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Oriental Conundrums

Over the past thirty years the UK electronics industry has depended more and more on investment by overseas firms. In fact without this investment there would be virtually no consumer electronics, semiconductor or computer industries in the UK today. Whether this overseas investment is a good or a bad thing hasn't mattered too much to date. It has continued to come in, often encouraged by government action of various sorts (grants, tax benefits etc.). Plants have been established and jobs created: thousands of them. Now alarm bells have suddenly started to ring, because of financial problems in East Asia.

Fortunately many of the current batch of plants are now in operation — for example production started recently at Korean manufacturer LG Electronics’ computer monitor plant at Newport in South Wales. Far Eastern investment in electronics in the UK started with the Japanese back in 1974. In more recent times Taiwanese and Korean firms have appeared on the scene. It is Korean investment that's causing most of the current concern.

Hyundai has decided to put a hold on its £3bn investment in two semiconductor plants in Scotland. Samsung has postponed the start of the next phase of its £450m development in the North East — semiconductor and PC manufacture were to have been added to its colour TV and microwave oven plants at Woyyard Park. Daewoo has announced that its overseas TV and microwave oven plants at Wynyard manufacture were to have been added to its colour TV plant in Antrim, Northern Ireland.

What's behind all this? There is, in Eastern Asia, a far greater tendency to save and invest than in the West. Because of the savings, banks have money to lend. Large companies borrow and invest. Everything is just fine so long as the economy remains in an expansionary phase. But no economy continues to expand indefinitely without pausing for breath. What happens when the rate of economic expansion decreases? Excess capacity then becomes evident: firms start to make losses, loans may cease to be serviced, the banks come under pressure, confidence in the economy is lost and a sort of self-feeding collapse can set in.

Traditional business practices in East Asia have made the problem far worse than it might otherwise have been. Banks have not been entirely open in reporting on their activities, auditing is often poor and the banks and major firms tend to have rather too close relationships. So banks don’t ask too many questions and continue to provide loans against collateral that they see is appreciating in value — even if only in paper terms. Any bad debts are simply shunted aside instead of being written off. This is asking for trouble when economic expansion slows down. Increased losses and bad debts can soon destroy confidence. In Korea the result of all this has been a full-blown economic crisis, with the International Monetary Fund having to be called in to save the situation.

There are many consequences of this sort of situation. Firms cease to invest both at home and abroad: hence the decisions by many Korean firms noted above. Investors may try to sell overseas assets to pay for loans that are called in, thus exporting their problems. Or they may try to move funds abroad when the domestic currency loses value, making the currency problem worse. This is why so much depends on that vague quality confidence. When a currency loses value, the country’s exports become cheaper for others. You can thus try to export your way out of the problem, but this damages the economies of other countries. It is very difficult to assess the balance of all these effects, which don’t show up in an expansionary economic context. But once they appear they do no one any good.

A major contributory factor in the current situation has been asset inflation, which occurs when the price of assets — houses, shares, whatever — increases rapidly because there is more money available than there are opportunities to use it. This can lead to excessive investment because paper collateral is generated and loans are extended against it: this is the real bubble economy condition, the basic cause of situations like the USA in 1929 and the East Asian problems today. Central banks and international banking operations then have to do their best to sort out the problem.

It is always clear enough in hindsight what has caused an economic upset. It is not so easy in day to day banking and business to do anything about it. A bank that refuses to lend will simply lose business to others. Central banks try to impose some order by altering interest rates, but this is not a precise weapon. We have to live with business cycles, and to hope that excesses in some countries do not plunge us all, as a result of increasing internationalisation of trade and banking, into economic difficulties.

It is a pity that some sort of middle way cannot be established between the reluctance of many Western firms to invest and take chances and the tendency of East Asian firms to invest and plough on regardless, seeing increased production and market share as their aim rather than a reasonable profit margin. We all have a lot to learn — and one problem is that each generation tends to make its own mistakes instead of learning from past experience. What can be done is to ensure adequate financial supervision, which may or may not work. In time it all blows over, but a lot of people can suffer in the process.
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**TELEVISION January 1998**
Progress with Digital TV

Agreement on a standard decoder specification for digital terrestrial TV (DTT) was reached in early November. Several groups were involved, including the Digital Multiplex Group (DMUX) which represents the main UK terrestrial broadcasters, also British Digital Broadcasting (BDB) which has the DTT franchise. Broadcasters, set-makers and semiconductor manufacturers have all been involved.

The decoder is to be sold at a subsidised price of around £200. BDB has invited twenty or so manufacturers to tender for initial orders, including Pace, Philips, Toshiba and Grundig-Hyundai. The decoder will offer a number of standard features, including selection between 4:3 or 16:9 aspect ratio displays, a quarter-screen picture with text information, enhanced teletext and data services, an electronic programme guide and stereo sound. Interactive operation is not included in the initial basic specification. Viewers will be able to receive pay-TV channels by taking out a subscription with BDB, a smart card being used for access. For access to BSkyB’s digital satellite TV service an additional module and subscription will be required. A further module will be needed for Audio Described sound tracks, which are designed for those with sight problems.

SGS-Thomson Microelectronics (STM) and Philips have developed a four-chip decoder design which is to be jointly marketed by the companies and is now in the sample production stage. Motorola has also been supplying sample production chipsets to manufacturers.

At much the same time as the DTT decoder announcement, a reference set-top box design for digital satellite TV was announced by BSkyB, which has reached an agreement with SGS-Thomson Microelectronics to provide the chips for the basic operation of the initial set-top boxes. These chips include STM’s ST20-TP2/TP3 32-bit microcontroller, STV1119 PAL/NTSC encoder, STi3520L MPEG-2 decoder and other microcontrollers. The software to be used was jointly developed by SGS Thomson and the OpenTV venture between Sun Interactive and Thomson Multimedia. Pace, Matsushita, Sony and Nokia have already entered into agreements with BSkyB to produce the set-top boxes.

Sony has announced that it will be launching digital TV receivers in the UK next year: no specifications or price details have been released.

BSkyB and Cable and Wireless Communications (CWC) have agreed to co-operate on the launch of digital TV services, with joint promotion and marketing. Under the agreement CWC will offer its subscribers BSkyB’s pay-per-view services in both analogue and digital form. A fibre-optic link will connect BSkyB’s Isleworth studios to CWC’s digital head-end. This is not a technology agreement. CWC will use its own decoder, EPG and conditional access system.

The European Broadcasting Union (EBU) and the European Association of Consumer Electronics Manufacturers (EACEM) have called for an open, unfragmented digital receiver market, both set-top boxes and TV sets. The organisations want to see standard software and hardware interfaces in all receivers. On the software side they consider that Java or a combination of Java and another system represents the most promising basis of a generic standard for use with digital broadcasting. They also want patent royalties to be “reasonable, fair and non-discriminatory”.

Monitor Production

Production of computer monitors has started at Korean manufacturer LG Electronics’ new plant at Newport, South Wales. It took just over a year from the initial announcement of plans to the start of production. When the plant reaches full capacity it will be able to produce 2m monitors a year, creating 6,100 jobs - 500 staff are already working at the factory. Our photograph shows Mr Oak Mo Lee, LG’s director of finance and administration, at the production line.

Lite-On Technology of Taiwan, at present the world’s fourth largest manufacturer of computer monitors, plans to increase production by over 50 per cent, from 3.5m to 5m units, during the present year (1998), with new plants in the UK and Mexico. The UK plant in Scotland was opened late last year and is expected to produce 1-2m monitors this year, building up to 2m a year by the end of the century. Most of Lite-On’s monitors are sold to computer manufacturers, including IBM, Compaq and Hewlett-Packard. The company expects to be manufacturing 8-10m monitors a year by 2000. Total world production of monitors in 1997 was estimated at 75m. The other manufacturers currently in the top four are understood to be Samsung, Philips and Acer.
Business/Trade News

CPC of Preston has entered a distribution agreement with Grundig and is now an officially approved distributor from which authorised Grundig dealers can obtain warranty spares. Products available include spare parts for all Grundig manufactured TV sets, music systems, car stereos and satellite receivers. CPC has set up a database, containing over 100,000 part numbers, dedicated to Grundig spaces. The company’s partfinder service enables parts to be quickly identified in cases where the customer does not know the part number: staff can then immediately provide the relevant order code, part and availability. CPC can be reached on 01772 654 455.

Satellite equipment supplier Longreach Supervision Group has added a new depot at Borehamwood, Herts to its nationwide network. The company now has nine depots and stocks more than 400 satellite product lines. It offers same-day collection, free technical assistance and free training. Longreach’s head office is at Bath, Avon (01225 444 894).

The distributor of BASF and Memorex brand audio and video products in the UK has, from January 1st 1998, changed its name to EMTEC Magnetics UK Ltd. The change follows the purchase by Korean group KOHAP of BASF’s worldwide magnetic tape business early last year. EMTEC Magnetics UK Ltd. can be reached on 0181 908 8203.

Matsushita is to expand its operations in Wales with a £15m investment programme. A new research and development centre is being set up at the company’s Cardiff base, creating 160 new jobs. Satellite TV decoder manufacture is also to start. At present the company employs more than 2,000 staff at the site producing colour TV sets and microwave ovens for the European market.

Fuse Warning

The Electrical Installation Equipment Manufacturers’ Association (EIEMA) has issued a warning about certain mains plug fuses, manufactured in China, that carry the BS1362 approval mark. Based on many years’ experience, EIEMA members have identified the following three factors as being vital for safe fuse performance:

1. The ceramic tube must be completely filled with an appropriate material, usually quartz sand. The purpose of this filling is to absorb the enormous energy released when a short-circuit fault occurs. Without it, the fuse could explode.

2. The fuse element must not touch the tube’s inside wall. If it does, the element will not be completely surrounded with energy-absorbing material.

3. The tube must have sufficient strength to withstand the high temperature and pressure generated during fuse operation, after which it must comply with the test requirements of the standard. This is to ensure that the fuse remains intact after operation.

EIEMA members routinely test their own and other manufacturers’ products. During recent tests certain Chinese-made fuses were found to have seriously inadequate quantities of arc-quenching material, and fuse elements that touched the inside wall of the tube. The result was critical rupturing of the fuse tube, producing an explosion within a type BS1363 approved plug whose cover sheared off and flew across the test bay. This, in an everyday situation, could cause injury and be a fire risk.

The Association does not suggest that all Chinese-manufactured fuses are unsafe.

DAB News

Three UK radio companies, Emap Radio, Capital Radio and DMG Radio, have signed an agreement with cable operator NTL to bid for a national commercial DAB licence. The Radio Authority is to advertise licences this spring. Services are due to start in 1999.

Great Western Radio, parent company of Classic FM, is to bid for a licence but would like to see the rules relaxed on the extent of the data services that DAB can offer: at present the limit is ten per cent. GWR is running a series of multimedia radio test transmissions in the London area, in conjunction with BT, the BBC and others.

GWR is one of “best internet” sites and can personalise their service.

Internet TV Service

NetChannel UK, a wholly-owned subsidiary of the US company NetChannel Inc., has launched its Internet TV service in the UK. This is intended as the first step to providing the service throughout Europe. The idea is to offer subscribers easy access to internet e-mail and the web (selected sites) via a NetStation set-top box which is connected to the TV set and a phone line, with remote control. There is no need for a PC. The box costs £299, a monthly subscription £14.95. Access is controlled by a smart card that plugs into the NetStation. Over thirty channels are available. Users are offered a selection of “best internet” sites and can personalise their own service.

Sharp has launched a Mini hi-fi system, Model MDX811, which can be linked to a PC to enable music to be downloaded from the internet and recorded on a blank Mini Disc. Suggested price is about £700.
had been switched on. The cure appeared to be related to the length of time the machine had been in operation. Capacitors C203, C204 and C206 on PCB VS37 were the culprits. They were all leaky, and generally very rare with this Sanyo mechanism – except when there has been an impact of one sort or another. The drum assembly is sprung, and if knocked can assume a curious ‘angled’ position that gives rise to the noise-band symptom.

A small amount of corrective pressure will usually release the assembly so that it returns to its normal position. The ‘flashing lines’ were dropouts caused by failure of C2106 (10µF, 16V) on the main PCB. D.C.W.

Sony CCDTR50E
No viewfinder picture was the fault with this early Handycam model. The cause was Q924 on the EVF PCB. Not a surface-mounted type this time: it’s a 68µF, 16V radial electrolytic capacitor. A service operation completed the repair. D.C.W.

D.C.W.

Sony CCDTR55E
Intermittent monochrome playback was the complaint with this machine. The loss of colour appeared to be related to the length of time the machine had been in operation. Capacitors C203, C204 and C206 on PCB VS37 were the culprits. They were all leaky, and

had contaminated the print with electrolyte. A clean up and three new capacitors cured the fault. The luminance signal level had also been affected, but the customer had apparently not noticed this. D.C.W.

JVC GRAX7E
There was a mechanism problem with this unit. It had failed because the supply side guide rail base was broken. After fitting a replacement assembly I checked the mechanism by powering the loading motor from an external source. It seemed to work all right, but when the unit was powered up normally and a tape was inserted it loaded half way then a clicking noise came from the motor. It disassembled the motor and found that there was a damaged plastic gear in its attached gear box. So, with growing confidence (misplaced) that all would be well, a new motor unit was fitted.

When an attempt was made to load a tape it once more stuck at the half-way position, then unlaced – this time, thankfully, without the gearbox noise. The cause of the trouble was this time found to be the M54543 loading drive chip. It would drive the mechanism correctly until the point of maximum torque was reached (as the pinch roller assembly began to move). It would then fail to produce the drive current required and abort the sequence. Once a new chip had been fitted all was well – except for the estimate, but you can’t always get it right!

The unit was finally serviced, tested and returned to the customer, who immediately took it on holiday with him. A few weeks later he called to say that the unit had worked well on his holiday and that he was pleased with the repair. Good, I thought – but?! Well the only problem was that the tape remaining display and counter occasionally “did funny things”.

On test I found that the counter would intermittently stop, miss a few counts then continue. The tape remaining data was also erratic. The cause of this problem was the supply reel which, during the previous trouble, had scraped the deck, damaging its alternate reflective/black surfaces. There was a circular scratch that exposed more reflective surface than was required. This was a bit confusing, as the mechacon didn’t register a faulty reel pulse train and stop the normal tape transport operation. A new reel cured this final (I hope!) problem. D.C.W.
PROMAX TEST EQUIPMENT

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A welcome to the fourth edition of this excellent book, which has become firmly established as an essential guide to satellite TV techniques and a reference source for all those concerned with installation, reception and repair. This latest edition contains a new chapter on digital satellite TV, also new sections on fixed dish systems capable of reception from two or more satellites, universal wideband LNBFs suitable for analogue and digital reception, and simplified downlink budget calculations for specifying digital receiving equipment.

Naturally the first thing I looked at was the chapter on digital satellite TV. It clarifies what is involved in this complex subject and provides a helpful, practical guide to what you need to know. In his preface the author says that the book is pitched “between a simple installation guide and an involved theoretical textbook”. That sums it up. You won’t find that you get bogged down in unnecessary theory; you will find clear explanations of what is involved in satellite reception, practical information on installations of various types including IF distribution systems, and a lot of relevant reference data. In short, it’s a book you will need if you are in any way involved in satellite TV.

The book can be obtained from the Customer Service Department, Heinemann Publishers Oxford, PO Box 382, Hailey Court, Jordan Hill, Oxford OX2 8RU. Phone 01865 314 301 for any further details you require. J.A.R.

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The AG2601 audio signal generator spans 10Hz to 1MHz in five overlapping ranges and features floating output and low distortion. This stable sine and square-wave oscillator is being made available to Television readers at the fully-inclusive special price of £129. Its normal selling price is £129 excluding VAT and delivery.

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AG2601 audio generator — specifications

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- Frequency range: 10Hz to 1MHz
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- Output waveforms: sine, square
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- ±3%±2Hz, 100Hz-100kHz
- O/P floating voltage: within ±1.5dB

Sinewave characteristics
- Distortion: <0.05%, 500Hz to 50kHz
- <0.5%, 50Hz to 500kHz
- Output voltage: 8V rms, max
- Output flatness: ±1.5dB (1kHz)
- Output impedance: 600Ω

Squarewave characteristics
- Output voltage: 15V pk-pk, min
- Rise time: 0.5μs
- Synchronization input
- Input impedance: 10kΩ
- Maximum input: 10V rms

Supply
- 115/230V, 50/60Hz

Physical data
- Dimensions: 150 by 250 by 130mm
- Weight: 2.5kg

*Test leads supplied as standard
Pace MSS1000

Why do people put their receivers inside closed cabinets? The man who brought me this Pace receiver told me he was a "computer engineer". I think he had something seriously wrong with his firmware: the receiver was, apparently, installed in a narrow gap inside his 'Hi-Fi' cabinet, with a VCR beneath it and a D2-MAC decoder on top!

Now, surprise, surprise, the decoder was intermittent "except", he said, "with the contrast set at 8, and even then it comes and goes". Usually the receiver won't work with the contrast set at maximum, so I guessed that the video level must be low.

As the fault was now permanent it took very little time to trace the cause, using my oscilloscope, to the surface-mounted transistor Q58 (see Fig. 1). A BC856B cured the trouble. Must remember to order some more!

Interestingly, I get lots of calls from repair 'engineers' who complain about decoder faults, low video levels, interference from the power supply and so on, but when I ask how far they got with scope checks to trace the cause I hear "oscilloscope?" I'm beginning to think that I am the only person in the world who even owns one let alone knows how to use it! Maybe I should set up a basic training course.

I explained the overheating problem to the "computer engineer". These receivers will run happily for years if they are installed on an open shelf. When they are inside a cabinet they really need a fan. Unfortunately he was not won over by my salesmanship - he told me that he'd already found the supplier of the fan kit "at the web site" and would order one himself. Damn these experts!

Galaxis Digital

Wow - my first digital receiver! This one is really neat inside. At £525 it ought to be, but I was impressed. The gentleman who brought it in was less impressed.

"Loop-through won't work" he announced.

"What, E to E?" I asked, then added "I mean TV aerial loop-through?"

"Nah, analogue receiver loop-through. You know, you connect your digital receiver to the dish, then your Amstrad through the digital. The signal goes through - except it doesn't any more."

I thought I understood, so I had a poke around. As the nature of the problem wasn't immediately obvious, I rang Satellite Scene at Derby. Technical Director Mike Hancox suggested that I check a diode next to the tuner. Sure enough, it had a dry-joint. A quick dab of solder and all was well.

But I told the customer to come back next week because "I wanted to soak test it to make sure". I'd never come across this loop-through feature before. It seemed that the Galaxis receiver had to be "parked" in standby on a vertically polarised channel, so that it sent 13V to the LNB. The analogue receiver could then control the LNB. Interesting. No need for a twin-output LNB or an additional cable.

Pace MSS1000

Pace MSS500 and MSS1000 receivers are beginning to come in more often. It's the usual problem: the customer has kept his pride and joy nice and warm for two years, and the electrolytics are now drying out.

The symptoms can be wonderfully varied however, and it can be quite a challenge to work out why a capacitor might have caused a particular fault. I now replace a set of capacitors that come in the Relkit 6 kit from SatCure (phone 01270 753 311). If the fault persists, I then start to hunt down the cause using conventional methods. But the kit usually fixes the problem.

An MSS1000 arrived by carrier last week. The customer's lucid description of the fault was all of two words long, "intermittent dekodering!" There was no sign of any fault during a two-hour soak test, but the diagonal, dashed lines that swirled across the picture indicated that the electrolytics had...
passed their 'sell by' date. I fitted the power supply capacitor kit and, for good measure, replaced C208 (1μF) which is next to the PTV111 sync separator chip on the decoder panel — it's often the cause of decoder 'dropout' when it has been cooked.

There were no decoder messages, and the channel name and on-screen menus drifted gently from right to left. Oh dear! After spending a fruitless hour with an oscilloscope in one hand and a helpful Pace engineer at the end of a telephone in the other hand I had to give up. There comes a time when "you can't see t' wood fer t' trees".

I packed the unit carefully and sent it off to Satfix, Swansea. He spotted the cause of the problem immediately of course, and phoned me to go.

"A tiny thread of solder, isn't it. You left it across a surface-mount capacitor. Want me to post you the magnifying glass, do you? Or perhaps new spectacles are required?"

I put my screwdriver down and breathed a sigh of relief. "In that case, madam, it will be ready this time tomorrow" I said with a smile. A few years ago I wouldn't have let her go as quickly as that. I left it on the soak test bench while other matters were receiving attention.

Once the SAT800 had warmed up nicely the picture vanished. Sound was still present — my TV set doesn't mute when there is no video — but the screen was blank. Out came the hairdryer and freezer. With these aids the culprit was soon located. It turned out to be a surface-mounted transistor, RE101.

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

jack@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 first class stamps.
Satellite dish alignment meters can be tricky to use. The null-method is a reliable alternative that requires no measurements. John Pitt-Francis shows how to go about it and the equipment required.

**Null-method Dish Alignment**

I do a lot of satellite installation work and have a small dish alignment meter that was bought for the purpose. It sits in its little case however, with its original batteries unworn. I dislike using it because the reading jumps about too much as I home in on a satellite transmission. And as it’s not channel specific, I wonder whether I have the right satellite — there are two strong sources of signals within 6° of Astra. To me, there is nothing as reassuring as picking up Sky News or CNN. The reading also jumps about in response to body radiation, giving my reflexes conflicting signals. So how do I know that the azimuth and elevation settings are at maximum? The alternative null-method of dish alignment described here solves these problems. It’s not difficult once you’ve got the hang of it.

**Theory**

The theory is simple enough. Fig. 1 shows a comparison between the polar responses of a typical UHF Yagi aerial and a 60cm Ku-band dish. The main difference is that the response of the dish is much sharper. Whereas the half-power points (-3dB) are at a beam width of 15° with the UHF aerial, they shrink to a beam width of 1.5° with a Ku-band dish.

When a dish is swung through its forward acceptance range there are two sharp thresholds at which the sound disappears into the background noise. This applies with both elevation and azimuth adjustment. Since the polar response of a dish is symmetrical, it follows that the optimum alignment position is halfway between the points at which the sound is lost.

**Method**

In practice, the null-method is as follows:

1. You need a satellite receiver which has been pre-tuned, using an aligned rig, to a channel that’s unique to the satellite you are after, for example Sky News with Astra. Use an independent cable between the LNB and your receiver. Connect its UHF output to a small monochrome portable.

2. Fit the dish with its adjustment screws just slack enough to allow movement of the dish. Find the satellite required — usually Astra. The adjustment is not precise at this point.

3. Tighten the elevation nuts, then swing the dish slowly through 3-4°. The sound will cut in then out again. While doing this, note the position of the LNB in relation to the objects behind it. You must keep your head still. It’s now a simple matter to find the mid-point...
between the two null points. With the adjustment in exactly this position, tighten each nut half a turn at a time in rotation.

(4) Slacken off the elevation nuts then repeat the above procedure, this time for elevation. As before, tighten the nuts half a turn at a time in rotation.

(5) You can repeat steps 3 and 4, but if reception was good at step 3 this is not really necessary.

(6) Don’t forget to skew the LNB (about -20° for Astra).

The dish is now set at its optimum reception point – without making any measurements!

Alignment Receiver
I use an old Ferguson SRB1 which has been converted for PAL with a 'Trac' conversion. It provides a useful menu with which to identify the required channel, without the irritating mute arrangements used in more modern receivers. The null method is not really practical unless such muting has been disabled. The AFC must also be disabled or switched off.

Audio Amplifier
By fitting a small AF amplifier and a mini speaker within the receiver you can do away with the need for a TV set for monitoring. An AF signal can be picked up at pin 1 of the scart socket with the SRB1. Use a suitable supply line and make a chassis connection.

There are plenty of AF modules about but I use a home-built one. Fig. 2 shows the circuit diagram. It’s made up on a small piece of Veroboard and sits in the front corner, squeezed into the gap at the right-hand side of the D2-MAC decoder box.

In Conclusion
To date the null method has resulted in null revisits! It’s a worthwhile alternative even if you get on all right with your satellite finder.
MTC EM1428
If you get one of these monitors with a dead power supply, the chances are that the IP38421 chopper control chip has failed. Check or, better still, replace C512 at the same time. A.S.

Unisys PW1000COL
This monitor was dead. We found that the 15kΩ MOX resistor in the secondary switch-mode power supply was open-circuit. There is no component reference number for it. A.S.

GoldStar 1505
This monitor had an EW fault. To restore normal operation we had to replace the TDA8172 field output chip and the GN324N EW amplifier chip. A standard LM324 IC was used to replace the latter device. To check whether TDA8172 chip is the cause of the fault, disconnect pin 3 and measure the voltage. If it’s positive, the chip is faulty. A.S.

Hewlett-Packard 700/41
If one of these terminals is dead with a blown BUW11A chopper transistor, check the four metal-glaze resistors for damage and replace them if necessary before powering up. There are three 5-6kΩ, 3W metal-glaze resistors and a 15kΩ, 3W one. The power supply and timebases are silent, so if you are attempting to repair the unit without a keyboard it is useful to know that a green cursor will appear at the top, left corner of the screen when all is well. A.S.

HIT KT81-144C/8M
HIT stands for High Tech International Trading GmbH. One of these monitors came in because it was dead. The screw that secures the 2SK1118 chopper FET had been driven in at an odd angle and had jammed before it tightened the FET to its heatsink. R826 (0.22Ω), the source resistor, was open-circuit and the 18V gate protection zener diode ZD809 was short-circuit. Surprisingly there was no other damage, but I replaced the transistor to be on the safe side. Don’t make assumptions about the optocoupler in this power supply. It’s for “green control”, not regulation. Release of the optocoupler biases a transistor that shorts out the 3842 control chip’s CR network, thus disabling the supply. Regulation is implemented by monitoring the 3842 chip’s chopper-transformer derived supply. I.F.

KDI430
We had to rebuild this monitor’s power supply — it arrived in a state of severe neglect. When we’d completed the repair we found that there was patterning on the screen. We were suspicious about the floating heat sink and damped this with a CR network. This improved matters considerably. Subsequently the patterning got worse and the monitor was brought back. The culprit turned out to be a 100µF, 16V electrolytic on the secondary side of the chopper transformer. I.F.

Samtron SC428PSL
• The ticket said “flushed and died”. At some stage the spring clip on the heatsink had been fitted clumsily. In fact it had dug into the copper-foil EMC shield on the chopper transformer. The stressed insulation on the windings had eventually broken down and arched to the copper board. Fortunately our customer had sent along an identical, damaged monitor to break up for parts. I.F.

Mitac AM4037R
“Pulsing and smokes” it said — possibly the most accurate fault description I’ve ever seen on a job card. This was another victim of brown glue! The line output transistor’s collector pad had tracked across to the driver transformer’s earth pad. Some work was required to file a guard ring and remove carbonisation from the PCB. The solder on the transformer pin’s winding wrap had been oxidised by the heat, and a fair amount of soot had to be cleaned off.

Take care when remaking the transistor’s connections. It’s on a heatsink away from the PCB, with fly leads — and the collector wire is not in the middle! I.F.

Atari Pattern Monitor
This is a monochrome model: the ones we’ve had in have a badge on the front saying System Solutions and a label at the back saying SM14 Target Model X-144ST. Several have had blown power supplies. It’s a simple self-oscillating arrangement with a bipolar chopper transistor, similar to that used by Wyse Technologies. The square ceramic 39Ω, 4W resistor that feeds the bridge rectifier blows — this may save the fuse. You are likely to find that the 2SC3150 chopper transistor Q101 is short-circuit and its 1-5Ω, 1W emitter resistor is open-circuit. It is as well to replace any resistors that look well done. R102 and R103 (both 150Ω) should be replaced to ensure reliable starting. They are high-voltage types. R106 (100Ω) should be upgraded — it limits the current flowing in the LOFT’s sync overwinding. Check the value of R105 (120Ω, 1W): if it goes high the chopper drive will be weakened. Although the opto-
coupler is protected by a BA157 diode (D105) I tend to replace it to be on the safe side.

The basic cause of power supply failure seems to be the HT rectifier on the secondary side of the circuit. Being unable to find any data on the type fitted, I have used a UF5408 which seems to be suitable.

The problem I had with one of these monitors was loss of video drive. A short length of coaxial cable runs from the video amplifier/contrast control to the CRT base panel. The solder joint to the inner conductor looked fine, but a gentle tug pulled it clean from the solder fillet.

Another thing to watch with these monitors is the resistor and diode that are mounted on the track side of the PCB between the chip power supply and the frame output stage. The resistor gets hot if it springs away from the PCB it can touch the plastic case and cause untidy melt damage. Secure it to the PCB with a blob of silicone rubber. Place a couple of ceramic ICs clipped together beneath the board to push the resistor against it while the unit is being soak tested.

This will ensure that the resistor is set firm, away from the plastic, when the unit is cased up. I.F.

**Taxan MV788LR**

This monitor came in dead with the line output transistor short-circuit. The unit worked when a replacement had been fitted, but a more careful examination showed that there was a bulge in C433 (4.7nf 50V non-polarised) and that R416 (22Q) was scored. I replaced these items then put the monitor through its paces.

Sometimes, when it switched to a higher-resolution mode, a flash was seen in the line output area of the chassis. Careful observation brought me to the BY329-1200 diode D405, whose heatsink had been deburred properly. As a result, the silicone rubber washer was punching through intermittently at the point of stress. I.F.

**Samtron SC428P**

"Screen pincushioning" was the complaint with this one. Actually the scan was excessive - the "pincushioning" was an incidental effect (loss of E/W control). D407, the lower of the two E/W modulator diodes, was short-circuit. It's type UF4304. Don't bother trying anything else - it must be a UF type. I.F.

**Samsung CUM4967T**

This monitor had a blown mains fuse. As the STR58041 chip was OK, a long search for the cause began. The degrading posistor didn't fail, but I cracked it open to make sure! I'd drawn out most of the power supply circuit while working on a previous repair, so I decided to lift each diode in turn to get the number for my diagram, at the same time checking the diodes and going over the soldering.

While refitting D609, which is next to VR601, I impaled my finger on a substantial solder sliver that jutted sideways from one of VR601's lugs. I'm just guessing that this must have made contact with one of D609's leads. This would have shorted VR601, reducing the regulated voltage to a minimum, but if the contact had been intermittent the failure would not have been so surprising.

The monitor was given a three-day soak test. I.F.
Nicam transmissions have made it possible to add the full Dolby Pro-Logic system to TV, making home cinema sound possible. This has led to a profusion of TV speaker arrangements. Alan J. Roberts surveys the current scene.

Over the years all sorts of electronic tricks have been used by manufacturers to improve picture quality. Black-level clamping and flywheel sync were early advances. Then automatic contrast control came with some sets: the contrast was varied to adjust for changes in ambient light level. How many of you can remember the photocell fitted in some Pye 405-line sets? Personally I can’t remember whether the system actually worked. Now of course you can get 100Hz scanning, scan-velocity modulation, digital noise reduction and other improvements with top-of-the-range models.

It is only fairly recently in the history of TV that manufacturers have made a real effort with audio quality. It started with Nicam stereo sound which, in the late Eighties, made true hi-fi TV sound possible. Now, with Dolby Pro-Logic, home cinema sound is a reality. It’s all a far cry from 2W of mono sound from a 4in. loudspeaker driven by a class A output pentode. This article explains some more recently adopted techniques.

Stereo
The most basic improvement is ordinary stereo. In the UK, and a number of other countries, we can enjoy digital sound quality brought to us via the Nicam system. The results can be very impressive when stereo outputs from a TV set or a Nicam VCR are fed to a good hi-fi system. With most TV sets the problem is that cabinet size imposes restrictions: the internal speakers are too small and too close together to give good results at normal viewing distances.

One trick that has been in use for many years is Spatial Stereo. By adding a proportion of the left channel to the right channel and vice versa, with a phase shift, you get an apparent increase in the distance between the speakers. There is usually a trade-off however, in the bass response and a general sound ‘thinness’. This is not too much of a problem when the internal speakers are on the small side and have a limited frequency response.

If the TV set has external speaker connections, normal hi-fi speakers can be linked up and placed farther apart. This gives a worthwhile improvement to the overall

Fig. 1: A listener in the centre hears the full sound. Those to the left or right hear a greater proportion of the relevant channel, producing the ‘hole-in-the-middle’ effect.

Fig. 2: Adding an independent centre channel enables listeners at the left and right to hear correctly balanced sound, with voices emanating from screen centre.
sound, limited by the fact that basic TV sets usually have low output powers.

Some TV receivers have a 'surround sound' provision. By connecting an extra pair of speakers to the 'rear' outputs, passive surround sound can be obtained with stereo material. This is not proper Surround sound, as the effect is achieved by feeding out-of-phase information, with delay, to the rear speakers. The results with a well-balanced system can be extremely good however.

One problem with widely-spaced speakers is the 'hole-in-the-middle' effect. Even with correctly-phased speakers, a listener sitting more to one side will not be able to resolve the centre image properly. Fig. 1 shows why. A centre channel is required to overcome this deficiency.

**Three Channels**

The addition of a centre channel enables a properly-defined centre image to be provided. In its simplest form, this centre channel can be generated by adding left and right information. But it's far better to provide an independent third channel. Speech (dialogue) can then be properly centralised, and can be clearly heard by a listener sitting towards the left or right, see Fig. 2.

**Dolby Pro-Logic Sound**

The Dolby Pro-Logic system includes a true centre channel and a separate rear channel. Although two speakers are used for the rear (surround) sound, they are usually connected in series, comprising a single channel. Fig. 3 shows the sound distribution with a typical system.

Thus the Dolby Pro-Logic system has four audio channels: left, right, centre and rear (surround). The two extra channels, centre and surround, are encoded within the left and right stereo channels and are decoded by a Dolby Pro-Logic processor. George Cole's excellent article in the September 1997 issue explains in detail how the Dolby systems work. Readers can refer back rather than going over the same ground here. What we will do is to take a look at typical sound systems used in stereo TV sets.

**Speaker Arrangements**

The simplest arrangement is, obviously, to have two speakers at the front or side of the TV set. Except in the most basic models, a widely used approach is to have two front-facing, full-range speakers in bass-reflex enclosures within the cabinet, at each side. Reasonably good fidelity is possible with this arrangement, depending on the size of the speakers used. Side-facing speakers can improve the stereo image, but this restricts the position of the TV set as the sides of the cabinet must be kept well clear: building the set into a wall cabinet would not be possible unless the set is provided with external speaker sockets.

Many setmakers now provide a rear subwoofer speaker, which is set into the rear of the cabinet facing upwards. This is usually a fairly powerful speaker that's mounted in an acoustically-designed chamber which forms part of the set's rear cover. It's fed with only the low bass signals, and is normally driven by a separate output amplifier. As it is fed with left and right signals, only mid-range speakers need be fitted at the front (or side) of the set to provide mid- and high-frequency reproduction and stereo separation. The theory behind this is that bass tones are far less directional than mid- and high frequency ones. So having all the bass coming from a single, central source makes no difference to the overall stereo effect. Furthermore an upwards-facing speaker provides an omni-directional effect, so the bass response is less affected by positioning. Fig. 4 shows the basic idea.

This practice of having a large sub-woofer at the rear with mid-range speakers and tweeters at the front means that the audio output power can be increased significantly. Some top-range models handle 70W or more per channel without extension speakers.

Fig. 5 shows a slightly more elaborate arrangement. This features surround sound, with two series-connected rear speakers driven by their own output amplifier. There is also provision to connect external left and right speakers. When these are used they are fed with full-range sound - the high-pass filters in the left and right channels are simply shorted out. In addition the sub-woofer is disconnected. The rear (surround) sound remains as before.
**KEF** claims that its Home Theatre system produces a uniform sound stage without the usual 'sweet-spot' localisation of other speaker arrangements. It says that, unlike conventional systems, its Uni-Q technology creates a highly detailed sound stage over an exceptionally wide area — and, with identical Uni-Q drivers for all five channels, the same high-quality sound is heard throughout the room. KEF says that it is compatible with virtually all quality receivers and hi-fi systems. The compact, discreetly stylish cabinets are flexible to position and easy to install.

**Philips GFL Series Receivers**

The final arrangement, shown in Fig. 6, is a full Dolby Pro-Logic set-up. This is a simplified representation of the circuitry used in the Philips GFL series of TV sets, which incorporate Pro-Logic sound. Four separate amplifiers are used, for left, right, centre and surround. Note however that the sub-woofer is driven by the left and right amplifiers. You will see that an inverter is present in the left audio channel. This is present because if two in-phase signals were to be fed to the sub-woofer they would cancel out and there would be no sound output from it. For the same basic reason the left- and right-channel speakers have to be connected out-of-phase relative to each other to produce in-phase sound for the listener.

When external speakers are connected, once again the full-range sound is fed to them. The left-channel inverter is bypassed so that ordinary hi-fi speakers will operate normally. The TV set then drives the centre and surround sound speakers.

There are a number of options within the sound set-up menu of GFL series sets. These enable the viewer (listener?) to customise the sound to his own preferences. It's possible for example to connect an external stereo amplifier to the left and right output sockets then adjust the TV set to produce a normal or wide centre output. In the normal mode, centre sound is fed to the set's centre speaker and bass sound to its side speakers: in the wide mode, centre sound is fed to the set's centre, left and right speakers. Alternatively the centre sound can be fed to the left and right speakers: this is the phantom mode, which is the preferred one when using an external stereo amplifier for the left and right sound.

Further possibilities are Dolby Three and Hall Surround. The first one is useful where surround speakers are not fitted or the surround channel carries no information: only the left, right and centre channels are used. The Hall mode is designed to produce a surround-sound effect with non-Dolby material: the centre channel is off, the left and right channels provide full-range left and right audio, and a separate L-R signal is generated for the surround speakers — the delay between the front and rear speakers is set at 120ms.

**In Conclusion**

So there you have it: from the days when TV sound was AM mono, then FM mono then digital stereo to full-blown Dolby Pro-Logic, which enables us to enjoy the full home cinema experience if we want to. In less than ten years TV sound has come a long way, mainly as a result of the introduction of digital techniques (Nicam).

What of the future? When hang-on-the-wall TV sets that use flat plasma displays become cheap enough for mass production, virtually any screen size may be possible. Then we may be able to experience true home cinema.
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Letters

TV Faults
A Ferguson T10R mains-battery portable came in for repair twice with the 8A fuse FD702 on the DC-DC converter board blown. I subsequently discovered that Ferguson has a 'protection module' which can be added. It seems that the cause of the problem can be excessive converter board current consumption. The protection module is designed to monitor the current and switch off the power if it exceeds the safe limits. The module's part no. is 20666690. Fitting instructions come with it.

In another case recently a Bush 1432T was brought in because of loss of field hold. On investigation I found that the field hold control VR304 had risen in value from 30kΩ to 60kΩ. I replaced it with a 22kΩ preset which provides a better range.

M. Della Verita,
Langley Park, Co. Durham.

Channel 5 and Cable TV
I have read with interest the recent letters (August and October) on Channel 5 and cable TV modulators - especially as I live in the same area as Mike Harris and have also experienced interference problems.

A Nynex technician told me that ch. 69 and any channel below 40 cannot be used for the cable service. Instead, he altered the modulator in the cable TV box to ch. 44. This cleared the interference to Channel 5 and the image-frequency patterns on BBC-1. The cable input is also much improved, but isn't perfect because of weak reception from a local ch. 44 relay station. This results in slight Venetian bars.

The +5 and +9 spacings are also occupied by weak signals, but the signal-to-noise ratio of the wanted to unwanted carriers appears to assist with spurious signal rejection. A filter would further improve matters.

This is just a foretaste of the problems that will have to be resolved when terrestrial digital TV starts. The broadcasters will be responsible for maintaining same-quality analogue TV reception by carrying out a vast programme of retuning and aerial alterations. It's a patently absurd situation, since the government has under consideration analogue transmitter switch off within five years. It would cost no more to provide every viewer with a free digital set-top box!

Peter Litler,
Stockport, Cheshire.

S-M Aluminium Electrolytics
The October camcorder page contained a reference to leaky surface-mounted aluminium electrolytic capacitors, C945 and C946. in the Sharp Model VLC690H. I recently had the same problem with one of these camcorders. It wouldn't initialise properly because the excessive load caused by the electrolyte leakage had led to the failure of the chopper transistor Q940. After replacing these items and C947, which was also leaky, the machine powered up normally. But the viewfinder image had severe pat- terning when the machine attempted to focus, and the focusing was very laboured and erratic. Further investigation revealed that several similar electrolytics on the SIP/autofocus board were leaky. They could be identified by the soldered joint appearing to be crystallised, more usually at the negative pad, or the presence of liquid just beneath the plastic bases.

The more closely I looked, the more of these leaky electrolytics I found. Certain values were more badly affected than others. I repeated the exercise on all the PCBs, and found a total of 35 leaky electrolytics. The worst affected was 47µF, 6.3V. All fifteen of these were faulty. Others were eight faulty 10µF, 16V electrolytics, four faulty 1µF, 50V electrolytics, three faulty 10µF, 35V electrolytics, two each 47µF, 16V and 22µF, 35V electrolytics and one 22µF, 16V electrolytic. By no means all of these are directly connected to the supply rails, so I can't believe that the power supply fault could have been responsible for their failure. I have never seen such a catalogue of unrelated failures before.

The camcorder is only about five years old and is otherwise in immaculate condition. I wonder how long it will be before the other capacitors of this type suffer the same fate? I don't relish the idea of replacing all the other surface-mounted electrolytics in the machine. Any thoughts on how to tackle the problem would be appreciated.

Arthur Coppock, B.Sc.,
Stockport, Cheshire.

Internet Group
In the March 1997 letters page I asked if anyone would like to contact me on the internet to exchange information, gossip, etc. I was subsequently contacted by a couple of dozen people who were interested in chatting about the TV trade in general. We have gradually built up a group of about forty members who regularly communicate. Many of the group members have web sites that offer help and information for the trade.

The general opinion is that we get tremendous benefit from the group, as we can often help each other by providing information on fault diagnosis, spares sources and news - to name just a few things. We would now like to enlarge our group.

We are not, strictly speaking, a newsgroup, just a bunch of electronics-orientated people from Britain and around the world.
Low-ESR Electrolytics

The use of low-ESR electrolytic capacitors was mentioned in Jack Armstrong's Satellite Workshop column in the November issue. Readers might like to know that Farnell Components of Leeds (01132 636 311) has available an extensive range of specialist electrolytics. Capacitors with effective series resistances as low as 0.018Ω and ones with temperature ratings up to 125°C can be supplied, thus ensuring ultra long life and reliability.

Michael Dranfield,
Buxton, Derbyshire.

Sony KVX2902U

The symptom description in my fault report (November) on one of these sets (BE3B chassis) may not have been wholly clear. The set would not respond to local or remote control commands when a locked picture was being displayed. Otherwise it was OK, so we were able to note down the EVR settings. The cure was a new microcontroller chip.

Richard Flowerday,
Harborne, Birmingham.

Satellite TV Polarisation Checker

Many thanks to Michael Dranfield for his satellite TV polarisation checker design which was featured in the June 1997 issue. I have found this thing invaluable. I added a 100Ω, 10W resistor across the F connector to load the satellite receiver's power supply. Beware - this resistor will run hot!

Pete Haylola, Billesley Satellite, Billesley, Birmingham.

Minimum Order Charges

In a letter in the October issue L. Jones discussed minimum handling charges for spares and components dispatched by spares distributors, and mentioned that one distributor appears to ask for a larger order at certain times in order to qualify for carriage-free delivery when its viewdata ordering system is being used.

At CHS we offer carriage-free delivery of all orders over £10 (excluding VAT) that are received via our CHESS viewdata system.

Any order under £10 received via CHESS has a £2 handling charge added to help cover costs. As with most distributors, we apply handling charges on a sliding scale on all orders received by telephone, fax or post. Our charge levels are £3.99 on orders under £10, £7.99 on orders between £10 and £20 and 99p on orders between £20 and £30. Orders above £30 are dispatched carriage free.

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So it pays to place your small orders by the CHESS viewdata system. We offer this low-carriage-fee charge facility to all our customers.

Pete Haylor, Billesley Satellite, Billesley, Birmingham.

35 Years in the Trade

It's a mystery to me how anyone can run a successful business charging the prices quoted in your What a Life! feature. In my opinion the TV trade has been busy cutting its own throat over the past twenty years. My business provides a first-class service: but we charge well for it and we, not the customer, run the business.

Those who advertise free estimates etc. cannot be very confident of their ability to trade. We give nothing away yet our very large workshop, 2,000 square feet, is always full.

Nevertheless we always enjoy the What a Life! articles. With reference to Vic Rummery of Bodmin - best of luck to him - if we sell an expensive product and for some reason the customer asks for his money back we reply that the money we have taken is ours, the goods are his, otherwise the customer is in effect only lending us the money!

No other business is so chaotically run as the TV game. I say run it fair to make a good living. We are skilled people and deserve it.

E.R. Webb. KTV Electronics, Camborne, Cornwall.

Electrical Safety

I read with interest C.N. Cory's observations on two-wire mains cables (letters, November 1997). As I understand it, for equipment to carry the double-insulated concentric-squares symbol there must be at least two insulating materials between mains voltages and the 'outside world'. Clearly this rule is not being enforced.

A poor example of double insulation I came across recently was a Kenwood DP990D CD player that required a new laser. The mains supply is present at a pair of pins that protrude vertically from a PCB at the rear of the unit, just millimetres below the non-earthed metal lid. If the lid had been bent downwards by an excessively heavy unit on top, or because of mishandling, the whole hi-fi system to which it was connected would have become live. Because of the price of a replacement laser, the unit had to be written off. The world became a safer place.

A problem can occur with equipment that has a live power supply and a floating main circuit, with a chopper transformer or line output transformer used to provide isolation. To prevent the floating side of the circuit floating off to a dangerous potential, the manufacturer uses a high-value resistor and a low-value capacitor to bridge the isolation barrier. The set’s sockets therefore float at 110V, sometimes with a surprising current capability.

Two cases of this sort have caught me out. One was a 14in. Boots colour set that produced a big spark when the aerial input was connected to an earthed aerial amplifier. The set didn’t like running in this way either - there was a thin hum bar on the picture. This was not a faulty set: they all do it. I actually own one of these sets, but I run it from an isolation transformer! Personally I don't consider this set to be safe, and I would not sell one.

The other surprise I had was when I was up a ladder in the pouring rain connecting a dual-LNB feed for a friend. We had connected the second LNB cable my eyes lit up and I got a belt. Both satellite receivers were switched off, but one of them was connected via a scart cable to a cheap TV set that was in standby. Amused I was not.

It's important that we are all aware of the possibility of voltages being present at the sockets of some equipment, and of how dangerous this can be when the equipment is connected to a non-earthed metal object such as a hi-fi system. The current should not be enough to be a serious threat, but a shock could blow you off a ladder or make you drop something - not to mention what members of the public might feel about getting a shock from something that you have installed.

Colin McCormick.
Plymouth, Devon.
Introduction to Digital TV

What will you be looking for when faulty digital TV receivers start to appear on the bench? It's early days so far, but J. LeJeune is able to provide some preliminary guidance.

In the absence of any UK digital satellite receiver models - in fact the receiver specification has only recently been confirmed - this article is simply an introduction to the black art of servicing Pace digital satellite receivers. The receivers seen so far have a family likeness: they look like the familiar analogue Models PRD900 and MSS200. But once the covers have been removed the inquisitive engineer is in for a shock - even with the mains supply disconnected!

The Pace PCB
The printed circuit board looks substantial. This is not surprising, as it consists of four layers of copper print on fibreglass substrates. The top layer carries mainly surface-mounted ICs. The second layer provides screening, to prevent crosstalk between the top layer and those beneath it. The third layer provides interconnections. The bottom, or underside, layer carries more surface-mounted discrete components, with connections to wire-ended, top-mounted components such as electrolytic capacitors and power semiconductor devices.

In terms of worry factor, the only layers that are likely to provide grounds for suicide are the buried ones. And as one of these is simply a screening plate, the one area that could cause the heart to beat a little faster is likely to be the third, interconnection layer. By now you will have realised that it can be investigated with the aid of a continuity tester. But don't use an old-fashioned buzzer: the back-EMF generated can cause a lot of damage to the 3.3V logic chips.

I have already seen some Dutch receivers with interconnection-layer faults. Problems of this sort are rectified simply by adding a jumper wire to make the required connection. Interconnection-layer failures are most likely to be caused by contamination during board manufacture: small quantities of the etchant used can be trapped when the four individual boards are fused together. In service, the board heats up. This activates the etchant, which eats its way through the copper track.

The Power Supply
The Pace digital satellite receiver uses a chopper power supply based on the now familiar TOP202 device. The circuit seems to be quite reliable, though the reservoir capacitor for the mains rectifier seems to have caused a few problems.

As power supplies are, for obvious reasons, less reliable than the rest of a piece of equipment, my guess is that most of the receivers that will eventually come into the workshop will have simple power supply failures rather than logic or other faults.

Servicing Requirements
To deal with anything other than DC faults your test equipment armoury will need to have suitable weapons, specifically a 60MHz oscilloscope, a frequency counter and a good digital multimeter. Without these items, and good eyesight, faults in the processing sections of the receiver are going to create problems.

There's a likelihood that a PC test program will be made available. It will interrogate the receiver via an RS232 port - this is a standard interface between a PC and a peripheral device, with a 25-pin D-type connector - and then provide an indication as to where the cause of the fault lies. Such a system would be invaluable for speeding up fault diagnosis.

UK receivers are likely to incorporate a fast modem as part of the specification, to provide interactive use.
Some means of testing this will also be necessary.

One very important clock signal is the 27MHz one (see Fig. 2), which is linked to the transport stream demultiplexer and is synchronised by data in the transmission. High accuracy is a basic requirement here. Even a small inaccuracy will result in loss of the picture and sound.

**Repair**

Once the faulty component has been located, repair has to be undertaken. The devices used in the DVR500 and DVR501 models supplied to the Netherlands are mostly of the surface-mounted type. Thus those who have serviced camcorders and subminiature audio equipment will have a head start when it comes to digital receiver repair.

Those who are new to surface-mounted devices are in for some surprises—mainly in terms of the cost of the desoldering/resoldering equipment required. Basic tools should include a strong magnifying glass, tweezers, a good bench light, a hot-air soldering tool with suitable nozzles to cater for the ICs used in the receivers being serviced, and a fine low-wattage soldering iron. You will need antistatic bench mats—and a steady hand.

If you are to carry out servicing on any scale, a proprietary surface-mounted component soldering/desoldering station is an almost essential investment. Some stainless steel probes that can be modified to produce a variety of hooks and spikes are worthwhile. For the sake of your eyes, don’t attempt to service digital equipment in a broom cupboard lit by a fly-blown 40W bulb. Good lighting is a primary necessity. A thorough visual inspection can sometimes save an hour’s probing with test equipment.

**IC Replacement**

Once you have located the faulty component, and you are absolutely certain that it is the IC with over 100 legs, begin by warming it with a small hot-air soldering tool. Use a circular motion to heat its body—see Fig. 1. Then fit a rectangular nozzle to the hot-air tool to direct the heat to the IC’s legs. Hold the nozzle about 2mm above the legs: the solder will soon melt. When bright beads appear between the IC’s legs, use the tweezers to grab one corner and lift the device off the board. It all sounds quite easy, and is after some practice.

Remove the excess solder and burnt flux from the vacant copper pads. Solderwick and the hot-air tool will soon complete the first part of this operation, then use a solvent to remove the burnt flux and leave the contact area clean, ready for the replacement chip.

Check the replacement chip for possibly misaligned legs, and if necessary straighten out any irregularities.
DIGITAL TV

Rear view of the Pace DVR500 digital satellite receiver.

before you solder the device to the PCB. Check also that the legs are tarnish free and bright looking. Prepare the PCB's solder pads by painting a thin strip of solder paste along them, on all four sides where the IC is to be mounted. Note that solder paste does not have an indefinite shelf life - keep it stored in a refrigerator at between 3-8°C will help to prolong its life. Soldering the IC to the PCB should be a one-step operation, so make sure that the solder paste is OK by testing it on a scrap board.

Place the IC on the solder pads accurately, and make sure that it doesn't move. A level surface is best, but this is not mandatory. Fit a small nozzle to the hot-air tool and begin to circulate the hot-air stream steadily over the IC's legs at a height of about 5-6mm (a quarter of an inch). Lower the height of the nozzle gradually. Take care not to dwell on one spot for more than a couple of seconds, as this would burn the PCB material and cause electrical leakage. Do not go nearer to the IC's legs than 2-3mm.

At some point the solder paste will melt, forming bright solder around the IC's legs. Remove the heat at this stage. Allow the work to cool naturally; this will avoid heat-stress trouble, dry-joints and IC damage. Once the repair has cooled, check it for solder bridges. These can be removed by careful use of a fine-tipped soldering iron or reapplication of the hot-air gun and the use of solderwick.

Go carefully at all times, and remember that the age-old golden rule of good soldering is absolute cleanliness.

Clues

The following general outline is based on the block diagram shown in Fig. 2. The signal from the LNB, with QPSK modulation, enters the receiver at a satellite (first) intermediate frequency. Within the receiver, the tuner first converts the selected signal to a second IF of 460MHz, which is synchronously demodulated to provide separated I (in-phase) and Q (quadrature-phase) outputs. These are passed to a converter chip which produces outputs in 6-bit digital form. It operates at a sampling rate of some 60MHz, under the control of a crystal oscillator which is voltage-controlled by an output from the following QPSK processing section. This delivers 3-bit data to the forward error correction block. Some quite elaborate data processing is carried out here.

Three chips carry out most of this processing in the Pace receivers, in what is referred to as the channel decoder. The form of this decoder will vary with the transmission medium - satellite, cable or terrestrial off-air. The end result however will always be an MPEG-2 data stream.

In the event of a no-signal fault, indicated in these Pace receivers by flashing of the two bottom segments of the front panel display and the on-screen message "searching for default frequency", check the Manual Tuning Data menu before delving into the electronics. The data should be set to correspond with the service you want to receive, i.e.:

LNB: Local oscillator frequency; polarisation; LNB power on.

Tuner: Tuner frequency; symbol rate; FEC (forward error correction) size.

These parameters must be set correctly for the receiver to lock to the incoming signal. If the parameters cannot be set, use a scope to check for activity on the bus lines from the microcontroller chip to the channel decoder chips when the remote-control handset is being operated. Also check that the remote-control receiver is OK.

To be more specific than this is impossible at present, because the only receivers seen in the UK have been brought in by Dutch or Belgian viewers for temporary use here. UK models promise to be different. But successful operation depends on good communication between the chips used in the channel decoder. A 60MHz scope can be used to check the clock and data signals.

The MPEG-2 data that emerges from the forward error correction chip in the channel decoder in the Pace Models DGT400, DVR500 and DVR501 is fed to a very large chip called the transport stream demultiplexer. This 160-pin monster has a useful pin which indicates whether the incoming data is good enough to process or is still so full of errors that it cannot be deciphered; pin 11 goes low when the FEC chip has been unable to correct the errors. Pin 14 is also very useful for diagnosing where the cause of problems lies. It goes high when the demultiplexer chip cannot synchronise with the incoming MPEG data, indicating that this is corrupt. The chip is clocked at 25MHz (pin 58) by a crystal oscillator which is also connected to the MPEG-2 audio decoder chip.

The demultiplexed signals are then checked to determine whether they need to be sent to the conditional access module. When a clear (unscrambled) signal is present the receivers will work without the CA module being plugged in. With a scrambled signal and no CA module, you will get a message telling you to insert it. You also need a viewing card, which fits in a slot in the receiver's front panel, behind a door.

Fault finding in the MPEG decoder section of the receiver is largely a matter of checking that data and clock signals are present. Good video with poor or no audio indicates that the demultiplexer is OK and that the problem is within the audio sections. But remember that the 25MHz clock for the demultiplexer chip is controlled by the MPEG audio processor chip. If the latter fails there will thus be no activity - no sound and no picture.

As usual, checks for activity on the interrupt request (IRQ) and data strobe (DSTRB) lines can be helpful in establishing where the cause of a fault lies.

Start-up

At power up the 68306 microprocessor chip used in
these Pace sets runs the software contained in the flash memory. Assuming that all is OK and that no corrupt data is present, it instructs the NEC microcontroller chip to operate the front-panel display. Faults such as dry-joints around the flash memory or corrupted data within it, or dry-joints around the microprocessor chip, are likely to result in the receiver being stuck in the standby mode. The power supply will be operational - so beware of the nasty high voltages that will be present here.

In these receivers, as in their analogue counterparts, standby is a matter of switching off the modulator and muting the vision and sound at the rear sockets. The power supply itself is a sort of combination of the MSS100 series chopper circuit with the sensing circuit used in the MSS1000 to provide feedback for regulation.

Processing Power
Digital technology takes radio and television broadcasting into the computer age. The processing power within a digital satellite TV receiver is equivalent to that in many a desk-top computer, fast processing being a primary requirement.

Exactly which processing blocks will be contained in which chips will depend on developments in IC technology. With later developments of the original Model DVR500, like the Pace DSR200 free-to-air receiver, the audio and video MPEG processors are integrated and there is no external 55MHz clock. It appears that the 25MHz audio clock is used, possibly doubled to 50MHz within the processor.

The introduction of a Pace tuner for the company's digital models extended the frequency range - there was a problem in that the original Philips tuners covered only 950-2,050MHz. Tuner failures were common with early receivers, but later ones with second-generation Philips tuners or the Pace tuner seem to behave better in this respect.

Teething troubles are to be expected with early production receivers, and the delay in the start of digital broadcasting in the UK may be all to the good - though you could argue that early troubles provide experience for service engineers.

In Conclusion
Training in digital broadcasting techniques, particularly in receiver servicing, is likely to be a hot topic in the coming months. With some notable exceptions, the training provided by technical colleges has rapidly diminished over the last few years. Training provided receiver manufacturers such as Pace has been available to the trade, and more is expected as the actual launch of services gets nearer.

The arrival of digital broadcasting represents an opportunity for engineers to promote their services. Many less capable engineers will probably opt out, and there will be a great deal of ignorance and confusion amongst viewers and the public in general when the transmissions start. Answering their questions, giving them reassurance and repairing their equipment when faults arise will provide your business with a much-needed boost.

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Donald Bullock gets some lessons on common camcorder problems from son Steven. So this month it's a load of camcorders

"We haven't been getting any camcorders in lately" Steven said the other day. "Perhaps they've all been put away for the winter."

"Good thing too" I replied. "I scarcely know anything about them, and can't generate much curiosity."

**A Handycam**

As we spoke, Cyril Sidgeworth popped in with a Sony Handycam, Model CCDF330E.

"Liney picture" he squeaked.

"Picture all liney. Sort of made of lines, like. Liney, you might say."

"OK, OK" I said, waving him out. As Steven plugged it in, I asked "what's the cause of that then?"

"Dud parents I suppose" he replied.

I looked at him. "The camera" I said.

"Oh. Loose guide poles on the tape arms I expect. Usually is." He's got long, thin fingers, like Greeneyes. Not short stubby ones like me. So he had it open in no time. Sure enough the guide poles were loose. Each pole is secured by a tiny screw. But there was still a problem when he'd tightened them.

For the first two minutes after switching on the control pulses seemed to be weak and, with a standard play recording, the tape speed kept switching between long play and standard play. After the two minutes however the camcorder worked perfectly. It continued to do so whenever we tried it for the rest of the day. We decided to put it aside until next day.

**And another**

This was as well, since Pete Porter bowled in at this point with a bagful of shopping.

"Can you mend this, Mr Bullock?" he asked, peering at his bag of shopping. I noticed an old screwdriver poking out of his top jacket pocket.

"No. Who would try? How is a chap supposed to mend a bag of shopping?"

He pulled out a pound of sausages, a box of eggs and a bag of pork chops and laid them out on our counter. Steven nicked his hair like Stan Laurel as I stood in indignant disbelief, like Ollie. Then out came a Sanyo VMPS120P camcorder.

"E's about a year old. Yest'dy he jammed up. All by hisself. I never touched 'im, 'onest. Cross me 'eart and wish to die."

He then departed, leaving his sausages. Steven displayed his expertise by rapidly opening up the camcorder. The tape carriage had been forced so brutally that it was quite unrepairable.

While I was wondering about it Steven was on the phone to Chas Hyde and Son.

"So the part number is 11923X0 and the price £20.40 altogether. That's cheap. Will you post it today?"

It arrived next morning, as we knew it would from this excellent firm. Steven had the camcorder working perfectly almost as soon as the postman had left.

When Porter returned I told him about the mangled tape carriage.

"Must 'ave been the missus" he said.

**Sunshine's Viewcam**

Our next caller was Sunshine Honeychild. She bounced in as though she'd just jumped from a carnival float and was carrying a Sharp Viewcam, Model VLC73H.

"What's up with it?" I asked.

"It's the laziest camera in town, man. Done do nuthin'. Nuthin' at all."

Steven tried it and found that it wouldn't eject the tape in it. There was no rewind or fast forward either. Once again his fingers flew into action and the camcorder was soon opened up. He examined it carefully.

"I reckoned it might have been the mode switch" he said, "but it isn't. The easiest approach with these is to remove all the casing parts first. Then it's a simple matter to separate the single PCB from the bottom of the deck."

When he'd done this he soon found the cause of the trouble. Several membrane leads connect the chassis and the panel. Three of the retaining clamps had never been clicked into place, so the conductors were only loosely connected. When they had been pushed home properly and the clamps had been secured the camcorder came to life, with excellent results.

**Dickie Downsize**

Dickie Downsize is a preacher of sorts and a general walking disaster. Not only does he do silly things, he tries to cover up his fool-
ishness. At such times the truth is not in him — and he makes us sore displeased.

As Sunshine Honeychild collected the news that my wife had appeared with a — a Canon E230E.

"It was all right until I used my new head-cleaning tape" he declared, "now it messes up my new head — and he makes us soreishness. At such times the truth is not in him — and he makes us sore displeased.

Dickie shuffled about a bit. "Dickence" he said, "you know that Vaseline you didn't put on your cleaning tape?"

"Yes" said Dickie. "Well, don't put it in again, eh? Because I'm going to have to charge you twenty five pounds for taking it out, then there's the cost of our test tape."

"Dashed good wheeze" he trilled. "It's happened before ack-tew-lee, don't they?"

"Daresay it has, Den" said Steven. "They do. The loading gears become brittle as they get older and the teeth wear or occasionally break off, jamming the works."

As he sallied off, Steven's fingers started to fly about like Ichabod's. He soon had the camcorder open, and quickly unlaced the tape and fitted new gears. We got them from Chas Hyde and Son. When Denzil returned he was delighted.

"Why, you've got it working as good as new" he said to Steven as he dug out his wallet. "I'm ever so pleased, 'cos it's a nice little camera, won't it?"

**Back to Cyril's Handycam**

I turned to Steven when he'd gone. "Well" I said, "you were bemusing the disappearance of all the camcorders. But we've had our share recently, and they've all gone back — except for Cyril Sidgeworth's Handycam. Wonder if we can clear up that final problem? Let's assume for the moment that the cause of the fault is mechanical."

We pulled it on to the bench and studied its mechanics carefully during the two minutes before the fault condition cleared. This enabled us to find the cause of the trouble. The back-tension arm is secured by a fixed pin that rises from the deck plate. During manufacture it had been lubricated with graphite grease. When the camcorder was left for a time and allowed to cool down the grease would solidify. Thus for the first two minutes, until it warmed up, the back tension was slack. In this condition the tape skated loosely over the heads, to the detriment of the essential control pulses. All so logical, and easy to understand, once you know what's going on.

We cleaned off the hardened grease, then applied new grease. When Steven had reassembled the Handycam and tried it I reached for the phone and dialled Cyril's number.

"Your Handycam's ready, Cyril" I said. "Get some cabbage and make for the shop."

"Ha Good" he squeaked. "Is all the liness gone? Are there any lines on the picture? Is it liney? What I mean is, is the liness all gone."

"Gone for ever, Sidgeworth" I said.

As we tidied the workshop I reflected on young Steven's servicing abilities. Not bad at all, I thought. He's obviously well endowed with my genes. I reckon that in time he might just become as clever as his dad.
**Fault Finding**

Reports from
Philip Blundell, AMIEEIE
Nick Beer
Robert Wainwright
John Edwards
Edward Branch
David Smith
Andrew Tebbutt
Terry Lamon
Keith Evans
Michael Maurice and
Chris Watton

Grundig ST55-725FT
(CUC7350 Chassis)
This new set was brought back with an unusual problem a week after being delivered. Only one function was affected – the OK message that comes on when a setting is memorised had changed to E. The correct values were being stored.

On Grundig’s suggestion new microcontroller and EEPROM chips were fitted, but the E remained. In previous Grundig chassis, special functions were called up by holding down one of the front control buttons then using the mains switch to power the set. After a few minutes of trial and error I found that switching on with the programme-down button held down cleared the ‘fault’. P.B.

Ferguson B49F (TX90E Chassis)
If there is no tuning, check the 33V supply at pin 4 of the tuner unit. If this is low or missing, check RH05 (12kΩ) which is by the tuner and RH04 (27kΩ) which is by the line output transformer. P.B.

Toshiba 2100TBT
This set had two faults: the picture pulsed for the first few minutes and the set wouldn’t tune or store a station. The reason for the pulsating picture was that the power supply didn’t run cleanly from cold. Replacing C824, C829 and C830 soon cured that. The tuning fault was a bit more obscure.

The exact symptoms were as follows: when a channel was selected the picture came up then the tuning slowly drifted off. This happened with all stations. Suspecting an AFC problem, I started by checking the voltages at transistor QA06. There was no voltage at its base, though there was at pin 5 of the IF module. RA75 (1kΩ) was open-circuit. P.B.

Sharp DV6635H (BCTV-A Chassis)
When this set had been on for a few minutes the picture would gradually go dark then disappear. Checks in the video section showed that the luminance was being lost in the TDA4681 video processor chip 1C400. The problem was not being caused by the chip itself; the sandcastle pulse at pin 14 was the trouble – it was misshapen. The field section of the pulse is derived from the TDA8350Q field output chip 1C500, where the pulse at pin 2 changed when the picture went dark. A new TDA8350Q chip restored normal operation. P.B.

Panasonic TC100G
This aged but nice portable TV/monitor was dead when powered from the mains supply. It was OK with a DC supply. There was a buzz, but the DC conditions on the primary side of the power supply were haywire. The outputs on the secondary side were, even when unloaded, at just over fifty per cent of the correct levels. R816 (330kΩ) in the trigger amplifier stage was open-circuit. N.B.

Samsung C15322T
This set produced no sound though the output stage was clearly working. In addition the sweep tuning didn’t stop. There was obviously a link between these two symptoms.

A check showed that the microcontroller chip’s ident pin didn’t toggle when a station was found. The associated pull-up resistor R709 went open-circuit on load, though it seemed to be fine when checked with a meter. N.B.

Harwood HTV4914
An intermittently snowy picture has been the problem with a couple of these sets I’ve had in. The impression you get is that there is a tuner problem or a faulty socket. The rather interesting cause however is an invisible break in the print just after the tuner’s IF pin. N.B.

Bush 2052T
After curing the usual excessive HT fault you may find that the sound is muted. Your reaction would be to replace the microcontroller chip 1C601. When this is ordered however you will find that an equivalent which won’t work properly is supplied. Once Alba has sorted out this problem you may still have the fault. Check the voltage at pin 13 of 1C601. If there is no voltage here, check the 1N4148 diode D304 in the network connected to pin 30 of IC301. It may be short-circuit. It seems that a number of engineers are waiting for microcontroller chips that are not needed. R.W.

Philips CTX-S Chassis
This set would occasionally switch off. Purely by accident and good fortune, whilst I was prodding around in the power supply area looking for dry-joints the HT preset R3325 fell apart. A replacement solved the problem. J.E.

Amstrad CTV250
This set would intermittently switch off, as if it had been unplugged. After a long time it might or might not go into the standby mode by itself. When it did, use of the remote control unit to select a chan-
I took the back off, hoping to spot the fault to put in an appearance. A blanket resoldering job followed by a two-day soak test proved that all was now OK. J.E.

Dynatron 279062EK/05Z (Philips 2A Chassis)
This set was dead. Its power supply was trying to produce the HT voltage but couldn't because the BU508V line output transistor was short-circuit. A replacement died but couldn't because the CRT was trying to produce the HT voltage. It was high at 150V instead of 112V. Replacing the
chopper drive coupling capacitor C909 (47µF, 25V) brought it back down to the correct level, but the field output chip had succumbed to the high voltages. The 12V supply was also missing, which is why there was no sound or vision. R422 (5Ω, 3W) and ZD402 (12V) had failed. Once these three items had been replaced the set was pronounced fit. E.B.

Hitachi CPT2236 (NP83CQ Chassis)
The customer complained that the picture "bounced intermittently". This was so, but it was more that the top inch of the picture came and went, leaving a gap at the top of the screen — the linearity was not affected. I scoped the field input at pin 1 of IC601 and found that a large line pulse was present on the waveform when the fault occurred. After much checking and changing of capacitors in the field timebase I found that C613 (100nF) was the culprit. It's connected across the field scan coils. E.B.

Fidelity ZX5000 Chassis
This set was dead with no 120V HT output from the power supply. When I disconnected R57 to unload it the BULT56A chopper transistor TR1 failed. As I've had similar problems before with this type of power supply I replaced the 4.7µF chopper transistor base coupling capacitor C5. I also replaced the chopper transistor base coupling capacitor C5. I also replaced the 10µF, 1.5kV line output stage tuning capacitor C28 as one of its legs was burnt, though it measured OK. Further checks brought me to the 100µF HT reservoir capacitor C18, which was open-circuit. After fitting replacements I started the set up via a variac. When the AC input reached 120V the set sprang to life and the HT remained constant at 120V as the input voltage was increased to 240V. E.B.

Panasonic Alpha 1 Chassis
This set was half dead! The channel numbers and the standby LED were alight, but there was no sound or raster. Various checks in the line output stage failed to reveal anything amiss, so I disconnected the scan coil plug. The standby LED then went out with the channel numbers still alight. So in went a new TLF15506F line output transformer. This brought the set back to life. D.S.

Granada C16BZ4
This set produced a yellow picture because R271 (56kΩ) in the blue channel was open-circuit. It's advisable to replace the equivalent resistors in the other channels as well. D.S.

JVC C14ET1EK
This set produced a picture that was swamped with a red cast. Checks on the tube base panel showed that Q502 was short-circuit collector-to-emitter. A.T.

Ferguson TX90 Chassis
There was reduced height with slight top foldover. Having had experience with these sets I looked for dry-joints around the field output transistors, but there weren't any. Voltage checks then showed that TR105 had only 0.5V at its base instead of 1V. The cause of the fault was in the DC feedback circuit, where R194 had risen in value from 270kΩ to around 500kΩ. Note that the value of this resistor varies with screen size. A.T.

Goodmans 1405T
This set had a blank raster, as if someone had switched it to the AV mode. The cause of the problem was cracked print along the rear edge of the board, removing the supply to ZD102. I've also had one of these sets that wouldn't tune because of cracked print in the same area. A.T.

Thomson/Ferguson TX805 Chassis
Failure of the M55038SP multifunction chip IL01 in one of these sets produced the blank raster symptom (no video). A replacement restored normal operation. The set was actually badly as the Goodmans 1410. A.T.

Sharp 59CS05H
If you get one of these large-screen sets and it looks as if the CRT is faulty, with poor focus, check whether R618 has risen in value. It should be 2-2kΩ. T.L.

Sony KVM2140
The complaint with one of these sets was that it would intermittently crack, with a picture flash. It was left on soak test and after a while it started to produce the symptoms. When I removed the back and inspected the PCB closely I saw that the line output transformer's earth pin was dry-jointed. A clean up and resoldering cleared the fault. T.L.

Sony KV25F1
This large TV set would lose its
picture and sound intermittently through the on-screen display remained. It was a difficult problem to deal with because the fault wouldn’t show on test in the workshop, only in the owner’s home – occasionally. I eventually checked with a friend who is familiar with the chassis. He recommended a Sony sync circuit modification which consists of changing R117 to 2kΩ (1-208-789-11) and C201 to 0-1µF (1-164-004-11), then replacing IC3 with the type supplied under part no. 8-759-447-61. The IC differs depending on model number, so check this.

The set concerned now seems to be behaving itself. The modification provides improved sync performance under weak signal conditions. T.L.

Ferguson ICC9 Chassis

If continual tripping is the trouble, try removing the fuse. The modifica-
tion which consists of changing R117 to 2kΩ (1-208-789-11) and C201 to 0-1µF (1-164-004-11), then replacing IC3 with the type supplied under part no. 8-759-447-61.
The IC differs depending on model number, so check this.

The set concerned now seems to be behaving itself. The modification provides improved sync performance under weak signal conditions. T.L.

Ferguson T10R

The complaint with this little 10in. set was a line down the middle of the screen, which is rather unusual nowadays. But the customer was quite right. I removed the back, powered the set up again and tapped the main PCB gently. A loud arcing noise came from the scan coils. The wire from the line output stage to the coils was just hanging on the tag – it appeared never to have been soldered. I cleaned the connections; made a good physical wrapped connection and resoldered it. This cured the problem. T.L.

Matsui 1436

Fluctuating brightness was the complaint with this portable. I’d had the problem before and just touched the sub-brightness preset VR303. This settled the picture. A new 10kΩ preset cured the problem. T.L.

Sony KVM14TU

This portable came in with a dark-screen picture that faded slightly. You could have thought mistakenly that the CRT was faulty. The things to check are the first anode supply diode D852 and the feed resistor R852. Replacing them should restore a good picture. You may find that the resistor is somewhat burnt. T.L.

Ferguson ICC9 Chassis

If the problem with one of these sets is a bright white screen, check the 10Ω safety resistors RB06 and RB07 on the CRT base panel. T.L.

Hitachi G6P Chassis

Most of the picture was blanked except for an uneven area about three inches wide at the left-hand side of the screen. What remained of the picture in this area suffered from line pulsing and unlocked colour, and was also expanded in size. When the back cover was removed it was evident that something was cooking. Close inspection of the components around the line output transformer revealed that tuning capacitor C782 was in some distress. A replacement put things right. K.E.

Grundig CUC70KT

Herringbone patterning and a negative picture, but only on some channels, was the complaint with this old set. The problem cleared when the set had warmed up. I eventually found that replacing the 47µF and 220µF electrolytics next to the IC in the IF can restored normal operation. K.E.

Hitachi NP83CQ Mk 2 Chassis

The picture was bright on the right-hand side of the screen, fading to very dark on the left-hand side. The condition improved as the set warmed up. This sort of thing usually means that the reservoir capacitor in supply for the RGB output stages, derived from the line output stage, is faulty. A quick burst of power to the CRT base panel cured the fault. M.M.

GoldStar CIT9508

After a few minutes the picture would fade and disappear. We’ve often had this fault with Ferguson sets, but never before with a GoldStar one. As with the Ferguson sets, the cause of the problem was loss of the CRT heater supply. Dry joints at connector P451 on the main panel were to blame. K.E.

Panasonic U4W Chassis

This set would occasionally refuse to come out of standby. The cause turned out to be the reservoir capacitor for the error sensing circuit in the power supply, C808. The correct value is 47µF (25V). When it was measured with a capacitance meter the reading was only 19µF. A new capacitor cured the fault. M.M.

B and O MX1000

This set was dead, with the line output and chopper transistors both short-circuit. A previous engineer had replaced the chopper transistor, which had failed again immediately. The cure for this is to replace the driver transistors in the power supply as well as the chopper transistor itself. The cause of the line output transistor failure was probably the dry-joint we found at the tuning capacitor. M.M.

Mitsubishi CT15M2TX

There were two faults with one of these sets. First, it wouldn’t come out of standby. The STR55401 chopper chip was responsible for this. The second fault occurred when the set had warmed up: line and field sync were lost. The cause was on the text board, where the MAB8461-W115 microcontroller chip IC704 responded to heating and cooling. A replacement restored normal operation. M.M.

Sony KVV2562U

There were lots of lines and the height and linearity were doing odd things. Scope checks showed that a sort of 50Hz ripple was present on the field output sawtooth waveform. It was also present at the input to the field output chip. The culprit was the CXD2018Q micro-function chip. Replacing this 48-pin flatpack device, which lives on board M, cured the fault. M.M.

Philips CP110 Chassis

After a few seconds the display would go out and there was no response from either the front panel buttons or the remote control unit. The culprit was the 1N4148 diode D6733, which is located beside the microcontroller chip. It was leaky. K.E.

Decca DYS9893C

This set was ‘dead’ except for the channel indicator LED. Checks showed that the power supply was working, and that HT was present at the collector of the line output transistor. There was no supply at the line driver transistor’s primary winding however. This supply comes via a plug-in PCB that carries the scart socket and the switching circuitry. The PCB connector had a dry-joint at its end pin (they aren’t marked). Resoldering brought the set back to life. M.M.

Samsung CI3132Z (P585C Chassis)

This portable produced no sound unless it was connected to a hi-fi

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system via the scart socket. Sound switching is carried out by the CD4066BCN chip IC601. The 2SC1815 transistor Q601 controls this and appeared to be faulty. A replacement cured the fault. M.M.

Philips CP90 Chassis with Fastext
The picture was OK when this set was first switched on. Then, after a few minutes, small black dots akin to satellite TV sparkles began to appear. After a few more minutes these dots turned into small rectangles and the picture became dark. The cause of the trouble was a faulty SAA2343P/F text processor chip. A new chip produced a good picture without dots. C.W.

Finlux 1000 Series
This set was dead with RU14 (10kΩ) burning up. The cause was a short in the changer transformer, which is the same type as in the 3000 series chassis. C.W.

Amstrad TVR2
When this set had warmed up the verticals became ragged. Checks in the power supply were fruitless, as no undue ripple could be found. What I did discover was that freezing the line driver transistor cleared the fault. But a replacement made no difference. So why was the transistor running away with itself? Checks on nearby components revealed that C1409 (1Np, 2kΩ) was open-circuit. Normal operation was restored when this item had been replaced. C.W.

Toshiba 2539DB
There was only a low whine from one of the background speakers. Everything else was OK. The culprit was the TA8211AH chip IC501. C.W.

Finlux 5100
Although the EHT came up when this set was switched on there was no sound or picture. When the tube’s first anode voltage was increased there was illumination on the screen. Checks showed that the SSV and S12V supplies were missing, the culprit being the BCS77 transistor T18. It was leaky. C.W.

Sanyo CPB2565/2566 (E3-A25 Chassis)
The complaint with one of these sets was flaring and a dim picture. Apparently another firm had condemned the tube. In fact the HT was low. After a few checks we found that the thick-film error voltage sensing unit A701 was suspect—it’s a small, four-pin module. As the circuit is shown in the manual, individual parts could be tested. The silicon devices were OK, but the resistors were up the wall. Unfortunately when we tried to order a replacement we were told that the unit is no longer available. Rather than scrap the set we decided to make a replacement on a small piece of Veroboard, with a potentiometer for HT adjustment. Fig. 1 shows the circuit. C.W.

Matsui 1466
Failure to start up, though the channel indicator is lit, has become quite a common problem with these sets. The start-up resistors R502 and R503 (both 330kΩ) in the power supply tend to go open-circuit. It’s best to replace them both. C.W.

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TELEVISION January 1998
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: Service manual or circuit diagram for the Ion Obelisk 3x/2.03 Hi-Fi amplifier. Or does anyone have an address for Ion Systems Ltd.? The one on the back of the unit is no longer valid. Failing that can anyone tell me the values of 24/24a on the power amplifier board? Dave Rhodes, 175 Flixton Road, Urmston, Manchester M41 5ED. 0161 747 7543.

For disposal: Tektronix 2235 100MHz, double-beam scope with delay sweep and probes. Recent calibration certificate. Reasonable offer. Ian Tilley, 6 Lime Road, Tiverton EX16 7JG. 01884 624 951.

Wanted: LOPT for the Mitsubishi TV Model CT1905BM, new or second-hand. Part no. is 334BD79010. Martin Abbott, Flat 7, The Highlands, Ludlow Road, Leominster, Herefordshire HR6 0DH. 01568 614 725.

For disposal: Collector has various issues of Practical Wireless/Television dating from 1947 to 1969 available. Please send stamped, addressed envelope for list. David Tilley, 6 Lime Road, Tiverton EX16 6JA.

Wanted: Does anyone know of a source of spares and service information for the Soundwave Model CTV1405P? A. Robertson, 261 Warrington Road, Abram, Wigan WN2 5RQ. 01942 865 621.

Wanted: TDA3300B and TDA3030B chips. Good price paid. R. Gifford, 4 Gipsy Lane, Needham Market, Suffolk IP6 8DY. 01449 723 009.


For disposal: Number of TV, radio and audio valves, all boxed and unused. For list send SAE or fax Mike Brett, 31 Eastfield Avenue, Watford, Herts WD2 4HH, 01923 224 951.

Wanted: Scan coils for the Mitsubishi Model CT2525TX (CRT type AS91HZ). Salvaged set will do fine. Also STK043 or equivalent. Have for disposal to enthusiast seven Radio and TV Servicing volumes between 1960 and 1971. Mike Weston, 67 Prince of Wales Road, Dorchester, Dorset DT1 1PS. 01305 267 154.


Wanted: FX765 VCR and a front memebre switch control panel for the Ferguson TV Model 51K3. Mike Haslam, 477 Warrington Road, Abram, Wigan WN2 5XY. 01942 865 766.

Wanted: Servo pack PCB for the Panasonic NVFS100B VCR; also any instructions/suggestions in connection with a jammed cassette holder. Eric Chapman, 42 Rochester Drive, Lincoln LN6 0XJ. 01522 688 307.


Wanted: For disposal: Two brand new unused. For list send SAE or fax Mike Brett, 31 Eastfield Avenue, Watford, Herts WD2 4HH, 01923 224 951.


For disposal: A number of TV, radio and audio valves, all boxed and unused. For list send SAE or fax Mike Brett, 31 Eastfield Avenue, Watford, Herts WD2 4HH, 01923 224 951.


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Wanted: LOPT for the Hitachi Model CT15. Andie Wilkes, 34 Tideswell Road, Great Ban, Birmingham B42 2DT. 01926 404 935 day, 01504 652 574 evenings.

More help on page 199
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Please add £1 P&P and VAT at 17.5% to all orders
All brand new components

We accept payment by Access, Switch, Visa, Cheque and Postal Order (Government, College etc orders accepted)

Prices quoted are subject to availability and may be changed without prior notice
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TELEVISION January 1998
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**AMSTRAD MOD KIT**

**FITS:**

- VX1 4000, 4600, 4700, 5200, TVR 123

**PRICE:** £2.75 + VAT each
**MODE SWITCH**

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**AUDIO CONTROL HEADS**

Replacement Audio Control Video Sound Head for National Panasonic

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**VIDEO CLEANING STICKS**

Price 17p each. 15p each pack of 10pc.
Order Code: SP14

**VIDEO MAINTENANCE TOOLS**

Set of 8 Allen keys packed in a plastic wallet
Order Code: TOOL 9, Price 125p
Specifically designed for video maintenance

**UNIVERSAL HEAD EXTRACTOR**

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

**BACK UP BATTERIES**

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<th>MAKE &amp; MODEL</th>
<th>CODE</th>
<th>PRICE</th>
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<tbody>
<tr>
<td>PHILIPS Part Nos: 138 - 101138, 138 - 10313 1.2V 90mAh</td>
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<tr>
<td>Part Nos: 138 - 10228, 2.4V 100mAh</td>
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**SATURN**

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<tr>
<td>PACE PRD800, PRD900</td>
<td>SATPSU1</td>
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<tr>
<td>PACE SS9900, 9200, 9010, 9210, 9220</td>
<td>SATPSU2</td>
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<tr>
<td>AMSTRAD SRD510, SRD520</td>
<td>SATPSU3</td>
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<td>AMSTRAD SRD530</td>
<td>SATPSU4</td>
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<tr>
<td>AMSTRAD SRX340, SRX345, SRX350</td>
<td>SATPSU5</td>
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<td>PACE D100/150</td>
<td>SATPSU6</td>
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<td>CHURCHILL 02MAC</td>
<td>SATPSU7</td>
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<td>PACE MSS100</td>
<td>SATPSU8</td>
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**SATELLITE TUNERS**

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<tr>
<td>PACE PRD800/MSS200 2GHz (221-2077062)</td>
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<tr>
<td>PACE PRD900/MSS1000 2GHz (221-21770112)</td>
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**SWITCH MODE TRANSFORMERS**

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<td>PRD900</td>
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**REPLACEMENT TV SWITCHES**

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<tr>
<td>GRUNDIG Part No: 29703, 29102</td>
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<tr>
<td>PRICE: 140p</td>
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<tr>
<td>SONY USED ON: K1612, KB1612, KV1614, KV2052, V2056</td>
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<tr>
<td>KV2062, KV2067, KV2212 + ETC</td>
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<tr>
<td>ORDER CODE: SW5</td>
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<td>PRICE: 150p</td>
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**SONY 2 PIN FUNCTION SWITCH**

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<tr>
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<tr>
<td>(POWER SWITCH 21mm + Remote)</td>
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<td>ORDER CODE: SW6</td>
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<tr>
<td>PRICE: 200p</td>
<td>SW9</td>
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**SATMETER**

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

Through operation with satellite RX powering the LNB.
- Acoustical signal: On signal strength
- *LED indicator: Vert/Hori
- Frequency Range: 900 to 2050 MHz
- Input impedance: 70 Ohm
- Power amplifier: 18dB
- Detection Range: -60 to -10 DBM
- *Max. Input signal: -10 DBM

ORDER CODE: TOOL 22, Price 500p
**FUSES**

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<tr>
<th>CURRENT RATING</th>
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<td>20mm</td>
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<tr>
<td>3.15A</td>
<td>20mm</td>
<td>Fuse34</td>
<td>100p</td>
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<tr>
<td>2.5A</td>
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<tr>
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**CERAMIC PLUG TOP**

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<tr>
<td>13A</td>
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**32 mm CERAMIC SLOW BLOW**

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**20mm CERAMIC TIME LAG**

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<td>20A</td>
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**38mm CERAMIC TIME LAG**

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<td>4A</td>
<td>Fuse43</td>
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</tr>
<tr>
<td>5A</td>
<td>Fuse43</td>
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**SPRING HOOK**

Spring hook to unlock springs in audio tape recorders & VCRs

ORDER CODE: TOOL20

**FAULT FINDING / COMPARISON BOOKS**

- **Satellite Fault Finding Guide Issue 1.**
  - Listing about 1,000 faults for over a range of 24 different brands.
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  - Over 300 pages packed with more than 5500 faults for different brands.
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  - Lists more than 8,450 faults with 460 pages covering 58 different brands.
  - Price: £16.00 only - No VAT. Order Code: BOOK02

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  - 25 WATT 240 VAC (250W 240V)...
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- **IC. PROTECTORS**
  - ICPF10, ICPF15, ICPF20, ICPF25, ICPF30, ICPF50, ICPF75, ICPN5, ICPN10, ICPN15, ICPN20, ICPN25, ICPN38, ICPN50, ICPN75
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  - 75ML, STP1 125p

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- 250ML, STP1 155p

**CLEANER**

- 350ML, STP1 255p

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- Spring hook to unlock springs in audio tape recorders & VCRs
  - Order Code: TOOL20
  - Price: £265p

**SPRING HOOK**

- prices for packs of 10 fuses **

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A terminal screwdriver incorporating continuity & voltage with Euroslot

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Price: £220p

**TELEVISION**

- Price: £265p

- Service Number: 0181 900 2329

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Tel: 0181 900 2329
Fax: 0181 903 6126
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Wanted: Leader LCT910A CRT

Model KVM1401 (BE22a chassis), part no. A-1645-07A (PCB marked 1-639-795-12). Also require Ferguson TX89 chassis main PCB (Model 3626 or 142M). Both items working if possible. Alan Dobey, 4 Cypress Avenue, Hillhead of Demere, Bridge of Don, Aberdeen AB23 8LA. 01224 823 955.

For disposal: Two Amstrad PCW9512 word processors, both working, one with 3.5in floppy disc drive conversion; one Amstrad PCW8512, not working but with spare CPU board; 9512 and 8512 diagnostic panels plus start-up discs for above. Offered in return for a generous donation to a charity for horses. K. Plummer, KC-10, High Street, Hampton Hill, Middx TW12 1PD. 0181 997 4802.

Wanted: service data, LOFT, line and EHT valves for the Bush type 54405-line TV receiver; service information, front user controls and rear cover for SageN 14us. Alba 405-line set circa 1954. Also any 40-line TV, particularly console models. Philip Gay, 80A Milton Brow, Weston-Super-Mare. Somerset BS22 8DE.

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**TELEVISION January 1998**

**READER SERVICE**

**TELEVISION January 1998**

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**TELEVISION January 1998**

**READER SERVICE**
Reports from
Alan J. Roberts
Roger Burchett
John Coombes
Terry Lamoon
Stephen Leatherbarrow
and Pete Gurney, LCGI

Philips VR813 etc
No display with all the functions working has been the fault with several of these machines I've had in recently. In each case the fault has been failure of the 315mA fuse that feeds the fluorescent display. No other fault has been found and a replacement Wickman fuse puts things right. A.J.R.

Sharp VCR8300
This very old machine was still in excellent condition. It would switch on but did nothing else. The drum drive belt had perished, and the loading arms were halfway up. I replaced the belt, but when I tried to wind the arms down manually I found that the loading motor had seized solid. It's not in the most accessible of places, but by careful manoeuvring I managed to extract the loading motor assembly. A search in my junk box produced an almost identical motor from an old lift assembly. It fitted perfectly, and when the assembly was replaced the machine came to life and worked surprisingly well. A.J.R.

Philips VR2547
I had to be careful with this one as it belonged to the dentist! The main problem was damage to the top edge of the tape - this was obviously the cause of sound drop-out. No, it was not the capstan bearings, though I tried relubricating them. The capstan flywheel 'soft brake' pad had become a very hard brake pad! R.B.

Saisho VR1000
The owner's complaint was that this machine wouldn't load a cassette. For once this was 100 per cent correct. All functions worked correctly when a cassette was loaded manually. The supply to the carriage motor was missing because of dry-joints at connector CD1009 on the carriage PCB.

Philips VR2547
I had to be careful with this one as it belonged to the dentist! The main problem was damage to the top edge of the tape - this was obviously the cause of sound drop-out. A new pinch roller cured that. He had also complained about an intermittent knocking noise. The machine now seemed to be faultless, but I left it running with a four-hour tape. After some time I was aware of a regular knock, which came from the area of the capstan. Once the noise started it got much louder very quickly. I removed and examined the capstan motor, and found that when the rotor was turned by hand it felt a little stiff at one point. A new motor cured this second fault. A.J.R.

Ferguson 3V31
This machine had been 'looked at' by its owner before he brought it to me. He'd covered his tracks so neatly however that this was not immediately obvious. The original fault had been a failed cassette lamp. When the owner had removed and refitted the right-hand panel (tuning and microcontroller) the 2SC1983 transistor Q204 had
become entangled with a wiring loom. As a result it had twisted and one leg had broken. The machine appeared to be dead, but actually there were no switched supplies. R.B.

Ferguson FV31R
No results and no display were the symptoms with one of these machines. We found that there was no 5V supply because the TIP120 transistor T773 was open-circuit. J.C.

Panasonic NVHD200
Intermittent tape loading was the complaint with one of these machines. The cause of the fault can be tracked down by noting the diagnostic code display. F03 and F04 mean incorrect mode operation or incorrect phase alignment respectively. If the display is F06, check the loading motor. J.C.

JVC HRD660EK
We sometimes get these machines in because of no results/no display. Q1 going short-circuit or the opto-coupler and IC1 being faulty are common causes. Check whether R2 or R3 (both 330kΩ) is open-circuit. The other thing to check is the 2SC3616 transistor Q2, which may be open-circuit or even blown apart, with the 0.33Ω resistor R9 open-circuit. J.C.

Panasonic NVSD40
Intermittent loss of one channel/turning drift are problems you sometimes get with these machines. In this event the items to check are the tuner unit and/or the AFC chip IC7653. J.C.

Matsui VP9601
There was good E-E but when this machine was put into the playback mode the E-E picture remained, with the playback sound coming through clearly. Nearly all the relevant circuitry is in the tuner module (MRF7 UB32), and fortunately I had a spare one available from an old panel. Fitting this cured the problem, but I then had weak E-E. A new tuner module restored correct operation. T.L.

Toshiba V705
This centre-deck machine came in because of a tape chewing problem. When I tried it there was no reel rotation. I stripped the machine down and found that the reel belt was off the capstan because the pulley had broken. Unfortunately the pulley is not listed separately, so the capstan motor assembly (part no. 70125660) had to be replaced. Luckily the machine was still under guarantee. T.L.

Matsui VP95010P
Slow rewind and mechanical noises were the complaints with this machine. Sure enough it didn't want to go into fast rewind. When I dismantled the deck I found that the spool assembly had sprung apart, with no sign of the circlip. A rebuild was possible, so I obtained a replacement circlip. This cured the fault. Apparently clutch gear assembly problems are quite common with these machines. T.L.

Philips 14TVC240
This combination TV and VCR was brought into the workshop with the complaint that the video section would jam inside intermittently. I stripped the machine down and powered it - fortunately these machines can be run while out of the cabinet. I found that the slightest pressure on the cassette when it was being ejected was enough to jam it. The eject mechanism depends on a long pulley shaft which looks as if it is not up to the job. When I examined this one certainly wasn't - I could see a split in the plastic gear. This made it slip on the plastic shaft. After replacing this item and the cam gear the machine behaved itself. T.L.

Ferguson FV11
Intermittent signals when hot was the complaint with this nice old machine. I've seen a lot of them over the years, but have never had this fault before. Voltage checks showed that the supply to the 5V regulator IC1 on the tuner/IF panel would fall from the correct 8.5V to 4.3V. The cause was R2, which when heated rose in value to around 430Ω. It's a 1.0Ω thermistor. S.L.

Toshiba V204B
This machine was very dead. As there were no blown fuses, and no short-circuits could be detected, I decided to check the electrolytics on the primary side of the power supply. CP008 (100μF, 25V) and CP007 (10μF, 50V) had both gone low in value. S.L.

JVC HRJ225
The cassette carriage was loaded and any attempt to power the machine resulted in shutdown after just one second. The supplies were all fine except for the switched +5V line, which measured 12V during the machine's very brief period of operation. This supply is derived from Q851 and Q852. Checks showed that the print between the base of Q851 and the collector of Q852 was open-circuit. The print run is only about 1cm long, but is straddled by R860 (470Ω) about half way along its length. As no crack or other fault could be seen, I assumed that this was another case of corrosive glue. R860 is a surface-mounted component. S.L.

Matsui VX3000/Soaisho VR3400
Intermittent tape chewing was the complaint with this machine. I eventually saw the machine fail to unload the tape then eject. The mode switch was faulty. A new belt kit (always necessary) and pinch roller completed the repair. S.L.

Ferguson FV71
The note that came with this VCR said that it had gone dead overnight. Although it appeared to be dead it had not suffered the usual chopper power supply failure. In fact if you listened to the power supply carefully you could hear that it was tripping very quietly. I've found that the usual culprits for this are CP07 (10μF) and CP08 (100μF). Both were replaced, using components rated at 105°C, but the fault remained. Substitution checks on the secondary side of the supply then revealed that the culprit was the circuit which was leaky. It's mounted on the print side of the PCB, not in the position marked on the board, and is between the 13V and 33V rails instead of between the 33V supply and chassis, as marked - the circuit diagram is correct however. Note that this power supply will run correctly only when it is connected to the main chassis. Resistive loads for test purposes will not give any meaningful results. P.G.

Toshiba V109B
This machine worked all right until the mechanism carried out any function or a tape was loaded. The E-E picture then became unstable, and hum bars appeared with some functions. It was obvious that the fault was in the power supply and was load dependent. The culprit was eventually found to be the STK7253 regulator chip, which was unable to supply sufficient current from its switched 9V output. P.G.
Reports from
Hugh Cocks
Chris Watton
and
Michael Maurice

Satellite Notebook

Pace SS9200
This receiver produced nasty-looking pictures on non-scrambled channels and could barely decode the VideoCrypt ones. I suspected trouble with the baseband video coming out of the tuner or in the area just after it. C115, C116 and C120 (all 10pF, 16V) around the UA733 video amplifier chip U21 were all slightly brown after clocking up a few years' service near the tuner. Replacing them brought back good pictures.

The power supply problems we have with these receivers here in Portugal are always the pink mains transformer going short-circuit in the summer and the BUT11A chopper transistor doing the same thing in the winter!

Whilst on the subject of these receivers, we had a customer in recently with an SS9000IRD. He had replaced his TV set, investing in a new large-screen model. The problem was that it produced a noticeable flicker with satellite pictures. We overcame the problem by increasing the value of the surface-mounted capacitor C27, by Q23 in the video clamp circuit, from 180pF to 270pF. Don't increase the value much more than this as the picture can then start to jitter. H.C.

Pace MSS100
The complaint with this receiver was that it would try to decode VideoCrypt programmes only very intermittently. The non-coded channels were OK. When the card was removed from the decoder there was no on-screen message, and trying the receiver on QVC and Channel 5, both of which use VideoCrypt but don’t require a card, produced no semblance of a picture. At least the card was cleared of suspicion – in the past, fruitless chasing after the cause of decoding faults has often ended up with the card being the culprit.

The signal from the dish was fine. There were strong signals on the non-coded channels, though the pictures looked a little dull. There was, unfortunately, no improvement when the receiver's AFC was switched off and a channel was manually tuned through.

I then headed into the ‘secret menu' by pressing Function, Menu, Radio and Store in quick succession (the Prima model is identical). This displays the video level and audio PLL settings as options 1 and 2 respectively – later versions of the MSS100, with a different microcontroller chip, have a third menu option for auto-tuning the audio PLL demodulator. The contrast level should be set at around 47 for Astra, though it may be best to use a slightly lower setting if Eutelsat reception is also required – some of the 'brighter' Eutelsat channels can suffer from video crushing. Try between 40 and 44.

With this particular receiver the contrast level had been set at 33. Normal results were obtained when the setting had been returned to 47. The receiver was in a holiday villa and the main menu had been locked, requiring access via a PIN number. Unfortunately this can't be done with the secret menu. To prevent a recurrence, the function button was rendered inoperative by sticking some tape over its PCB contacts. It seems that one can't be too careful with receivers used in holiday villas! H.C.

Channel 5 Confusion!
Keith has an oldish receiver that can't tune in the Astra 1D band. He told me that he had ordered "the box" to produce pictures and would give me a ring if he had any trouble connecting it up. I concluded that an Astra 1D converter had been ordered and didn't give it much more thought.

A few days later the phone rang. Keith was rather confused about connecting up his "box". I told him to bring it in, together with his receiver, and Channel 5 would soon appear. Unfortunately what Keith brought in was one of those ch. 37 UHF notch filters Channel 5 supplies in case of interference with other existing equipment.

He hasn't phoned yet for help with "the bigger" black box that should have arrived by now! H.C.

Patterning Problem
There was fine patterning on the pictures produced by a Pace MSS100 receiver. It was present with either a UHF or a start output. When the top was removed the patterning disappeared, and no amount of PCB prodding would bring it back. As soon as the lid was replaced, the patterning returned.

The cause of the trouble was bad contact between the spring that's soldered to the top of the tuner to make contact with the metal screening inside the plastic lid. It appears that an 'expert' had taken the top off and had bent the spring away from the lid to help with its replacement – the spring puts a lot of upward pressure on the lid.

The spring provides the only contact between the metal screen and the main chassis earth. If the
screen is allowed to ‘float’ and is in close proximity to the receiver, it seems that the metal will re-radiate signals – possibly something picked up from the power supply – into the video processing circuitry.

H.C.

**Sticky Feet**

Quite often, especially in the summer months, I come across Pace receivers that have very sticky rubber feet. This is more often than not because the receiver lives on top of a warm VCR. Sometimes the feet have almost ‘melted’, leaving a mess on top of the VCR or TV set when the receiver is removed for service.

To avoid making marks on the customer’s carpet etc., I stick a small piece of Sellotape over each rubber foot if the feet seem at all sticky. It might be advisable to stick a very small piece of tape on the feet of all older models to avoid possible future sticky messes! H.C.

**Pace MRD920/Maspro SRE450S MAC-D2 receiver-decoder**

These receivers are a few years old now and many continue to provide good MAC reception, mainly for BBC Prime. An external decoder is often used for the Astra VideoCrypt channels.

There can be a problem when you try to connect two dishes to the receiver, which has two inputs, as both LNBs will be powered. Changeover is done by IF switch- ing via pin diodes inside the Sharp receiver, which has two inputs, channels.

Where possible power for one of the LNBs should be separate from the receiver, which will then run cooler with no more MAC audio whistling and fading. For good measure, add heatsinks to the MAC chips. They run very warm, and are all on a subpanel that’s of identical size to the SS9000/9200 series VideoCrypt board.

We’re fortunate with the BBC, as only one polarisation is required with this satellite. In this case LNB powering was easy, as the customer had a very old satellite receiver which was pressed into service, also an IF splitter with a DC pass on only one side.

BBC Prime has started a digital subscription service via Eutelsat at 13°E, though we’ve not come across anyone who is trying to receive it. Most customers are sticking to their old MAC decoders for the moment, with replacement viewing cards obtained from Norwegian Telecom. This may sound strange, but a Swedish company provided subscription management for the previous MAC service!

H.C.

**Amstrad SRD500**

This receiver worked all right with a scart connection but there was no video output from the UHF socket.

The cause was traced to the modulator’s video input coupling capacitor C346 (10µF) which was open circuit. C.W.

**Russian TV Reception**

The system consisted of an Amstrad SRD350 satellite receiver which was connected to a SECAM-PAL transcoder via its decoder scart socket. It had been installed to enable the user to view Russian TV. Three TV sets were connected to an aerial splitter system, a JVC AV28F1EK which seemed to work normally, a Toshiba portable that had no colour and a Philips 2A chassis receiver that produced no sound.

I started by connecting the Amstrad receiver’s output to a Philips portable, and got no colour or sound. Then I noticed that the Amstrad receiver had a two-pin mains plug; it was a Continental model. So I disconnected the transcoder and returned the RF converter for 6MHz sound. Then I reconnected the transcoder and found that there was an enormous drop in the sound level and still no colour. The colour fault was cured by slight adjustment of the subcarrier oscillator. The sound fault was caused by the fact that when the transcoder was connected to the scart socket the audio as well as the video was looped through. Well, not quite – the audio pins of the scart socket weren’t connected at all! Crosstalk in the scart lead produced what little sound there was. Correct sound was obtained by linking the transcoder scart socket’s audio input and output pins. The customer had been putting up with all this for a couple of years. M.M.

**Prime-focus Dishes**

We are often asked to supply and fit an H/V switching LNB to an old prime-focus dish when a new receiver is installed. It can be difficult to obtain an H/V switching LNB with a C120 flange, and fitting a standard offset-dish LNB in the middle of a prime-focus dish isn’t very good, as its feed will see only about half the dish diameter. If it’s an enormous old dish which is wanted for only Astra or Eutelsat reception the pictures may be acceptable, but this approach is not to be recommended.

A relatively easy solution is to attach a C120 flange to the LNB feed. Old magnetic polarisers are a good source of these flanges. Saw the offset feed at the front of the new LNB off, then glue the C120 flange on with Araldite. With care the LNB and the old polariser tube C120 flange assembly can be mated with minimum tube diameter change between one and the other – this is important, as microwaves don’t like discontinuity in tube diameters (it attenuates them). When cutting the horn from the front of the LNB, put some paper into its end to prevent metal pieces getting into the LNB works!

With a touch of black spray paint the whole assembly looks very professional. The LNB can then be bolted on to the existing prime-focus dish scalar feedhorn. Needless to say, if you don’t feel confident about doing this, don’t! For one thing it will void any warranty claims. A much easier approach is to remove the offset feed plastic cover and insert a piece of 22mm aluminium tube that runs the length of the offset feed. The microwave signals from the dish will then enter the tube and be transferred directly to the LNB input at the rear of the now-redundant offset feed. Secure the tube by replacing the front plastic cover – make sure that it’s fixed in place securely. Pack polystyrene between the outside of the 22mm tube and the inner wall of the original offset feed.

No scalar feed rings can be used with this method. As a result there will be slightly less signal than with a conventional feed. But the results are very acceptable.

If you try the modified LNB with an offset dish the results will be very poor, because the tube can’t ‘see’ the dish properly. H.C.
Panasonic NVL20/25/28 series VCRs

These well-made machines are relatively easy to service, having an established fault pattern. Brian Storm provides a quick-check guide to servicing.

The Power Supply
The most obvious place for faults to develop is in the ageing chopper power supply. Fig. 1 shows the circuit. To ensure reliable power supply start-up, C1109 should be replaced as a matter of course whenever one of these machines is brought into the workshop. To protect the semiconductor devices from damage, it's a good idea to replace the small electrolytic capacitor C1114; also to remake any ageing solder connections, especially at power components.

The electrolytic capacitors on the secondary side of the chopper transformer (T1101) should be checked with an oscilloscope. A quick check on the ripple level on all the supplies will prevent unnecessary investigation in the video and servo circuits when obscure faults are present.

Here are some common power supply faults.

Power supply dead: C1109 (1μF, 400V) is probably open-circuit. Alternatively D1118 (MA180) could be leaky.

Power supply dead with D1113 (20V zener diode) short-circuit: Check whether C1114 (47μF, 16V) has fallen in value.

Servo problems: Check whether C1122 (330μF, 10V) is open-circuit.

The Mechanism
The deck has been well documented in previous articles. Here are some faults that are particularly common with these models.

Intermittent damage to cam gears and arm P: The capstan rotor clutch torque is too high. Part no. for the complete rotor is VXP1113.

Alignment between the cassette housing and the bottom mechanism keeps being lost: The right-hand cassette housing is broken or worn. Part no. is VXA4078.

Intermittent picture rolling or poor tracking: Cause is the back-tension arm sticking off. Clean and regrease it.

Intermittent drum ‘twitching’: The impedance roller is sticking.

Intermittent solenoid operation: Tighten plug P1504.

Noisy rewind or fast forward: Belt tension roller is worn. Part no. is VXA3516.

System Control
The system control circuitry is generally very reliable. It uses two microcontroller chips, IC7501 and IC2001, that rarely give any trouble.

Cutting out can be caused by a build-up of dirt and fluff on the reflective surface beneath the take-up spool, where the reel pulses are generated.

It's not uncommon for problems to occur with the connectors between the main PCB and the timer PCB. An intermittent fluorescent display is probably the most common fault of this type.

Here are some other faulty common faults.

Operation intermittently ‘freezes’: Check for dry-joints at X6101.
Intermittent stopping: The reel sensor is faulty. Part no. is ON2170.

Capstan motor stops intermittently: P2001 is dry-jointed.

Audio dub cuts out after five minutes (Model NVL25): Change IC6001 to type MN6740VCQK.

Intermittent cutting out and powering down: P2001 is loose or dry-jointed.

No operation: Q6101 (2SC2206) is probably faulty.

Dead, unable to power up: C6011 or C6012 is probably leaky.

Dead with “write” illuminated in display: The MN15522VMS chip IC6801 is faulty.

Servo Control
Most of the servo control circuitry is within IC2001. The capstan FG amplifiers IC2301 and IC2302 can cause problems by amplifying noise from the power supply or from an out-of-line FG pickup head.

Failure of the capstan drive chip is usually caused by intermittent connections at the capstan plug P2001.

The following are some fairly common servo faults.

Capstan motor grinding and cogging: C1122 in the power supply is faulty.

Capstan motor is unstable in the play mode: Check the FG head to capstan rotor gap.

Capstan motor torque poor or motor is inoperative: Capstan drive chip IC2101 is faulty.

Poor tracking: Back-tension arm is not engaged.

Other Faults
The following are some other fairly common problems you get with these machines.

Poor E-E gain: Tuner unit (type ENV87823H3A) is faulty.

Poor feed-through gain: Tuner unit (type ENV87823H3A) is faulty.

Intermittent playback and E-E distortion: RF converter (type ENC17952A) is faulty.

No sound or no picture: AV input jack switches faulty. Part no. VEJ0777.

E-E picture smeared: C7678 or C730 and C731 faulty.

Barcode scanner inoperative: Short the battery contacts together for thirty seconds then clean and tighten the contacts.

Macro problems (Model NVL28): Fit a 22µF tantalum capacitor across C9568.
Trade Memoirs

Derek Townsend recalls his workshop experiences over the years since he entered the trade in the late Fifties.

I entered the radio and TV trade, as it was then known, in the late Fifties. In those days you would sign up for a five-year apprenticeship and would go to the local technical college for at least one day a week. I still remember one teacher who referred to a valve's anode as its 'plate'! He taught us radio (or was it wireless?) and TV repair, and told us to take it in two stages. To some extent this is still relevant today.

First was the observation test cold, i.e. look around for visual evidence of faults before powering up. Secondly was the observation test warm, i.e. plug in and check power supplies etc. We used to call this stage "plug in and tune for maximum smoke"! It's a shame that with all the safety devices these days you seldom get this effect.

I'll never forget his face one day when we all connected our oscilloscopes to the test TVs we had on our benches to create little green test cards on the screens. We had connected field and line sync pulses to the scopes' X and Y inputs and the video signal to the Z input at the rear. This was way before colour TV came to the UK. We were given a couple of brief afternoon lessons on the US NTSC system however, the only colour system at the time. It all seems a lifetime ago. But we learnt something - eventually!

Workshop Life
One of my earliest recollections of workshop life was of replacing DK91/96 valves in Vidor and Ever Ready portable radio receivers. The valve heaters were powered by a 1.5V battery. When its output fell below 1.1V the local oscillator would cut out. If it did so before the voltage fell it meant a new valve.

Then the transistor radio appeared. There were these soldered-in three-legged devices and no valves. How on earth did they work? About the same time the printed circuit came along. How were we going to cope with all this new technology? No more low-emission DK91/96s and no H1' batteries, just low voltages everywhere.

Who remembers the Perdio Piccadilly pocket radio which came in a gold cardboard box? It was really fun to work with, especially if you laid it down on top of its box to start on it, not realising that the box's gold covering would short out the PCB.

Another tedious apprentice job - after you'd washed and polished the workshop floor, fetched twenty Players for the workshop manager and made the tea - was fitting new elements to Morphy Richards CA75 irons, not forgetting to make sure that the thermostat was set to cut out at 180°C on the wool setting (I think!). Who now remembers the smell and smoke that would emanate from the new element? On this subject, hands up all those of us who remember the smell that a worn-out selenium rectifier produced. The only good thing about these rectifiers was the washers we made from the cooling fins. Do you remember the number of BY100 silicon rectifiers you fitted to replace these smelly devices?

Was it Easier?
Was servicing easier in those far-off times? Some things were straightforward. Mains droppers, rectifiers and valve heaters would go open-circuit. With the valves it was like Christmas-tree lights - always the last one you came to that was the culprit. But it was not all that simple. The PCC84 and PCF80 valves in tuner units were troublesome, and you had to remember to smear the contacts in Cyldon tuners with Vaseline. Then there was IF instability. This was caused by an open-circuit or leaky capacitor, but just try to find the right one.

Thoughts about capacitors bring back memories of the waxed paper type. These would always become leaky at some stage. After you'd removed them from the equipment on the bench, the procedure was to use a soldering iron to melt the wax into the lid of a tin. You could then use it to stick screws on the end of your screwdriver. In those days there didn't seem to be any cross-cut screws in our industry - maybe they were not invented until later.

Another problem was the EHT rectifier valve, which was soldered to the top of the line output transformer. If you applied too much heat to the terminals they would disappear into the transformer's plastic covering. This plastic was a weird substance that would eventually break down under the stress of the high voltages present, creat-
ing beautiful corona discharges. Some early Baird sets (no, not the ones with the big scanning wheel - I'm not that old) had a truly lethal EHT supply. It used a winding on the mains transformer to step up the voltage. Just try shorting that out with your screwdriver! Only the service manager was allowed to take the back off these sets.

**Tube Replacement**

There is one job I shall never forget from my apprentice days - replacing the CRT in an old BBC only Ekco TV set. The tube was mounted in a metal cradle, and the mask and implosion guard were fastened at the front. The whole thing was held in by four bolts, similar to today's sets. Sounds easy, doesn't it?

As we know, all TV sets collect dust over the years. The mask around the viewing area in these old sets was made of a weird rubber-cum-plastic substance which became very dirty if not properly sealed. The glass implosion guard was held on to the front of the mask by PVC tape, and a rubber seal was, respected if it was the rear of the mask and the front of the tube. The mask was a whitish colour and was easy to blemish with fingerprints. When you pushed the rubber seal to the back of the mask, there was always the right amount of dust left to drop down between the glass and the mask. The service manager would tell us that tube replacement should take about half an hour. With me it took about four hours! The only way to remove fingerprints from the mask was to dismantle the whole thing and wash the mask in soapy water.

**Modernistic Murphys**

I recall the futuristic-looking Murphy V3104/10 series sets which had a lift-up control panel lid at the top of the cabinet. This lid was connected to the on/off switch, so that the set came on when the lid was lifted. These sets came with only two sets of coils in the tuner unit, so new coils had to be ordered and fitted if the set was to be used in a different area. To tune the coils you had to use a long knitting needle with its end filed down to form a screwdriver. This was pushed through a hole in the control panel, down a plastic sleeve: if you were lucky enough, you could just about manage to get the screwdriver end to reach the core of the coil inside the tuner. If the core was tight, the needle would snap in the sleeve. A long time was then wasted trying to retrieve it. How many mothers couldn't understand why their knitting needles kept on disappearing?

**Before the Aerosol**

Before the advent of the aerosol switch cleaner all we had was Servisol shake and spill cans. Hard luck if you dropped as much as a spot on a plastic component. We would use this terrible liquid to deal with spiders (don't tell the RSPCA). It was hopeless with something like a noisy doorbell control, except if it was the rear of the spindie - what a mess! We kept rows of replacement volume controls on the spares shelves, next to the rows of valves. They had different resistance values and some incorporated a switch, either double- or single-pole. What a lot to confuse the young apprentice!

The worst thing you could do with this 'liquid' was to pour it over the multiple-gang waffer switches used in all the better radio receivers of the time. Sometimes you could get away with it, but me - never! The problem was that the HT voltage, about 200V, would track around the Paxolin wafers and make permanent circuits where they weren't supposed to be. The pennisance for doing this terrible deed was to replace the whole switch bank. This was a complete afternoon's nightmare. We're talking about the days before the PCB: so the first thing you had to do, prior to cutting away the wires and components from the switch wafers, was to draw a diagram showing all the connections. If some clever Dick hid your diagram, panic would set in.

**Mechanisms**

We also had to deal with record player decks that incorporated autochanger facilities. Then there were those cheap reel-to-reel tape recorders which all seemed to cost 29 gns. Most of them used the BSR deck. Think of all those broken jockey springs that had to be replaced! If you were really lucky you could work on a Philips deck, adjusting the clutches with things that looked like sweets, or on Grundig TK5/8s with worn out belts that could stretch for miles. I think we all gave a sigh of relief when some clever engineer came up with the audio tape cassette. But it might have been good training for the VCR mechanics that were to come along twenty or so years later.

**Colour TV**

How many of us in this trade suffer from bad backs and blame it on the advent of colour TV? It had been bad enough carrying an old radiogram the size of a large sideboard. To deliver the new dual-standard colour TV sets was no mean feat either. For one thing they had proper wooden cabinets. They also had switches whose contacts became tarnished. Thank goodness by now we had Servisol in aerosol cans - just didn't smell the same anymore!

The coming of colour TV introduced the chopper power supply to TV, initially in the Ferguson 3000 chassis. We had just got over the 2000 chassis with its weird EHT regulator panel. Some manufacturers were still making hybrid colour TVs, with big PL509s etc. If you had one of these in your lounge you didn't need central heating. They consumed a great deal of power - and what a fire hazard some of them were.

**Video and All**

Subsequently we had to deal with video cassette recorders, of various sorts before the VHS system became the standard. The early Philips cassette system had one reel above the other and ran for about an hour. The Sony and Sanyo Betamax machines were giants. Then there were those Hitachi disc players, like glorified audio LP machines - they had a stylus playing system.

We've been through a great deal during my long participation in the trade. Am I really this old? And are there many other engineers who have been in it for as long as I have? There don't seem to be many of us around here anyway.
Pace PRD800/900 PSU Repair

Pete Haylor on how to carry out repairs without tears

The phone rings. "My satellite has stopped working. It was all right yesterday. There are no lights on." Those familiar words usually mean that another PSU has gone!

This short article has been written after carrying out several hundred power supply repairs to Pace PRD800 and PRD900 satellite receivers and their variants with the aim of helping others confronted with the problem.

Access
Disconnect the receiver from the mains supply before you open the case, which is held by a screw at each side and three at the back. Remove these five screws. Then remove all screws on the back panel along with the nut on the LNB connector.

Inside, the PCB is usually held to the case by four rivets. The best way to remove them is to slide a small screwdriver or similar tool underneath then twist it until the top section lifts. Remove it then use a small pair of tweezers to lift out the remaining part.

Sometimes there are three rivets and a screw which also has to be removed.

Two support prongs pop up through the PCB. To release them, use a pair of long-nose pliers to squeeze the ends together. Then lift the PCB carefully. The complete PCB should lift from the front then slide forwards to release.

Repair
Start the repair by obtaining a repair kit. Then check that it includes all the parts. I always desolder the components using a solder mop only. Do not attempt to remove them at this point. Turn the PCB component side upwards then, using a pair of small side cutters, cut the leads from all the components to be replaced. Finally, remove the remaining lead sections carefully. Turn the PCB over and check that the holes are all clear. If you have a PCB cleaner, clean the board before fitting the replacement components.

Solder the capacitors at one leg only. Turn the PCB over and push them away from the power transistor, then solder the other legs. Fit the IC and the other small components. Finally, preform the 100kΩ resistor's leads so that it is held off the PCB, then solder the leads at the print side.

Double check the solder joints. Use a magnifier to check all the solder joints in the power supply, especially at the transformer pins. Now check the whole PCB for any other poor joints – the IR module is a particular favourite for dry-joints.

Moment of Truth!
Fortunately I have a variac. If you can obtain one, grab it! Use it to increase the mains input to the receiver slowly. At 120-180V the power supply should switch on. If so, try changing channels and test the receiver with a suitable TV set and dish. If all's well, increase the mains voltage to 230V and leave the receiver on for as long as possible. Finally, connect the receiver to the mains supply directly and give it a soak test.

If you don't have a variac, try to find some way of preventing application of the full mains voltage at first switch on. It may be possible to use a mains lamp as a way of limiting the initial current surge, but I have not tried this myself.

Most of the scrap satellite receivers I've seen have been damaged by 'expert repairers' who have destroyed the print in the power supply area.

Variants
The Pace PRD800 also appeared as the Ferguson SRD5, Goodmans ST700, Granada M/N92MR1/A, Hitachi SR1050D, Maspro SRE250S/1, Mitsubishi ST-PB10 and the Philips STU802/05M and STU812/05M.

The PRD900 also appeared as the Ferguson SRD16, Grundig STR1R1D, Maspro SRE350S/1 (later), Nokia SAT1600, Panasonic TU-SD200 and Philips STU824.
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October was a very quiet month for DX reception. But news continues to come in about the excellent late-September tropospheric openings. Paul Logan in Northern Ireland received several Spanish VHF-FM radio channels. This was over a difficult path, to Co. Fermanagh. Sud Radio from the Toulouse Pic du Midi (southern France) 1,050kHz transmitter was received in the Netherlands, a wholly land path. During the same period Norwegian VHF stations were being received in the Netherlands.

While on the subject of FM radio DX reception, Mike Gaskin (Cornwall) comments in Teleradio News (HS Publications, Derby), issue 91, on events during an SpE opening to Spain on July 9th. Short N/S-skip back-scatter reception occurred across the UK, and the 50MHz amateur band was open to the USA. On the following day, at 0900, Mike heard a music station at 87-8MHz with an American voice declaiming "easy listening through the night on your downtown radio". Unfortunately there was no identification before fade-out at 0915. Scandinavian and Icelandic stations were heard later. Just after 2000 the 87.8MHz signal returned and Mike noted the comment "Eastern Standard Time is now 1310". He feels that the propagation might have been via an auroral trans-polar path – it has happened before, with distant Russian ch. R1 signals. I have no reports of low-band VHF-DX during the early July period – can folks please check their logs?

With the start of the new solar cycle, number 23, there has already been an auroral event – on October 11th, when there was a beautiful display in Ottawa, Canada. When solar activity is on the increase auroras, solar storms etc. become more common. Watch out for possible signals via auroral reflection.

Back to the poor DX-TV reception during October. A prolonged SpE opening produced RAI (Italy) chs. 1A and 1B on the afternoon of the 15th. And that was it!

Satellite Reception

In a very interesting letter James Broughton (Yateley, Hants) describes how he modified his motorised H-H mount, adding an extra 6in. actuator drive to allow satellites with an inclined orbit to be tracked. The system also enables single-band LNBs to be stacked vertically, and provides precise dish peaking with setting-up tracking inaccuracies removed. See the accompanying photograph. The top motor bolt is connected to half of a square-section UHF aerial bracket. A bent 10mm threaded rod connects to the H-H motor rotor arm. The added weight provides a further bonus in that the counterweight action reduces the effort needed by the horizontal motor – and reduces motor noise.

Dean Rogers (London SE2) has been using his 80cm dish to monitor the Ryder Cup golf world feed via Eutelsat II F4 at 7°E. The test pattern included the identification "CTV" – for Carlton TV, which provided the technical facilities for European Tour Productions.

The Louise Woodward trial led to many live news feeds and inserts across the Atlantic during the late October period, with both NTSC and PAL signals. PAS-3R at 43°W seemed to be the most commonly used satellite for analogue feeds. There have been fewer analogue signals via Orion 1 at 37.5°W, though RTP (Portugal) was present in the clear on October 16th, at 12:07GHz (vertical). The CMT feed to Europe on the 15th via Intelsat 601/803 at 27.5°W was also in clear analogue form, but only for a short period.

John Locker (Wirral) has managed to identify some very unusual signals received via Intelsat 601/803 at 27.5°W during several days in mid-October. When
I checked during the early evening one day there were, in clear analogue at 11.59GHz horizontal. NTSC video shots from an aircraft, with a screen overlay of numbers, graphics etc. (see accompanying photograph). The moving pictures would suddenly flick through a progression of zoomed shots, from a wide shot to close-ups. These showed buildings, airfields and tanks, obviously subjects of military interest. There was no active audio subcarrier.

During the early afternoon on the following day there were more silent NTSC pictures, this time showing an unmanned aircraft. The tail had two downwards-pointing fins and a propellor behind. It was taken taking off along a desert runway. There were then more air views, demos etc.

John tells me that it was an unmanned surveillance aircraft undergoing tests prior to use in Yugoslavia. Manned surveillance aircraft are not flying in this area. An interesting sighting!

PAS-3R at 43°W has been carrying some interesting analogue material. One reader reports an educational feature entitled The Second Annual Worldwide Lessons in Leadership Series (Fortune magazine) with dubbed Spanish—the original English was available on another subcarrier. I’ve noticed that such lectures/educational programmes tend to be seen around tea time, UK. It’s well worth checking at 27.5, 37.5 and 43°W for such offerings. Typical of the more unusual programmes was the United Nations Television UN Day Concert from NY via PAS-3R on October 24th: rather heavy stuff, with serious music and speeches.

Roy Carmen (Sadoway) comments on the lack of signals from Eutelsat I F5 at 25.5°E. This satellite now has a variable inclined orbit. He has seen numerous UK Breakfast TV show feeds via Intelsat K at 21.5°W, usually prior to 0745 UK time. The Reuters Uplink-2 truck seems to be very active here. Check out 11-53GHz horizontal for early morning activity.

Terrestrial TV News

UK: Dave Rushdon hopes to obtain one of the new local RSL licences for his TexTV service in Edinburgh. He had originally planned to use ch. 34, but this was halted when the ITC advised retaining domestic VCRs etc. to ch. 34 as a result of the local Channel 5 transmissions.

Gibraltar: A local company, Peninsula Productions Ltd has applied to take over the running of radio/TV services from GBC, which is not popular and is running at a loss.

Greece: The state channel ET-2 has been renamed Net TV, with a new programme line up. The aim is to gain audience share. The government is to tell private broadcasters that following a recent frequency reorganisation two fewer TV networks will be allowed—fewer channels are available than originally thought.

Italy: Padova based RETE Nord has been renamed TV Set following a change of ownership. It will provide a new regional network covering the NE corner of Italy.

South Africa: The Independent Broadcasting Authority has received seven applications to operate the first independent TV network in South Africa. A decision is due to be announced in March.

Germany: Three digital terrestrial TV transmitters are being tested in Berlin, using 1kW ERP on chs. E43, E48 and E59. The ch. 5 transmitter at the Alexanderplatz in Berlin is now used by TV Berlin.

In the Hamburger area satellite TV services are being transmitted on chs. E22 (TM3) and E44 (Nickelodeon 0600-1800, VOX 1800-0600).

Six states are blocking digital TV development following the recently announced partnership between the Kirch Group and Deutsche Telekom.

Internet DX Club: The Club European de DX Radio Television (CEDRT) has set up a web site at: http://www.direct.co.uk/~sorwin/cedrt.htm.

Content is in French. The UK representative is Mrs J Winsor whose e-mail address is: sorwin@direct.co.uk.

Satellite News

PAS-5 arrived at 58°W in early September, with 24 C band and 24 Ku band transponders. The satellite is intended for communications between Europe and the Americas. It’s rather low on the horizon in the UK, but you should be able to receive it if you have clear sight to the SW.

Intelsat 803, which was launched in late September, is to move from 27.5°W to 21.5°W this month (January). It has taken over many of the SW.

The French Canal Satellite digital network in South Africa. A decision is intended for communications between Europe and the Americas. It’s rather low on the horizon in the UK, but you should be able to receive it if you have clear sight to the SW.

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**DX-TV**

**The unmanned surveillance craft seen taxiing for take-off. From Intelsat at 27.5°W.**

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Band I Allocations

After checking with the DTI on the recent 48MHz and 52MHz OB link frequency allocations I received part 2 of the UK Radio Frequency Allocations list. There's a massive range of allocations within the TV-DXing Band I, ranging from "services ancillary to broadcasting" (SABs) to wind profiler radars.

Of particular interest is "video transmissions for railways, track to train, using leaky feeder techniques on 50-5MHz". I'd be interested to know whether any reader living close to a main rail service has seen anything at this frequency.

One-way paging systems use 48-99375 49-49375 MHz, two-way paging systems use spot frequencies 48-9750 and 49-9875 MHz. On-site spot frequencies for hospital paging are 49-250, 49-375, 49-500, 49-4625 and 49-4750 MHz.

**Sunsspots**

We now appear to be into the rapidly rising solar cycle no. 23: high averaged-out sunspot counts were recorded in both July and August, the highest for some years. This should mean improved HF propagation, particularly during the daytime in winter. It's unlikely that we shall get low VHF MUFs (maximum usable frequencies) this year, but there's the possibility of solar flares and related disturbances - even Auroral activity (see earlier).

Those with knowledge of this subject are suggesting that the solar maximum, with the highest reflected frequencies, will occur in about the year 2000. With the rapid move to digital transmissions, satellite reception etc., the coming cycle could well be the last opportunity for analogue Band I DX-TV. The peak of cycle 24 will see completely different TV transmissions, unlikely to be at VHF! In the USA the FCC has suggested closure of analogue terrestrial transmissions by the year 2007, and the year 2015 is being suggested for total analogue Band I DX-TV.

**New Products**

Leaflets received from Aerial Techniques (01202 738 232 232) feature two recently introduced colour TV sets with unusual features. There's a 12/24V, PAL/NTSC/SECAM, all bands including cable, 10in. (25cm) model with teletext and remote control. A 14in. model is basically similar but with French system L and Middle Eastern system B/G SECAM. The sets are made by Thomson - the 12/24V operation suggests that they are intended for long-distance lorry/holiday driving.

A New Zealand company, Tennatron of Motueka, has introduced a co-channel interference filter. The description claims that fitting the filter in-line with the aerial signal removes unwanted signal interference across the wanted channel. I don't know whether this is an advanced phasing system of some sort, using phase shifting to achieve cancellation, and have requested further technical details and a price.

**What Causes Sporadic E?**

There has always been controversy over the causes of Sporadic E ionisation in the lower ionosphere which is about 75 miles above the earth's surface. Such ionisation can reflect VHF signals, making reception across considerable distances possible.

The August 1997 issue of *Six News* contained an item entitled "The Cometary Origin of Sporadic E", which was an edited version of a paper submitted to the AGM of the Society of Amateur Radio Astronomers, West Virginia, on July 15th, 1996. It suggests that thunderstorms can be discounted as a cause of SpE.

Now turn to the May 1995 issue of the *Benelex DX Bulletin*. It contained an article by Bill Thompson, published earlier in the WFTDA Magazine, entitled "E-Skip: Myths versus Facts". In the section on thunderstorms and E-skip, it claims that while the theory is controversial "the evidence is now overwhelming". The view put forward is that severe thunderstorm activity produces high-altitude wind shears which form the basis of sporadic E ionisation clouds. An interesting example was quoted. Rapidly moving severe thunder/hailstorms/tornados produced SpE clouds that moved NW across North America at speeds up to 200 m.p.h. At the same time there were SpE openings.

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Answer to Test Case 421  
- see page 165 -

This Sony SLV315 fault was not a nice one at all. It was not a common fault either, as Sage’s call to Sony’s technical office confirmed. At least the symptom was not intermittent, which would have made things even more difficult. Unfortunately it’s not possible to analyse the serial data stream that passes between two microcontroller chips.

The scrap pile came to the rescue! Sage found an SLV315 that was marked “video heads worn, all else OK”. He carried it back to his bench in triumph. His first step was to insert the MF126 board from the scrap VCR in the faulty one to confirm the innocence of its stop and eject switches and its IR receiver. The fault was still present. So he inserted the MF125 board from the scrap VCR, the one that contains the timer/tuner microcontroller chip and the fluorescent display panel. This restored normal operation. When the suspect panel was inserted in the scrap machine, the fault went with it.

The easiest course would have been to leave it at that. But the job was a chargeable one, and so far as Sage is concerned a second-hand PCB is not a satisfactory solution in such a case. The faulty machine worked correctly, with its own MF125 PCB, once this had been fitted with a new XP501/16 microcontroller chip. Who can tell exactly what had been going on inside the original one? Happy Christmas to you all!

NEXT MONTH IN TELEVISION

The Ferguson TX805 Chassis
J. LeJeune takes a look at the technology used in this Thomson-designed small-screen chassis. Interesting features include the use of a Wessel circuit which employs a single transistor as both the chopper and the line output device.

The Language of Digital TV
Digital TV brings new signal processing and modulation techniques and a whole new language - Digispeak! Mark Paul starts an explanatory listing of the terms you will encounter and need to understand.

Build this LOPT Tester
It’s very helpful to have a means of testing line output transformers. Charles Ritchie presents a simple tester design based on a TBA920 line generator chip.

The Onwa Power Supply
Chinese made Onwa chassis are used in many Alba, Bush, Perdio and other models. Their power supply has proved to be troublesome. An account of the circuit’s operation and a technique and a whole new language - Digispeak! Mark Paul starts an explanatory listing of the terms you will encounter and need to understand.

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Pace PRD800/900 Modification
Martin Pickering, B.Eng., has discovered an unused microcontroller option in these satellite TV receivers.

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