engines enable you to type in key words. Then, within a few seconds, you are presented with a number of WWW addresses where you will find text that contains these key words.

For example my son had a school project that related to oil exploration. In order to help him to gather information I pressed a few buttons with my computer mouse and was connected to a search engine called Alta-Vista. Typing in the two key words 'Shell' and 'oil' produced a list of web page addresses. The first one I selected downloaded a page that included pictures and information about oil recovery from undersea drillings. I printed out five pages then clicked on the next address. After about five minutes, I had enough information to write a book on the subject! My son received top marks for his homework, and the teacher asked which library he had used because the village library didn't have a single book on the subject.

This example shows that for the cost of a five minute telephone call I was able to search for, find and download all the information I could reasonably use on a particular subject. The possibilities are endless, and the amount of information is increasing exponentially at about 10 per cent a month.

Your own web page

If you want your own web page you can achieve it quite easily. It will give world-wide access to information about you or your products or your favourite charity, pets, hobby, disease, component equivalents . . . in fact whatever information you care to provide. It was

estimated a year ago that between 15 and 30 million people had access to the Internet, with the number increasing by around 10,000 per day. Think of this as thirty million customers! If your business has anything at all to do with mail order, what are you waiting for? Even if it hasn't, bear in mind that tourists or businessmen arrive in your country daily looking for a product or service which you may provide. If they know about your services before they arrive, you will be number one on their list.

What use is it to me?

I was asked this very question today by a printing firm. It's difficult to explain to a blind man the precise advantages of being able to see! How can I possibly describe in a few words what the Internet is all about? In these articles I've attempted to give you an overview, with some screen-shot pictures which I hope have helped. All I can suggest is that you find some excuse to spend a small amount of money. Use inventive accounting. If you don't already have a suitable computer, you'll have to buy one. It doesn't have to be new. You'll also need a modem and appropriate software. This is all capital expenditure, but you'll use the computer system for other things. So the only real cost will be your Service Provider at £10 to £12 per month and your telephone calls. Make sure that these are at local rate, and keep them short. Now you can find out for yourself what use the Internet is. It's no longer a fad for computer whizz kids. It is an essential tool, just like the telephone itself - but it's more than that, because it is an incredible way to find and exchange information. ■

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Most readers will be familiar with the name City & Guilds. You may well have its certificates in a drawer at home. But have you ever considered how far up the qualifications ladder City & Guilds can take you? It's probably higher than you realise.

During the Eighties the government recognised the need for a national framework of vocational qualifications. Having achieved a distinguished reputation for traditional crafts and technician qualifications, City & Guilds was keen to respond to this need. As a result City & Guilds now provides a comprehensive range of National Vocational Qualifications (NVQs) in addition to its own traditional schemes. Since the inception of NVQs, City & Guilds has awarded over half the one million NVQs awarded to date.

As part of its development process, City & Guilds reviewed its higher-level awards programme, the Senior Awards. These are spread over four levels and are designed to increase the number of qualified professional people in the workshop at advanced levels.

The Licentiatehip

The Licentiatehip (LCGI) forms the basis of this Senior Awards structure. Offered in over sixty different occupational fields, it provides a flexible method of accrediting individuals' qualifications, work achievements and personal skills. Electronics is one of the areas in which the LCGI is available. Unlike many qualifications, the LCGI requires no additional course work or examinations. It is awarded on the basis of existing qualifications and achievements.

To qualify for the LCGI, a candidate must already hold a level 2 and 3 qualification. In addition, evidence of career progression and industrial achievement is required. While all applicants must meet each of these four requirements, the way in which they do so can vary. Examples of the types of qualifications and the evidence City & Guilds will accept are as follows.

Level 2 Qualification

One of the following: a Part II certificate in Radio, Television and Electronics Mechanics or Electronics

Servicing with the EEB, or Microcomputer Technology or Telecommunications and Electronics Mechanics.

Level 3 Qualification

One of the following: two Part III certificates in Radio, Television and Electronics Mechanics, or the Part III certificate in Television and Information Reception, or two Part III certificates from the remaining modules of Electronics Servicing or the Part III certificate in Telecommunications and Electronics Mechanics.

Career Extension

Suitability for the award of an LCGI is assessed by examining previous suitable qualifications or appropriate work experience. Further details can be obtained from the City & Guilds Senior Awards team.

Industrial Achievement

The Radio, Television and Electronics Mechanics certificate or the EEB Industrial Achievement or the Electronics Servicing certificate of the EEB or five years' appropriate employment after attaining level 2 and the possession of documentary evidence, acceptable to City & Guilds, of completing a training programme.

Summary

Successful LCGI applicants are those who have the ability to understand and practise the principles of a technical subject or professional activity.

Benefits

Once achieved, the holder of an LCGI diploma is entitled to use the letters LCGI after his/her name. The award provides a clear indication, particularly to employers, that an appropriate level of competence has been reached. In terms of the national framework, City & Guilds considers the LCGI to be broadly equivalent to an NVQ at level 4.

Further information, including application forms, can be obtained from City & Guilds, Senior Awards Unit, 1 Giltspur Street, London EC1A 9DD, telephone number 0171 294 2650.

Servicing the Philips G90AE Chassis

How to tackle a dead G90AE and a summary of other faults you could encounter with these sets. Richard Newman reports

The Philips G90AE chassis was introduced in 1989 and has proved to be a good performer. Above all, it's reliable. As in many other chassis that appeared at about this time, extensive use is made of surface-mounted components. The chassis is found in sets with screen sizes from 14 to 21in. As you would expect, most faults occur in the power supply. So we'll concentrate on this area of the chassis.

An article of mine in the December 1995 issue dealt with the G110 chassis. The G90AE can be regarded as its baby brother. If you can tackle the G110 chassis, the G90AE should not present any problems.

Power Supply

The circuit of the discrete-component, self-oscillating chopper power supply is shown in Fig. 1. All but three of the transistors used are surface-mounted types. T7625 (type BUT11AF) is the chopper transistor itself. The power supply is similar to that used in the G110 chassis, and operates in the same way. Thus the circuit description given in my previous article covers, in the main, the G90AE power supply. Only a few notes on its basic operation will be included here.

T7625 is connected as a blocking oscillator, with feedback from a secondary winding on the chopper transformer L5625 via C2620. T7615 and T7616 in the base circuit of T7625 provide the switch-off action, responding to pulses from the secondary winding via the optocoupler D7614. T7612, in conjunction with C2611 and R3611 which provide a time-constant, introduces a switch-on delay so that T7625 switches on at precisely the right moment. C2625 forms a resonant circuit with the transformer's primary winding.

On the secondary side of the circuit T7637 is the error amplifier that monitors the HT voltage while T7652 and T7654 form a pulse-width modulator. T7654 controls the current flowing in the diode section of the optocoupler. The operation of this circuitry and the standby system is identical to that in the G110 chassis, with standby control applied via T7671. For further information, refer to page 106 in the December 1995 issue.

The protection circuit differs slightly. Three series-

connected 33V zener diodes (D6657-9) monitor the 95V HT supply. They control the trip circuit that consists of T7655 and T7656. Similarly D6655 monitors the 8.2V supply developed across C2660, while D6661 monitors the voltage across C2534 in the line output stage (EW drive circuit). Note that D6658 is incorrectly shown as D6656 in the official circuit diagram.

Repair Kit

As with the G110 chassis, there's a Philips repair kit – type SBC7023 – for the power supply. The component count is much less than with the G110 chassis however. Most failures occur on the primary side of the circuit. As the repair kit also covers the G90B chassis, it includes a number of parts that are not required for the G90AE. Fitting instructions are provided, but I find the details rather small. Diode polarity is not always marked on the PCB, and the small instruction sheet is sometimes difficult to follow. What I have done is to use a photocopier to enlarge the instructions, marking all relevant components including diode polarity. The instructions include four layouts, two for the G90AE and two for the G90B – these depend on the production code and PCB wiring. Make sure that you follow the correct diagram.

As with the G110 chassis, never replace just the BUT11AF transistor. If the mains fuse has blown and T7625 is short-circuit, use the official repair kit. If the fuse has blown and T7625 is OK, check the degaussing posistor R3601. This item tends to go short-circuit and you might be in luck. A tell-tale rattle from R3601 when you remove it will probably confirm the diagnosis.

If a power supply rebuild is required, follow the same general rules as with the G110. Clear the bench and remove as many plugs as necessary so that the panel lies as flat as possible on the bench, print side up. A bright light and a small, hot iron are essential, together with some good tweezers, fine desoldering braid and some sort of magnifier. I prefer to use eye magnifiers or goggles rather than a single glass, as both hands are then free.

When removing chip diodes and transistors I usually desolder their tags with the fine braid then grip the item with the tweezers and apply just enough heat to free it

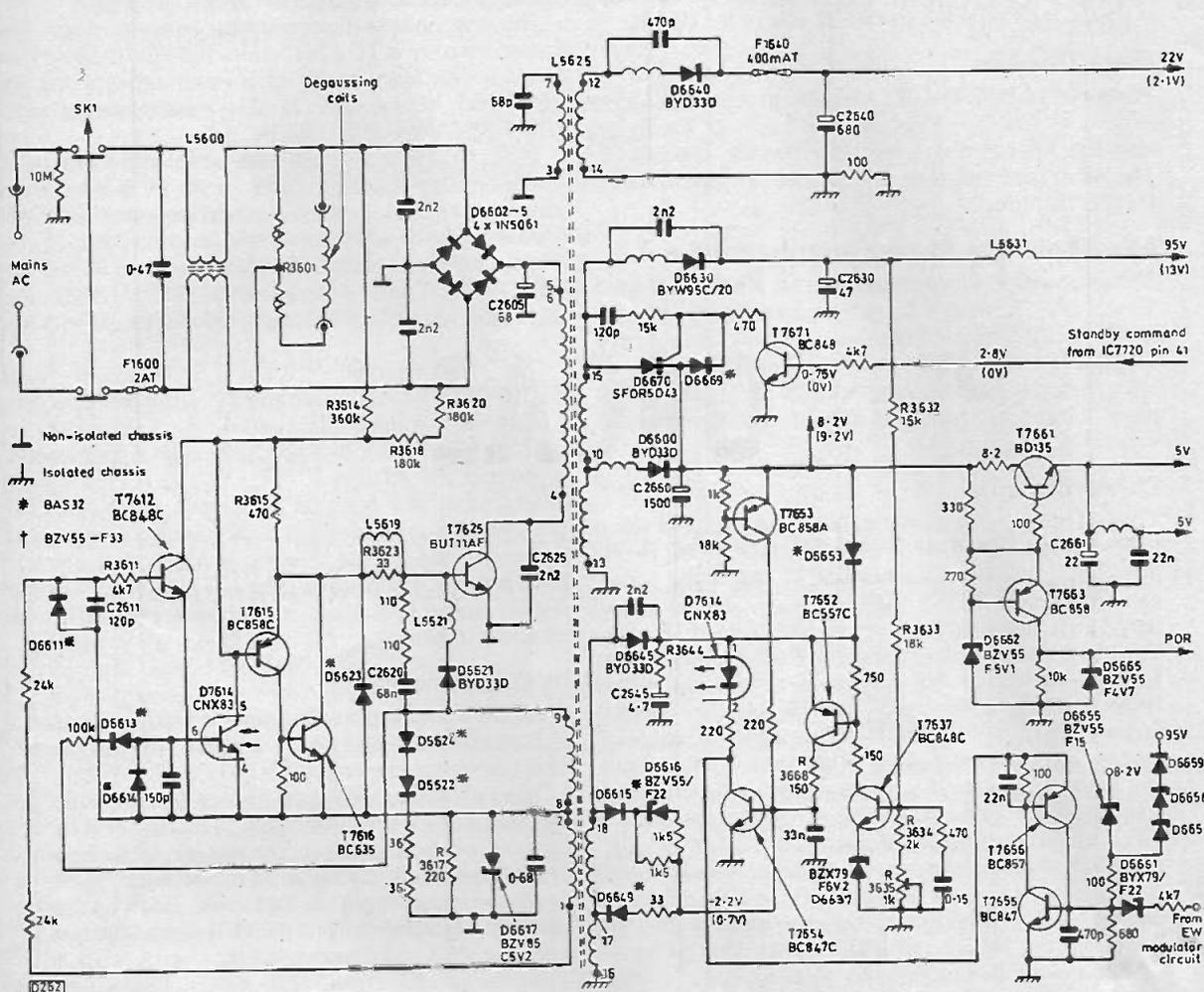


Fig. 1: The chopper power supply circuit used in the Philips G90AE chassis. Voltages shown in brackets apply in the standby mode.

from the board. Be very careful about this, as the pads can be lifted from the PCB.

Use the tweezers to position the replacement component on the pads as accurately as possible and hold it in place. Secure by applying fine solder to each pad. The solder connections must be made very quickly. This may not be the textbook method, and some engineers may cringe, but I have found that chip components are a lot tougher (within reason) than they appear and I have never had any problems.

Testing

When everything has been fitted, double check your work – particularly diode polarity. If all seems to be well, reconnect the plugs you removed with the exception of plug A5 which connects the 95V HT supply and the scan coils to the line output stage. Connect a 60W bulb across the HT reservoir capacitor C2630, then connect the set to the mains supply via a variac. I recommend that a meter set to read 240V AC is connected across the mains input socket (plug A1) so that the applied AC can be monitored, and that another meter is connected across the bulb to monitor the HT voltage.

Switch the set on and increase the mains input slowly. At around 150V the power supply should start to operate and the bulb should glow. When the mains input is further

increased, again slowly, the light from the bulb should stabilise and further increase in the mains input voltage should not result in the bulb glowing more brightly. If everything seems to be OK, increase the mains input to about 230V and check that the HT is correct. Then switch off, disconnect the bulb and test meters and reconnect plug A5. You can then check the set for normal operation. The HT might need slight readjustment – R3635 is the HT preset.

No Go or Incorrect Operation

If there are no results during initial tests, first check whether there is any HT at all. If the voltage is very low or is only half the correct 95V, check the HT sensing zener diodes D6657-6659. One or more of them could be short-circuit. It is also worth checking D6655 and D6661. Any of these diodes could be faulty, with the result that the protection circuit comes into operation. I have also known D6611, D6613 or D6614 on the primary side of the circuit to be faulty, preventing start up.

If you are not sure whether the cause of no start up is on the primary or secondary side of the circuit, reduce the mains input to about 70V and short-circuit pins 1 and 2 of the optocoupler D7614. If the bulb lights, the primary side is OK.

If the power supply starts up but won't stabilise, reduce

the mains input to about 70V and short-circuit pins 4 and 5 of the optocoupler. The power supply should then stop. If so, the fault is on the secondary side of the circuit.

Final Touches

When everything is OK, it's advisable to clean the PCB to remove residual flux. Finish off with a lacquer. This is not essential, but can give a more professional appearance. The more care you take, the greater the likelihood of success first time.

Miscellaneous Power Supply Faults

The optocoupler is the main suspect for random failure of T7625. D6653 can shut down the power supply if leaky. T7652 and R3668 can deteriorate, leading to excessive height and width or the power supply being shut down apart from a ticking noise: check C2630 as well. C2630 can also be responsible for a display with corrugated verticals.

Other Circuits

The rest of the set is conventional. It uses a U743 tuner followed by a TDA8341 IF chip. For tuning drift check the ZTK33B 33V regulator D6770. After the video emitter-follower T7881 there's a nice, simple colour decoder circuit based on the good old TDA3561A chip. This drives three single-transistor RGB output stages. Loss of one colour can be caused by leakage in the BAS32 diodes D6406 (red), D6416 (blue) or D6426 (green). Leakage in C2359 (0.1µF) is a possible cause of loss of colour. C2560 (33nF) in the beam limiter circuit can cause problems. If it's leaky there will be limited contrast; if it's open-circuit there will be a blank raster.

The sound department consists of a TDA8191 chip, which is basically an intercarrier sound demodulator and power output amplifier in one chip. The 20V supply to pin 18 of this chip comes via two series-connected BAS32 diodes D6272 and D6278. These can go open-circuit, sometimes intermittently, to cause loss of sound.

Sets with the teletext option have the relevant chips mounted on the main board instead of a separate panel. There are only four chips. Problems here are very rare. The 5V supply in this area is derived from an 8.3V supply that's generated in the line output stage. The reservoir

capacitor is C2843 (220µF). If there's no teletext with F7 displayed, check this capacitor which can dry up.

The sync and the field and line generator stages are incorporated in a TDA2579 chip, IC7470. If there's no line timebase operation the chip's start-up supply (at pin 16) could be missing. In this event check D6455 (BZX55/F5V6) and T7455 (BC858).

The line driver and output stages are conventional. So is the simple two-transistor EW diode modulator drive circuit. The field output stage uses two BD939F transistors, with a Wickman fuse for protection. If you find the fuse open-circuit, check the transistors and R3501 (390Ω) which could be open-circuit. R3508 (24kΩ) can go high in value, the result being reduced height with top foldover.

The microcontroller chip IC7720 is type TMP47C434N-3555. It occasionally causes problems, e.g. a blank raster with no sound and no on-screen display, or the picture darkening with no remote control operation. A separate EEPROM chip, IC7770 (X2402), is used to store programmes and personal preference information. If channels cannot be stored, replace this chip. The snag in this area is the old one of static interference. Later sets have a metal shield fitted over IC7720. This chip can display simple fault codes, a table being provided at the back of the manual.

In Conclusion

A different line output transformer is used in sets with a serial number that starts PM01 or higher. The part number of the new transformer is 4822 140 10367.

Take care when refitting the back cover. I normally lay the set face down when doing this, so that the PCB locates correctly on the supports in the rear cover. In the early days of these sets the cause of a cracked PCB was in some cases found to be the fact that it didn't rest on the supports. This tends to bend the PCB down. The result is a cracked PCB and a written-off set.

Mention has been made of the G90B chassis. This is a Nicam set with a higher specification than the G90AE. A TDA8153 chip (IC7380) on the tube's base panel provides the RGB outputs. The power supply is almost identical to that in the G90AE. There may be a future article in this. ■

TV Books

Satellite Repair Manual, 4th Edition, by Martin T. Pickering. Arlon House Publishing, 240 pages.

You could say that what Martin Pickering doesn't know about satellite receivers isn't worth knowing. What he does know has become legendary. Having been at it since the start of consumer satellite TV, he has built up a massive data base on satellite receivers. Not only on their faults, common and less common, but also on modifications and upgrades. Martin brings in-depth expertise to the subject, having previously been involved with equipment reliability testing and component specification.

This book has become established as a bible for satellite TV repair. But the subject doesn't stand still. New models, new faults – there is always something to add. So here we have the fourth edition, which has been completely updated and now has 240 pages – the previous edition had 135.

In addition to receiver fault notes and general information you'll find many useful button sequences for resetting parental lock codes, resetting installation choices to factory defaults and other less well known operations, practical information on LNBS with typical current drains, a list of manufacturers and suppliers

addresses and other useful material, all presented in a nice ring binding so that the book lies flat on the bench.

Our review copy came from Davenham Satellites (01606 49 085). The book is also available from most satellite accessory suppliers. Price is £16.95.

Television IC Data Files, by John Edwards. Published by Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford OX2 8DP (01865 310 366). 272 pages, £14.99.

What do you do when you are fault finding and you come to a suspect IC? Even if you have the circuit diagram, the chances are that it will not be very helpful about what you need to know – the pin voltages and the type of waveform, if any, to expect at the various pins. What you can now do in this situation is to turn to John Edwards' book *Television IC Data Files*, which presents this information clearly for the majority of chips you are likely to come across when servicing TV receivers and VCRs. This worthwhile addition to the servicing data shelf or tool kit is likely to be frequently consulted.

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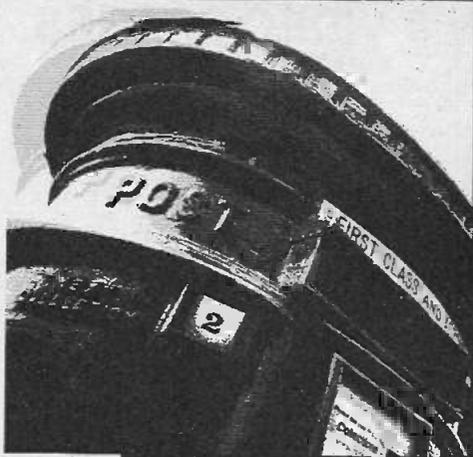
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SA1306	£12.80	STR50115	£4.80	TD42050	£4.80	TD43653B	£3.20	TD49570	£6.80
SA1306	£12.80	STR50115	£4.80	TD42050	£4.80	TD43653B	£3.20	TD49571	£6.80
SA1306	£12.80	STR50115	£4.80	TD42050	£4.80	TD43653B	£3.20	TD49572	£6.80
SA1306	£12.80	STR50115	£4.80	TD42050	£4.80	TD43653B	£3.20	TD49573	£6.80
SA1306	£12.80	STR50115	£4.80	TD42050	£4.80	TD43653B	£3.20	TD49574	£6.80
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SA1306	£12.80	STR50115	£4.80	TD42050	£4.80	TD43653B	£3.20	TD49580	£6.80
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SA1306	£12.80	STR50115	£4.80	TD42050	£4.80	TD43653B	£3.20	TD49599	£6.80
SA1306	£12.80	STR50115	£4.80	TD42050	£4.80				



We welcome letters from our readers and try to publish as many as we can. You can send them typed, hand-written, or on disc. Address them to the Letters Editor, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

PCBs

Having just been press-ganged into repairing a friend's satellite receiver – yes, it was the power supply! – I was surprised to find that its PCB was of the thin, tatty SRPB (synthetic resin impregnated paper board) type that should have been scrapped years ago. Talk of spoiling the ship for a ha'p'orth of tar! Of course, manufacturers of consumer electronic gear will hold up their hands in horror and moan about the price of a decent fibreglass panel, but would it add all that much to the cost of the finished product?

You have only to look at what is

Satellite TV Repair Kits

Further to my letter about satellite receiver power supply repair kits, published under the heading "A Warning" in the October issue, I should point out that the letter was written following bad experience with kits obtained from several different suppliers. Subsequent correspondence and checks however have established that some excellent kits are available. They comply with the original manufacturer's specification or, sometimes, improve on it. So with care over selection you can be perfectly safe with repair kits. As with so many things, experience is the best guide.

Some manufacturers can supply kits that are cheaper than 'pattern replacement' ones. I recently received a circular from a well-known distributor advertising parts for GoldStar/Matsui video decks. When I checked on this I found that the original manufacturer's parts were in some cases considerably cheaper than the suggested replacements.

*Michael Maurice,
Wembley, Middx.*

Letters

probably the fiercest cut-throat area of the consumer market at present, the PC. I have never come across a computer that uses SRPB board. OK, the complexity of today's PCs necessitates multilayer boards with buried tracks, which you couldn't fabricate in what is basically resin-soaked cardboard! Even the earliest machines – the BBC, ZX81, Spectrum, Commodore 16 and 64 – used fibreglass panels however. And can fibreglass be all that expensive when CPC is asking under £127 for Pentium motherboards with a full chipset except for the memory and processor? Oh yes they do – there are two on page 302 of the 1997 catalogue.

The industrial equipment I have serviced over the years has all used fibreglass PCBs. Unlike SRPB, it takes a lot of heat to char epoxy/fibreglass. The risk of arcing or tracking between printed tracks is much reduced, and fibreglass is self-extinguishing on exposure to fire. The track and pads survive the soldering iron better than with SRPB, and I've found that there is a reduced proclivity for dry-joints to form. Now that we have the added imposition of nasty little surface-mounted components, the greater rigidity of fibreglass would reduce the risk of damage because of flexing whilst servicing. And when was the last time you found a crack in a fibreglass board?

Last but not least, circuit performance would be enhanced as fibreglass boards offer much improved electrical characteristics. Would any setmaker like to comment?

*Pete Roberts,
Runcorn, Cheshire.*

Service Information – GoldStar

A couple of corrections are required to servicing information on GoldStar models published in your December issue.

First, the GoldStar D17 mechanism mentioned in VCR Clinic, on page 120. The part number quoted, 333-206A, is for the take-up lever only. The lever (098) and pinch gear (088) must be replaced together. They are available as a kit, part no. 450-435A.

An additional part, take-up arm 061, is required with models that use

the early D17 deck – these include the GSE-C21i, GSE230i, GSE231i, GSE-C400i and P-N420i. A complete kit – take-up arm, take-up lever and pinch gear – is available under part no. KITD170001A.

Secondly, on page 109 in the TV Fault Finding section Model CIT2068F should have read CIT2168F (chassis type PC04A). The same fault noted by John Edwards applies to other sets that are fitted with this chassis. The part number for the crystal is 156-007L. *Technical Department,
LG Electronics UK Ltd.,
264 Bath Road, Slough,
Berks SL1 4DT.*

Well Done Daewoo

I feel I must write to congratulate Daewoo, Northern Ireland, for its excellent service. Recently I ordered a video head amplifier IC from the company as it was no longer available from CPC. Cost inclusive of VAT and P&P was similar to CPC's catalogue price. The replacement didn't cure the fault however. After a telephone call to Daewoo, I ordered a complete head amplifier assembly at under £17 inclusive. I sent a cheque with my order and the very next day the postman was knocking on my door with the part. Well done Daewoo, and well done the PO.

Incidentally the machine was a Goodmans badged machine, Model GVR4500. Daewoo's Northern Ireland address is Daewoo Electronics UK, Greystone Road, Antrim, N. Ireland BT41 1NU – telephone 01849 425000, fax 01849 425100.

Name and address supplied.

Those Amstrads PCWs

The 3in. disc drives in my Amstrad PCW8512 and PCW9512 are still playing up, despite fitting new belts, cleaning the heads etc. One accepts only its own master disc and its own choice of general-use discs. The other will accept its own master disc and nothing else. A spare drive I have won't work at all because the stepper motor doesn't switch on.

*I know that these machines are old

and worthless now – perhaps that's why I am attached to them – but I would like to get them going again for articles such as my What a Life! Questions: can 3in. double-sided drives be obtained, new or used, and if so from where; and can suitable 3.5in. drives be got at a price that makes them worth fitting to these machines? If anyone out there has the answers, please drop me a line care of *Television*.

Don Bullock,
Spain.

Life at the Workshop

It was a smashing day. The sun was shining, the birds were singing, the ferrets were asking to be taken out to chase rabbits (which they never caught) and I had just received a letter from the local hospital to inform me of the date of my op for a beginner's rupture. I decided it was to be the day that I would buy the winning lottery ticket by using a new infallible system – the previous twenty three infallible systems still had a few bugs to be sorted out.

The first job in was a Mitsubishi CT28AV1BDS, an all-in-one set with a 28in. screen, teletext, Dolby Pro-Logic Surround Sound and a built-in satellite system. The screen was blank, but the on-screen graphics came up. Well, the line output stage was obviously OK. How difficult might the problem be? I passed it on to Liz – probably just the TDA3562 or equivalent, I said nonchalantly.

Liz, my wife for over thirty years, hates me to say it's an easy one and has for the past twenty nine years been promising to divorce me. I've managed to avoid this by grovelling, and over the years have become quite an expert at it. As it turned out, I would need all my expertise by the time this particular set was returned to the customer.

As we didn't have a service manual Liz had a quick look for signs of damage on the main PCB. Sure enough there was a dark patch around Q952, a 2SC2236 transistor which, on checking, proved to be short-circuit. Of course we didn't have one in stock. We carry one thousand six hundred transistors in stock, but as Murphy's law is in force here we never have the one we need most.

The next day the transistor arrived. It was fitted, along with a new 9.1V zener diode (D957) that holds its base at 9V. We were not very amused to hear the bang as these two items immediately expired. It was definitely time for a service manual.

Enter our local Mitsubishi agent. Unfortunately local means the next

town, about thirteen miles away. I was able to borrow the manual, and rushed back to the one-eyed monster (no, not the cat). By now the Mitsubishi had become a joint venture, with Liz doing most of the work and me doing most of the swearing.

The circuit showed us that Q952 provides the 8V supply to the Dolby panel. This led us to D303, which was reading low resistance both ways. It supplies the MPS3410 chip IC301. After replacing the faulty parts, and a Mitsubishi fuse (Z953) which supplies 20V to the collector of Q952, we had 20V and 8V feeds but still no change to the fault symptoms.

With teeth gritted, we carried on. Scope checks at the TEA6415C AV switching chip IC202 showed that the video signal was going in but not coming out (thanks for the suggestion, George). After replacing it we put the boards back where they belonged, fitted the speakers and switched on. Everything worked except the sound.

By now Liz was helping with the swearing and I was busy checking everything she had done. After all she is only a woman, and they are not as clever as we men, are they? Not a thing was wrong. In desperation I phoned Mitsubishi, who helpfully pointed out that I might check IC301 on the Dolby board. This cured our last problem, saved my marriage and, in spite of the cost, made the customer happy.

We received a letter from British Telecom a few days ago, returning our application for a phone card as we no longer have a BT phone line. The application was for two international cards, one for me and one for Liz. It was signed with our name – but we hadn't applied for them. Had we not recently changed our phone company we would have found out from our next telephone bill that someone had been charging our phone number for lots of overseas calls.

This is the way it works... I find your name and number in the directory, then fill in an application form in your name for an international phone card to allow me to charge my calls from other people's phones. On the application form there's a space to insert a PIN number of one's choice. When you receive the phone card you think that it has been sent to you as a free service. You either keep it or destroy it, and think nothing more of it. Meanwhile I sell the PIN number to someone who wants to make overseas calls free, having first demonstrated that it works by phoning say the New York Pizza Hut, and you get your first bill in three months' time.

The local CID are looking into it, and a TV engineer I know has just received his phone card and PIN number which he threw straight into the bin thinking it had been sent as part of a new free service. If you have received a phone card from BT without asking for one, phone BT and ask why it was sent. There will be an 0800 number at the top of the accompanying letter. If you are not satisfied that it is safe, cancel it or change the PIN number.

I had my operation. It was nasty, painful and takes about three months to recover from. Think about me the next time you lift a 26in. television set by yourself. It's not worth it.

I didn't win the lottery, but it can't be far away as I now have a new infallible system...

On these last cheerful comments I leave you with the thought for today: If nothing bad has ever happened to you, then you haven't lived, and if nothing good has happened it must be your turn now!

John Hopkins,
Felixtowe, Suffolk.

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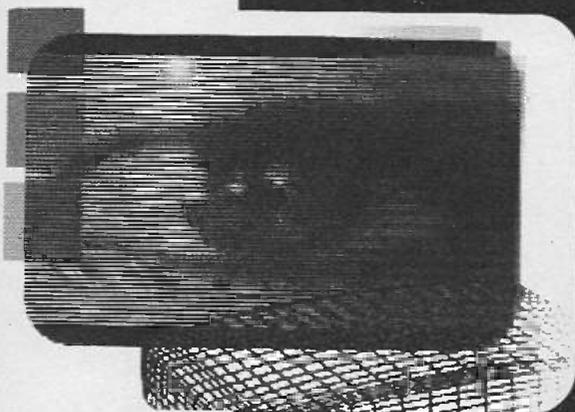
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Chris Watton
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Mike Orr and
Graham Richards

Sharp DV5105

This set was dead: the mains fuse had blown, and the chopper transistor Q702 was short-circuit. DC checks in the power supply showed that R705, which is a 3.3k Ω safety resistor (part no. RR-XZ0242BMZZ) in the start-up system, was open-circuit while R711 (100 Ω), which is across the base-emitter junction of Q702, had gone high in value. After replacing these items and the TDA1039 chopper control chip IC700 the set worked normally. P.B.

Mitsubishi Euro 12 Chassis

This set would sometimes revert to standby instead of coming on. A check at test point 91 showed why: the 148V HT supply was high at 180V. The rather complicated chopper circuit uses two chips, a master regulator on the isolated side of the circuit and a slave regulator (chopper drive) chip on the live side. It seemed logical to check R961, R972 and R960, which form an HT sensing network, but they were all OK. Time for a phone call to the nice man at Mitsubishi Technical.

The items he suggested I check or replace were C906 and D907 in the chopper transistor's base circuit, R922 in the slow-start circuit and R909 in the feedback to the slave regulator chip. In view of previous

TV Fault Finding

experience with chopper power supplies I decided to start with C906 (47 μ F, 50V), which couples the drive to the base of the chopper transistor Q901. A replacement cleared the fault. P.B.

Samsung Cl6229T (P72 Chassis)

The complaint was no picture. When the tube's first anode control was advanced a picture that was reminiscent of a failing monochrome tube appeared, i.e. silvery whites and poor HF response. After removing the back cover I found that C416 (2.2 μ F, 250V) had dried up, a replacement restoring a normal picture. This electrolytic decouples the HT feed to the line output stage. A.T.

Sanyo CBP5156

There was no on-screen channel display, a volume bar that disappeared half way across the screen, and no blue in the teletext display. The cause of these symptoms was dry-joints around the SAA5246 text processor chip, circuit reference IC001. A.T.

Hitachi C2114R

At switch on the raster would turn bright green with flyback lines, eventually becoming so bright that the set shut down. Tapping around the tube base area seemed to make the fault come and go, so all likely looking dry-joints in this area were resoldered. Unfortunately the set was back inside a week, with the same fault. The cause was an intermittent short-circuit within the tube. About two weeks later another of these sets appeared with similar symptoms - this time the blue gun was affected. A.T.

Soundwave/Beon 2001

The cause of field collapse was simply that the two 0.33 Ω safety

resistors R314/R316 in the supply to the field output stage were open-circuit. A.T.

Sanyo CBP2580 (EB1-25 Chassis)

This set would shut down intermittently: the period during which it kept going became progressively shorter as the set warmed up. After resoldering a number of likely looking dry-joints and checking around in the power supply, all to no avail, I found that the set could be made to run indefinitely by entering the service mode (menu on the set's control panel, followed by menu on the remote control handset) and stopping the IM BUS RUN. This indicated that the cause of the fault was somewhere on the IM bus. Replacing the NVM3060 EEPROM on the digi board cured the fault. A.T.

Ferguson 51P7 (TX98 Chassis)

After about two hours the power supply would hiccup: when the set came on again it was on a different channel. In fact it always came back on channel 1, the customer using only channel 3. She said that it always went off in the middle of her favourite programme and came back in the middle of her most hated one! We became overnight hero after curing the fault by replacing the TBA8138 multi-voltage regulator chip IC11. C.W.

Salora M Chassis

The set was brought to us because it was 'dead'. In this event the thing to do is to switch on, remove the mains power, then plug back in to see if the set is in standby. If it is, you can be fairly sure that the power supply is OK. A short-circuit line output transistor was the cause of the trouble with this set.

No dry-joints, which are often the

cause of this failure, could be found. But experience has taught us that the line output transistor seldom fails without cause. We found that C527 (8.2nF) was low in value, reading about 1nF when checked with our tester. Replacing the transistor and capacitor restored reliable working. C.W.

Samsung CI3312Z (P58SC Chassis)

If you get one of these sets with either the 3-15A mains fuse or the 5.6Ω, 7.5W surge limiter resistor R601 open-circuit, but with no obvious short-circuits, check C816 (2.2nF, 2kV) which may be dead short or leaky. This capacitor is connected in parallel with the chopper transistor: you will often see a line around its case. It's so annoying to blow another surge limiter resistor, especially when it's your last one! C.W.

Ferguson TX10 Chassis

These old staggers have certainly performed well. With a good tube they still hold their end up. This one had a very loud hum on the sound and two large hum bars on the screen. The voltages on the secondary side of the power supply were all within tolerance, but when looked at with a scope huge ripple could be seen. The mains bridge rectifier's reservoir capacitor C708 (220μF) was all but open-circuit – in fact there was only about 225V across it. There was a very good picture once this item had been replaced. C.W.

Ferguson ICC8 Chassis

This set was dead, though the red LED was alight. The set attempted to start up, but immediately went to standby. The cause of the trouble was loading on the line output transformer. We found that the focus pin at the base connector on the CRT panel was corroded – it had turned green inside. As the set lives in very damp conditions we checked inside the focus/A1 control and found signs of arcing there. Replacing these two items cured the fault, but the set will probably be back – the customer doesn't believe that his house is damp! C.W.

Beko 12220NX

The status information appeared on the screen at random intervals. It appeared more frequently as the set warmed up. Eventually it was present almost all the time. There was an accompanying slight click from the speakers. The cause of the

fault was on the audio panel, where the 17.47MHz crystal Q2 was drifting when warm. C.W.

Hitachi CPT2178 (G6P Chassis)

There was a dark picture with flaring reds. When the contrast control was turned up the tube gave the impression that it was sick. But a check with our B & K tester showed that the emission was good.

Apart from the low first anode voltage everything on the CRT base panel seemed to be OK. As little other than the line output transformer is involved in producing the first anode voltage a replacement was tried. This made no difference.

Maybe something on the CRT base panel was causing the trouble? We removed the A1 spark gap and replaced the capacitor, but the results were the same. So what could be holding the first anode voltage down? It could be only the PCB itself. We used a scribbling tool to score around the printed land. After that we had the correct first anode voltage and a bright picture. C.W.

Beon CTV1412R

The problem was no tuning. There should be about 2-6V at the base of Q8 but this voltage was missing. We found that R010 (470kΩ) was open-circuit. B.McE.

Finlux 5000 Series

If the BUZ91 chopper transistor Tu1 keeps failing after about five-ten minutes, check the BYV36C diode Du7 in the snubber network. The fault occurs when this diode is leaky. B.McE.

Sanyo CBP3012

The HT voltage was low and there was no regulation. We found that the 2SC536 voltage error sensing transistor Q553 was leaky. B.McE.

Nikkai TLG1409

Field collapse was the complaint with this set. We found that the 10Ω safety resistor R306 was open-circuit for no apparent reason. B.McE.

Finlux 5000 Series

If one of these sets is dead you may find that the BUZ91 chopper transistor Tu1 is short-circuit and that both fuses, a 1.6A Wickman fuse on the main board and a 2.5A fuse on the front panel, have blown. Before replacing these items check whether rectifier diode Du1 (BY500), which produces the 70V HT supply, is short-circuit. Also check the voltages at pins 2 and 3 of

ICu2 (TDA4605) with Tu1 out of circuit. There should be 1.2-2.5V at pin 2. If the reading is 0V, replace Ru24 and Ru26 (both 150kΩ). There should be 1.8V at pin 3. If the reading is high, replace Ru22 and Ru23 (both 374kΩ). B.McE.

Hitachi CPT2658

The display on this set's screen consisted of a couple of dozen squiggly lines. There was an accompanying smell of burning. Our first conclusion was that the scan coils had failed, which can happen with this model. The culprit turned out to be C507 however. It had gone short-circuit. E.R.

Matsui 1480B

The complaint with this portable was that it would lose line and field sync. This might occur at switch on or when the set had been running for some time. Flexing the text panel made the fault come and go. The cause of the trouble turned out to be a dry-joint at the negative lead of the electrolytic capacitor C940 (1μF). Resoldering this capacitor cleared the fault. E.R.

Osaki P142

Line collapse was the fault with this set. It was fairly easy to sort out: the print around one of the legs of L407 had developed a hairline crack. E.R.

Network NWC1410R

The customer's complaint was that this set had suddenly lost its picture and begun to smoke. A look at the main PCB showed that R338 (10Ω) was in a sorry state – it was burnt black. This wasn't the main trouble however: the line output transformer had developed shorted turns. Replacing these two items restored the picture – with no smoke. E.R.

Hitachi CPT2598

No picture was the complaint with this large set. On closer investigation we found that there was field collapse. A couple of quick checks soon revealed that the supply to the field output chip was missing because R715 was open-circuit. Replacing this item restored the picture. T.L.

Toshiba 2112DB

This Nicam set arrived on my bench with a blank screen. I soon discovered that there was no on-screen display and no remote control action. According to that wonderful Toshiba help manual, the thing to do in this event is to check

the 5V supply to the text panel. If it's missing, replace the 5.6V zener diode DF80. The advice was spot on. Thanks Toshiba. T.L.

Matsui 1436XA

No colour was the complaint with this set. The colour began to appear after about an hour however. Grabbing a tin of freezer and applying it to the chroma circuitry I found that C318 (2.2 μ F, 50V) was very heat sensitive. A replacement restored full colour. T.L.

Mitsubishi CT14MS1BM

Intermittent field jitter was the complaint with this set. Sure enough after a few minutes the display did flicker. Careful tapping soon revealed a perfect dry-joint at R461. Cleaning the connection and resoldering cured the problem. T.L.

Sony KVM1400

There was no power. The red standby light was on however – it flashed twice. A quick check in the line output stage showed that there was no HT supply. This was simply because the N15 ICP fuse PS801 was open-circuit. Popping in a new one brought the set back to life. T.L.

Matsui 1403

This portable was lifeless. A quick check showed that R651 in the power supply was open-circuit. I replaced it and fitted a new STK7348 power chip. When you get this problem it's worth checking C655 (0.47 μ F, 50V) which is usually short-circuit. It will save blowing the IC again. T.L.

Goodmans 2043T (GoldStar PC04A Chassis)

The picture was dark, with high and uncontrollable colour saturation. When a channel was selected it would appear and then almost immediately drift off tune. A check on the 12V supply, at C429, produced a reading of only 8V. The two series-connected smoothing resistors R437 and R427 had risen in value. Our circuit diagram gave the values as 3.3 Ω , 1W (safety type), but those in the set were marked 1.5 Ω . So we fitted replacements of this value, clearing all the symptoms. C.A.

B & O 3119

This set was dead, with safety resistor RP14 open-circuit and the BU508A line output transistor short-circuit. Although there were no obvious excess loads or shorts anywhere, replacements quickly

joined their predecessors in the bin. So we replaced the line output transformer. This restored the picture, but with severe field cramp, EW distortion and RL52 in the U2A and U3 supply lines open-circuit.

Time for a phone call to the ever-helpful B & O technical department. We were advised to replace the TDA4950 EW correction chip IG01 and coil LG02, which had probably damaged it. This advice turned out to be spot on. An expensive collection of components and also time – but fortunately most owners of B & O sets are wealthy! C.A.

Nikkai Baby 10

The on-screen display and the sound were OK, but there was no picture. A long search finally brought us to R425 (270k Ω), which provides biasing in the beam limiter network. It was open-circuit. C.A.

Mitsubishi Euro 4Z Chassis

The picture produced by this set was almost obliterated by a curtain of severe horizontal lines and streaks. Force of habit took us to the IF module to look for dry-joints, but we had no luck here. The cause of the symptoms was subsequently discovered to be in the power supply, where the 470 μ F reservoir capacitor (C920) in the 15V supply had fallen to a very low value. As it lives close to a large heatsink we used a 105° replacement. C.A.

Ferguson TX10 Chassis (1550/1551 Series)

To start with we had tripping and a low, growly hum from the speaker. Checks in the chopper power supply showed that the BYW95C efficiency diode D702 was short-circuit. A replacement got rid of the growl, but the set was still dead. Resoldering a dry-joint at mains input pin 12/2 brought it back to life, but with a very bright picture. The cause of this final fault turned out to be R834 (1.8M Ω), which is in series with the tube's first anode supply preset RV831, on the earthy side. It was open-circuit. C.A.

Panasonic Alpha 3 Chassis

One of these sets had a very intermittent colour fault. When the symptoms were present they lasted for only a short period and were quite difficult to see. We eventually found that it was easier to try to establish the fault area by soak testing the set in the teletext mode. In this mode you could see a very

slight variation in the blue level.

With a scope connected to the collector of the blue output transistor Q352 we found that the DC voltage was varying by a volt or so. The culprit turned out to be a 330pF ceramic capacitor, C352. It provides frequency-selective decoupling at the emitter of Q366 (Q352 and Q366 are connected in series). M.O.

Goodmans 2175R

The problem with this set was top foldover – about two inches. It took us some time to discover that C333 (4.7 μ F, 160V), which decouples the vertical centring supply, was open-circuit. M.O.

Mitsubishi CT2965STX

The customer said that it was a faulty on/off switch, but it wasn't! The standby light was on and flickering, but apart from that the set was dead. Tests showed that there was HT – some 134V – but the voltage at D952, which feeds the 12V regulator, was only 8.5V and pulsing. Checks in this area failed to reveal anything amiss however. I then connected a lamp to the HT rail and found that it didn't light up. So the cause of the fault was on the primary side of the power supply. The culprit turned out to be C905 (220 μ F, 25V). M.O.

Toshiba 140E4B

One of these sets displayed a symptom that's rare these days, no line sync. A quick check showed that there was no feedback waveform from the line output transformer at pin 35 of IC501. Resistor R402 (27k Ω), which is connected to pin 10 of the transformer, was open-circuit. M.O.

Hitachi C14-P218F

This set was dead, with the power supply doing nothing because R902 (82k Ω) was open-circuit. We replaced R903 (also 82k Ω) as well. But there was now no sound, with the sound output chip acting as a frying pan! A replacement TBA820M chip (IC401) cleared this last fault. G.R.

Toshiba 175T9B

The customer complained that remote control didn't work. We found that the set was also stuck on channel 2, and that none of the front controls worked. Operation via the remote control unit was established by desoldering the front control keys (SA01). Before checking on the price of a control key assembly I

melted the plastic rivets open to gain access to the thick-film assembly. There were clear signs of liquid contamination here. I removed the assembly, cleaned off the contamination and reassembled it. The results were perfect. I've done several of these repairs since. **G.R.**

Ferguson IKC2 Chassis

One of these sets would occasionally trip off, just for a second or so. This sometimes occurred with a channel change, or with a rapid scene or brightness level change. There's a modification to deal with this: change the value of RP26 from 2.2k Ω to 1.5k Ω . It works! **G.R.**

ITT CVC1120 Chassis

When this set was switched on the EHT arced from the line output transformer to C506, which is in the HT supply to the RGB output stages. After replacing C506 and the transformer there was good sound but only a blank raster. As nothing seemed to be amiss in the RGB output stages we disconnected the beam limiter by lifting one end of R901. The video then

reappeared. We soon traced the cause of this fault to C542 (33nF, 100V) which was open-circuit. It had obviously been damaged by the EHT leak. **G.R.**

Tatung 165/166 Chassis

This set was dead though the standby light was on. It had been knocked over, and a crack on the tube's base panel needed repair. After doing this I got the meter out and soon discovered that the temporary contacts on the mains switch had no more than 0.5V on one of the pins. There should have been -15V here. The supply comes via two 82k Ω resistors, R803 and R809, with a 15V zener diode (DR06) for stabilisation. R803 measured 97k Ω while R809 was open-circuit. When these two 0.25W resistors had been replaced the -15V supply was restored and the set worked correctly. **G.R.**

Grundig CUC720 Chassis (Stereo)

At switch on the sound appeared for a second then disappeared - the picture was perfect. Operating the front hi-fi switch would also

produce sound for a second. The cause of the trouble was the standby relay in the power supply. It has several internal make-and-break contacts that are prone to failure, usually producing the dead set symptom. **G.R.**

Loewe-Opta Classic M124 (C8500 Chassis)

For picture jitter and/or hum on the picture, the channel digit display flickering, the sound going low and the remote control and user buttons intermittently not working, check for dry-joints in the power supply and check the print and soldered joints around the infra-red receiver, also the soldered joints on the front PCB. **G.R.**

Philips 2A Chassis

For field cramp at the bottom of the raster, replace C2575 (4.7 μ F, 25V). It usually goes open-circuit. **G.R.**

Hitachi NP83CQ Chassis

For a blank white raster with flyback lines, check whether the 5V supply is missing at zener diode ZD802. If so the chances are that ZD802 (4.7V) is short-circuit. **G.R.**

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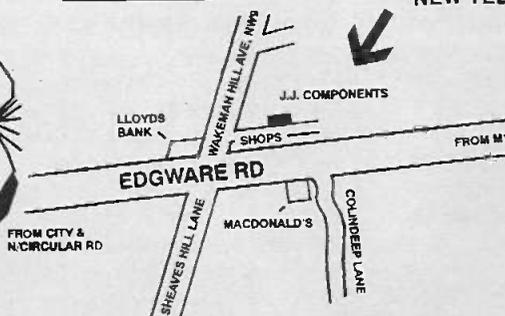
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HELP WANTED

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

Wanted: Circuit diagram for the JVC HRD210, serial no. 172B5248. Les Mansfield, 2 Cefn Bychan Road, Pentyrch, Cardiff CF4 8PG. 01222 892 791.

Wanted: OQ002 transistor-diode array chip for the Philips PM3240 scope, or scrap panel or scope. Name your price. Geoff Chadwick, Wirral. 01516 080 815.

Wanted: TDA2653 field timebase chip for a 26in. Grundig TV receiver, or is there an alternative for this apparently obsolete device? The type suffixed A isn't a replacement.

B. Knight, 29 Beaumont Rise, Fareham, Hants PO15 6DA.

Wanted: Audio and video processing panel for the Panasonic Model TXW3 (Euro 1 chassis). M. Farooq, Jammatt Television Services, 15 North Street, Keighley, W. Yorkshire BD21 3SL. 01535 604 079.

Wanted: Circuit diagram and/or any other information for the Conquer TV pattern generator, made in the early Eighties and possibly sold as a kit. E. Hall, 58 Manor Way, Guildford, Surrey GU2 5RR. 01483 568 553.

Wanted: Following issues of *Television*: March 1985; October 1986; January and December 1987; January, February, March, May, July and December 1988; January, July and August 1989; June 1990; March 1992. I have, for collection or anyone willing to cover postage costs, the following issues: May and June 1986; March, April, June, July and September 1987; June 1989; May and June 1992 and from September 1992 to January 1994 inclusive. Mark Allen, 01209 313 855.

Wanted: Instruction manual for the Drake ESR250E satellite receiver. John Grover, 102 Eldon Road, Luton LU4 0AX. 01582 563 293.

Wanted: Circuit diagram for a 9in. mono CCTV monitor type VMB230

(RS?). Also a PDC adaptor, type VU-V115E, for the JVC HRJ410 VCR. Roger Galpin, 50 Whitby Crescent, Woodthorpe, Nottingham NG5 4LY. 01159 269 365.

Wanted: Potted regulator for the Ricoh Fax 10 or a complete power board from a scrap machine, a power supply for the JVC HRD750EK VCR and a circuit diagram for the Smith Corona 5FEE word processor. Rod Douglas, Mayfield, Dornock, Annan, Dumfries and Galloway DG12 6SU. 0146 140 331.

Wanted: Circuit diagram or manual (photocopy OK) for the Sanyo VTCM40 Beta Hi-fi deck. Also a head drum for the Philips N1502 - or can anyone repair the existing one (chipped head)? Martin Imber, 37 Hoskyn's Avenue, Harley Warren, Worcester WR4 0LL. 01905 616 751 (evenings/weekends), 01386 793 416 (daytime).

Wanted: Original or good colour photocopies of the IBA's 1:625,000 coverage maps for the Darvel, Black Hill and Craiggally transmitters. Iain Davies, 10A Stafford Place, Weston-super-Mare, N. Somerset BS23 2QZ. 01934 416 458.

Wanted: Circuit diagram (photocopy OK) for the Maspro SRE80R satellite receiver and an original handset to go with it (would Wembley man call again - I lost your number). D. Benyon, Marshland View, St. Annes Hill, Bude, Cornwall EX23 0LT. 01288 353 373.

Wanted: Source of parts or information on the Onwa TV Model K9228, also the front membranes for the Bush Model 2720 and the front door flap. K. Hodgetts, Cooper TV, 86 Windle Street, St. Helens. Merseyside WA10 2BL. 0174 429 622.

Wanted: Information/service manual/spares address for a Philips Model FP20S cinema projector and

Model 6411 audio amplifier. Philippe Mil, Pope Hennesst Street, Curepipe, Mauritius (Indian Ocean).

Wanted: Service manual for the Clarion car radio cassette player Model PN9082M. Can copy and return. G. Gilchrist, 5 Hume Drive, Uddingston, Glasgow G71 7DW. 01698 812 463.

Wanted: LOPT for the Orion/Plustron Model CTV55 - it's marked FB-113. S.J. Luck, 1 Tudor Avenue, Stanford-le-Hope, Essex SS17 8BX.

Wanted: Disc motor for the Ferguson Model CD07 or CD08 CD player. A scrap machine with good disc motor would do. Laurie Jones, 56 Southridge Rise, Crowborough, E. Sussex TN6 1LQ. 01892 654 867.

Wanted: Function PCB for the Hitachi VT11/VT14 or GEC V4004. Philip Barry, 6 Cowling Road, Bwrrill, Bedale, N. Yorks DL8 1RN.

Wanted: LF0034A chopper control chip used in the Salora Ipsalo 2 circuit (receiver is Model 1H1F). P. Aherne, 2 Arthur Road, Bexhill on sea, Sussex TN39 3PN.

Wanted: Circuit diagram for the Meazzi drum echo unit, Meazzi factotum tape echoplex or any other vox echo unit. Eddie Cocks, 86 St John's Road, Hedge End, Southampton SO30 4DF. 01489 782 885.

Wanted: Student requires second-hand field-strength meter. Ken Darville, Avia, Station Road, Yeoford, Devon EX17 5HU. 0136 384 017.

For disposal: Two Ferguson 3V22 VCRs and a JVC HR7200EK. Transport and head were OK prior to pack up. One Sony SL8000UB and Sanyo VTC5000, OK for spares. One Grundig 2 x 4 Plus with faulty video head. Offers for any or all to A. Hankin, 27 Ingram House, Park Road, Hampton Wick KT1 4BA. 0181 977 4917.

Wanted: Service manual or circuit diagram for the Hitachi HA4700 HiFi amplifier. Can copy and return. Nicholas Arnold, 19 Bond Street, Bournville, Birmingham B30 2LB. 0121 458 1187 (evenings).

Wanted: The following *Television* back issues: November 1983, January 1984, February 1985, May 1985. P. O'Reilly, 23 Dillon Street, Clonmel, Co. Tipperary, Ireland.

Wanted: Service manual or circuit diagram (photocopy OK) for the Sony TC880-2 open-reel recorder. Christopher O Kelly, 36 Clonliffe Gardens, Drumcondra, Dublin 3, Ireland. 01 837 0667.

Wanted: Following issues of *Television*: April-December 1986 and January-December 1987, 1990 and 1991. E. Bradley, 17 Thornton Crescent, Church Langton, Nr Market Harborough, Leics LE16 7TA. 01858 545 539.

Wanted: Reasonably priced TV/VCR test equipment - generators, counter etc. - also a working Hitachi G6P chassis and modified tube base panel. S. Connor, 35 Victory Avenue, Whittlesey, Cambs PE7 1XT. 01733 206 794.

Wanted: Pinch roller for a Ferrograph 724 tape recorder or address of anyone who stocks parts.

M. McDermott, 91 Hargwyne Street, Stockwell, London SW9 9RH.

Wanted: Remote control with LCD panel for the Ferguson 3V53. Alan Boardman, 4 Beilby Road, Haydock, St. Helens WA11 0US. 01942 276 868.

Wanted: Someone willing to build part of a satellite receiver circuit. PCB and most components supplied. Mark Redhill, 16 Lambert Street, Hull, Humberside.

Wanted: Service information - circuit diagram etc. - for the Ferguson 3V29 and Baird 8930. A. Ashurst, 62 Westfield Road, Harpenden, Herts AL5 4LU. 01582 767 990.

Wanted: Circuit or any other information for the 20in. Ultra-hires computer monitor type 20C3066 (made in Taiwan). Phil Lacey 01932 872 730.

Wanted: Wired remote controls for the Ferguson 3V29/30 and any spare leads with jack plugs attached. Richard Kingsford, 10B Heath Road, Twickenham, Middx TW1 4HG. 0181 891 5386.

Wanted: Does anyone know where I can get manuals for the Nikko TRM30IC amplifier and FAM10 tuner? J.E. Harley, 29 St. Peter's Way, Mickle Trafford, Chester,

Cheshire CH2 4EJ. 01244 300 967.

Wanted: LOPT for the Matsui Model MB10, also a circuit diagram (photocopy OK) for the Soundwave Model CTV2001T. W. Simmons, 2 Marston Crescent, New Lodge, Barnsley, S. Yorks S71 1SY.

Wanted: Circuit diagrams or field service manual for the Amstrad VCR5200. J. Abram, 11 Derwent Gardens, Ilford, Essex IG4 5NA. 0181 550 8546.

Wanted: Teletext decoder board, part no. OPK203, for the Sony Model KV2752UB - new or used OK as long as it works. Jim Weir, Oakfield, 22 Marywell Brae, Kirriemuir, Angus DD8 4BJ. 01575 572 647.

Wanted: Labgear Televerters, Model CM6022, or any other VHF/UHF converters as used for cable distribution. Also coin-operated £1 meters for use with TV sets. G.H. Jones, Einion Electrics, Llanfair Caereinion, Welshpool, Powys SY21 0RZ. Phone/fax 01938 810 539.

For disposal: Two Sony U-Matic VCRs, 400 U-matic video tapes, one Philips N1502 with five tapes, one Sony SLC7 and one JVC 6000E. Any reasonable offers considered. Phone 01494 881 190.

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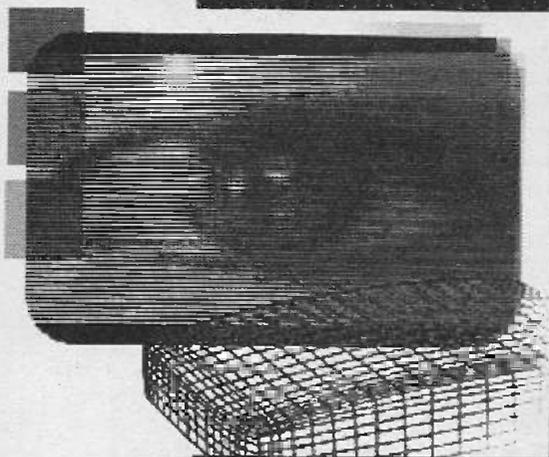
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Monitors



Reports from
Andrew Spriddell
B.D. Andrews
Michael Maurice
M. Field and
Alan Bonhomme

Samsung CJ4581

For field foldover at the top of the screen replace C448 (100 μ F). You will probably find that although faulty it reads OK when checked with a capacitance meter.

It's worth mentioning that this monitor has three height controls on a subpanel attached to the CRT shield. These will probably all need to be reset after work on the field timebase. To do this you will have to drive the monitor at CGA, EGA and VGA rates. A.S.

Mitsubishi

Some monitors use an MZ318 diode in the start-up circuit. It's listed as a 180V device in some places, though it's actually an 18V diode. So watch out!

Note that the Mitsubishi XX1449 circuit diagram can be used when servicing the Dell VC2E (with the controls at the front). B.D.A.

Digivision CD20, MC20, TC19

If the CRT heaters don't light up, feel for a fuse in the wires to the CRT base. This item is not shown in the circuit diagram. This also applies with other monitors.

The power supply in some of these monitors fails to start up and requires an up-graded transistor to solve the problem. Replace TR3 with an MCR106-8, and fit a larger heatsink. B.D.A.

Tandon MD14

If U901 or D802 fails check R903.

This resistor gets very hot and as a result its solder melts. You might find that it has fallen off the PCB. B.D.A.

Mitsubishi 3920

For loss of sync check the internal/external sync switch. B.D.A.

Taxan KX245

For a collapsed picture check C715. This is a 2.2 μ F, 50V non-polarised electrolytic. B.D.A.

IMB 5154-002

If the picture is dim, check C23, R32 and R37. B.D.A.

Apple Two Page Monitor

This monochrome monitor was completely dead. The chopper transistor, type ON4418, was short-circuit and split; the two resistors connected to its emitter were open-circuit; Q104 had a hole in it, so there were no markings; and Q103 was short-circuit. The mains fuse had also blown – I wonder why?!

No information could be obtained from Apple or the company's dealers. The suggestion was made that I obtain a new power supply, the outrageous price of approximately £300 being quoted. But it appeared to be a standard power supply, manufactured by Philips. I started to draw out the circuit, but this was obviously going to take far too long. I guessed that the semiconductor devices would not be all that different from those used in a normal TV power supply.

Fortunately I was able, through the pages of *Television*, to find another user who had a similar difficulty. The ON4418 chopper transistor is not available from either Philips or Apple, and no one would quote an alternative. I found that a BU908A would do in this position. So I fitted one and replaced the following items: Q103 BD230; Q104 BD231; IC105 CNX83A; C110 47 μ F, 63V; R103 and R104 each 2.2 Ω , 5W.

When the unit was switched on it worked but tripped out. The

external control was coming on. Removing the thyristor enabled me to bench test the supply, and when it was refitted in the monitor all was well. The customer was absolutely delighted. M.M.

Epson GQ5000 Laser Printer

This machine had an intermittent fault. It would fail to warm up, the liquid-crystal display continuously displaying the message "warming up" until the machine beeped and displayed fault code E0003.

Epson technical was unable to help. I was told that an 'E' code indicated an engine fault, and the suggestion was made that I return the printer for service. What I did was to dismantle the machine and remove its power supply. I then discovered that power for the heater is controlled by a triac, whose legs were all dry-jointed. Resoldering provided a complete cure. M.M.

Tatung TM3401

If you get one of these SVGA monitors with severe vertical cramping, which resembles crossover distortion, first check the usual things – the supply to the field output stage, the output coupling capacitor, the feedback resistors, the flyback boost diode etc. Then if necessary try the PMC panel which is bolted to the side of the line output transformer.

I found that one of the two power MOSFETs here was running very hot. Further investigation revealed that the 680k Ω gate pull-up resistor had risen in value to over 1.5M Ω . M.F.

Samsung CVM4967T Sync Master 3

The east-west control didn't work. It took some time to find out why. As an initial move I replaced the LM358 dual operational amplifier chip IC202, but this made no difference. I eventually found that replacing C207 and C208 put matters right. A.B.

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BABY 10	16.00	1605	16.00	AS2087	1.50
CTV171	16.00	1610	16.00	AS2088	1.50
ALC	16.00	1615	16.00	AS2089	1.50
CTV14RS	16.00	1620	16.00	AS2090	1.50
BABY 10	16.00	1625	16.00	AS2091	1.50
CTV171	16.00	1630	16.00	AS2092	1.50
ALC	16.00	1635	16.00	AS2093	1.50
CTV14RS	16.00	1640	16.00	AS2094	1.50
BABY 10	16.00	1645	16.00	AS2095	1.50
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BABY 10	16.00	1685	16.00	AS2103	1.50
CTV171	16.00	1690	16.00	AS2104	1.50
ALC	16.00	1695	16.00	AS2105	1.50
CTV14RS	16.00	1700	16.00	AS2106	1.50
BABY 10	16.00	1705	16.00	AS2107	1.50
CTV171	16.00	1710	16.00	AS2108	1.50
ALC	16.00	1715	16.00	AS2109	1.50
CTV14RS	16.00	1720	16.00	AS2110	1.50
BABY 10	16.00	1725	16.00	AS2111	1.50
CTV171	16.00	1730	16.00	AS2112	1.50
ALC	16.00	1735	16.00	AS2113	1.50
CTV14RS	16.00	1740	16.00	AS2114	1.50
BABY 10	16.00	1745	16.00	AS2115	1.50
CTV171	16.00	1750	16.00	AS2116	1.50
ALC	16.00	1755	16.00	AS2117	1.50
CTV14RS	16.00	1760	16.00	AS2118	1.50
BABY 10	16.00	1765	16.00	AS2119	1.50
CTV171	16.00	1770	16.00	AS2120	1.50
ALC	16.00	1775	16.00	AS2121	1.50
CTV14RS	16.00	1780	16.00	AS2122	1.50
BABY 10	16.00	1785	16.00	AS2123	1.50
CTV171	16.00	1790	16.00	AS2124	1.50
ALC	16.00	1795	16.00	AS2125	1.50
CTV14RS	16.00	1800	16.00	AS2126	1.50
BABY 10	16.00	1805	16.00	AS2127	1.50
CTV171	16.00	1810	16.00	AS2128	1.50
ALC	16.00	1815	16.00	AS2129	1.50
CTV14RS	16.00	1820	16.00	AS2130	1.50
BABY 10	16.00	1825	16.00	AS2131	1.50
CTV171	16.00	1830	16.00	AS2132	1.50
ALC	16.00	1835	16.00	AS2133	1.50
CTV14RS	16.00	1840	16.00	AS2134	1.50
BABY 10	16.00	1845	16.00	AS2135	1.50
CTV171	16.00	1850	16.00	AS2136	1.50
ALC	16.00	1855	16.00	AS2137	1.50
CTV14RS	16.00	1860	16.00	AS2138	1.50
BABY 10	16.00	1865	16.00	AS2139	1.50
CTV171	16.00	1870	16.00	AS2140	1.50
ALC	16.00	1875	16.00	AS2141	1.50
CTV14RS	16.00	1880	16.00	AS2142	1.50
BABY 10	16.00	1885	16.00	AS2143	1.50
CTV171	16.00	1890	16.00	AS2144	1.50
ALC	16.00	1895	16.00	AS2145	1.50
CTV14RS	16.00	1900	16.00	AS2146	1.50
BABY 10	16.00	1905	16.00	AS2147	1.50
CTV171	16.00	1910	16.00	AS2148	1.50
ALC	16.00	1915	16.00	AS2149	1.50
CTV14RS	16.00	1920	16.00	AS2150	1.50
BABY 10	16.00	1925	16.00	AS2151	1.50
CTV171	16.00	1930	16.00	AS2152	1.50
ALC	16.00	1935	16.00	AS2153	1.50
CTV14RS	16.00	1940	16.00	AS2154	1.50
BABY 10	16.00	1945	16.00	AS2155	1.50
CTV171	16.00	1950	16.00	AS2156	1.50
ALC	16.00	1955	16.00	AS2157	1.50
CTV14RS	16.00	1960	16.00	AS2158	1.50
BABY 10	16.00	1965	16.00	AS2159	1.50
CTV171	16.00	1970	16.00	AS2160	1.50
ALC	16.00	1975	16.00	AS2161	1.50
CTV14RS	16.00	1980	16.00	AS2162	1.50
BABY 10	16.00	1985	16.00	AS2163	1.50
CTV171	16.00	1990	16.00	AS2164	1.50
ALC	16.00	1995	16.00	AS2165	1.50
CTV14RS	16.00	2000	16.00	AS2166	1.50
BABY 10	16.00	2005	16.00	AS2167	1.50
CTV171	16.00	2010	16.00	AS2168	1.50
ALC	16.00	2015	16.00	AS2169	1.50
CTV14RS	16.00	2020	16.00	AS2170	1.50
BABY 10	16.00	2025	16.00	AS2171	1.50
CTV171	16.00	2030	16.00	AS2172	1.50
ALC	16.00	2035	16.00	AS2173	1.50
CTV14RS	16.00	2040	16.00	AS2174	1.50
BABY 10	16.00	2045	16.00	AS2175	1.50
CTV171	16.00	2050	16.00	AS2176	1.50
ALC	16.00	2055	16.00	AS2177	1.50
CTV14RS	16.00	2060	16.00	AS2178	1.50
BABY 10	16.00	2065	16.00	AS2179	1.50
CTV171	16.00	2070	16.00	AS2180	1.50
ALC	16.00	2075	16.00	AS2181	1.50
CTV14RS	16.00	2080	16.00	AS2182	1.50
BABY 10	16.00	2085	16.00	AS2183	1.50
CTV171	16.00	2090	16.00	AS2184	1.50
ALC	16.00	2095	16.00	AS2185	1.50
CTV14RS	16.00	2100	16.00	AS2186	1.50
BABY 10	16.00	2105	16.00	AS2187	1.50
CTV171	16.00	2110	16.00	AS2188	1.50
ALC	16.00	2115	16.00	AS2189	1.50
CTV14RS	16.00	2120	16.00	AS2190	1.50
BABY 10	16.00	2125	16.00	AS2191	1.50
CTV171	16.00	2130	16.00	AS2192	1.50
ALC	16.00	2135	16.00	AS2193	1.50
CTV14RS	16.00	2140	16.00	AS2194	1.50
BABY 10	16.00	2145	16.00	AS2195	1.50
CTV171	16.00	2150	16.00	AS2196	1.50
ALC	16.00	2155	16.00	AS2197	1.50
CTV14RS	16.00	2160	16.00	AS2198	1.50
BABY 10	16.00	2165	16.00	AS2199	1.50
CTV171	16.00	2170	16.00	AS2200	1.50
ALC	16.00	2175	16.00	AS2201	1.50
CTV14RS	16.00	2180	16.00	AS2202	1.50
BABY 10	16.00	2185	16.00	AS2203	1.50
CTV171	16.00	2190	16.00	AS2204	1.50
ALC	16.00	2195	16.00	AS2205	1.50
CTV14RS	16.00	2200	16.00	AS2206	1.50
BABY 10	16.00	2205	16.00	AS2207	1.50
CTV171	16.00	2210	16.00	AS2208	1.50
ALC	16.00	2215	16.00	AS2209	1.50
CTV14RS	16.00	2220	16.00	AS2210	1.50
BABY 10	16.00	2225	16.00	AS2211	1.50
CTV171	16.00	2230	16.00	AS2212	1.50
ALC	16.00	2235	16.00	AS2213	1.50
CTV14RS	16.00	2240	16.00	AS2214	1.50
BABY 10	16.00	2245	16.00	AS2215	1.50
CTV171	16.00	2250	16.00	AS2216	1.50
ALC	16.00	2255	16.00	AS2217	1.50
CTV14RS	16.00	2260	16.00	AS2218	1.50
BABY 10	16.00	2265	16.00	AS2219	1.50
CTV171	16.00	2270	16.00	AS2220	1.50
ALC	16.00	2275	16.00	AS2221	1.50
CTV14RS	16.00	2280	16.00	AS2222	1.50
BABY 10	16.00	2285	16.00	AS2223	1.50
CTV171	16.00	2290	16.00	AS2224	1.50
ALC	16.00	2295	16.00	AS2225	1.50
CTV14RS	16.00	2300	16.00	AS2226	1.50
BABY 10	16.00	2305	16.00	AS2227	1.50
CTV171	16.00	2310	16.00	AS2228	1.50
ALC	16.00	2315	16.00	AS2229	1.50
CTV14RS	16.00	2320	16.00	AS2230	1.50
BABY 10	16.00	2325	16.00	AS2231	1.50
CTV171	16.00	2330	16.00	AS2232	1.50
ALC	16.00	2335	16.00	AS2233	1.50
CTV14RS	16.00	2340			

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1N4001	0.04	ZSC2570A	0.38	AN5265	1.76	BC558C	0.18	BRX44	1.82	CD4016	0.14	RB156	2.40	TD41013A	1.56	TDA46002D	4.27
1N4002	0.07	ZSC2655	0.21	AN5435	1.46	BC558C	0.06	BRX49	0.43	CD4017	0.47	RC4558	0.55	TD41015	1.37	TDA4601D	1.46
1N4004	0.04	ZSC3153	2.65	AN5512	1.76	BC636	0.14	BRY55	0.28	CD4049	0.35	REG6ABY1D	15.90	TD41035T	4.27	TDA4605D	4.82
1N4005	0.07	ZSC3182	1.20	AN5515	2.79	BC637	0.11	BSX20	0.35	CD4053	0.54	RCP10G	0.26	TD41044	1.43	TDA4950	4.10
1N4006	0.04	ZSC3225	0.60	AN5521	1.66	BC639	0.21	BT139600	1.29	CD4093	0.32	RCP15J	0.17	TD41060	1.00	TDA4950	1.76
1N4007	0.06	ZSC3330	0.52	AN6610	0.94	BC640	0.11	BT151500R	1.12	CN062A	1.29	RCP15M	0.44	TD41085C	2.74	TD47240A	2.57
1N4148	0.06	ZSC3502	0.45	AN7171K	5.56	BC848B	0.28	BU2080	1.15	CN082A	2.10	RCP30M	0.30	TD41170	1.82	TD47240A	2.57
1N5062	0.26	ZSC3795	2.69	BA157	0.09	BC848C	0.18	BU208A	1.46	CN083A	2.55	S2000A3	1.54	TD41170N	2.57	TD48138	1.87
1N5400	0.11	ZSC3795B	2.21	BA158	0.07	BC858B	0.07	BU208B	1.61	CN075B	0.52	S2000AF	1.71	TD41170S	2.85	TD48140	4.82
1N5401	0.14	ZSC3807	0.91	BA159	0.11	BC858C	0.10	BU226A	1.36	DTA114E5	0.51	SAA129302	10.37	TD41515A	3.16	TD48145	1.87
1N5402	0.12	ZSC3885A	6.82	BA3910B	6.99	BC875	0.33	BU406	0.69	DTA124E5	0.19	SAAS012	3.34	TD41516G	3.59	TD48172	6.65
1N5408	0.14	ZSC3892A	6.82	BA5406	2.14	BD131	0.28	BU426A	1.29	DTA124E6	0.77	SAB3035	1.71	TD41518Q	4.27	TD48175	2.65
1N6263	0.20	ZSC420A	0.60	BA5412	2.40	BD132	0.26	BU500	1.41	DTA144E5	0.19	SDA2516	2.89	TD41519	4.27	TD48175	6.41
1N914	0.04	ZSC4242	2.31	BA6109	1.85	BD135	0.33	BU500S	0.35	DTA144E6	0.19	SGSF344	10.78	TD41520B	2.40	TD48178FS	3.90
1S1555	0.07	ZSC4517	4.78	BA6209	1.46	BD136	0.20	BU508A	1.29	FXT749	0.43	SL1430	3.85	TD41520B	2.40	TD48180	4.87
2N2222A	0.23	ZSC4517A	2.52	BA6209H	1.27	BD137	0.46	BU508AF	1.32	HA13001	1.92	SL1431	2.82	TD41553Q	4.79	TD48190	3.59
2N2369A	0.19	ZSC458	0.12	BA6219B	1.76	BD138	0.29	BU508B	1.56	HA13108	1.88	SL1432	2.85	TD41554Q	6.12	TD48380	2.53
2N3055	0.50	ZSC4742	0.30	BA6222	1.70	BD139	0.31	BU508DF	1.88	HA13117	2.85	SL1433	1.87	TD41557Q	4.23	TD48503	2.13
2N3773	1.52	ZSC536	5.11	BA6238A	2.91	BD140	0.24	BU508V	1.40	HA13119	1.88	SL1434	3.06	TD41558Q	7.69	TEA1039	2.11
2N3904	0.32	ZSC8050	0.52	BA6247	1.95	BD233	0.23	BU806	2.83	HA13119	2.85	SL1435	3.86	TD41558Q	7.69	TEA1039	2.11
2N4123	0.30	ZSC945	0.12	BA718	1.08	BD234	0.24	BU807	0.51	HA13151	13.20	SL1436	10.69	TD41670A	2.98	TEA2018A	2.29
ZSA1013	0.35	ZSD1207	0.57	BA785	0.96	BD237	0.31	BU908	1.58	HAS1338SP3	7.69	SL1437	9.48	TD41675A	3.85	TEA2039C	7.04
ZSA1015	0.11	ZSD1266	0.82	BAV21	0.21	BD238	0.24	BUR444500B	2.57	HM6251	14.32	SL1438	11.49	TD41904	1.63	TEA2031A	4.26
ZSA1015GR	0.11	ZSD1275	1.41	BAW76	0.03	BD239	0.33	BUR454600C	2.99	HM6253	0.55	SL1439	11.49	TD41908A	2.14	TEA2164	3.48
ZSA1020	0.44	ZSD1292	0.84	BAX14	0.17	BD243C	0.44	BUR454800A	4.99	KBL08	1.42	SL1440	2.87	TD42004	2.57	TEA2260	9.58
ZSA1175	0.26	ZSD1397	2.31	BD107B	0.29	BD244A	0.34	BUR455600B	2.54	KA6210AH	8.15	SL1441	2.82	TD42005	1.83	TEA2265	2.40
ZSA1286	0.60	ZSD1398	2.14	BC108	0.24	BD244C	0.42	BU711	0.65	LA1230	1.95	SL1442	15.00	TD42006	1.06	TEA2265	3.60
ZSA1370	0.83	ZSD1426	3.51	BC108C	0.15	BD433	0.29	BU711A	0.95	LA4282	4.93	SL1443	4.87	TD42030H	0.86	TEA5101A	6.40
ZSA1706	0.50	ZSD1439	5.86	BC109A	0.28	BD434	0.31	BU711AF	1.18	LA4449	2.45	SL1444	4.87	TD42030V	1.46	TEA5115A	2.91
ZSA608	0.24	ZSD1441	5.90	BC141	0.36	BD437	0.28	BU712A	0.91	LA4445	3.45	SL1445	4.87	TD42040H	4.34	TC106D	0.82
ZSA673	0.10	ZSD1453	3.85	BC147A	0.24	BD438	0.38	BU712AF	1.87	LA4700	4.27	SL1446	4.87	TD42050	4.56	TC225M	1.82
ZSA733	0.18	ZSD1497	4.74	BC148A	0.35	BD826	0.35	BU718AF	1.37	LA6398S	0.90	SL1447	4.87	TD42170	0.80	TCP106D	0.60
ZSA769	1.29	ZSD1541	4.06	BC157	0.13	BD839	0.57	BU756A	1.48	LA6510	2.84	SL1448	4.87	TD42270	0.60	TP102	0.86
ZSA872A	0.25	ZSD1546	7.89	BC158B	0.12	BD901	0.52	BU756AT	3.10	LA7520	4.80	SL1449	4.87	TD42540	1.20	TP107	1.12
ZSA933	0.36	ZSD1548	5.95	BC182L	0.14	BD902	0.60	BU746A	0.84	LA7800	1.61	SL1450	4.87	TD42541	1.12	TP110	0.56
ZSA966	0.41	ZSD1554	3.25	BC184A	0.12	BD939F	1.61	BU748A	1.52	LA7830	1.88	SL1451	5.74	TD42576A	5.85	TP112H	0.95
ZSA970	0.19	ZSD1555	2.85	BC184L	0.06	BD95C	1.68	BU741B	1.39	LA7835	2.99	SL1452	9.40	TD42577A	2.99	TP121	0.50
ZSA984	0.38	ZSD1556	5.11	BC184LC	0.10	BF180	0.38	BU741C	1.83	LA7837	2.48	SL1453	23.41	TD42578A	2.91	TP122	0.48
ZSB1010	0.35	ZSD1651	2.38	BC212	0.98	BF194	0.22	BUR81A	3.11	LC7132	4.70	SL1454	9.38	TD42578A	4.91	TP127	0.47
ZSB1143	0.77	ZSD1710	2.52	BC212B	0.19	BF199	0.84	BUX84	1.83	LED3G	0.10	SL1455	4.48	TD42581	4.27	TP137	0.48
ZSB1243	0.60	ZSD1877	2.14	BC212L	0.10	BF224	0.21	BUZ71A	1.97	LED3R	0.10	SL1456	5.98	TD42581Q	1.99	TP29E	0.62
ZSB641	0.21	ZSD1878	2.83	BC213L	0.04	BF240	0.11	BUZ71B	1.83	LED3Y	0.10	SL1457	10.52	TD42582	3.85	TP3055	0.93
ZSB649A	0.77	ZSD1884	3.35	BC237B	0.19	BF244	0.43	BUZ90A	2.55	LM3177	1.29	SL1458	3.86	TD42594	2.21	TP30C	0.17
ZSB686	2.05	ZSD1887	3.56	BC238	0.11	BF245A	0.19	BY127	0.18	LM324N	1.48	SL1459	4.87	TD42600	7.69	TP31C	0.45
ZSB698	0.35	ZSD1911	5.80	BC238C	0.07	BF245B	0.41	BY133	0.77	LM339N	0.50	SL1460	6.87	TD42611A	0.64	TP32A	0.48
ZSB716	0.43	ZSD3950A	1.97	BC307	0.06	BF256A	0.23	BY139	0.08	LM358N	0.52	SL1461	10.86	TD42611AQ	1.32	TP35C	0.48
ZSB764	0.30	ZSD400	0.34	BC307B	0.15	BF258	0.94	BY148	0.16	MM9481	11.85	SL1462	7.69	TD42653A	4.70	TP36C	2.14
ZSB772	0.50	ZSD401A	0.77	BC308	0.08	BF324	0.18	BY227	0.23	M5218L	0.69	SL1463	11.49	TD43001B	0.75	TP41C	0.65
ZSB774	1.61	ZSD468	0.28	BC308B	0.19	BF391	0.18	BY228	0.16	M5218L	0.69	SL1464	1.35	TD43505	2.40	TP42C	0.50
ZSB891	0.80	ZSD669A	0.84	BC309C	0.14	BF420	0.21	BY2291000	1.31	M54544L	2.84	SL1465	1.87	TD43560	3.06	TP4760A	2.57
ZSB892	0.35	ZSD716	1.63	BC327	0.10	BF421	0.24	BY229800	1.88	MS8655P	4.96	SL1466	2.87	TD43561A	5.38	TP4761A	1.85
ZSC1213	0.14	ZSD756	0.47	BC328	0.14	BF422	0.19	BY255	0.14	MC13002P	7.69	SL1467	2.29	TD43562A	3.98	TP4761A	1.25
ZSC124	0.48	ZSD837B	1.12	BC337	0.14	BF423	0.14	BY259	0.18	MC14066B	0.21	SL1468	13.74	TD43562ATF	0.97	TL072	0.08
ZSC1318	0.19	ZSD856	0.70	BC338	0.06	BF458	0.31	BY398	0.12	MC14426P	1.29	SL1469	2.72	TD43562ATF	0.97	TL072	0.08
ZSC1573	0.35	ZSD898B	0.41	BC368	0.18	BF459	0.43	BY399	0.18	MDC2062	13.74	SL1470	2.70	TD43565	2.74	TL082CP	0.21
ZSC1740	0.16	ZSD965	0.87	BC369	0.18	BF460	0.18	BY448	0.35	MU2955	0.98	SL1471	4.93	TD43566	6.41	TMP47CA32AP8189	15.10
ZSC1815	0.17	ZSK1118	3.40	BC372	0.40	BF469	0.38	BYD14J	0.30	MU4052	3.34	SL1472	2.74	TD43567B	10.31	TMP47CA32AP8189	15.10
ZSC1827	0.58	7406	0.69	BC372	0.40	BF469	0.38	BYD330	0.12	MU802	2.91	SL1473	2.74	TD43568	4.27	TPU2732	10.85
ZSC1959	0.10	7407	0.69	BC372	0.40	BF469	0.38	BYD331	0.16	MU802	2.91	SL1474	3.20	TD43569A	5.87	U28298	2.40
ZSC2001	0.23	74HCO4	0.34	BC346A	0.12	BF487	0.57	BYD33M	0.26	MU802	2.91	SL1475	5.87	TD43640	5.98	UC23842	1.46
ZSC2023	3.18	7805	0.78	BC547	0.11	BF759	0.11	BYD510-40	2.55	MU802	2.91	SL1476	3.93	TD43650	12.82	UC3844	1.29
ZSC2060	0.30	7808	0.72	BC547A	0.04	BF763	0.23	BYD518	0.21	MU802	2.91	SL1477	4.50	TD43653B	1.54	UC3844	1.29
ZSC2078	1.80	7809	0.69	BC547B	0.11	BF788	0.11	BYD519	0.21	MU802	2.91	SL1478	4.50	TD43653C	2.55	UC3844N	1.91
ZSC2120	0.23	7812	0.52	BC548	0.06	BF869	0.06	BYD520	0.27	MU802	2.91	SL1479	4.50	TD43653Q	2.57	UC3844N	1.91
ZSC2230	0.55	7815	0.82	BC548A	0.11	BF869S	0.48	BYD521	0.27	MU802	2.91	SL1480	4.50	TD43654	1.88	UC3844N	1.91
ZSC2235	0.38	78L05	0.35	BC548B	0.06	BF871	0.06	BYD522	0.41	MU802	2.91	SL1481	4.50	TD43654A	2.82	UC3844N	1.91
ZSC2236	0.36	7912	0.35														

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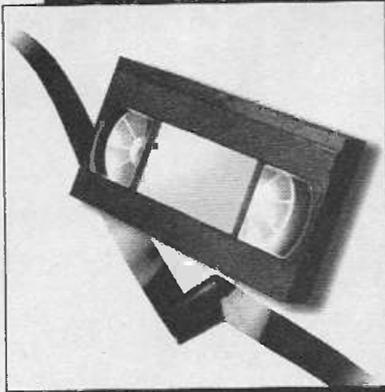
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Toshiba V204

This VCR was dead. Checks on the power supply outputs showed that they were all low and pulsing. The situation was the same when the power supply was removed for testing. Resistance checks on the secondary side of the circuit failed to reveal any shorts, but when the chopper transformer was removed a 1M Ω leak was measured across the 1N5822 rectifier DP080 in the +6VE supply. A new 1N5822 diode restored normal operation. P.B.

JVC HRD790

This was another dead VCR. Checks on the power supply outputs showed that the unswitched 5.8V supply was missing at the emitter of Q802 (2SC1740S). When this transistor was checked it was found to be open-circuit base-to-emitter. P.B.

Panasonic NVFS100B

This machine came from another dealer, who is a main Panasonic service centre. It arrived in pieces. Once the deck had been rebuilt and the connection gear and side carriage had been replaced the machine would power up, accept a

VCR Clinic

tape and carry out the normal mechanical functions. Playback was unwatchable however.

I found that the entry and exit guides had been twiddled, and that the base of the audio/control head was bent. It was impossible, however carefully the guides were adjusted, to obtain the correct FM envelope. After many fruitless attempts at alignment I decided to replace both entry and exit guides (items 57, 58, 61 and 62 in the mechanism diagram in the manual), the entry and exit stoppers (60) and the AC head assembly (34). It was then possible to set up the tape path correctly.

But the pictures were still not right. The upper drum was worn, with one of the LP heads chipped, and the capacitors in the 1H CCD unit required replacement. The dealer wouldn't agree to replace the upper drum, but when the rest of the work was completed the machine worked correctly. In all the years that I have been repairing Panasonic G mechanisms I've never before had to realign the entry/exit guides let alone replace them. M.M.

JVC HRD637HM

This multistandard machine came in because a tape had jammed. The owner had removed it, causing additional damage. On investigation I found that the original problem had been caused by a tape guide, which had come apart and jammed the mechanism. The customer's efforts had damaged the plate assembly. Rebuilding the guides and replacing the plate assembly cured the fault. M.M.

Sony SLV270 Mk 2

This machine, a Grundig clone, suffered from buzz on the E-E and record sound. I suspected the RF

block then noticed the TBA120T sound demodulator chip on the main board. There are two filters associated with this chip. Replacing the F385SFE6.0 filter banished the buzzes. M.M.

Mitsubishi HSB32

"Stuck in pause" it said on the job card. On inspection I found that the tape wasn't being loaded up to the capstan shaft because the half-load arm didn't return to its eject position. It fouled on the tension lever. The reason for this was that the tension lever's brake pad had come off, allowing the lever to move too far to the left. A replacement tension arm cured the fault. M.M.

Panasonic NV230

This machine had been serviced about eight months ago. It now required an upper drum, for which a quote was submitted. The customer decided to take the machine away to think about it. A few weeks later he brought it back.

A quick check revealed that it had been elsewhere, and that the saboteurs had been active. The drum's flywheel had been moved, its phase now being way out. The entry and exit guides were loose and out of alignment, and the entry guide's lock screw was missing. When all this had been put right and a new drum had been fitted we got a good picture. But when we made a recording and played it back there was nothing on the screen. The luminance record level preset had been set so that there was no record FM signal at the head amplifier. Readjusting this completed the repairs. M.M.

Goodmans TX1100

There was no capstan servo lock –

in fact the capstan motor was running slow. Checks in the servo circuit were inconclusive, but checks in the power supply showed that the UCOM 5V rail had 2V of noise on it. Replacing C509 cleared the noise and cured the servo fault. M.M.

Samsung VIK316/326/346

If one of these machines is dead, check for 5V across C33 (330 μ F). Replace it if the voltage is low. C34 (470 μ F) can also cause problems. These electrolytics can lose capacitance slowly, causing capstan warble and patterning on RF loop through. Replace them with 105°C types. G.R.

Fisher FVHP5100

This machine had two faults. First, it would shut down after six seconds because the loading mechanism was jammed. I found that the flat of the mode switch spindle had turned 180° then presumably jammed. Securing the switch and clearing the jam was all that was required.

Secondly there was no capstan rotation. This was caused by a leaking electrolytic capacitor (C1) on the motor plate. It had leaked electrolyte, removing the supply to the SA3001 motor drive chip. Replacing C1 and fitting a wire link (after cleaning) saved the cost of a new motor. G.R.

Salora SV6600/Sanyo VHR1300

The symptoms were intermittent stopping in playback, capstan servo warble and poor channel tuning (i.e. drifting and hum in the E-E mode). We soon found that the voltage at the 33V regulator transistor Q5004 was 47V. Zener diode D5004, type GZA32, was zenering at 47V! A replacement put everything to rights.

The 33V line is also used as a reference by the STK5482 regulator, hence the various fault symptoms. G.R.

Philips VR6467

For rolling pictures in all modes – record, playback and E-E – check the 220nF, 100V capacitor that decouples pin 2 of the TDA3755 chip IC7451. You will probably find that it is dry-jointed at both ends. G.R.

Decca DVR6641/Tatung TVR6141

If one of these machines is totally dead, go straight to the mains bridge

rectifier diodes D801-4. They should produce a 30V DC output (off load). If not, replace all four diodes. We fit the beefier 1N5392 or 1N5401. The 1N4006 type usually fitted is not up to the job. G.R.

Panasonic NV430

This rather complicated two-speed machine was dead, though the clock flashed on for a second. Almost always the cause of this fault is the two 100 μ F, 63V electrolytics in the power supply. Check the condition of the 3,300 μ F and 47 μ F, 63V electrolytics if there are signs of hum on the picture. G.R.

Mitsubishi HSM55

This machine had a tape jammed in it. The cause of the trouble was obvious once the tape had been removed – the capstan motor belt had come off because the capstan pulley was cracked. This is becoming a very common fault. Fortunately you can now obtain the pulley from Mitsubishi – you don't have to replace the capstan motor, which is rather expensive. A new pulley and belt restored the machine to full working order. T.L.

Ferguson FV95

Be warned. If you get one of these machines from a customer who says he cannot get anything from it on his TV receiver, check that it's being used with a scart TV set. These machines are not designed for RF connection. The instruction booklet is not that clear, and customers do move the machines around to other TV sets in the house. You could end up wasting a lot of time for nothing! T.L.

Samsung VIK350

Two of these machines came in recently with the same fault – "went bang then dead". R1011, IC101 and C110 in the power supply had all failed, which is not unusual. In these two cases however IC602 and the capstan IC were showing signs of severe overheating while R630 and R631 were both open-circuit.

These items, including the capstan motor assembly, had to be replaced to get the VCRs working. S.H.

Toshiba V254B/Ferguson FV90LV

Failure to accept tapes was the complaint with one of these machines, though the lift shuffled in and out when we switched it on. Initial checks were carried out around the loading motor drive chip IT002. We then moved over to the

main microcontroller chip IT001, where we discovered that pin 26 had not been soldered. This is the chassis line, and is connected to pin 9 of IT002. When pin 26 of IT001 had been soldered the machine worked normally. S.J.

Hitachi VTF860

A number of these machines have come in dead. The main causes are D11, D12 or D13, RF1 (a 68 Ω resistor) or PR2 (ICP-N38). They are all on the secondary side of the power supply. S.J.

Goodmans TX3950

This machine produced rolling E-E pictures. We replaced several items before finding the culprit, which was C183 (10 μ F, 50V). It's on the main PCB, near the RF converter. S.J.

Mitsubishi HS550V

No playback colour was the complaint with this machine. On test we found that when making a recording there was a colour signal at TP2N, which is just behind the head amplifier on the main PCB. As the head amplifier is almost impossible to get at when the machine is working I took a guess and replaced IC201 (BA7184). This restored the playback colour. S.J.

Akai VS967

When the sound was switched to Nicam it would almost completely disappear. Replacing the SAA7320GP chip IC4 restored the Nicam sound. S.J.

Toshiba V705

There was no playback or E-E sound. A quick check showed that the 9V supply to the sound chip IN007 was low at approximately 2.5V. Replacing zener diode DW011 cleared the fault. S.J.

Sanyo VHR274

There was a playback fault with this machine – it switched between a picture and a blue screen. A quick check at the audio/control head showed that the control pulses were missing. They were also missing when we traced back to the BU2896K chip IC351. A new BU2896K chip restored correct playback. S.J.

Toshiba V109

The customer complained that he couldn't eject the tape. When I tried the machine out I found that there were no mechanical functions at all. Replacing the 2SA1297Y

transistor Q082 restored the machine to life. S.J.

Hitachi VTF630

There were some very puzzling symptoms with this Nicam VCR. It would sometimes power up without producing a display; if a display did appear, any one of the function indicators would light when the standby button was pressed. The standby, green on LED and record lights were sometimes on – without a tape in the machine! Although a tape was accepted, no functions could be selected.

After checking the power supply outputs I cast a jaundiced eye in the direction of the main micro-controller chip. When I checked on its price however I decided to consult a local engineer with experience of odd Hitachi faults. He told me to rewire the three-pin link lead from the front, drop-down panel. When I checked here I found that one wire was indeed open-circuit.

The particularly misleading thing about this fault is that I had earlier disconnected the front membrane to eliminate it from the search. So beware: these machines will not respond to remote control commands with the front panel removed. S.L.

Sharp VCA30

The problem with this VCR was poor rewind. It would occasionally fail to complete a tape rewind, with consequent shut down. This is a common problem with these machines. The cause is dirt on the take-up reel's soft brake. Clean and lubricate both spool spindles and clean the brake pad – or preferably replace it (it's not expensive).

We are seeing more and more of these machines and others (in particular Saisho/Matsui VCRs) with failed capstan motor bearings/bushes. The cause is contamination from above, i.e. tape or pinch roller debris. This acts as a very efficient grinding paste. We now strip, clean and lubricate (with bearing oil) the bearings whatever the reported fault. S.L.

Matsui VX3000

This machine would power up and accept a tape. But it wouldn't accept any deck commands and would then shut down with a short capstan motor run. These machines are designed to load the tape around the drum on accepting a cassette. The one we had failed at this initial point.

Checks in the power supply

showed that the PC12V supply was missing at pin 2 of CP501. We had no circuit diagram, but the supply appeared to be derived directly from pin 6 of the STK5342 chip. So we replaced this chip, and were rather disappointed to find that the -situation was the same as before. But we felt that the cause of the fault couldn't be far away. This was so: R508 (10k Ω), which is connected between pins 4 and 6 of the STK5342 chip, was open-circuit. After replacing this resistor we found that the working voltages at pins 4 and 6 are 24.5V and 13.5V respectively.

To prevent unnecessary callbacks, we stripped out and cleaned the mode switch assembly and replaced all the belts. S.L.

Matsui VX2500

The customer complained that there was no sound with his recordings. In fact the previous sound was present, which is a characteristic of bias oscillator failure. What we actually found however was that the amplitude of the oscillator's output was only about a quarter of what it should have been – 50V or so peak-to-peak is normal. The 2SB698 transistor Q02 was short-circuit. S.L.

Panasonic NVF75

This machine worked perfectly except for one small detail. While editing tapes, which the machine's owner was inclined to do, there was some flickering blue disturbance in the background with super still or super fine slow. Fortunately the cause of the problem was not as obscure as it first seemed. Replacing C1022 (47 μ F) in the power supply cleared the fault. B.S.

Panasonic NVJ35

There are days when it doesn't pay to get out of bed. This machine was the cause of such a day. The E-E picture was blank, and the erase symbol flickered on and off intermittently in the fluorescent display. In addition the mechanism (type G) had shed a few gear teeth and refused to accept a tape. While puzzling over the former symptoms I realigned the mechanism, replacing the usual gears (VDG0343, VDG0346 and VDG0448). Once this had been done the machine accepted and loaded a tape – but wouldn't stop loading. I hastily unplugged the machine and replaced the mode switch (VSS0175A). This failed to cure the fault as the print to one of its pins was open-circuit. A good,

clear playback picture appeared when this had been repaired.

I started to check around the fluorescent display and timer circuitry. IC7501 was replaced and a new display was fitted, but the erase symbol still flickered on and off erratically. As all the diodes, resistors and capacitors on the timer board checked out OK I decided that I should be looking for the cause of the other fault.

When I checked through the E-E picture circuitry I found that the E-E video stopped at the input/output AV switching chip IC3901. Checks in this area failed to reveal any obvious problems, but one of the switching lines was permanently high. As the signal on this line comes from the MN15522VMS subsystems control chip IC6801, I started to carry out checks here. It seemed odd that nearly every pin of this chip was at about 5V. When I removed the supply and the reset to this chip, the E-E picture came up. Inexplicably, the display problem had also been cured. Replacing IC6801 completed the marathon job. B.S.

Panasonic NV870 (DI Mechanism)

The hi-fi sound would be lost intermittently while a tape was being played. The longer the machine was in use the worse the symptom became, suggesting that there was a thermal fault. Use of a hairdryer on the electronics failed to instigate the fault however.

Following a hunch, I decided to check on the mechanics and found that minute changes in the back tension coincided with the loss of sound. Back tension is applied via the tension arm 1 unit (VXL1157) which engages, on the underside of the mechanism, with the main cam gear (VDG0200). Close examination of this gear revealed that the Moriton grease used here for lubrication had become lumpy with age. This would occasionally prevent the back tension arm engaging fully. The 'thermal fault' I had suspected must have been caused by the grease's characteristics altering with the temperature of the machine.

Cleaning the cam and applying fresh grease cured the problem. N.B.

Panasonic NV370

We've had several dead NV370s in recently because the mains transformer's primary winding has been open-circuit. N.B.

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TALKING WATCH Yes, it actually tells you the time at the press of a button. Also features a voice alarm that wakes you up and tells you what the time is! Lithium cell included. £7.99 ref EP26

RUBBER COATED HELIOS Binoculars, 10 x 25, fully coated optics. £45 ref RP1, same spec but nitrogen filled and waterproof £75 ref RP2

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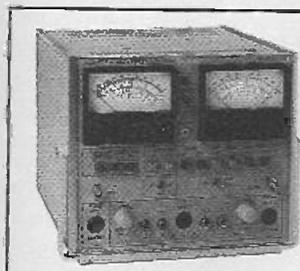
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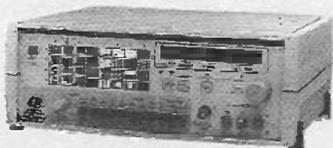


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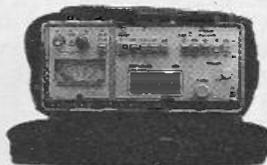
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Compact high performance generator, RF and video outputs. Frequency range same as GV-698/11, 37 to 865 MHz. Circle pattern included. £ 433

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Ideal instrument for the professional installer of FM/TV aerials and satellite TV dishes. Covers 48 to 856 MHz and 950 to 2050 MHz. Lightweight, compact and rechargeable battery operated. £ 599



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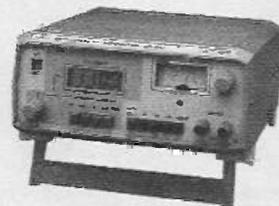
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Model MC-944

This meter has everything for the top flight installer of aerials, dishes, CCTV, MATV, SMATV and other systems. Features include TV monitor, spectrum analyser, sync pulse, teletext, printer output, 99 memories, tuneable audio subcarriers, etc. Full autocorrection for superb, unequalled accuracy.

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20 Hz to 200 kHz, harmonic distortion 0.02 % maximum over audio band. Frequency counter resolution as high as 0.1 Hz. 600 ohms impedance. Output level attenuation range 60 dB, with analogue meter for setting accuracy. Excellent output level flatness. £ 240



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Two versions available: 0.1 z to 1 MHz and 0.2 Hz to 2 MHz. Producing sine, triangular and square waveforms, with variable symmetry. Excellent performance. £ 153 & £ 206



CRT Rejuvenator
Model TA-903

Similar to TA-901, but has three meters to monitor cathode current. Special technique allows repeated rejuvenation of CRT. Supplied in attache style case, for easy field and workshop use. £ 498

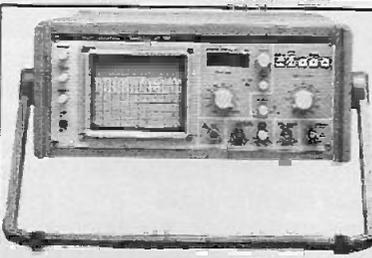
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An essential tool for every TV workshop. Promax have made many thousands. Supplied complete with a set of base adaptors. £ 235



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The aerial installers best friend. Calibrated for accurate signal level measurements. Digital frequency display ensures correct signal selection and identification. Built-in demodulator for easy station ident. and audible tone for easy positioning. This meter is light in weight, but has outstanding technical features. £ 299



R.F. Spectrum Analyser
Model AE-566

1 to 1000 MHz, with 950 MHz to 1750 MHz option. Built-in tracking generator. Offers spanwidths from 1 MHz to 1000 MHz. Includes normalizer. This analyser is ideal for production and educational applications, as well as R+D. £ 2800



The company has been producing test equipment in Spain for over thirty years, earning a strong reputation for excellent engineering, quality performance at budget prices. The equipment is supported by Alban Electronics from their St Albans facility. These products are suitable for only professional and educational applications.



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What a Life!

Uncertain and suspicious customers, various different makes and models, Don Bullock gets them all

There we were soaking up the sun and helping the Spanish to erode their vast surplus of plonk when Shy Victor Smallpiece minced in carrying a Samsung VCR.

"I don'tt wantt to be pushy, Mr Bullock, I'm shewer. Ack-chew-alley I've broughtt you a repair."

It was a VXK306, a sleek, new-looking machine with one of those centre-mounted decks. When I switched it on the clock display came up brightly then went out, leaving no sign of life. I hoped I could fix it without my capacitance meter, which blew up the other day, or the oscilloscope, which Steven has pulled to bits. When I removed the top I saw a fairly full chopper power supply board enclosed in a shiny tin box, about six inches long by two and a half inches square.

Without a circuit diagram all I could do was to carry out a few checks. It was likely that the chopper had stopped oscillating for some reason, possibly because of a short-circuit across one of the outputs.

I made sure that AC was reaching the bridge rectifier circuit and that its DC output, measured across the reservoir capacitor with its negative tag as the meter's earth connection, was healthy. It was, and there was plenty of HT at the collector of the chopper transistor. As the transistor itself checked out OK, it was time to move the meter's negative lead from the live earth point to an isolated earthing point on the secondary side of the circuit.

Fortunately the chopper power supply's output voltages are marked on the panel. I didn't expect to find any. But voltages there were – those I measured were all exactly double what they should have been!

Hmmm.

At this point two things happened. Our neighbour, Mrs Sweet, showed

up with her VCR, which was also a VXK306. And Greeneyes collared me to go out shopping. Son James was around, so I explained what the situation was and asked him to take over.

When we returned, James had both VCRs working.

"Mrs Sweet's machine had a cassette jammed in it" he said. "That was easy to deal with. So I tried her power pack in the other machine, which then worked with the correct DC outputs from the chopper circuit. After refitting the original power supply boards in the two machines I tried capacitor substitution – swapping over the reservoir/smoothing electrolytics at the outputs. When I transposed C35 (470 μ F, 16V) from the faulty machine to the good one it produced the same symptoms. So I fitted a replacement and everything is now OK.

He's learning fast. "Good work!" I said, "I wondered how long it would take you to work that one out. . ."

As he'd reassembled both machines I left it at that. But I put the faulty electrolytic aside. It'll be the first to greet my capacitance meter when I get it back.

Mrs Runner's TV

When I returned to the UK my first customer was Mrs Runner. She was followed by her son Clarence, who was carrying an ITT TV set that turned out to be fitted with the CVC1175 chassis.

"Tell Mr Boolock, Clarence. Do as I say."

Clarence opened his mouth but she cut in again. "Flagpole" she shouted, "nothing but a bloody flagpole."

I fingered my chin and wondered what the weather was like in Las Palmas.

"Tell Mr Boolock what was on when it happened, Clarence."

Clarence breathed in, then she started up again. "It was that la-di-da chap who spouts about the stars: and with Jupiter in conjunction with Mars the prospects are pretty poor aimafraid . . ." She laughed at her good imitation then left.

The set had line collapse, which is an unusual fault these days. I glanced uncertainly at the line output stage and noticed that L502, which is part of a series LCR network across the scan-correction capacitor C518, was leaning a bit. Sure enough one of its two tails had parted company with the board – it had never been properly tinned. I made it good, thanked my lucky stars for an easy repair and switched on.

There was a whooshing noise and R512, a 100 Ω safety resistor which is also part of the LCR network, sent out a smoke signal that read "goodbye". I fitted a replacement then looked around the circuit again. C518 (0.47 μ F, 400V) had lost one of its legs and cracked open. No wonder there was no line scan.

After replacing C518 I dropped below bench level and wound the set up using our variac. To my relief it sprung to life, displaying a proper raster. When the aerial had been plugged in there was an excellent picture.

In the fullness of time Mrs Runner returned. "Ask Mr Boolock, Clarence. Go on."

Clarence shuffled his feet and breathed in to speak, but the voice I heard was Mrs Runner's.

"Why don't you ever speak" she shouted, "just like your farther – 'e never says a word." Then she turned to me.

"Ready. Fifteen." I said.

"Bloody 'ell" she said. Then,

looking at Clarence, "it's all your fault. You wouldn't speak. They takes more notice of a man."

Mechanisms

Dick Flotsam padded in with a Philips FCD285 stacking unit. As usual his feet were at a quarter to three. I retreated a bit. Having been brought up on early Philips wireless sets with their remarkably sophisticated RF circuits and resultant knife-edged tuning, I've always had a good respect for Philips' electronics – in spite of their bulky, pitch-covered capacitors and a tendency to use pesky, high-value resistors. But having also suffered from Philips autochangers and, more recently, VCRs, I run from the mechanics.

This reminds me of the time about forty years ago when I worked for a firm that used to sell a lot of nameless radiograms, each of which housed a nameless autochanger. The changers were troublesome and inscrutable, so we used to pile them on a spare bench awaiting the attention of Blenkinsopp, whom I suppose you would call the company's TLO in today's jargon. He used to pull out a pair of pliers and bend the thin wire rods and levers this way and that, and eventually got them going. For a while, anyway.

Then, as our sales grew and our piles of faulty autochangers also grew, his visits became fewer and fewer and we eventually realised that they had stopped. We knew that he still called on another dealer up the road. So one day, knowing that he was due, we kept an eye open for him.

This was easy. Our workshop, above the sales area, looked down over the main street. The huge plate glass windows of the shop opposite gave us a clear reflection of our own shop front and pavement. Eventually we spotted Blenkinsopp a few hundred yards away on the opposite pavement, striding towards us. As he drew closer he crossed over the road to our side then, doubled into a crouch, ran past close to the wall.

But back to Dick Flotsam "Can you mend this for me?" he asked.

"I doubt it, Dickense" I said. "What's up with it?"

As it was dead I took it on and opened it up. This required more time than it takes to say so. The mechanism controls are a long way from the front panel, long plastic bars being used to connect them.

When I eventually had the main chassis out on the bench I switched on. There was nothing except for a crackling noise that seemed to come from the mains transformer. But it was cold. Then the unit came on and the crackling stopped.

Thinking that the on/off switch might be cooking, I removed it from the panel and carefully slid off its metal retaining cover. Bits and springs flew everywhere. So this was the end of that switch. But the bits I eventually found seemed to be OK.

I then noticed that the pins of the mains transformer, which is panel mounted, had recently been resoldered. When the solder was removed I discovered that one of the pins for the primary winding was blackened with corrosion. It sat as good as gold in its solder blob, but was virtually insulated by its coating.

Oddballs

Mr Nutt called in with a Panasonic KXF2060 fax machine. He's a picture of health countryman but is convinced that everyone is out to get him. It must be five years since we managed to persuade him that his neighbour's satellite dish wasn't a secret listening device.

"Had the telephone man out to move the socket. Crafty fellow bugged it" he said, his eyes darting around the workshop. "People can bug phones, you know. The so-called engineer reckoned my line isn't bugged. Yet he bugged it himself."

"What makes you think that?" I asked.

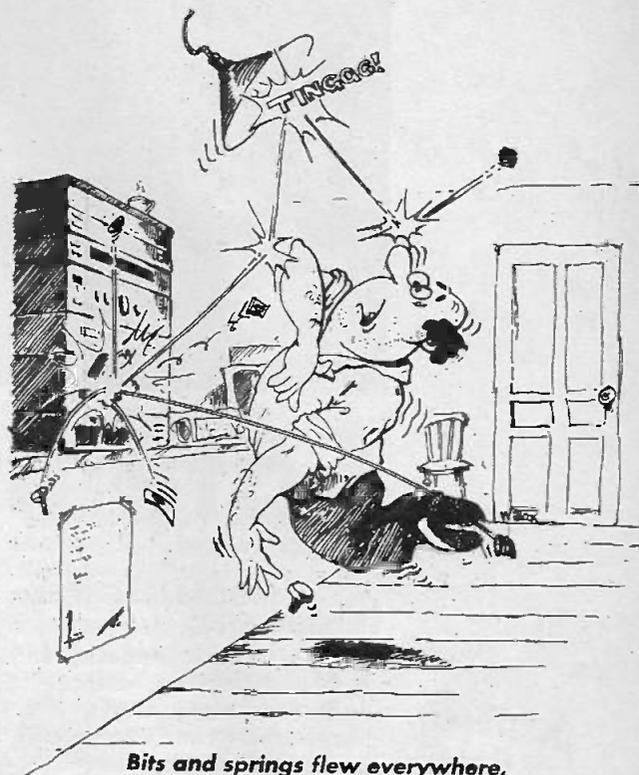
A knowing smile came over his face as he pushed the fax machine towards me. "Why else would he disable my fax? It was all right when he came, but when he left it wouldn't accept my outgoing messages. Still won't. Stops me calling for help unless I use the bugged phone."

He studied our faces then left, looking uneasily about him.

As Steven began to open the fax machine Major Hagger strode in and tapped his brass-topped stick on the counter.

"Who the devil was that paranoid cove?" he barked. "Squinted through your door blind like a bally quising. I'd execute that type if I had my way. Make the country a better place."

Then he removed his gloves, took a parcel from under his arm and placed it on the counter. "I've got an assignment for you" he said,



Bits and springs flew everywhere.

"and I'd like it completed by 1700 hours if humanly possible."

"What's the matter with it?" I ventured.

"Ticking like a bally bomb" he said, "reminds me of the day I took issue with Monty in Tripoli. One of those dashed natives..."

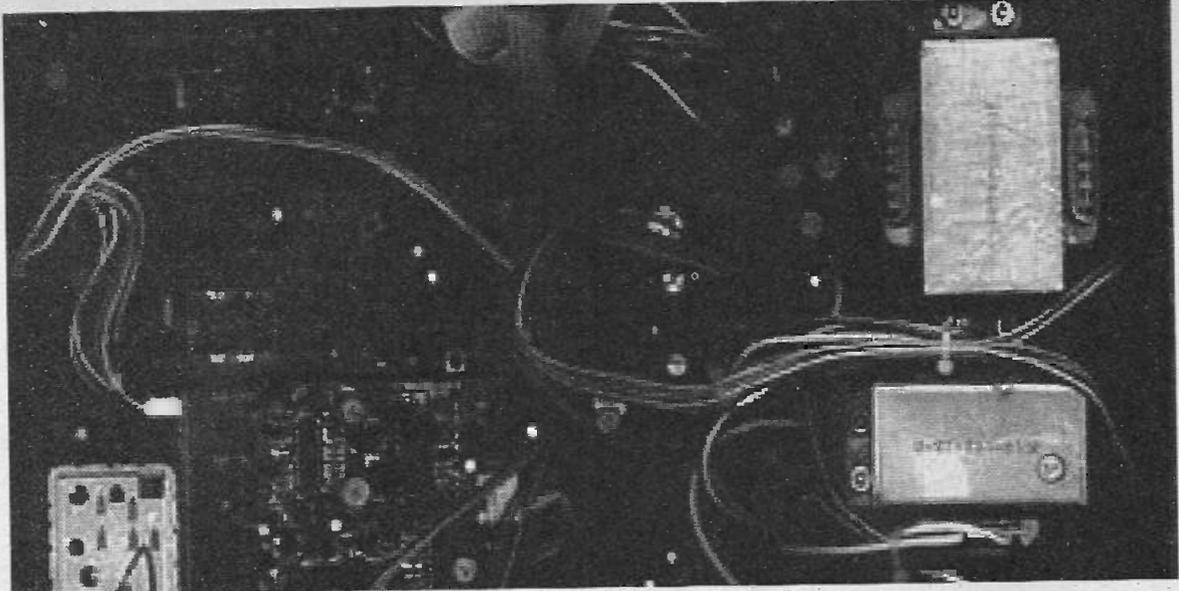
"Ah! The phone" I said, running off. "We'll phone you before five, major."

"Didn't hear a phone" he said as he left.

I opened the parcel. It contained a Pace PRD800 satellite receiver. On test it turned out to be dead though quietly ticking. The chopper transistor and its control chip were OK, so I checked the capacitors that worry me most in these sets, C7 and C8. They should both be 10 μ F (25V). C7 had fallen in value to 7 μ F while C8 measured 8 μ F. I'd expected them to give lower readings, but replaced them and tried the set again. It was now OK. Then Steven came in.

"I've fixed the fax" he said. "Mr. Nutt was right on one count at least. The telephone man had disabled it. Look at this bit of telephone cable sleeving he'd carelessly dropped into the paper feed slot. It was moving around with the roller, which couldn't make contact with the paper."

I walked outside and looked towards the Prince Albert. "Come on" I said to Steven. It seemed the most sensible thing to do. ■



Satellite Notebook

Reports from
 Philip Blundell,
 AMIEEIE
 Nick Beer
 Michael Maurice
 Hugh Allison
 Pete Haylor and
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Philips STU824/05G (Pace PRD800/900)

This receiver could be switched on via the front keyboard, but the remote control handset had no effect and only a blue screen was displayed. Scope checks around the microcontroller chip U2 showed that the supplies, reset and clock oscillator were OK, but there was no I2C bus activity – the lines were all high. A new EEPROM chip (U6) restored normal operation. **P.B.**

Pace PRD800/900

A common problem with these receivers is low RF signal loopthrough caused by a dry-joint at the centre pin of the aerial socket. The RF amplifier/modulator is simply a screened area of the single PCB: the aerial socket's centre pin can be pushed in by a faulty coaxial plug or a ham-fisted user, forcing its way through the PCB. Resoldering is often enough, but if the socket is damaged the whole metal frame needs to be replaced. It's very cheap to buy – just use a suitably hot iron! **N.B.**

Ferguson SRA1S

The sound was very poor, as though the RF modulator's sound coil was off frequency. We found that the modulator was blameless however – by connecting the audio output sockets to an amplifier. Sound demodulation is carried out by the U2829B chip U1. A replacement cured the fault. **M.M.**

Jacking Arm Trouble

A local resident has a high-specification installation that includes a six foot motorised dish. The problem was lack of dish movement. Apparently the

customer had noticed that the dish failed to go completely to one end of its normal swing about a month before I became involved. By this time only 20° of swing was left, at one end. I measured the jacking arm motor current indoors – always a good place to start – and found that the motor took the expected 1A while moving, the current rising to 5A when the jacking arm stopped.

A check on the dish showed that there was nothing physical to stop it turning, and when the jacking arm to dish bolt was undone the dish swung very freely from one end to the other. This left only the jacking arm.

When I took the arm off, I noticed that there were a lot of ants on it. Then, on separating the screw jack from the motor/gearing assembly on the arm, I discovered an ants' nest inside the screw jack assembly! The ants were getting in and out via an eighth of an inch drain hole at the bottom of the jack. Several good winds from one end to the other, turning the screw jack with stilsons, got the nest out. A good oiling then returned the system to a silky smooth action.

Should you ever remove a screw jack, for whatever reason, it's a good idea to count the number of turns you give it off the installation. You can then easily reset it prior to refitting. This prevents having to reset the end stops and/or resetting the satellite positions. **H.A.**

More Lightning

We certainly get a fair amount of lightning around here at certain times of the year. In this case a tree very close to the customer's house had been struck during a spectacular storm with torrential rain. The

lightning had got into both the TV and satellite IF feeders, taking with it the MTI LNB, the Pace SS9200 and a Grundig TV set!

The inside of the MTI LNB had a lot of vaporised print adjacent to the F socket. I've never seen an LNB with so much physical damage. The SS9200's tuner PCB print was blackened around the F socket area, condemning this. Strangely, after replacing one short-circuit mains rectifier diode, repairing the burnt print by the diodes and a vaporised fuse the power supply worked. By some miracle the BUT11A chopper transistor survived the onslaught. C128, which decouples the LNB voltage near the tuner, was dead short: the print in the area of C128 to the tuner's LNB voltage pin had disappeared!

I fitted a new tuner and was greeted with a good picture, though the audio via the scart connector was poor. A finger close to D19A, the tuning diode for the audio demodulator VCO, produced tuning effects. Replacing the LM7001 chip (U17) restored perfect sound.

I next tried the UHF modulator's output. Surprisingly, this was OK – despite the TV aerial having been plugged into it. The UHF loopthrough must have bypassed the full force of the strike, as the TV set's UHF aerial plug was blackened inside and the tuner was scrap. **H.C.**

MAC Decoder Problems

There are times when MAC decoders seem to cause us more problems than everything else put together. Unfortunately the ICs used to decode the signal run very warm. The heat build up, especially during warm summer weather, is often more than the decoder can take.

The usual symptom is that the decoder just sits there, refusing to decode anything. A check on the incoming signal strength and the baseband signal from the receiver show that everything is normal in these respects. Another symptom can be that the MAC signal is detected all right but no "insert card" message is seen and inserting the card makes no difference.

A MAC receiver-decoder produces even more heat than a stand-alone decoder of course. Recently a colleague was testing a brand new receiver-decoder and accidentally placed some more equipment on top of the unit. Decoding ceased fifteen minutes later, though normal operation was restored once the unit had cooled down.

Providing the heat-producing chips with heatsinks helps a lot. Why the manufacturers don't do this remains a mystery – possibly it's because the chips usually (but not always) survive the first year of use. Owners of eighteen month old MAC decoders are not amused when they receive a large repair bill – by VideoCrypt standards MAC decoders are not cheap. Surely some thought could have been given to heat dissipation during development work, adding relatively little to the cost.

A Norwegian customer recently asked us to install a MAC decoder of UK origin. We'd no previous experience of the unit and found that to obtain reliable operation a portable fan had to be directed at it. Let's hope for better things in the coming digital era. **H.C.**

Drake ESR200 Receiver-positioner

The magnetic polariser assembly in this five-year old installation had failed. Since the receiver would also work with a voltage-switching LNB we fitted one of these – selection of vertical or horizontal polarisation is then done via "Band 1" or "Band 2" in the programming mode, after selecting the correct combination of microswitches at the rear of the receiver (with later models LNB selection is done by the software).

When the new LNB had been fitted we found that the signals were good at the lower end of the IF range but were quite weak above about 1,500MHz. The cable run was a very long one, though good-quality cable was used and no problems had occurred before. Trying a line amplifier made matters worse. Head scratching time.

The dish was movable, and I found that the 'weak' signals became clearer either side of the position where the dish picked up maximum signal. This didn't happen with lower-frequency signals such as Sky News or Eurosport.

The tuner seemed to be suspect, so I removed its lid and adjusted the trimmer nearest the F connector. This produced good pictures at the high-frequency end of the band and didn't affect the lower-frequency signals. The new LNB's IF gain must have been higher than that of the old one, just enough to upset the tuner.

I'd done battle with Drake tuners some years ago, when these systems were new, but had never had this problem. On occasions the tuner fails, producing a low gain/streaking effect not unlike the symptoms you can get with the Pace SS9000/9200. Unfortunately the cost of a replacement tuner is quite high. **H.C.**

Cable Trouble

The owner of a Pace MSS200 system little more than a year old rang to say that the receiver was "stuck in standby". I told him to unplug the receiver from the mains supply for a couple of minutes, then reconnect it and try switching on with the front panel button. He phoned back shortly afterwards to say that this made no difference.

When I arrived at the scene I disconnected the IF input to the receiver. At this point the receiver switched on, but produced the "LNB Short Circuit" display when the cable was reconnected. The cause of the problem was isolated to the cable itself, which went via a 15mm tube from a rooftop terrace to the living room.

Builders had recently done some work just below the dish site, to repair storm damage. Unfortunately they had hit the tube, shorting out

the cable. The owner had been away for several months and during that time had left the receiver plugged into the mains supply. Luckily for him it hadn't been a few years earlier, when with some models this type of fault would have resulted in the death of the mains transformer. **H.C.**

MTI LNB Problem

The owner of a four-year old installation that used an MTI LNB complained about "poor pictures". Suspecting the LNB (see article in the December 1995 issue) I tried a replacement, which cured the problem. What was wrong with the original one?

The precise fault symptom was reception OK sometimes, poor at other times. So I replaced the local oscillator transistor, which made no difference. Suspicion next fell on the low-noise amplifier (LNA) section, particularly the final two stages of amplification which are common to both signal polarities (they were both equally poor when the fault was present).

After removing the mass of screws that secure the LNA cover I checked the GaAsfet transistor voltages. Each transistor should normally have 3V at its drain and a small negative voltage at its gate. With the cover removed however the amplifier could become unstable, resulting in wildy varying voltages. The readings were OK except for the final transistor, which had virtually no drain voltage. The drain feed comes from a 5V supply, via a chip resistor.

Applying pressure to this resistor made the voltage come and go. With the aid of a magnifying glass, I saw that the resistor had a tiny hairline crack in it. The amazing thing was that the fault took four years to become apparent. The resistor had possibly been stressed mechanically during the soldering process. **H.C.**

Quickies

Pace PRD800/900: For a rolling picture check and replace as necessary C544, C36 and C99. They are all 10 μ F, 25V electrolytics.

Amstrad SRD550: If the display is flashing, check whether R612 (1M Ω) in the power supply is open-circuit.

Pace PRD800/900: No picture from the modulator. Check Q105 (BC846B).

Amstrad SRD510: No sound and vision. Tuner is probably faulty.

Pace PRD800/900: Power supply dead. Replace C5 (22 μ F, 16V), C7 and C8 (both 10 μ F, 25V) and resolder C4.

Amstrad SRD520: No remote control operation. Earth modification.

Pace PRD800/900: Intermittent blue screen. Switch off and disconnect from the mains supply. Remove card and wait thirty seconds. Install card when asked! **P.H.**

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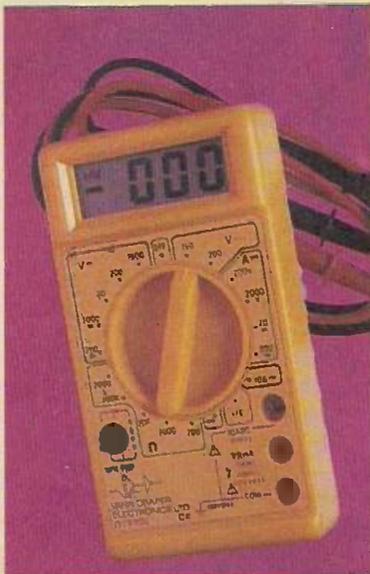
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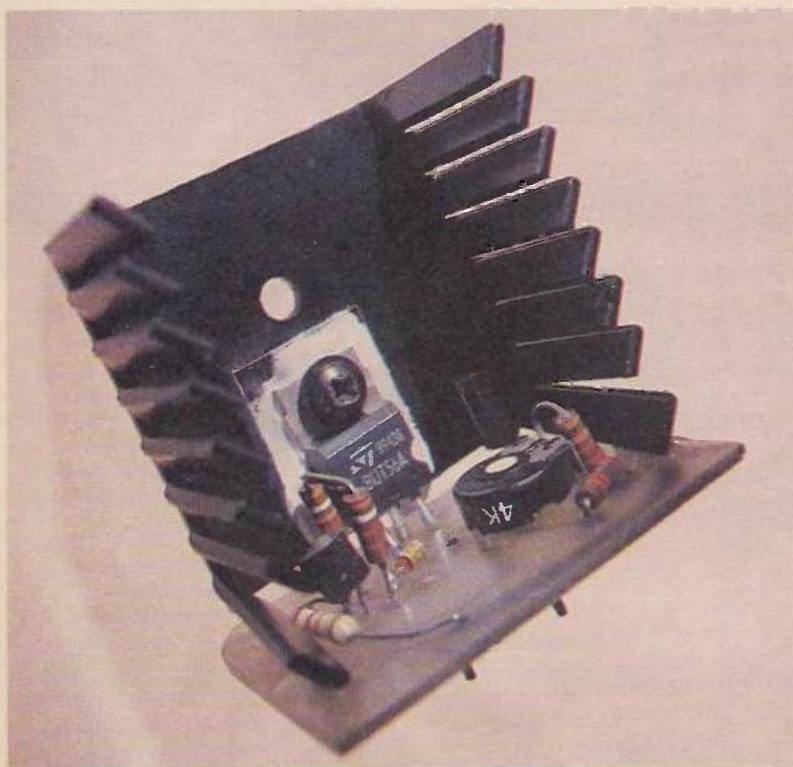
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Sanken STR4XX Substitute



Michael Dranfield describes a compact, discrete-component replacement module for the Sanken STR4XX range of chopper chips, which are now obsolete. It can solve the problem with many sets that are otherwise uneconomic to repair

The Sanken STR4XX series of chopper chips has been obsolete for some time now. As a result, the prices quoted for them has soared. Take for example the STR451, which is used in the Amstrad CTV1400 14in. colour portable. I have seen prices as high as £29 quoted for this device. Add a £30 labour charge, then VAT, and the set becomes uneconomical to repair.

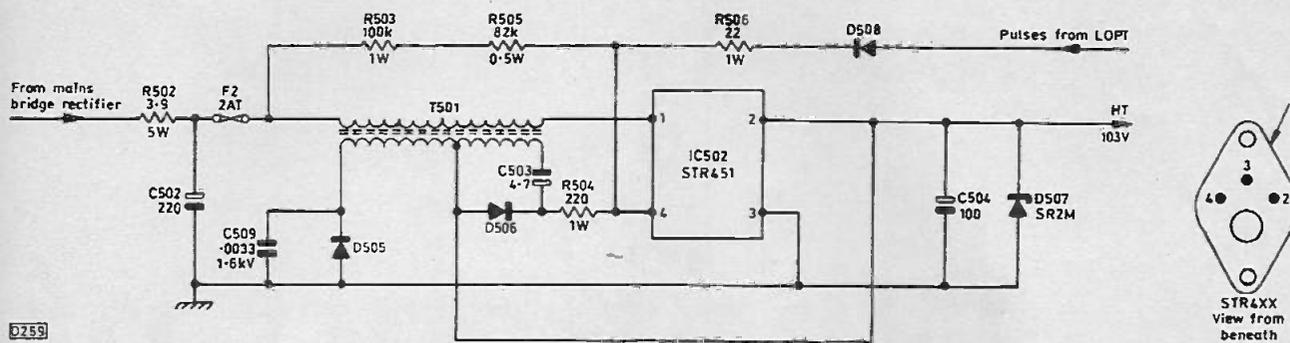
The Sanken four-terminal (three pins plus case) STR4XX series of ICs provides a range of fixed, non-adjustable output voltages. These voltages range from 102V with the STR442 to 130V with the STR453. As the output voltage is fixed, it is not possible to use an alternative device. So what happens to sets that use these chips? The project described in this article provides a discrete-component plug-in substitute. It has the advantage that the output can be adjusted over the range 85-140V by means of an on-board preset. As a result, it can be used to replace the entire STR4XX range of devices.

Circuit Operation

The STR4XX chip forms the active device in a chopper power supply based on the blocking oscillator principle. It operates with feedback pulses from the line output stage so that the chopper and line output stages run in synchronism to avoid beat patterning.

Fig. 1 shows the power supply circuit used in the Amstrad Model CTV1400. At switch on the mains bridge rectifier produces some 320V across its reservoir capacitor C502. The base of the chopper transistor in IC502 then receives forward bias via R503 and R505, which are sometimes referred to as the start-up resistors. Thus the chopper transistor switches on and current flows through the primary winding of the chopper/blocking oscillator transformer T501. C504 on the output side of the circuit charges, with D507 present to provide overvoltage protection.

Positive feedback via C503 and R504 drives the transistor to saturation. These two components set the free-running frequency of the oscillator circuit. When the transistor saturates, there is no longer any change in the current flowing in the transformer's primary winding and the positive feedback comes to an end. The charge across



C503 reverses, switching off the chopper transistor. In the free-running state C503 then discharges via R504, R505 and R503 and in due course the chopper transistor switches on again. In normal operation however pulses from a tap on the line output transformer, fed via D508 and R506, switch the chopper transistor on, thus synchronising the operation of the chopper and line output stages.

Substitute Module Circuit

Fig. 2 shows the circuit of the substitute STR4XX module. Q1 is the chopper transistor, with Q2 controlling the DC conditions at its base. These are in turn set by the error amplifier transistor Q3. This transistor's emitter voltage is clamped at 6.8V by zener diode D1. Its base is connected to the preset control R4, which is part of a potential divider network (R2, R4, R5 and R7) across the HT supply. With the resistor values given in the components list, the HT is around 100V with the slider of R4 at approximately the mid-track position.

Construction

Although the prototypes use a custom-made PCB, full constructional details are not included as the board design will vary from set to set. For example a 22in. Hitachi set that uses the STR4XX device will need a heatsink twice the size of the one used for a 14in. colour portable. The module illustrated has a 7.1°C/W heatsink. This is adequate for most 14in. portable sets. A basic PCB layout is shown in Fig. 3.

Installation

Note the following points before fitting one of these substitute modules to a TV set.

First, most sets that use this type of circuit employ an avalanche diode across the output (D507 in Fig. 1) to provide protection against excessive HT voltage. If the original STR4XX device had gone short-circuit the avalanche diode will also be short-circuit. In this case Q1 in Fig. 2 will be destroyed at switch on. So check on this first. Remove the avalanche diode before fitting the substitute module.

Next, disable the line output stage, say by disconnecting the base of the line output transistor to remove its drive. Connect a 60W bulb across the module's HT output. Now switch on and, using a digital voltmeter, adjust the preset control R4 for the required HT across the bulb. In the Amstrad Model CTV1400, which uses the STR451 chip, this is 103V.

If the power supply is working correctly, switch off, refit or replace the avalanche diode, reconnect the line output stage, remove the 60W bulb and switch on. With the line output stage running, the HT voltage will have risen by a few volts. So readjust R4 for the exact voltage required. Table 1 shows the correct output voltages for the various chips in the STR4XX range.

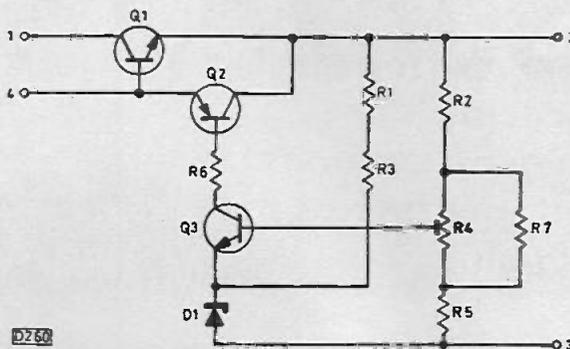


Fig. 1: Chopper power supply circuit used in the Amstrad Model CTV1400.

Fig. 2: Circuit diagram of the STR4XX substitute

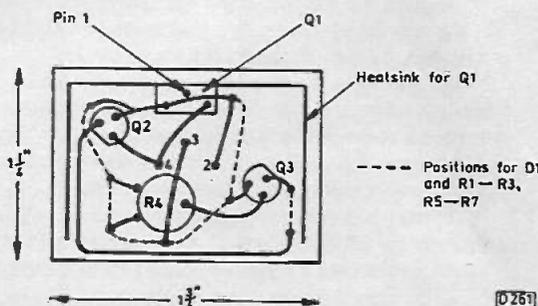


Fig. 3: Basic module PCB layout.

Table 1: Output voltages

Chopper chip	HT
STR440	107V
STR442	102V
STR450	115V
STR451	103V
STR452	123V
STR453	130V

Component details

Q1	BUT56A	R2	47kΩ
Q2	2SA1015	R3	39kΩ
Q3	2SC1815	R4	4.7kΩ
D1	6.8V, 400mW	R5	2.7kΩ
		R6	22kΩ
R1	3.9kΩ	R7	3.3kΩ

All fixed resistors 0.5W, 2%
R4 is a miniature preset

Heatsink for 14in. sets Farnell type 179-935.

What sort of FUTURE?

The brown goods trade is its own worst enemy. Can anything be done about it? Michael Maurice assesses the current situation

There are today virtually no courses in brown goods servicing, and the salaries and opportunities are certainly not attractive

It is interesting to compare the brown goods and motor trades. In both, complex pieces of equipment are serviced by highly trained engineers/mechanics using sophisticated and expensive test and diagnostic equipment. Yet the way in which the two trades are perceived by the public and the manufacturers differs radically.

In the motor trade, if a repair under a manufacturer's warranty takes say three hours to complete, the service department concerned will be paid for three hours' labour at approximately £30 an hour. Some main motor dealers thrive off this, and certainly won't turn work down.

In contrast, a brown goods repair department will be paid a flat rate by the manufacturer for under-guarantee work. The fee varies over a range of about £15 to £25. As most jobs today take over an hour to complete, this payment represents a fraction of the cost of running a service department. And this doesn't include collection and delivery, and the time required to complete the paperwork involved.

The motor trade appears attractive to young people starting their careers. Training is excellent, and there are many further education courses which are devoted to automotive engineering and car maintenance.

Compare this with the situation in the brown goods trade. There are today virtually no courses in brown goods servicing, and the salaries and opportunities are certainly not attractive. This has led to an acute shortage of good engineers. The problem is so severe that at least one large national service company is offering potential employees conversion courses. As long as you know some basic electronics, you are given twenty weeks training after which you are expected to be able to repair all TVs, VCRs, audio and microwave products. You can guess what the results are.

Price policy

The consumer electronics industry is hell bent on reducing prices and the margins on its new products. Why? If it is because the industry considers that there will otherwise be inadequate sales, this view is wrong. The colour TV boom was in the early Seventies, when VAT on such goods was 25 per cent and the cost of a colour TV set was approximately a third of that of a new car. The VCR boom

was in the Eighties, when the cost of a video was approximately ten per cent of that of a car. Despite a few indifferent periods for sales, the prices of cars have kept up with or moved ahead of inflation. New car sales continue to rise. This August has been the second best for sales.

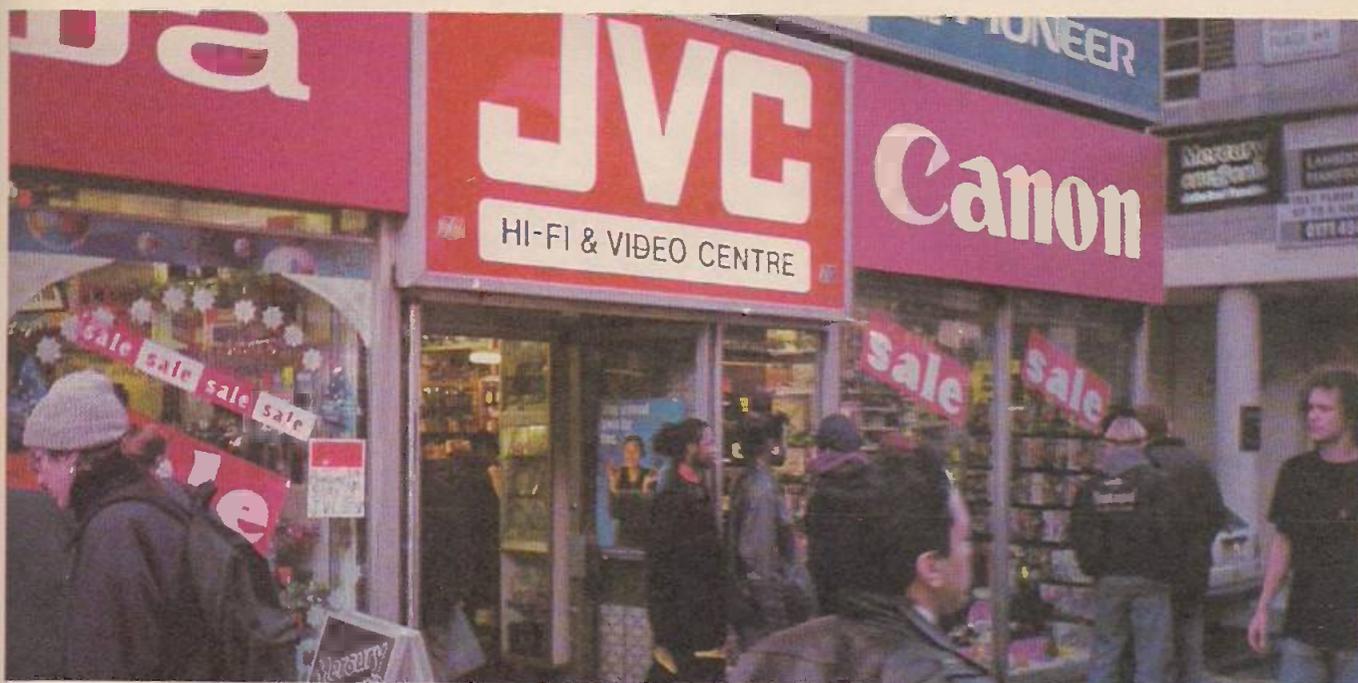
If the price of TV sets and VCRs averaged about £600 for a basic model, products would still sell – the public is not willing to do without them. Retailers would make more money and the manufacturers would make more profit. More spares would be sold, which is traditionally where manufacturers have made profits. And service departments might actually be able to break even or, dare I say it, make a profit! After all, that's why we are in business, isn't it?

The brown goods and, now, the computer trade differ from other high street retail activities in trying to get by on low profit margins. These trades seem to be more concerned with turnover than profit. The mark-up on clothing and other items is much higher. In addition electronic hardware can and does go wrong, which is why we are here. Have you every heard of a pullover that needed a service, or a chicken that failed after six months! The fact is that in addition to good profit margins most other high street retailers don't need costly service departments.

Subsidised servicing

The multiples heavily subsidise their service operations. In one of his many television interviews, Sir Stanley Kalms claimed that his engineering department costs the group £65m a year. When you consider that extended warranties are underwritten by an insurance company, and that parts and labour claims are submitted to manufacturers under their guarantee schemes, this is a huge subsidy/cost to bear. In fact it is fifty per cent of the group's latest pre-tax profits.

The latest gear to reach brown goods retailers is full of digitally-controlled surface-mounted chips. We will soon require a PC with manufacturers' programs and interface units simply to set up all the variables with domestic VCRs and colour TV sets. We have already seen this with the latest camcorders. So service departments will have to invest in PCs – possibly one for each bench engineer, and each fitted with different manufacturers' programs and interface systems. Highly specialised soldering and desoldering equipment is also required. All this represents a large capital



investment. Given the present state of the market, such an investment would yield a very poor if any return.

A throwaway trade?

Perhaps we are going the same way as electrical goods. Irons, toasters, radios etc. are now throwaway items. Most consumers would not contemplate spending even £12 on repairing them. And what about the environmental aspects? TV sets and VCRs have virtually no recyclable parts, and are not made of biodegradable materials. So the industry keeps adding to the waste problem.

For the time being, consumers are reaping the benefit. But what happens when equipment goes wrong? If, ten years ago, I quoted a repair price on the odd occasion of say £200 it was generally accepted. Today, if I give an estimate of say £70 to repair and service a VCR it will be rejected. The punter can buy a new one for £140. Next year VCRs may break the £100 barrier. It doesn't matter that the £140 video is the equivalent of the Lada in the motor industry – brown goods do not have the same status appeal.

VAT

It has been suggested that if you register for VAT your public credibility is enhanced. This may be so, but if your turnover exceeds £48,000 a year you have to register for VAT, and as far as manufacturers' and other contract work is concerned it becomes a must.

Suppose you work on a set retail labour charge of say £40 per job. If you are VAT registered, the charge rises to £47 or, if the £40 is inclusive of VAT, your labour charge becomes £34.78. Customers may consider that £47 is too high, in which case you have to ask yourself whether you can afford to pay the £5.22 out of whatever profit you manage to make. If you are small and work from home, stay out of the VAT field if you can.

Expansion and investment

What about the future then? I have managed to earn a living and keep my head above water, but if I wanted to expand I would have to take on staff and invest in more test equipment. If it works out, great. I might make more money. If it doesn't, I risk losing everything, possibly including my home. I certainly couldn't afford to inject large sums of money to keep such a business going.

Suppose that I decided to take the plunge and invest in some equipment. Let's say I purchase the latest SMD soldering station. That could cost around £1,500 plus VAT. I would require staff of course, and as my standards are high the calibre of the engineers I took on would have to be high. But if you try recruiting good engineers you will find that there are very few of them. Many have either left or are trying to leave the brown goods service field, moving to other employment. Examples I know of include an engineer who became a traffic warden, one who opened a greengrocer's shop and one who found himself better off driving an HGV around the country.

Cowboys

Another problem is the cowboy or agency element. Where I work there are several advertisers in the local paper/Yellow pages who have little experience of repairing the latest equipment. They tackle the easy repairs – dry-joints, fuses, head cleaning, switch replacement etc. – and sub-contract the rest of it to repairers like myself. But they usually end up making more money than the true engineers. In some cases their only investment consists of a soldering iron, a set of screwdrivers, some solder and braid and the old banger of a car! The industry could easily put a stop to this by insisting that engineers are registered – gas fitters have to be CORGI registered by law.

In conclusion

The comments above may seem negative. But this need not be the outcome. The trade should take a long, hard look at itself and its future. If the multiples intend to go on selling extended warranties, they will have to back them up: this means high-calibre engineers in up-to-date workshops with appropriate test gear. Manufacturers want to see more approved service centres. These are a vital link between the manufacturer and the public and, being overseen by and answerable to the manufacturer, should guarantee that products are repaired to a high standard and at a fair price to the consumer.

Unless the manufacturers review the situation now, in five, ten or twenty years' time customers are likely to have severe problems when they require their hi-tech purchases to be serviced. ■

It doesn't matter that the £140 video is the equivalent of the Lada in the motor industry – brown goods do not have the same status appeal

Long-distance Television

**DX conditions and reception. Satellite sightings and news. 1997
meteor shower dates. Roger Bunney reports**

I hope your aerials are still intact – the remnants of Hurricane Lilly passed across the southern UK in late October. A lift in tropospheric conditions towards the end of the month brought Band III and UHF openings. There was rather more than the usual Sporadic E activity during the month, the SpE log being as follows:

- 5/10/96 TVE (Spain) ch. E3; RTP (Portugal) E3; also an unidentified ch. E3 signal.
- 13/10/96 RTP E3; TVR (Romania) R2; also unidentified signals in chs. E2 and R2.
- 14/10/96 RTP chs. E2 and E3.
- 20/10/96 RAI (Italy) IA, B; TVA (Italy) E3; Video (Italy) E2; RTS (Serbia) E3; TVE E3, 4; TVR R2; also unidentified signals.
- 21/10/96 TVE E2, 3, 4; unidentified signals in chs. R1 and R2.

The Televisión de Galicia test pattern, received by John Locker via Hispasat at 30°W.

The tropospheric enhancement lasted from the 20th to the 24th,



bringing high-level Band III and UHF signals from stations in France, Germany and the Benelux countries. Local UK stations suffered from some co-channel interference. Reception peaked on the 24th, when the spectrum from ch. E2 to the top of the UHF band was jammed with signals. NRK-1 (Norway) was present on all Band III channels, while TV2 was seen in Holland at UHF. Signals from DR (Denmark) appeared in chs. E8 and E11, and several Danish TV2 transmissions were noted at UHF. As ever, East Anglia and Essex were the best locations for such reception. Cyril Willis at King's Lynn had installed a new Triax UNIX100 Yagi array, covering chs. 21-50, "just in time".

The Orionids meteor shower peaked on October 20th, bringing lots of signal pings. It was a good day for DXing.

Satellite Sightings

Several enthusiasts have now received signals from Arabsat 2A at 26°E. The Ku band signals received in the south and south east are rather weak, requiring threshold extension when a small dish is used. More acceptable picture quality is seen with the craft's C band offerings. Twelve Ku band transponders are in use, while in C band seven high-power and thirteen medium-power transponders have been booked. Qatar is listed as being at 12.521GHz with horizontal polarisation. The new Arabic JCS caption received via Eutelsat II F3 at 11.080GHz horizontal also refers to JCS at 12.521GHz from 26°E, suggesting that JCS is Qatar. Can

anyone confirm this?

The past few weeks have been relatively quiet across the Clarke belt, perhaps because of the increasing use of digital transmission. Eutelsat II F4 at 7°E can usually be relied upon to provide a variety of news feeds and exotic identifications however. Despite the EBU's threats some years back to adopt upmarket encryption, most feeds for pan-European distribution continue to use SIS – sound-in-syncs. With a standard analogue receiver there will be no audio and the picture will jump about because of the in-sync sound signal. I use one of the imported Dutch 'EBU decoders' to sort out the signal. It incorporates a sync stabiliser and an audio demodulator. Picture lock is obtained within a couple of seconds, and the audio then comes through – though the quality is rather 'gritty'. Several sat-zappers have noticed that with some SIS signals there is also a standard audio subcarrier. These signals seem to be reluctant to lock when the Dutch EBU decoder is used – has anyone else noticed this problem?

The QVC shopping channel, US version, was in Germany in early October, with live feedback from the streets in Hesse to the States via Intelsat K. Live phone-ins and US audience reaction were included.

Stathis Panagiotidis uses a 1m dish, Cambridge Gold 0.7dB noise LNB and Pace MSS138G receiver for satellite DXing at his home in Thessaloniki, Greece. He reports that Turksat 1C is now in operation at 42°E and finds that its Eurobeam is at a similar strength to the Turkish beam. There has been some

swapping of transponders between Turksat 1B and the new 1C. Arabsat 2A at 26°E provides very weak Ku band signals in Macedonia: by using a reduced IF bandwidth (15MHz) Stathis has been able to see five Ku band channels. The new Intelsat 707 at 1°W is now providing him with much stronger signals – the Israeli beam has also been improved – but the TV Norge signal is unwatchable. CMT via Intelsat 601 at 27.5°W comes in noise free, better in fact than you would get using a 1m dish in the UK.

Mid-October is solar outage time, as the sun tracks behind the satellites in the Clarke belt. Satellite signals can then be lost in solar noise. John Locker (Wirral) had calculated the downlink drop-out times – PAS-4 (68.5°E) at 0653, Astra (19.2°E) at 1019 and Intelsat 601 (27.5°W) at 1345 GMT for example. His calculations proved to be accurate. John's sons were watching Manchester United v. Liverpool on TV2 via Intelsat 707 at 1°W when, at 1035GMT, the picture froze and went into little boxes. This proved that Eutelsat II F3 at 16°E was being used for the outside broadcast feed to TV2 in Sweden. The pictures were out for about four minutes, which suggests that digital video isn't immune to such interference after all.

Intelsat now offers sun interference data, intended to enable earth station operators to manage their communications best when outages occur, via the Internet. You can find this information on the Intelsat Home Page at <http://www.intelsat.int/96falsun/ioclog.htm>

Roy Carmen mentions that it is always worth checking Hispasat at 30°W since this is commonly used for one-off outside broadcasts, including numerous feeds to the UK.

Cyril Willis comments on reception of NTV (Russia) via the GALS 1 and 2 satellites at 36°E. There are weak signals at 12-170GHz. These are due to be scrambled, as NTV intends to run at least five subscription channels by next summer. There are reports that a third satellite, Gorizont 17, is to be slotted in at 36°E.

News Items (Terrestrial)

UK: The ITC has invited comments on the proposal for RSL (restricted service licence) TV, which could come into use in late spring this year. RSL allows a low-power

transmitter (maximum 25W) to be used for a limited period (often 28 days) within a given area. RSL radio stations operate in the medium wave band and at VHF, using relatively inefficient aerials.

The ITC has also asked for applicants to run the Isle of Wight cable franchise. Because of the widely spread villages and areas of low population, the use of MMDS (microwave distribution) might be allowed where cable laying is not a viable proposition. This could offer an interesting new opportunity for TV-DXing.

Ireland: Ulster TV has withdrawn from the TV3 project. As a result, TV3 is not expected to start until late next year. It was originally given a licence in 1989.

Finland: A fourth national TV network, run by the Ruutunelonen media group, could be on air before long though no opening date has been announced so far.

Slovakia: The new commercial TV network came into operation at the end of August. The main transmitters are as follows:

Banska Bystrica	E49	220kW
Banska Stiavnica	E43	1.1kW
Bratislava	E44	650kW
Kosice/Dubnik	E59	370kW
Poprad	E42	220kW
Ruzomberok	E22	1kW
Trencin	E40	26kW

Powers e.r.p., polarisation horizontal in all cases. The Banska Stiavnica e.r.p. is to be raised to 220kW in August 1997.

Satellite News

Travel Channel is moving from Intelsat 601 to Astra 1E on January 1st, with digital transmission. The aim is to improve its coverage in Eastern Europe.

The Canal Plus Espagne group Socicable is to bring twenty digital TV channels into operation on January 1st, initially via seven Astra transponders – the package will be moved to a Spanish satellite later.

RTVE (Spain) has been holding discussions with Televisa and telecom operator Telefonica of Mexico with a view to establishing a digital TV package with up to 60 channels for the Spanish-speaking world.

Silvio Berlusconi's Mediaset group is to launch an eight-channel digital package via the Telepui service from Hot Bird. It will



The PanAmSat Home Page directory of contents. Photograph from John Locker.

include Canale 5, Rete 4, Italia 1 and a news service. Canal Plus is planning a seven-channel digital package via the German Kirch DF1 service. But problems have been experienced with DF1's digital programming: subscribers have complained about picture quality, flashing squares, motion delay and long decoder lock-up times. DF1 says that these "minor problems" are being sorted out.

Star TV's first DTH digital service started in early December, with a

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The Iraqi national TV network logo, photographed by John Locker during a news feed via Eutelsat II F4 at 7°E.

five-channel package aimed at Indonesia. The service will be expanded to 18 channels, called Indovision, during 1997 – both soft and hard scrambling will be used. Star TV is also joining the Middle

Meteor Shower Duration

Quadrantids	January 1st-6th
Lyrids	April 19-25th
May Aquarids	April 24th-May 20th
Cetids	May 7th-June 9th
Delta Aquarids	July 15th-August 20th
Perseids	July 23rd-August 20th
Orionids	October 16-27th
Taurids	October 20th-November 30th
Leonids	November 15-20th
Geminids	December 7-16th
Ursids	December 17-25th

Peak Activity

January 3rd at 1000
April 22nd at 0800
May 4th
Late May
July 29th-August 6th
August 12th at 1500
October 20th-22nd
November 3rd
November 17th at 1600
December 13th at 2200
December 23rd

East Orbit package, contributing ten channels. The 30-channel package is aimed at the Middle East and North Africa. The BBC has restarted the supply of programmes to Star TV.

Hughes Communications' Galaxy has merged with PanAmSat to form PanAmSat Corporation, which will own 14 satellites with a further seven to be launched during 1997.

The Russian NTV network has launched a DTH service via the GALS satellites. The four new TV channels are free initially but scrambling is to start this spring. Expansion to 16 channels is planned by the year 2000.

Meteor Showers - 1997

Our thanks to the British Astronomical Association for providing us with the main Meteor Shower dates for 1997 – see list above. The Leonids shower can be very active: "substantial" activity is expected in 1997. In recent years the Perseids shower has often had a double peak – check at 0700 as well as 1500 on August 12th. The Cetids is a rather vague shower.

John Wiley and Sons Ltd., Baffins Lane, Chichester, W. Sussex PO19 1UD (0800 243 407) has just published the 2nd edition of Neil Bone's book *The Aurora – Sun-Earth Interactions*. Neil is the director of the Meteor Section of the British Astronomical Association.

MS Reception

DX reception is possible when signals are reflected from the ionisation produced by meteor material that enters the earth's upper atmosphere. Meteor showers occur at predicated times each year, but random meteor scattering occurs throughout the year. Signal strength is much less with scattering than with a regular

shower. Both rely on space debris that burns up rapidly, producing white trails of light across the sky.

As the debris burns up, intense localised ionisation occurs at E-layer height (approximately 120km) – thus reception distances are the same as with SpE propagation. This ionisation can reflect VHF signals, producing brief signal flashes if you are lucky enough to be tuned to the relevant channel and your TV set has quick sync locking. One of the most productive showers is the Leonids in late November: in a good year the results can resemble a normal SpE opening.

Most MS reflection occurs in Band I. Unfortunately this band has in recent years become increasingly congested by the output from low-power RF devices such as walkie-talkies, baby alarms, garage door openers and other items. With even a selective DX receiver you are likely to lose the use of the main MS channels E2 and R1, or at best suffer heavy interference. It's therefore worth trying to exploit channels E3, E4 and R2 – before these too are lost, this time to mobile radio.

An aerial used for Band I MS reception need not be elaborate or large, but it's best to mount the aerial above the level of nearby housing and other signal obstructions. If you use a full-sized Band I aerial for SpE reception this should be adequate, though a low-noise aerial amplifier is essential. When MS activity is really intense it's possible for signal reflections to occur in Band III. For such reception an eight- or ten-element aerial coupled to a low-noise, high-gain amplifier is required.

In my experience it's best to tilt the aerial upwards, by about 15° above the horizontal level. MS reception requires a great deal of patience!

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Simple

Motorised Dish Conversion

Conversion to motorised dish operation is easy with the new Supersat Mini Polar Mount kit. **Mike Hancox**, Technical Director of Satellite Scene, tests and reviews the system

The three million or so Astra viewers would be more than happy to motorise their dish systems if this was a simple matter. They are put off by technical talk that makes it sound difficult and complicated. What they want is say Astra at 19.2°E, Eutelsat at 16, 13, 10 and 7°E plus Intelsat at 1°W. They are not interested in news links, test patterns and blips of pictures from dying satellites. The new, cheap mini motorised conversion kit from Supersat and other suppliers (see later) is the answer.

I received one for appraisal a few days ago. It has been designed to fill the gap between motorised and non-motorised systems nicely. There are all the bits and pieces we are used to – a polar mount, a jack arm, a positioner, and the traditional four-core cable to the reed switch/jack motor assembly – but the similarity with previous systems ends here. There are simply no difficult bits. It's all done for you before despatch, by the lads at the factory. The system is actually known as the Supersat Mini Polar Mount Automatic Positioner Kit, and the biggest task it involves is probably filling in the order form!

'Kit' is probably something of a misnomer, as most of it is pre-built ready to fit. Even the elevation setting is preset for the area concerned. If you can bolt a jack arm into two pre-formed holes, fit a U bolt around a pole, and connect four wires with correct polarity you've done the job. It really is that easy.

On Test

In the time it took to make a paper aeroplane out of the single instruction sheet we had the polar mount up on the

pole. After a couple of simple bolting operations the 80cm concentric dish, which can be supplied as an extra should the already installed dish need upgrading, was up and ready at an elevation of exactly 27° – we checked this with our now defunct inclinometer.

Some of the new CT100 Shotgun cable with a built-in four core, available from Eurosat, Walsall, made linking up easy. So we pressed on to the positioner.

Again, it was all so simple. Just connect the motor and reed switch wires, insert the supplied scart lead into the decoder socket at the rear of your receiver and you are ready to go. No need for a spectrum analyser or anything like that. All you have to do is to press the east or west button at the front of the positioner until the dish is about half way through its factory-set allowed axis, tune the satellite receiver to TV Norge (via Intelsat 707 at 1°W), then rotate the whole polar mount assembly at the U bolt until the signal is received.

Assuming that you have mounted the main pole truly vertically, a great picture will be seen. Just clamp the U bolt at the optimum signal position and leave the rest to trust in the chaps at Supersat.

You can now carry on with the simple task of programming the various satellites into the positioner. My preferred method is to give each satellite a position number that comes to mind easily. For example Hot Bird position 13 signifies that it is at 13°E. Entering information into the positioner is simplicity itself. If you can programme the buttons on a car radio, you can do this.

Now here's the best bit about it. With later Pace receivers you can tune to any channel, move the dish to the correct satellite and enter the Pace satellite number – you'll find this in the Pace set-up menu for that channel – into the positioner. Then, every time you call up one of that satellite's channels, the dish will move to the correct position automatically.

Verdict

I couldn't believe how simple it is to get the system up and running. It seems to be totally foolproof. I recommend it, especially as this natty little earner sells for £195.95 including every last nut and bolt. Pile them high and sell them cheap! You can't lose.

The Supersat Mini Polar Mount System is available from selected branches of Eurosat (01922 39 299) and the company's dealers, from all branches of Satellite Solutions (01604 787 888) and the company's dealers, and from Telepart/Economic Devices (01902 773 122). Trade information can be obtained direct from the manufacturer. Supersat (01902 29 022, fax 01902 29 052).

View of an assembled Supersat polar mount system.



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Answer to Test Case 409

- See page 169 -

Even those sections of a TV set that have always been there, like the picture tube, can continue to pose puzzles for the technician. In this case it wasn't the tube that was playing tricks however. There were two classic dry-joints at pins 9 and 10 – the heater supply pins – of the CRT base socket, where they are connected to the tube base panel. Examination with a magnifying glass clearly revealed a crystallised ring around each pin.

Whenever continuity was lost and the heaters went out – they couldn't be seen through the layer of dust on the tube, especially under the bright bench lamp – the tube's emission fell. This was detected by the auto grey-scale correction system in the HA11948 video processor chip IV21, which monitors tube emission via pulsed feedback. Pin 1 of connector BV02 provides the link between the tube base and video/chroma boards for this feedback. When a fall in emission is detected, the chip turns up its RGB outputs to provide compensation. Hence the very low cathode voltages when the picture disappeared. With this type of fault the HA11948 chip behaves more predictably – once you realise what's happening – than the TDA3562A chip featured in Test Case 403 (July 1996).

Cleaning and resoldering all the connections between the CRT base socket pins and the PCB cleared up the problem.

NEXT MONTH IN TELEVISION

Servicing the Samsung VIK310/320/350

This popular range of VCRs has been around for some three years now. They are good machines from both the user's and the technician's viewpoint, are reasonably easy to operate and can be quickly dismantled. The faults that occur tend to follow a definite pattern. **Mike Leach** describes the problems you may encounter and the way in which to deal with them.

Simple TV Tuning Aid

Whether you are in the workshop or in the field it's useful to have a signal source for setting up TV sets' AV and satellite channels. **Ian Rees** has designed a unit that provides adjustable signals in the range ch. 30-40. A four-position switch enables blank or modulated rasters to be displayed, either individually for manual tuning or combined for self-programming sets. The blank raster is also useful for grey-scale adjustments.

Repairing old RC Handsets

Presentation is all important with any older equipment you may wish to sell. One major problem can be the remote control unit. A set's value is much reduced if this is missing or defective. **Malcolm Burrell** describes some repairs that can be carried out.

The NiCad Cell

Care is required with charging and the use of Nickel-Cadmium batteries. **Tom Bowers** describes their construction and characteristics and gives advice on how to get the best from them.

Published on the third Wednesday of each month by Reed Business Information Ltd., Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. **Filmsetting** by Marlin Imaging Ltd, 2-4 Powerscroft Road, Sidcup, Kent DA14 5DT. **Printed** in England by BPC Magazines (Carlisle) Ltd., Newtown Trading Estate, Carlisle, Cumbria CA2 7NR. **Distributed** by Marketforce (UK) Ltd., 247 Tottenham Court Road, London W1P 0AU (0171 261 5555). **Sole Agents** for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. **Television** is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed of by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.

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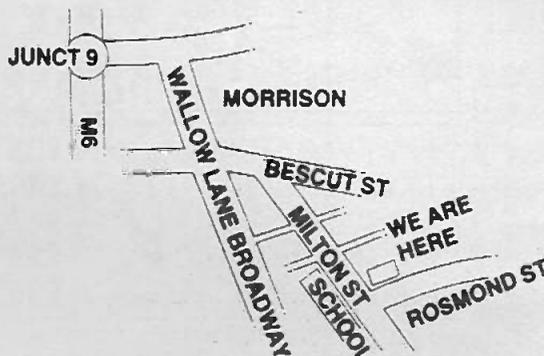


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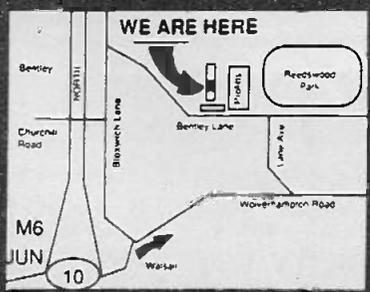
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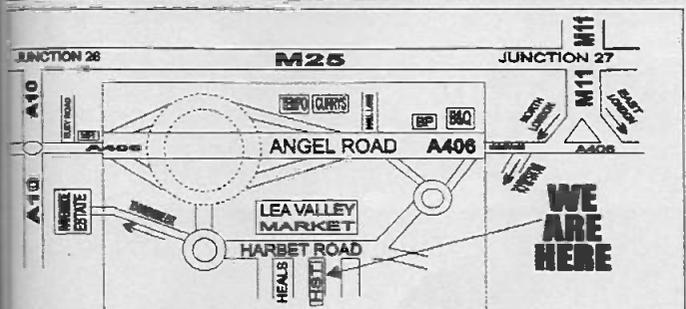
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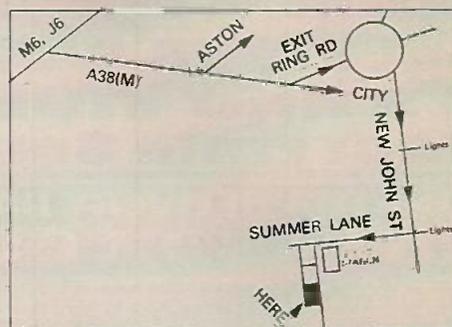
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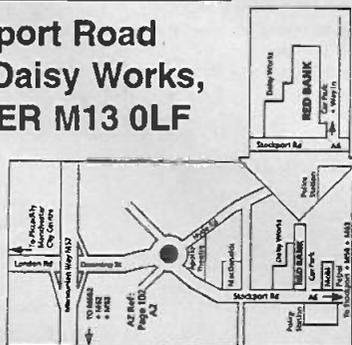
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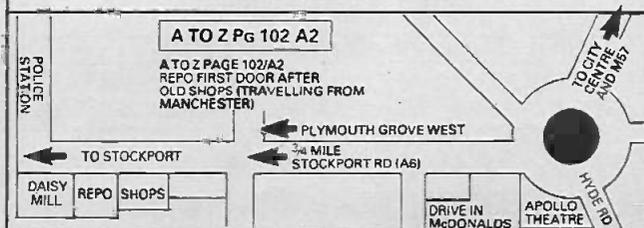
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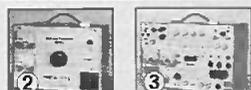


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BU801	£0.50	CD455BE	£0.20	IN5401	£0.03
BUK454/600	£0.40	FE3B - General Inst		IR106A	£0.10
BUW11	£0.40	Diode	£0.04		

AN5551	£1.00	AMSTRAD 510	
ST6385BB 1/BFY	£2.00	Main IC ZC409233P	
SN96551 NL	£3.00	£8	
SAA1061	£3.00	HITACHI VT 753E	
SAA3018	£1.00	Text Panel	£20
STR58041	£4.00	STR4211	£5
BF870	£0.20	STR4211	£5
BF869s	£0.20	STK4793	£5
UPD6376CS	£3.00	LA7830	£1
BC550C	£0.20	LA7831	£1
M58658P	£1.00	ST6391BI/BC	£2
M708 ABI	£1.50	FERGUSON ICC7	
M708 LBI	£1.50	T/V Amplifier	
BY208-800	£0.10	2 way Gain 7DB	£8
BYV28/200	£0.10	1500 MATSUI	£20
2435121	£10.00	EQV ORION D2096 HEAD	
2436792	£10.00		
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HITACHI CLE-883A HAND SETS	Replaces IR8512 CPT2196/CPT2578 £8	AMSTRAD 6.600 Loading Motor £3
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Hitachi Issue 6 Teletext PWB F.S.T.	£15	Yellow/Spot VHF/UHF AND.C CAM	
Hitachi PC315-11 Issue 7 Teletext Panel	£15		
Hitachi PC232A5 Issue 4 Teletext Decoder	£15		

2435063	L.O.P.T.	£10	Focus Pots	
2435085			K40	£2
Etri 240v fan 6in	£5	Recorder Remote VA260	£5	
DL701 Delay	50p	TMP47C634N/2685		
DL711 Line	50p	£1		

Matsui VX3000 Hand Set	£3	2SC4589	
VCR Head VX3000	£10	Switching or Line O.P. transistor 10A-1500V	£2
Matsui VSRI500 Head	£5	Hitachi Modulator	
Hand Set	£4	No 5587881	£5
Power Supply	£5	NEW.	
Main Panel	£3	Send for list of video panel	
Capstan Motor IC No M56730 ASP	£15		

Hitachi Capstan Motor ACE G4-B to ACE G40-B	£10.00		
Hitachi Video Hand Set RM933E Video Plus	£30.00		
Amstrad VS1000-VS 1100 Power Supply	£5.00		
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6MHz XTALS	30p	for	
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8.8MHz T/V XTALS		TX89-TX98-TX100	

Amstrad - Perdeo		Regulator	
Fidelity - Decker - Tatung	£4	L298N	£4
Plastic - Front Panels for all 1992 Models	each	7805	20p
Mitsubishi RMM35 Hand Set Video	£5	7806	20p
Nokia RC202 Hand Set	£4	7809	20p
Siemens Hand Set 1994 Model T/V Video	£5	7812	20p
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IF PANEL	£4		
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TX86 8 Push Button Unit	£5		
TX85 Switch MOD			
TX86			
TX89			

TX89 Tubase Panel	£5.00	Orion Motor	
TX98 Tubase Panel	£5.00	50p each	
TX99 Tubase Panel	£5.00	Canon Motor 12v	50p

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8 Way Tuning Pots	50p		
UHF Small Tuner UE30 and UE33	£3.00	Switch Mode	
4944 Tuner	£3.00	Farnell Power Supply	

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24V Sub Min Relays	£0.25	12 volts 1 amp	
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Positor 2322 662 98012	50p	Small in case	£10
3 Pin PO5. PTH451 Black Type	50p		

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FERGUSON UPPER DRUM YDM2018B	£10.00	Text IC	
FERGUSON UPPER DRUM YDM2037A	£20.00	SAA 5231	
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