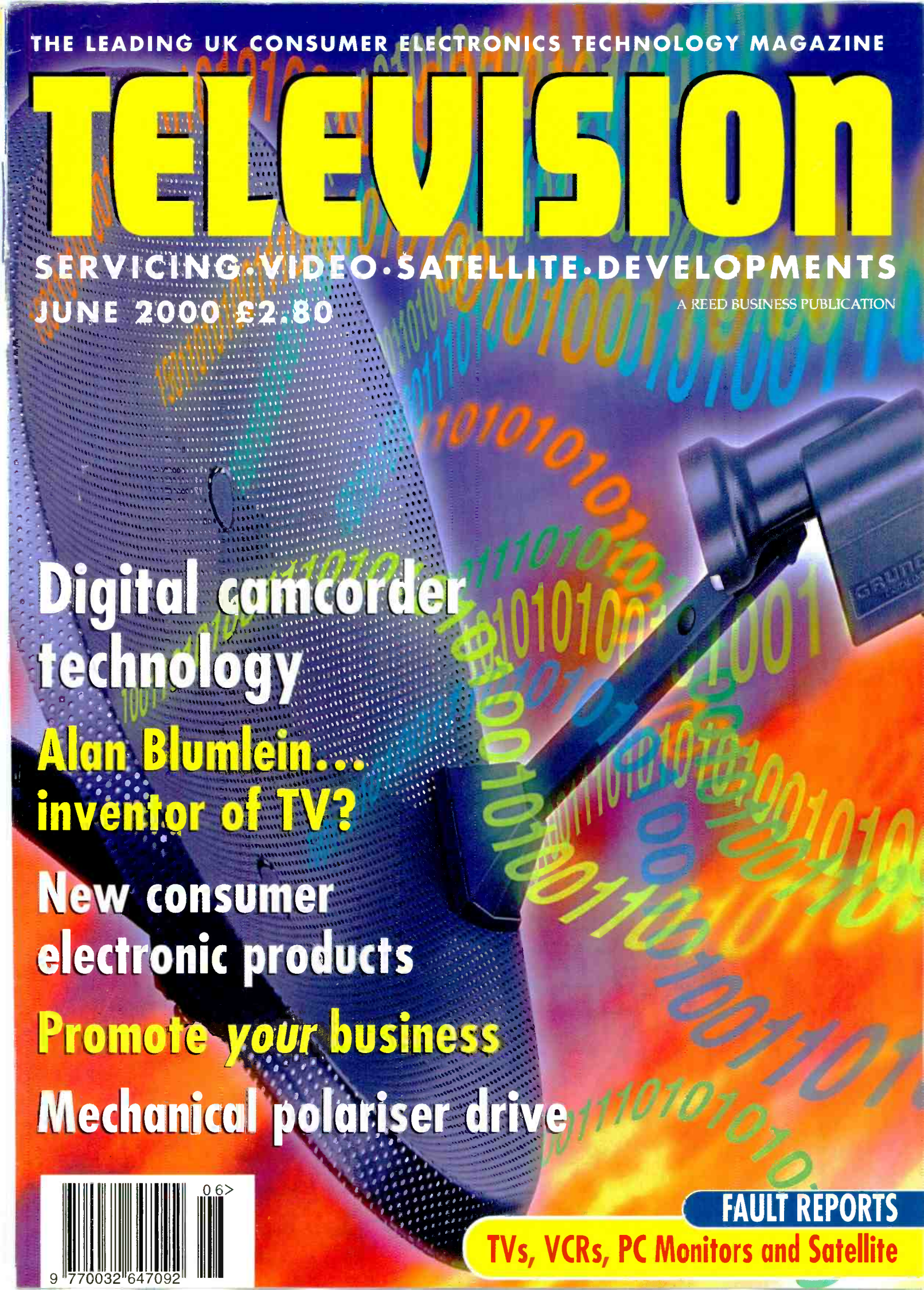
THE LEADING UK CONSUMER ELECTRONICS TECHNOLOGY MAGAZINE

TELEVISION

SERVICING·VIDEO·SATELLITE·DEVELOPMENTS

JUNE 2000 £2.80

A REED BUSINESS PUBLICATION



Digital camcorder technology

Alan Blumlein... inventor of TV?

New consumer electronic products

Promote *your* business

Mechanical polariser drive

FAULT REPORTS

TVs, VCRs, PC Monitors and Satellite

9 770032 647092 06>

KÖNIG
ELECTRONIC

Have you asked for....

The König Part Finder CD Rom?

A simple to use database containing all König parts.

Visit our Website for more information

@ www.konig.co.uk

Available from your KÖNIG CLUB Founder Members

CHS · Seme · WILLOW VALE ELECTRONICS LIMITED

Also available from your König Approved Stockist

Technical help line: 01635 278678
E-mail: technical@konig.co.uk

CONTENTS

June 2000 Vol. 50, No. 8

Editor
John A. Reddihough

Production Editor
Tessa Winford

Consultant Editor
Martin Eccles

Publisher
Mick Elliott

Advertisement Sales Manager
Matthew Harradine
0181-652 3033

Advertisement Sales Executive
Pat Bunce
0181-652 8339
Fax 0181-652 3981

Editorial Office
0181-652 8120
Fax 0181-652 8111

Note that we are unable to answer technical queries over the telephone and cannot provide information on spares other than that given in our Spares Guide.

June issue on sale May 17th.

Next issue, dated July, on sale June 21st.

The Setmakers Suffer

The UK's TV setmakers have been badly affected by the overvalued pound. Lord McNally, president of BREMA (the British Radio Equipment Manufacturers' Association), made this clear at the Association's recent annual general meeting. He pointed out that "production of small and medium size TV sets has long since shifted to central and eastern Europe and Turkey. Whereas, in 1996, TV set production in the UK reached 6·2 million, with a positive trade balance of £550m, production has declined to just 3·7m sets last year. There was still a positive trade balance, but it had declined to £115m."

The problem of the overvalued pound is a strange one – so often the pound has been a weak currency. It is not its value with respect to the dollar or yen that's the problem but its value with respect to the euro. At the time of writing the exchange rate with respect to the Dm is over 3·34Dm. At the pound's lowest in recent years it traded at 2·21Dm. This is a variation of over fifty per cent. A currency as strong as this makes it difficult, to say the least, to export manufactured goods. The problem is that of a weak euro rather than a strong pound however, which is why it is so difficult for the government to take any action.

The euro is weak for two reasons. First there has been a steady flow of funds out of the euro area as Europeans have invested elsewhere. And secondly the euro is a relatively new currency and is distrusted by the international investment community. Yet economic conditions in Euroland are good: you would think that an obviously undervalued currency backed by strong economies would be a safe bet. But no, that's not the way markets work. Sentiment is a very strong factor unfortunately.

Sooner or later the euro will strengthen and the pound weaken, that's for sure. The problem is when? The pound's overvaluation has already lasted a long time and shows no sign of weakening. Largely because of the strong pound, manufacturing output has fallen each month since last November. Over 240,000 jobs in manufacturing have gone since March 1998. There was a loss of 140,000 last year alone, and the loss is still on the increase. Investment in manufacturing has been on the decline – down 14 per cent in real terms last year. That bodes ill for the future.

It might not have mattered so much had Europe not been our main trading partner. A huge market on the UK's doorstep is the obvious place to sell goods. Selling cannot easily be switched elsewhere. The tragedy is that overseas investment has saved the UK's manufacturing industry, certainly the TV setmaking industry, over the last twenty or so years. Overseas manufacturers, in particular the Japanese, once saw the UK as a good place in which to set up plants. The possibility of exporting to Europe was obviously a strong point in favour of the UK. No longer, as the difficulties of the car industry and the TV manufacturing industry clearly illustrate. Taizo Nishimuro, president of Toshiba, has said that "the level of sterling has made it unbearable for any manufacturer in the UK to compete in the global arena". The future of Toshiba's remaining British factory, the Plymouth TV plant, is apparently in question.

The government seems relatively unconcerned, primarily because the contribution of manufacturing to the UK's gross domestic product has for a number of years been on the decline as the contribution of service industries has steadily increased. We are, it is felt, destined to be a service-based economy. There is also the fact that a strong pound has a benign effect on inflation, holding prices down. If – or rather when – the pound falls to a more reasonable level it will be that much more difficult to hold inflation in check. Wage pressures would increase, and interest rates would probably have to rise quite markedly. That's not a situation with which the government would be comfortable – especially as the next general election approaches.

There is, unfortunately, little that the government can do about our overvalued currency. Interest rates could be reduced, making the pound a less attractive currency. But control of interest rates has been handed to the Bank of England's Monetary Policy Committee, with the express remit of using interest rates to control inflation rather than the value of the pound. It is hard to see that tinkering with interest rates would anyway have much effect on the value of the currency. An alternative would be direct intervention in the currency markets – the government selling pounds in other words. This again has in the past proved to be ineffective. To buy euros and wait to make a killing sounds an attractive proposition. But in practice the degree of intervention that would be feasible is limited, and the effectiveness of such a move is questionable. It is however about the only possible course, and should be tried. Amongst other things, you can't indefinitely sustain a growing trade deficit.

Correction

Bush 2114T: In TV Fault Finding, page 430, April the TDA3562A colour decoder chip used in this model was incorrectly referred to as the "TDK version". This should have read "TFK version". Our apologies for this editing error.

CORRESPONDENCE
All correspondence regarding advertisements should be addressed to the Advertisement Manager, "Television", Reed Business Information, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Editorial correspondence should be addressed to "Television", Editorial Department, Reed Business Information, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

INDEXES AND BINDERS
Indexes for Vols. 38 to 48 are available at £3.50 each from SoftCopy Ltd., who can also supply an eleven-year consolidated index on computer disc. For further details see page 499.
Binders that hold twelve issues of *Television* are available for £6.50 each from Television Binders, 78 Whalley Road, Wilpshire, Blackburn BB1 9LF. Make cheques payable to "Television Binders".

BACK NUMBERS
Some back issues are available at £3.50 each. For further details see box on page 475.

SUBSCRIPTION ENQUIRIES

Telephone:	01444 445 566
Fax:	01444 445 447
Credit card orders:	01622 778 000

Address: Television, Subscriptions Dept, PO Box 302, Haywards Heath, West Sussex RH16 3YY, UK.
Make cheques payable to: Television
Subscription rates:

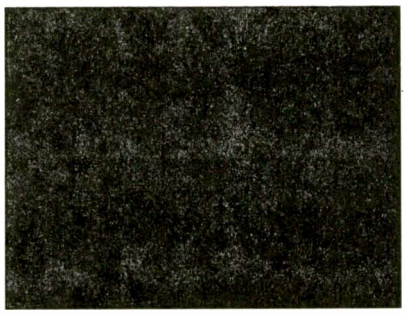
UK	£32.00 per year
Airmail Eire	£36.00 per year
Airmail Europe	£46.00 per year
Airmail Rest of World	£59.00 per year

NEWSTRADE ENQUIRIES
Distributed by MarketForce
Telephone: 0207 261 7704

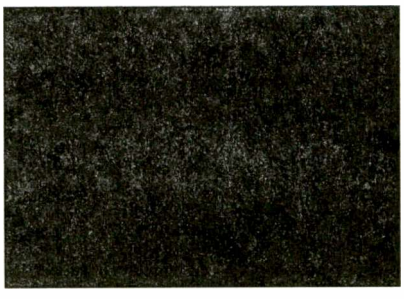
WEB SITE
For a full list of RBI magazines:
http//www.reedbusiness.com

ISSN **0032-647X**

REED BUSINESS INFORMATION



Mechanical polariser drive circuit



To obtain optimum satellite receiver input with weak signals Roger Bunney found it an advantage to use a mechanical polariser. This needs a power supply/ control system. A practical circuit is described below

Digital transmissions and the use of Eutelsat II F3 at 36°E as a major carrier of OB/SNG newsfeed signals led me to assess the possibility of increasing the signal input to my satellite receivers. A larger dish than my current 1·2m one would help of course, but local planning (and financial) considerations put paid to this approach. The 1·2m dish is adequate for most digital SNG signals, but on an overcast and wet day picture freeze and dropout occur. The threshold level of the RSD ODM300 digital receiver in use isn't wonderful either – many current digital receivers suffer from this handicap. The often marginal signals received during the Balkans war in 1999 led me to consider the use of a lower-noise LNB and a more effective polariser.

Previous Head End

The head-end system I had been using at the dish consisted of Chaparral scalar rings, a Racal ferrite polariser, and a Chaparral LNB with a noise figure of about 0·8dB average. The polariser was controlled by a modified Citizen's Band power supply, which also provided 12/18V for the LNB – the reason for using a separate power supply is that several receivers are in use. The current-operated polariser has variable control settings for vertical and horizontal polarisation, depending on frequency. It has an insertion loss of 0·2dB. The cross-polarisation rejection varies across the frequency bandwidth.

An Alternative

A better solution seemed to be to use the Chaparral Ku-band Polarotor 1. This is an integrated package, with a feedhorn that has scalar rings. The insertion loss is less than 0·1dB. In addition the vertical and horizontal settings are not subject to the variance with frequency experienced with my previous system, and the cross-polarisation rejection is at least 25dB. There is an increased, though slight, dish shadowing loss compared to the ferrite in-line assembly.

Implemenation

For the same reasons as before, I am using a separate LNB supply. The additional need was for a power supply and drive circuit to control the mechanical polariser. It has to provide 5V DC at up to 0·5A, and a variable mark-space ratio TTL logic pulse to drive the servo-controlled probe in the polariser.

Kesh Electrics (Satellite Sytstems) Ltd., 6-11 Main Street, Kesh, Co. Fermanagh, N. Ireland BT93 1TF (01365 631 449) came up with a simple circuit and a small PCB, which made construction easy. The polariser control circuit was adapted from that used in early satellite receivers such as the SR1000, CX2460 etc. The power supply is simple, and the whole lot fits in a standard diecast box. A screw-up four-pin microphone socket (of the type used for CB microphones) is used for the control cable connection to the polariser at the dish.

The polariser power supply/control circuit is shown in Fig. 1. There's nothing critical about the construction. The mains transformer (T1) is a cheapie surplus one with an 0-13·2V secondary winding. Anything similar will do provided that it can, with the bridge rectifier, provide sufficient current for the regulators.

The control circuit uses an NE555 timer chip to produce the pulses to drive the polariser. The only preset adjustment is the 10kΩ control. With the main 10kΩ skew control at mid-position, adjust the preset for equal travel of the feed-horn probe plus and minus with respect to the main skew control's centre position. It's obvious once you've built and tested the circuit. If a scope is available it can be used to check the output pulses as the skew control is adjusted.

Once you have made the power supply/control unit, a check indoors with a length of 5A, three-core mains cable to provide the connection to the head end will show whether the polariser probe moves in sympathy with skew control rotation, also whether the vertical/horizontal switching works. The probe moves through a 90° arc.

The motor seems noisy, producing a sharp buzzing while in action. I gather that this is normal.

Hunting

There was a problem with my prototype unit: at one end of the skew setting, both vertical and horizontal, the polariser probe became unstable, moving rapidly through perhaps 30°, to and fro and out of control.

By chance a copy of the New Zealand magazine *SATFacts* arrived a few days later. It contained a small item entitled 'Feedback – Chaparral polarotor hunting'. The answer to the problem is to fit the following

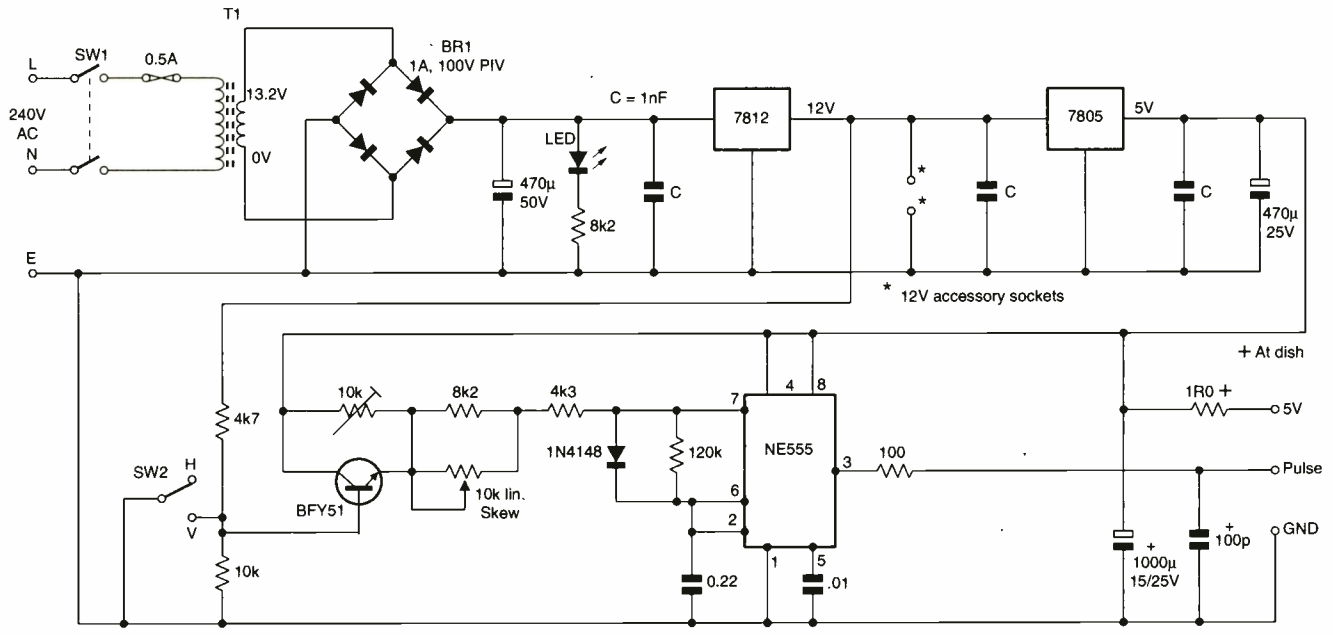


Fig. 1: Circuit diagram of the mechanical polariser power supply/control unit.

components at the dish end of the cable. A 1Ω, 0·5W carbon resistor is added in series with the 5V feed. Decouple it at the input end with a 470-1,000µF 15/25V capacitor connected to the earth terminal. Fit a 100pF capacitor between the pulse connection and the earth terminal. The value of the 5V supply decoupler depends on the wire resistance. With a modest run of 18 or 20 SWG wire 1,000µF should be the maximum used. If thinner (higher resistance) wire is used, the value may need to be increased to say 2,200µF.

TV expertise and how to handle the customers. Reflections on the trade in earlier, happier times and the present decline. Don Bullock's servicing commentary

WHAT A LIFE

"He fades, then he cuts out right to nothing" said Mrs Ponsonby as she settled her fluffy little dog on our counter. "Sit there Fifi" she continued, "if you're good, Mr Bullock might find a tit-bit for you to eat."

As Paul slipped out to her car for the set I smiled at Fifi and Mrs P smiled at me. Then she looked away and I gave the dog a cuff. It flew off the counter, yelping.

"Stop being a silly, Fifi" she said as she sat it on the counter again, close to me, "or Mr Bullock won't like you. And that'll mean no snackies."

I smiled indulgently.

The set was a Ferguson C49F. Paul connected it up and switched it on. Sure enough the picture began to fade. It didn't take him long to find some classic dry-joints at plug BV03, which connects the heater and HT supplies to the CRT base panel. Resoldering them put an end to the fading, but a minute later the line output stage died. This was obviously a separate fault. Paul and Steven conferred over the lifeless chassis and decided they would need a bit of time.

"I'll call back when you ring me" Mrs Ponsonby announced. Then, turning to me, she continued "look after my Fifi while I open the car door, there's a dear."

As she went Fifi stood up and bit my hand. I clouted its ear. Fifi yelped and barked at me, so I gave it another clout. Then Mrs P came back in.

"Stop being so noisy, just because nice Mr Bullock hasn't got a snacky for you" she said to the dog.

"I gave her one while you went to the car" I said, "she just kicked up."

Mrs P smiled. "How kind you are" she said, then scooped up the dog. "Come on you little silly" she said.

Cutting out

The cutting out proved to be a difficult and time-consuming fault. There were some dry-joints, which were resoldered. Some more were found and attended to. After that the set seemed to be working all right, so it was boxed up. But as soon as the back had been fitted it cut out again. Paul then discovered that the set could be made to trip by flexing the chassis ever so slightly. But a search for a hairline crack, using our magnifier, failed to find the cause of the tripping.

We eventually got to the bottom of it however. The TDA8218 field timebase and line generator chip IL01 has a V-shaped heatsink attached to its top. During manufacture it had been crushed slightly. As a result, its right-hand side was almost touching some of the IC's pins. When the back was refitted the board was flexed slightly, shorting the heatsink to pins 1-4 of the chip. Fortunately the IC had withstood all this, and bending the heatsink back cured the trouble.

When Mrs P called back her dog looked at me and howled.

"Don't start that again, Fifi" she said, "there's no kinder man than Mr Bullock."

I smiled nicely and waited for the

chance to give it another clout.

But she swept Fifi up and went to depart. "We'll see that nice Mr Bullock again, won't we Fifi?" she cooed.

"Hooee wooo" howled Fifi.

Field trouble

"Sharp it is" said the chap who bounced in with a set whose cabinet had been in the wars. "It don't say so but I know, 'cos I left it in front of the fire one night last year. It's a Sharp all right. Something funny at the top of the screen."

The picture was cramped at the top, with separate red, green and blue bands. Steven suspected the TDA8170 field output chip IC501 and fitted a brand new replacement. The result was field collapse. Puzzled, Steven fitted another one. This brought back the field scanning, but the initial fault was still present. He decided to carry out some scope tests.

There should be 23V at the supply pin 2. Instead there was 15V with a lot of hum. Time to check back to the source, where the 100µF, 35V reservoir capacitor produced a reading of 30µF. A replacement restored the correct voltage level and cleared the fault symptoms.

"It certainly looks like a Sharp set" said Steven, "don't know about the model number, but several use this arrangement."

The Mulligans

Mr and Mrs Mulligan came in with a Ferguson set. Mrs M is lovely. But Paddy, her husband, is a huge, rich fiftyish market trader who wins every argument he gets into – and there are many – without needing to say a word. He uses his raised chin and, to emphasise his point, clenches his fists.

"Set's dead" he announced as he placed a 21in. Ferguson model on the bench. "And don't be telling me it isn't."

I looked up at the underside of his chin. "I'm sure it is" I said. "Steven, Paul: Mr Mulligan's set is dead!"

"But the button things light up" said Mulligan.

"Right" I said.

The Mulligans departed and Paul made some checks in the power supply. There was HT but no start-up feed. A check on the TDA8138 multi-output regulator chip showed that its 17V input was present and there was a 5V output, but there was no 12V output. Was this output being loaded down or was the chip faulty? Paul decided to try a new TDA8138 first. This brought the set back to life.

A Granada set

An old banger drew up in front. The Reverend Goode alighted.

"Donald, your looking bonny" he said. "I've brought you the verger's set. It's a Granada. He says it's dead. Would you take a look at it for him?"

When we switched it on there was no picture or sound. It was a CD66JS6F.

"I'm off to get some whiskey" the Rev. announced, "I'll pop in on the way back. You will get it right, won't you?"

When we took the back off we saw that the TDA8170 field output chip had blown its top off. Not surprisingly, R715 in its supply had failed. So replacements were fitted. When we tried again the top of the new chip flew past Paul's ear. It taught him all about the Doppler effect.

Time for a more detailed investigation in the field output stage. We found that C658 (3,300µF, 35V), C705 (1,000µF, 35V) and C706 (2,200µF, 35V) were all leaky. Then we checked R715 again. It's actually a circuit protector, type N25 (1A). Not surprisingly it was open-circuit.

We replaced these items and fitted a new chip. When we tried again Paul ducked. He needn't have bothered. This time everything was OK and an excellent picture appeared.

"Excellent, Donald" the Rev. declared on his return, "you're for heaven, that's for certain."

"But not just yet, eh?" I asked.

"Excellent" the Rev. laughed, "that's a good one Donald."

Times past

A recent article brought back to my mind the rather different conditions in the trade in earlier times, and the way in which leading companies then operated. Take Ekco for example. When Mr E.K. Cole decided to start producing radio sets he gathered together some leading engineers to work on his ideas. It took them some time to come up with a design that Cole considered to be worthy of the name. When he was satisfied, he put the set into production and insisted on quality checks throughout the production process.

Then he sought a limited number of top-class dealers, generally one in each town. They were closely checked to assess their integrity and service capabilities. If they passed muster, he offered them a sole Ekco agency on certain conditions.

They had to stock and display his range of products, agree to demonstrate them in the homes of prospective customers, and sell them only at the recommended retail price. In addition they had to promptly service all in-guarantee Ekco products, both those they had sold and those brought in by people who had moved to the area. They also had to service all out-of-guarantee Ekco sets, whether the repair was profitable or not.

In return, he undertook to provide sales leads from national advertising, technical training, excellent service sheets at no charge, and advice on any technical problems that became apparent. Where modifications were advisable, the components required were provided promptly at no charge. Each dealer was duty bound to implement these modifications. He set the highest standards throughout his business.

The same was true of Mr Murphy and his sets. When our local Murphy agent retired, the town was checked to find a suitable replacement. Our company was one of two that were considered for the franchise, and in due course we received a visit from a couple of representatives.

We were closely questioned on a variety of trade matters. After that our workshop and technical capabilities were checked. We were then told that they would let us know.

In fact they chose the other dealer. I couldn't complain. He was a good man who had been established for many more years than we had, and already had the local Ekco dealership. He went on to sell a great many Murphy sets, made a lot of money, and deserved to.

They were good times for this trade. The setmakers took a pride in their products, and dealers took a similar pride in their standard of service. The public were offered first-class products with an excellent after-sales service. These who wanted to buy cheaper products could do so.

Then some kind sole decided to make Retail Price Maintenance illegal. The whole trading system collapsed, and our trade was never the same again.

Today

The article that set me thinking about all this was Michael Maurice's piece in the March issue. It was closely reasoned and summed up the present dire situation. "Ours is a diminishing and dying trade" he said: these seven words write a book.

Michael referred to the cheapness of today's products. Mass production, free trade and the excessive value of the pound have all contributed to this, and Joe Public has got used to paying less for more. Unfortunately, the less a product costs, the less Joe Public feels inclined to spend on repairs or a reconditioned set.

Michael is also right in saying that Joe Public no longer knows or cares what make his set happens to be. In our trade, pride of ownership has gone. It's not the case in the motor trade. Thirty years ago most of our customers would identify the make of their sets as soon as they brought them in. No longer.

It's true but sad that our trade is in decline. There are no newcomers, and numbers are falling. Think of the number of independent dealers there used to be in your area, and count how many are left. Customers suffer. It's no good telling the pleasant lady at Argos about the way your picture flutters on Channel 5 at twenty past eight every night.

But Michael's comment that "in most trades or professions you are over the hill at 35 and positively old at 46" really twists the knife in for me. Oh dear. Slip the Aspirins into my quivering hand somebody.

TELETOPICS

Web news round-up

Granada Media Group is to launch a new, free web-TV service called G-Wizz in July. The service will be run in conjunction with PowerChannel Europe, an internet consumer research group. Free set-top boxes that give full access to the internet and enable viewers to send and receive e-mail will be supplied through Granada's high-street rental outlets. There will be a £30 refundable deposit for the STB, and users will be expected to complete a monthly on-line survey of their spending. As part of the deal Granada Media will be taking a 23·5 per cent stake in PowerChannel, which collects and sells information on consumer behaviour.

G-Wizz will act as an internet service provider (ISP) for TV viewers linked to it. Some 200,000 boxes, which can be used with either an analogue or digital TV set and a telephone line, are expected to be made available during the second half of the year. G-Wizz will also offer viewers of popular shows such as Coronation Street and Emmerdale programme-related material that they can call up.

The UK company ichooseTV has announced a free, personalised TV service. This will be a video-on-demand service provided via the web, with users able to create their own personalised TV schedule. The commercial aspect is that it will enable advertisers to target closely-defined groups. According to the company the service will start in September and will use Microsoft and Real Networks video compression technology.

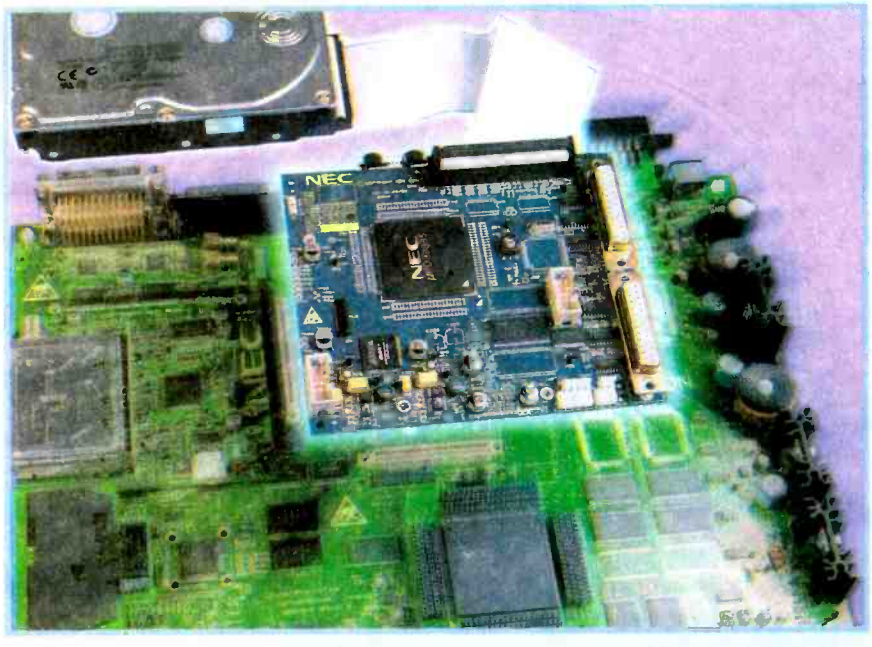
A US ISP called Neo has launched a product called i-DVD. It looks and works like a standard DVD player but in addition provides internet access and e-mail facilities – a full-sized, wireless linked keyboard comes with it. The price is roughly the equivalent of just over £60, and there's a monthly internet connection charge of some £12. Neo's profit comes from this charge. The unit has Dolby stereo.

DASA (the Domestic Appliance Service Association) has opened a web site at http://www.dasa.org.uk

Consumers can read about how DASA, which has both white and brown goods sections, provides protection against servicing cowboys. Every DASA member is listed, with address and telephone number. Those considering a career in domestic appliance servicing, or who wish to improve their competence, will find information about relevant National Vocational Qualifications (NVQs). Full details of membership are included, with an application form that can be downloaded.

Antiference Ltd., the leading UK aerial and accessories manufacturer, has opened a web site at http://www.antiference.co.uk

It has been designed to appeal to experts and beginners alike. There's advice on aerial choice and common reception problems, detailed DTT transmitter information and a comprehensive listing of retailers and installers. Helpful links to other sites, such as the BBC and ITC, are included.



NEC has announced the μPD82885 chip for use in digital TV set-top boxes that incorporate a hard-disc drive to provide what is known as a personal digital recorder (PDR). In addition to simultaneous recording and playback, it enables features such as enhanced-quality fast-forward, rewind and slow-motion to be included. The chip is fully compliant with NDS's XTV technology, and complements NEC's EMMA family of 'back-end' devices for STBs. NDS, a News Corporation subsidiary, is a leading supplier of open conditional-access software and interactive systems for digital TV services. The above photo shows the μPD82885 with an evaluation PCB that incorporates the μPD6103 EMMA single-chip STB 'back-end' chip.

Servicing Prospects

There are now some 25m mobile phones in use in the UK. What happens when they go wrong? They seem to be sent to firms such as Westwood Communications in Glasgow. This firm's investment is such that it can now repair 56,000 phones a month. Last year it spent £140,000 on training, and a greater sum is to be spent this year. The firm offers manufacturers and networks a guaranteed eight-hour repair service, and a 24-hour turn-round for their customers. Plenty of work for someone there.

Here's another prospect. Comet and others are sponsoring a scheme for refurbishing trade-in cookers, refrigerators and freezers for local resale. It anticipates an EEC directive on appliance recycling. Renew North East has been enlisted to train people to carry out the work. It seems that "a real skills shortage of people able to repair and refurbish electrical white goods" has been identified.

Component Video Inputs

Toshiba is to introduce a range of six TV models with component video inputs (Y, U and V). The first sets, Model 32ZD06B, a widescreen Nicam set, and Model 32ZD08B with Dolby Digital sound, will be available from July. The sets are aimed at home cinema users who have DVD players with component video output sockets.

Rental Merger Go-ahead

The merger of the Radio Rentals and Granada rental chains to form Box Clever has been approved by the Department of Trade and Industry, subject to certain undertakings: rental charges are not to be increased (save to cover any tax increases) for existing contracts and for new customers who rent for more then five years without an equipment upgrade; there is to be no administration fee for upgrading equipment except in respect of direct-to-home rental, where the fee must be kept at the present level; there is to be a one-off offer to renters of more than five years who have not upgraded or added to their equipment to upgrade to more modern equipment at no extra charge; and a minimum rental period of twelve months is to be adopted.

The merged company, which will be owned 50:50 by Granada and Rental Holdings, will have almost 900 outlets with an annual turnover of some £700m. But there are likely to be store closures and job losses.

A TV Fire Hazard

The Alliance for Consumer Fire Safety in Europe has highlighted the safety hazard represented by plastic TV cabinets. It points out that families do not appreciate how easy it is for a TV cabinet to catch fire from candles, cigarettes and other sources of heat, and that once alight a TV set can cause a real blaze. TV fires in the USA have dropped by 73 per cent since the early Nineties. During the same period they have increased in Europe. In the USA, plastic TV cabinets use brominated flame retardant DecaBDE to meet safety requirements. In Europe the cabinet has to pass a horizontal burn test, which is claimed to be less stringent. BREMA is apparently working with the Department of Trade and Industry on the question of these different standards. A report is expected shortly.

Digital Progress

At the end of March ONdigital had some 673,000 subscribers, a 22 per cent rise during the quarter. The company says it is on course to achieve its aim of a million subscribers by the end of the year. Games channels have already been added. ONrequest, a pay-per-view service offering movies initially with sports and other events to follow, should be available by the time this is read, also interactive programming and advertising trials. Internet access through the TV is promised later in the year.

CWC has signed up 190,000 subscribers for its digital cable services, with 150,000 installations completed. 90,000 customers have signed up for interactive TV, and more than 60 per cent of these have set up TV e-mail accounts.

Digital TX Tweak

Because of interference problems the DTT multiplex transmission powers at some sites vary. For example at Crystal Palace multiplexes C and D are transmitted at 1·6kW ERP, the other multiplexes being transmitted at 10kW ERP. NTL is at present carrying out a programme to increase these lower powers and thus the viewer coverage. By frequency adjustment and changes to aerial directivity, it is hoped to be able to increase the Crystal Palace multiplex C and D transmitted power to 10kW. The work is expected to be finished by December. Similar work is being carried out at Hannington, Hemel Hempstead, Oxford and Sandy Heath. In all some 750,000 extra households should be able to receive the at present lower-power transmissions.

New Technology

Sharp and Sony have announced the development of a 50·8mm diameter, high-density magneto-optical disc for use with digital still cameras, digital camcorders and other equipment. The disc has an 0·5mm thick substrate and can record 1Gbyte of data using red laser technology or up to 2Gbytes using a blue laser system. There are plans to develop a 4Gbyte disc. The new disc format is being backed by Casio, Fujitsu, IBM, Mitsubishi, Pioneer, Philips and TDK.

Matsushita and Quantum Corporation have developed an IEEE 1394 (FireWire) hard-disc drive that can record MPEG-2 images directly. The drive can read and write two channels of MPEG-2 video simultaneously and provides features such as pause, search and repeat – these can even work while the drive is receiving a real-time signal. Panasonic plans to incorporate the drive in new products to be released during the second half of the year.

The LG Model PD60Xi, which is claimed to have the world's largest (60in.) plasma TV display, was on display at the ER Show. See report on page 464.

Interactive TV

Two Way TV has launched an interactive games service in the Greater Manchester region via CWC's digital cable network. Viewers can access a range of interactive games. The UK's first interactive TV betting service, Vernons Matchball, has been launched by Ladbrokes and Two Way TV – Ladbrokes has a 20 per cent stake in Two Way TV. There are at present some 17,000 users of this service.

Broadcast News

The DVB Project demonstrated major progress at NAB 2000 with the transmission of dual high-definition and standard-definition TV services within a single 6MHz channel bandwidth.

NBC is to use Dolby E and Dolby Digital equipment and technology for its DTT services. Dolby E enables broadcasters and producers to move up to eight audio channels through an existing digital audio system prior to encoding as Dolby Digital for transmission.

CAI Trade Fair

This year's CAI (Confederation of Aerial Industries Ltd.) trade fair is being held at the Heathrow Park Hotel, Heathrow Airport on June 20th-22nd. It will include a programme of seminars, with the 20th Digital Day, the 21st Interactive Day and the 22nd devoted to the future. Manufacturers and distributors will have their latest equipment on display. Those in the trade can obtain a free ticket: phone the CAI on 020 8902 8998, fax 020 8903 8719 or e-mail office@cai.org.uk

What is Digital Video Cassette?

Digital video cassette technology isn't just about high-quality movies. It also enables domestic users to carry out the type of video editing normally associated with studio work. But, as Steve Beeching makes clear, if anything goes wrong with a DVC camcorder there's little the average repair shop can do about it

This series of articles is about DVC technology. The articles are intended to inform, not to encourage service technicians to 'have a go'. Any attempts at repairs will end in disaster for those who are not suitably trained and equipped.

Some cases of tampering have lead to the service technician, or his company, having to pay large sums of money in damages to replace a written-off digital camcorder. So there you have the health warning!

As you will read over the next few months, the technology is of a very high level, the chips are very small and often have no legs, and the PCBs have six layers. If these multilayered printed-circuit boards are flexed too much they will lose their inter-layer integrity. Even if replacements are available, they cost in the region of £600/£800 plus VAT! They also require expensive PC-based software and connection jigs to set up various parameters.

DV, or Digital Video, is the leading edge of video technology. It is possible that we will see the steady demise of S-VHS and Hi-8 formats in the world of videography and home recording within the next five years, and tape being replaced by optical disc, DVD or PC hard disc drives.

Table 1 outlines the benefits of the DVC over existing analogue systems. Video recorders with integrated hard-disk drives will gradually replace the VHS video recorder, built into the set top box or the television set.

Digital video – versions

Digital-video format has two versions – HD for future high definition wide screen specifications and SD for standard definition for normal TV signals.

There are two sizes of digital video-cassette: DV for main deck video recorders and Mini DV (DVC) for small hand-held camcorders. It is probable that main deck versions will also accommodate Mini DV cassettes either by dual mechanics or a size adaptor unit in a similar manner to the current VHS-C format to VHS adaptors.

JVC has launched a twin-deck VCR with a DVC mechanism and an S-VHS mechanism for editing and dubbing. All the products carry the DV and Mini DV logos. Recording times are given as 270 minutes for DV and 30/60 minutes for Mini DV tapes. A DVC60 cassette in the LP mode can record 90 minutes with no apparent degradation of picture but with reduced error correction.

Joint-level interface protocol

Joint Level Interface Protocol (JLIP) enables a personal computer to be connected to video equipment with bi-directional control via an RS232 port (Com 1 or Com 2) and a JLIP interface box.

The interface is incorporated into video equipment designated as JLIP compatible, with the JLIP label on 3-way or 4-way mini-jack connectors.

Three peripheral items of video

Table 1. Camcorder video format comparison.

	VHS	S-VHS	DVC
Recording system	Analogue	Analogue	Digital
Resolution	230 lines	400 lines	500 lines
Colour bandwidth	0.5MHz	0.5MHz	3.0MHz
Video s-to-n ratio	43dB	48dB	54dB
Jitter performance	Fair	Fair	Excellent
Audio format	FM/linear	FM/linear	PCM
Tape storage	Fair	Fair	Excellent
Tape speed	23.39mm/s (11.695mm/s LP)	As VHS	18.831mm/s (12.55mm/s LP)
Tape width	1/2 inch (12.7mm)	As VHS	1/4 inch (6.35mm)
Cylinder speed	1500 rev/min or 2250 rev/min in C format	As VHS	9000 rev/min
Cylinder size	62mm or 41mm in C-format	As VHS	21.7mm
Head azimuth	±6°	As VHS	±20°
Track pitch	49µm (25µm LP)	As VHS	10µm

equipment can be connected to each JLIP junction box. Also, up to 30 junction boxes can be daisy chained, giving control of up to 99 VCRs, printers, camcorders or monitors! The PC uses JLIP software to allocate a number to each item of equipment, camcorder, VCR, DVD, video printer and monitor. For example the JVC DVC camcorder is allocated No. 7.

As digital camcorders have frame time codes recorded, an editing list using JLIP software can be assembled to copy video clips between the camcorder and a video recorder. The list, in assembled order, has the option to have wipes, dissolves and effects between edits. The software can also control the rec/pause stop/start of a standard analogue VCR with fine timing correction to accommodate various mechanical delays.

Once an editing list has been made up on the computer, it can be stored as a file. In this way many edited copies of a tape can be assembled and are all identical.

JLIP control of an editing list will hold the recording VCR in record/pause whilst it searches each logged video segment on the camcorder. It will then play the segment, put the VCR in record for copying, then pause the VCR while it searches for the next segment and so on. This is automatic.

Assembly editing

The JLIP equipment list is supplemented by a dye sublimate colour printer and the perfect still frames can be printed out as photographs or downloaded into a computer, saved as a JPEG file and subsequently printed out on a high-quality printer.

The JVC system now extends to picture enhancement via a frame grabber and standard photo-touch software that can be used to retouch the picture before saving and printing. Panasonic offer photo-editing software called DV Studio as a PC interface to capture still pictures and save them into a library or print them out.

JLIP is a control system and not a signal distribution system. It provides the consumer with a basic non-linear editing system. A software package called JLIP 'Video Producer' gives the user access to a selection of special effects, mixes, wipes etc. that can be applied to edit points.

FireWire/I-link

FireWire is a high-speed personal computer and digital video input/output interface also known as i-link, the proper term being IEEE 1394. It is designed to carry real-time video and audio between a PC and peripheral DV digital camcorders, DVCR video recorders, DVD player/recorders, video monitors and printers.

FireWire is a fast (400Mbit/second) interface that will extend the domestic or semi-professional PC-based control into a non-linear editing system, now that the cost of hard-disk storage has dropped to affordable levels.

For real-time DV format video and audio, the storage capacity is about 200Mbyte per minute. A 4Gbyte hard-disk will store about 20 minutes of programme material, sound and vision, a 13Gbyte hard drive will store an hour.

DV is less compressed than MPEG-2 encoding as it does not use inter-frame temporal compression. In basic terms MPEG needs to process more than one frame simultaneously as part of its encoding and decoding system. DV on the other hand encodes and decodes within a single frame. This requires less processing memory and is termed intra-frame compression.

Digital-video connections are to IEEE 1394/100. They transfer PCM audio, compressed DV or MPEG-2 video and audio streams as a package at a data rate of up to 40Mbit/s.

A mixture of JLIP and FireWire will control up to 63 devices – well within most user requirements. JLIP controls the functions of the peripheral devices, 'play', 'record', 'picture search', etc. FireWire handles the digital signal paths between the DV camcorder, PC hard-disk storage, DVD recorders and DVCRs. It also handles both terrestrial and satellite digital receivers, when fitted.

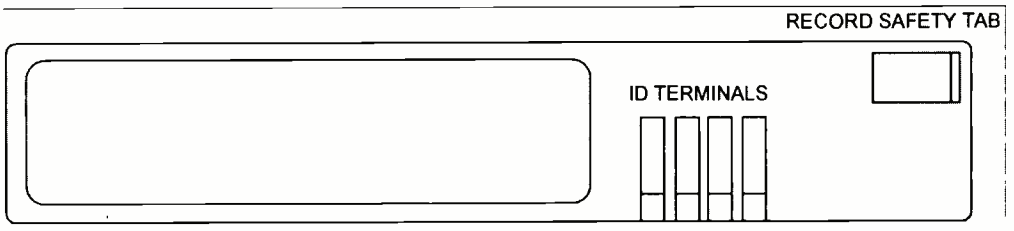
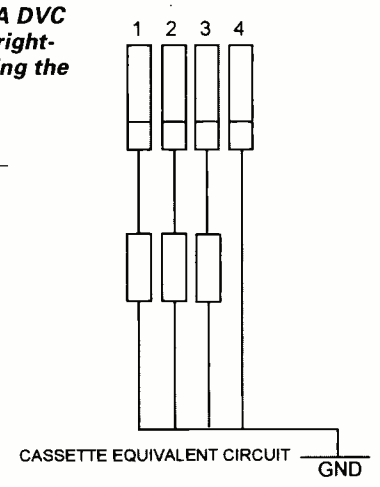


Fig. 1: Basic cassette identification system. A DVC has four identification terminals at the rear right-hand side. Identification consists of measuring the resistance from the ID terminals to ground.



TERMINAL	ITEM	IDENT	RESISTANCE
1 (VDD)	TAPE	7um	OPEN
2 (SDA)	TAPE	ME CLEANING MP	OPEN 1K8 SHORT
3 (SCK)	GRADE	CONSUMER INDUSTRIAL COMPUTER	OPEN 6K8 SHORT

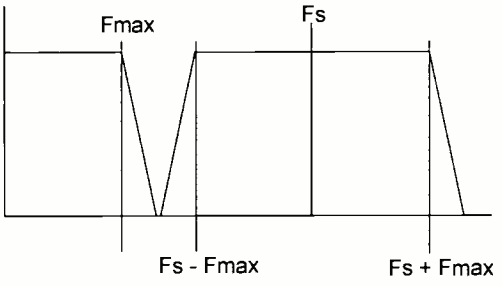


Fig. 2: The A-D sampling spectrum – the sampling frequency must be greater than twice the maximum signal frequency.

PC based non-linear editing systems control the DVC camcorder functions from the capture software via the IEEE 1394 lead, so JLIP is not required for this type of video segment capture.

Who needs FireWire?

What sort of applications will benefit from FireWire? Among them are desktop video editing, desktop publishing and video conferencing. Complex domestic audio/visual systems in which the signals travel between the equipment in digital form will also benefit. These systems introduce no signal degradation over a limited number of generations and have-full compatibility.

DV uses less compression than MPEG-2 and thus requires more storage space. DVD and hard-drive video storage use MPEG-2 compression. DV and PC non-linear editing maintain the DV format.

Recording your own DVDs

If the home user has edited DV tape on a PC and copied it back to tape he or

she may later want to store it on optical disk, or DVD. This process is not as complex as it first may seem, as DV and MPEG-2 are very close in compression format.

For DV, frame compression is identical to the MPEG-2 'I' frame. It requires only the additional motion adaptive extrapolation to convert DV to MPEG-2. This is achieved by the JVC HM-DR10000 D-VHS recorder that has DV input and records as MPEG2 on the tape.

I am sure that DV to MPEG-2 converters will become available, possibly in software format, to convert the DV edited 'holiday of a lifetime' to MPEG-2 for DVD recording using something like EasyDVD (apologies to Adaptec's EasyCD).

DV and Mini DV tapes

The DV tape ribbon is 6·35mm wide and 7μm thick. It is likely that the 60/90 minutes recording time will be extended as thinner tapes are developed.

Standard DV tape is ME type, i.e. it has metal evaporated on to it. However there is provision within the specification for metal-particle (MP-type) tapes when they become more readily available.

Although it has a much higher performance, metal-particle tape is more abrasive than the metal-evaporated alternative. Its drop out increases with continued usage, and it is less suitable for domestic use as the consumer expects to be able to re-use tapes many times.

Each tape cassette has four terminals at the rear right-hand side for tape data and memory access. Once the tape has been loaded, the system control microcomputer within the VCR checks the cassette to see if a memory facility is present within the cassette; if there is, it's read. If no memory is present the terminals are checked.

Next, further measurement takes place to determine the type of tape used, in terms of thickness, type (ME or MP) and grade, which will be either consumer or professional. This is called the BCID or 'basic cassette identification' system.

Full details of the information contained within the cassette memory are not yet available. However, in terms of pre-recorded material, the information content would be the titles, content and running times, in a similar manner to a CD audio player, and basic cassette information. Very few camcorders will be able to read and write to the IC memory.

The cassette's construction

The DV cassette uses metal-evaporated tape in order to sustain the high output and stability required for digital recording.

Four contact terminals are provided at the rear. The resistance between these terminals provides identification information as already described. Where a more advanced cassette with an internal memory IC is used the terminals change function. Pin 1 becomes a power line and pins 2 and 3 are for I^2C bus communication.

When a cassette is inserted, the systems control CPU first tries to read the BCID memory IC via the serial communication bus. If this fails, it then reverts to reading the internal ID board resistance for basic data. Where BCID is used, the resistances to ground of terminals 1, 2 and 3 denote the characteristics as shown in the Fig. 1.

Digitising a video signal

In order to digitise an analogue signal and maintain its integrity the sampling rate must be at least twice the maximum analogue signal frequency. For example, the CD audio sampling frequency is 44·1kHz, which is more than twice the 20kHz maximum audio signal frequency.

The reason for this is that the frequency spectrum of the sampling frequency, F_s, spreads from F_s–F_{max} to F_s+F_{max}, where F_{max} is the highest analogue frequency. See Fig. 2.

It is not good for the lower part of F_s–F_{max} to mix with the upper part of the analogue signal spectrum, i.e. F_{max}. If it does, beat harmonics are formed. These harmonics add to both frequency spectrums, causing signal distortion and patterning. F_s must be greater than twice F_{max} in order to avoid negative fold back and aliasing in the lower part of the frequency spectrum.

For a video signal with a bandwidth of DC to 6MHz, the sampling frequency must be greater than 12MHz. A good choice is four times the colour sub-carrier frequency, i.e. 13·5MHz.

An added advantage of this choice is that the digital sampling signal can be phase-locked to line syncs. This means that for any given TV line the sampling takes place at regular intervals along the TV line, this symmetry being repeated for every successive line.

A given frame is therefore made up of a symmetrical array of sample points in a fixed grid. In a camcorder this array is already present on the CCD imager as its pixel array. Phase-locked sampling is called 'orthogonal sampling'.

There are two chroma signals, R – Y and B – Y, which are sampled at half the luminance sampling frequency, i.e. 6·75MHz. The chroma signals are bidirectional, being centred on 0V with both positive and negative values. To overcome this, the A-D converter shifts the 0V point to the most negative value by clamping, so that the signals are always positive, see Fig. 3. Sampling is carried out from this new reference.

Sampling rates and bit lengths

When a video signal is digitised there are two important factors to consider. One is the sampling rate and the other the number of bits used in each binary sample word. Fig. 4 shows the sampling process. The portion of analogue signal shown at the top left is sampled 27 times. Each sample is then converted to an eight-bit binary word which indicates the amplitude of the sample.

After digital processing the signal is converted back to its analogue form by a D-A converter. The waveform is rebuilt from each sample. However the level given by a sample word remains the same until the next sample arrives. As a result, the waveform is not as smooth as it was originally. It is made up of steps: this distortion of the signal is called 'quantisation noise'.

Ideally, digitisation should mirror the signal so that the final analogue signal looks as good as the original one with no noticeable quantisation noise. This can be achieved by increasing the number of samples per second and/or by increasing the number of binary bits used for each sample.

As well as reducing the quantisation

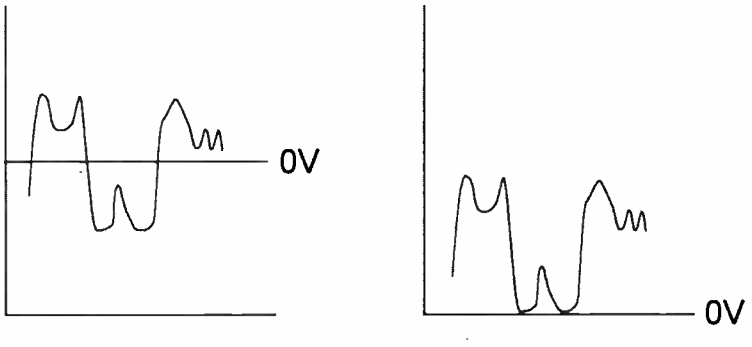


Fig. 3: The A-D converter clamps the maximum negative chroma signal excursion at 0V.

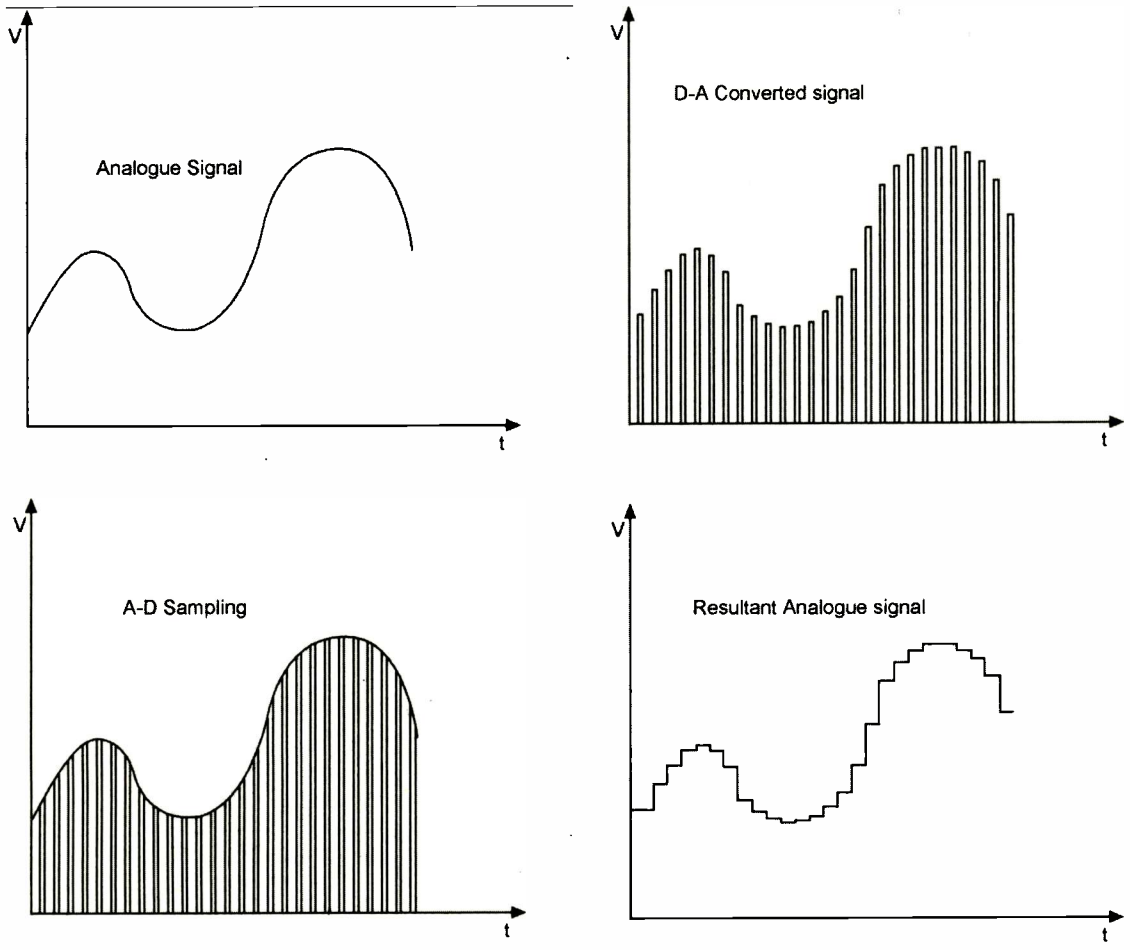


Fig. 4: The A-D and D-A conversion processes. The original analogue signal shown is sampled 27 times then converted to binary digital form. When reconversion to analogue form occurs, the waveform has steps in it – this is referred to as quantisation noise.

noise, the resolution of the signal is improved and the final analogue signal is nearly as good as the original. If only two bits were used, the signal could have only four quantisation or grey-scale levels. Use of eight-bit words gives 256 grey-scale levels, i.e. 2^8. With a sampling rate of 13·5MHz, this is sufficient for high-quality video digitisation.

Such A-D conversion without compression results in a data rate of about 240Mbit/s. For domestic digital recording this is reduced to around 40Mbit/s. MPEG-2 reduces the data rate even further, to 20Mbit/s for 'high profile', 15Mbit/s for 'main profile' or down to 4Mbit/s for 'low profile'. A rate of 15Mbit/s is generally used for DTV, while 9.8Mbit/s is the maximum for DVD.

Digital camcorder block diagram (Fig. 5)

Analogue video signals from the CCD imager are processed by the usual correlated double sampling of the imager signal. This is done to remove noise components, to clamp the black level and to blank the unwanted additional black areas of the imager. After this the signal is digitised at 9 or 10 bits, depending on the manufacturer, before being converted to a standard 8-bit signal for digital processing.

Once in this digital format, the camera signal is processed in a single IC – the digital-signal processor or DSP. These processes include AGC, white balance, colour matrixing to R–Y and B–Y and Y levels, auto focus and zoom/focus tracking. Digital functions such as image stabilisation, digital zoom and special effects are also carried out in this IC by the use of the adjacent camera frame memory.

As there is only one memory it is not possible to combine certain functions: digital zoom and special effects both use the same memory IC and are not available at the same time. The customer can choose either.

All clock lines, sync and timing pulses are generated within the sync-signal generator IC, or SSG, using crystal oscillators forming interlinked phase-locked loops. These are used to time all signals from the CCD imager to the servo, deck functions, record and playback data. Clock and data signals are carried by an I^2C bus which links all the ICs.

Once processed in the camera section, the digitised video image is transferred to the 'shuffle memory' at the frame rate. From there, the E-E signals are passed to the D-A converter for monitoring.

At the output of the shuffle memory IC the digital recording video signals are shuffled to average data blocks and compressed by about 5:1. Digitised audio data is added at this point, and both are stored in a second memory known as the error-correction control, or ECC, memory.

Error correction parity calculations are carried out at a high level and parity checksums are added. Next, the data is passed on to the digital-control interface, or DCI. Within the DCI integrated circuit, sub-code and tracking data are added to the video and audio data before it's recorded on to the tape.

During playback, the digital data is recovered using a phase-locked loop. At the same time, tracking and sub-code data are extracted and passed on to the servo microcomputer, while sub-code, time and date and frame count are sent to the D-A converter for 'on screen' display via the I^2C bus.

Video and audio data error correction is carried out in the ECC IC. In the case of the video data, this is sent to the ECC memory which serves as a compressed-data frame store. The data is stored in small blocks in the memory, corresponding to the position of the data in the original analogue picture.

Any data blocks that are severely

corrupted, to the extent that the error correction is ineffective, are not written into the memory. Therefore previous data remains in that location. This is similar to analogue playback drop-out compensation.

In the worst conditions, the same still frame will be repeatedly read out of the ECC memory until the off-tape data is good enough to update the data in the ECC memory. Severe data errors will result in pixel blocks being displayed during playback – a common condition when the video data heads are clogged. Video data read out of the ECC memory joins the audio data again at a point where both can be fed out via the IEEE 1394 digital connector for digital copying or editing.

The data rate at this DV connector is about 40Mbit/s. Further along the playback path the video signal is expanded and put into the shuffle memory. From there, it is read out to the a D-A converter where syncs and blanking are restored to give a composite analogue video output signal.

When recording, the video data is shuffled around in the shuffle circuits. During playback, the shuffle memory operates as a video store for playback special effects. There is no 'shuffling' in playback.

Steve Beeching I Eng. is with Newark Video Services, whose web address is www.newarkvideoservices.co.uk

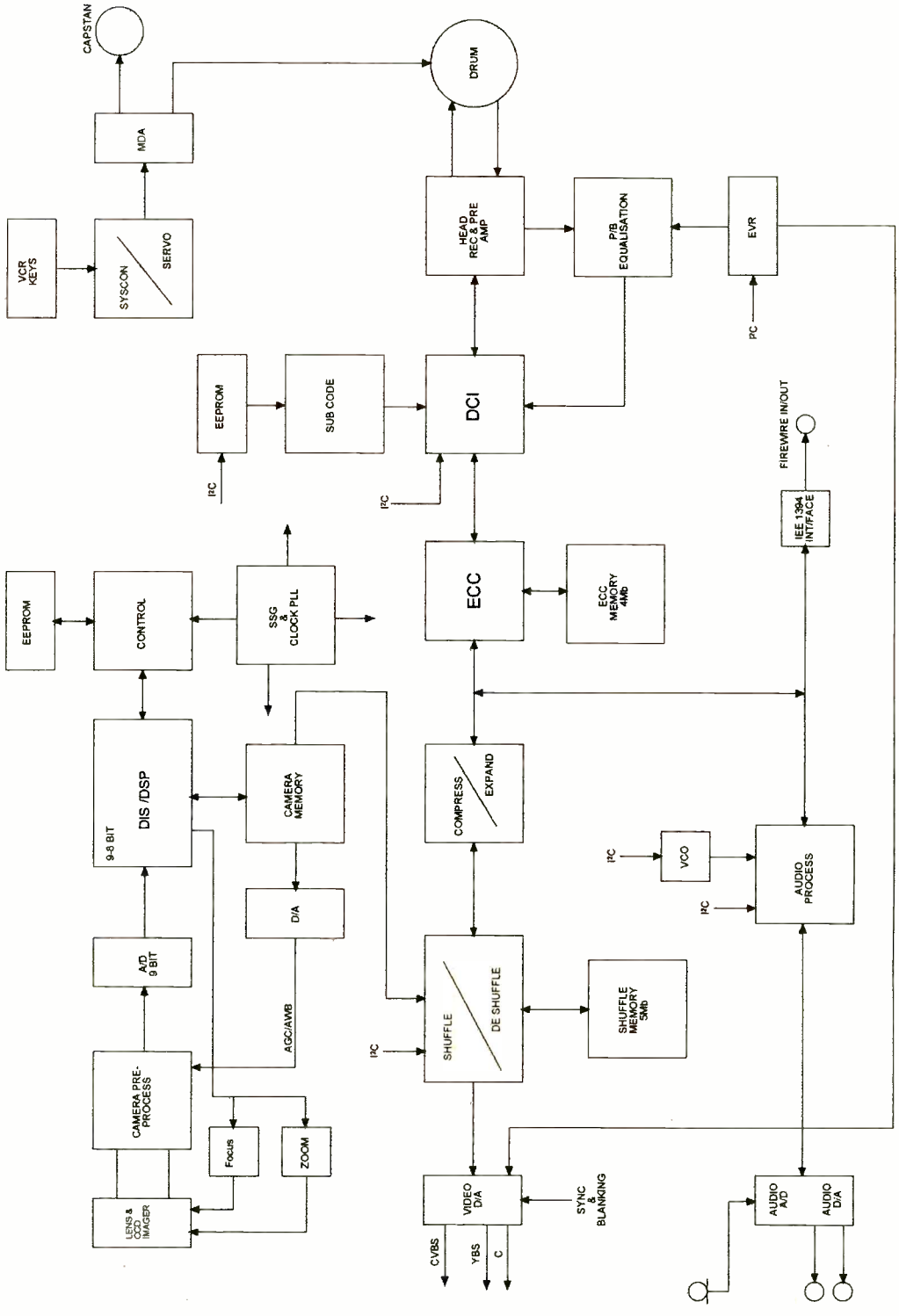


Fig. 5: Basic digital video (DV) camcorder block diagram.

www.telepart.co.uk

You can search our www site for video spares, semiconductors, remote controls, satellite gear, line output transformers and CCTV components. Its simple and will only **cost the price of a local call.** You can order parts, enquire about parts, or simply send a message.

have you got Economic Devices OFFICIAL HASSLE COLLECTOR

Yes! I've got HASSLE

HASSLE!!!

Our experienced staff WANT WANT WANT to help you.

Remote Controls

from **£5.95** each

Stock held for over **5000** different models

Remote controls in stock for 1000's of models at exceptional prices. If we don't stock the remote for your model number - send the old one and we will even get one made for you.

OUR PROMISE

If we can't find the part required immediately, we will HASSLE and HASSLE our suppliers. HASSLE and HASSLE the manufacturer. We will make phone call after phone call, Fax after Fax on your behalf. WE WILL DO ALL THIS FOR YOU. We will do it willingly and we will do it for FREE

...and look at the special offers.....

(strictly while stocks last)

BUT11A @ 79P each BUT11AF @ 79P each
BU508A @ 60P each Fully wired scart lead 99P

a slight inconvenience.... ....you must buy more than one.

BU208A	X 5	£3.75	TEA2018A	X 5	£3.70
BU508A	X 5	£3.00	UC3842	X 5	£2.95
BU508AF	X 5	£4.25	CNX62A	X 5	£1.45
BU508D	X 5	£4.45	S2000AF	X 5	£4.20
BUT11A	X 5	£1.45	TDA3653B	X 5	£2.75
BUT11AF	X 5	£2.35	TDA3654	X 5	£3.45
Philips type 1.2 volt Back up battery				X 5	£2.95
Philips type 2.4 volt Back up battery				X 5	£6.00
Scart - Scart lead 1.5m Fully wired				X 2	£1.98
Positor PT37,TH98009 (White)				X 5	£2.95
Thorn TX100 Chssis 110 DGR LOPTX				each	£11.24
Philips CP90 Chassis LOPTX				each	£11.63

.....and now ask for a full price list .....

MAJOR STOCKIST PHOENIX

PSU repair - refurb kits

Look for the PHOENIX stamp of approval

Over **200,000** kits sold

USE ONLY GENUINE PHOENIX REPAIR AND REFURB ELECTRONIC KITS

NEW Pace Digibox Repair / Refurb Kit

YOU!! NEED ECONOMIC

USE your ACCESS or VISA

SEMICONDUCTORS

Just a few of the types stocked - all QUALITY products at KEENEST prices

REMEMBER we can help you with over 34,000 different types

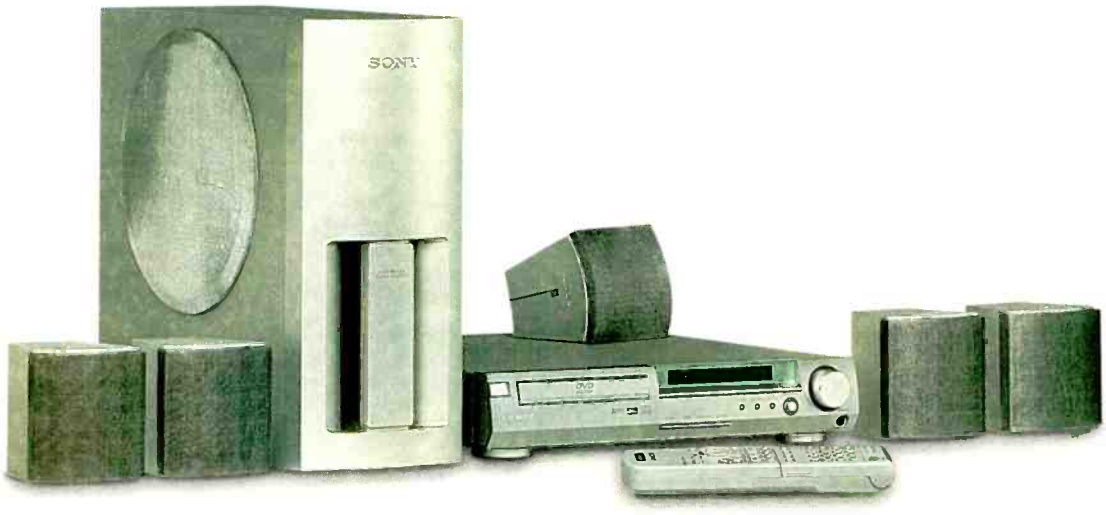
1N4001	2SC2482	AF200	BC637	BU208A	BZV10	MPSA06	TA8215H	TDA4605-3
1N4002	2SC2500	AN5265	BC639	BU208D	CD4001	MPSA42	TA8216H	TDA4605Q
1N4003	2SC2655	AN5512	BC640	BU250AF	CD4013	MPSA56	TA8221	TDA4943
1N4004	2SC2705	AN5515	BC848	BU2508DF	CD4017	MPSA92	TA8251H	TDA4950
1N4005	2SC2785	AN5521	BC847C	BU2520AF	CD4053	NE555	TA8403K	TDA7052
1N4007	2SC3225	AN5601K	BC848	BU2525AF	CD4066	NE555D	TA8427K	TDA7263
1N4148	2SC3311	AN7174K	BC848B	BU326A	CD4069	OA47	TA8718N	TDA7394
1N4936	2SC3425	AN7190K	BC848C	BU406	CD4094	P600A	TAA550B	TDA8138
1N5062	2SC3795A	BA157	BC850C	BU426A	CNX62A	P600J	TAA611CX1	TDA8140
1N5400	2SC3807	BA158	BC856B	BU500	CNX82A	P6KE130A	TAA761	TDA8145
1N5401	2SC3885A	BA159	BC858	BU506D	CNX83A	P6KE180A	TBA120U	TDA8170
1N5402	2SC3892A	BA3910B	BC858B	BU506DF	CNY17F	R2KL	TBA820M	TDA8171
1N5404	2SC3953	BA3918	BC858C	BU508A	CNY75B	R2M	TBA920	TDA8172
1N5406	2SC3955	BA4558	BC859A	BU508AF	D2VREM	R4050	TC1544P	TDA8175
1N5408	2SC3973B	BA5406	BC875	BU508AFI	DCREG	RG2	TDA1013A	TDA8178FS
1N5822	2SC4231	BA5412	BCY59	BU508APH	DTA114ES	RGP10G	TDA1013B	TDA8179S
1N914	2SC4517A	BA6209	BCY71	BU508D	DTC124ES	RGP15G	TDA1015	TDA8180
2N2222A	2SC5129	BA6209N	BD131	BU508DF	DTC144EF	RGP15J	TDA1044	TDA8190
2N3055	2SC5149	BA6219B	BD132	BU508V	DTC144ES	RGP30M	TDA1060	TDA8218
2N3055H	2SC536	BA6247	BD136	BU806	FR605	S2000A	TDA1085C	TDA8350Q
2N3440	2SC945	BA321	BD139	BU807	FX749	S2000A3	TDA1170	TDA8380
2N3773	2SD1138	BA143	BD140	BU908	H1000L	S2000AF	TDA1170N	TDA8391
2N3904	2SD1207	BAT85	BD234	BU405A	HA13119	S2000N	TDA1170S	TDA9503
2N4401	2SD1292	BAV20	BD241A	BUH515	HA13150	S2055AF	TDA1175	TEA1039
2SA1012	2SD1330	BAV21	BD243	BUH515D	HA13151	SAB3035	TDA1519A	TEA2018A
2SA1013	2SD1398	BAX14	BD243C	BUH517	HM6251	SG264A	TDA1521A	TEA2029C
2SA1015	2SD1426	BC107B	BD244C	BUK444500B	IRFBC40	SGSF344	TDA1524A	TEA2029CV
2SA1015Y	2SD1439	BC108	BD317	BUL54AR	JC501	SL1431	TDA1554Q	TEA2031A
2SA1016	2SD1441	BC108C	BD433	BUT11	KA2206	SR2KN	TDA1557Q	TEA2164
2SA1020	2SD1453	BC109B	BD434	BUT11A	KA22066	STA441C	TDA1558Q	TEA2164G
2SA1020Y	2SD1497	BC141	BD435	BUT11AF	KBU602	STK4132II	TDA1675A	TEA2165A
2SA1145	2SD1541	BC182	BD436	BUT12A	KGA210AH	STK4141II	TDA1904	TDA2260
2SA1302	2SD1545	BC182L	BD437	BUT12AF	KSR1004	STK4142II	TDA2005	TEA2261
2SA562	2SD1546	BC184L	BD438	BUT18AF	LA4282	STK4152II	TDA2006	TEA5101A
2SA673	2SD1548	BC212	BD839	BUT56A	LA4705	STK4192II	TDA2030H	TEA5101B
2SA683	2SD1554	BC212L	BD901	BUW11A	LA6324	STK5332	TDA2030V	TEA5170
2SA684	2SD1555	BC237	BD911	BUW12A	LA7116	STK5342	TDA2050	TIC106D
2SA733	2SD1556	BC237B	BD912	BUX84	LA830	STK5372H	TDA2541	TIC246D
2SA933	2SD1650	BC238	BDW94C	BUZ71A	LA832	STK5481	TDA2577A	TICP106D
2SA940	2SD1651	BC2388	BF199	BUZ77B	LA833	STK7253	TDA2578A	TIP110
2SA950	2SD1761	BC239	BF240	BUZ80	LA7835	STK730-060	TDA2579A	TIP111
2SA952	2SD1815	BC258	BF245A	BUZ90A	LA7837	STK7341II	TDA2581Q	TIP112H
2SA966	2SD1858	BC307	BF258	BUZ90AF	LA7838	STK7348	TDA2593	TIP120
2SA970	2SD1877	BC307B	BF324	BY127	LC7132	STK3907	TDA2611A	TIP2955
2SA984	2SD1878	BC308	BF420	BY133	LED3G	STR10006	TDA2653A	TIP29E
2SB1010	2SD1879	BC309B	BF421	BY184	LN1203N	STR11006	TDA2822M	TIP3055
2SB1143	2SD1884	BC327	BF422	BY227	LM317T	STR50020	TDA3301B	TIP31A
2SB1243	2SD1887	BC238	BF423	BY228	LM324N	STR50103	TDA3505	TIP41C
2SB560	2SD1889	BC337	BF458	BY229	LM339N	STR50103A	TDA3560	TIP42A
2SB649A	2SD2012	BC338	BF459	BY255	LM358N	STR5142M	TDA3561A	TIP42C
2SB688	2SD400	BC368	BF469	BY298	LM381	STR54041	TDA3562A	TIP761A
2SB774	2SD400F	BC369	BF487	BY299	LM386N	STR5412	TDA3565	TIP791A
2SB793	2SD467	BC372	BF494	BY399	LM2938T	STR58041	TDA3576B	TL072CP
2SB8922	2SD669A	BC546A	BF758	BY448	M49481	STR59041	TDA3592A	TL082
2SC1383	2SD718	BC546G	BF759	BY476	M51182L	STR6020	TDA3603P	TLP731
2SC1740	2SD837B	BC547	BF788	BYD14J	M54544L	STR61001	TDA3650	TOP204YAI
2SC1740S	2SD856	BC547A	BF869	BYD33D	M58655P	STRD4429	TDA36538	U2829B
2SC1815	2SD965	BC547B	BF871	BYD33J	MC13002P	STRD6008X	TDA3653C	U4614B
2SC1815Y	2SD965R	BC548	BF960	BYD33M	MC1310P	STRD6202	TDA3653CQ	UC3842
2SC1846	2SK1118	BC548B	BF970	BYV10-40	MC34063API	STV5730ST	TDA3654	UC3844
2SC2023	2SK135	BC548C	BF981	BYV27200	MCR100-8	STV9379	TDA3654Q	UPC1018C
2SC2120	2SK1507	BC550B	BFR90	BYV95B	MJ15003	T60171V	TDA4500	UPC1025H
2SC2229	2SK241	BC550C	BFR90A	BYV95C	MJ2955	T90S3V	TDA4503	UPC1032H
2SC2230	2SK30A	BC556A	BFR556A	BYV96D	MJE13005	T90S4V	TDA4505E	UPC1365C
2SC2235	2SK526	BC556B	BR100	BYV96E	MJE18004	TA7140P	TDA4505M	UPC1378H
2SC2236	7407	BC557A	BR049	BYW56	MJE3055T	TA7280P	TDA4510	UPC1394C
2SC2240	7805	BC557B	BSX20	BYW76	MJE340	TA7281P	TDA4600	UPC1488H
2SC2274	7806	BC558B	BT139600	BYW95C	MJF18004	TA7698AP	TDA4600/2/3	UPC1498H
2SC310	7809	BC558C	BT151500R	BYW96E	MJF18006	TA8205AH	TDA4601	UPC574H
2SC2314	7812	BC635	BTA08400S	BYX10	MJF18204	TA8207	TDA4601D	ZTK338
2SC2335	78L05	BC636	BTA12600	BYX55600	MN650	TA8210H	TDA4605	ZTX650

Over 34,000 types of transistors, IC's, diodes etc. or equivalents stocked

REMEMBER TO ADD £1.50 POST & HANDLING U.K. MAINLAND ONLY. EXPORT AT COST. ADD 17.5% VAT TO TOTAL

Economic Devices

32 Temple Street, Wolverhampton, WV2 4AN, UK Tele ++ 44 (0)1902 773122 Fax ++ 44 (0)1902 429052



Electrical Retailing Show report

The ER Show at the NEC is the UK showcase for new consumer electronic products. There were plenty of new items being displayed and demonstrated this year. George Cole reports

The ER (*Electrical Retailing*) Show is held every year at the NEC, Birmingham. Many consumer electronics companies find it a suitable opportunity to launch new products and display others planned for release later in the year. There were certainly plenty of interesting products and developments to be seen at this year's show.

Television

Sony gave visitors their first experience of its new Digital Reality Creation Multifunction (DRC-MF) technology, which uses a digital signal processing algorithm developed by Sony to increase picture resolution by a factor of up to four. The system is designed for use with both 50Hz and 100Hz displays – with the latter the resolution is increases by a factor of two. TV sets that incorporate DRC-MF include the KV36FS70, a 36in. model, and Sony's new PS1 range of rear-projection sets.

Sony also launched a new range of portables, called Mio Wega, that use Wega flat-screen technology. The first such models are the KV14LM1 and KV14LT1.

Toshiba was making bullish noises about its new DFS (Dynamic Frame Scan) picture-enhancement technology, which is designed for use with 100Hz displays. It employs three techniques to enhance picture quality. First is flicker reduction: in addition to a doubled field rate of 100Hz, a motion-vector compensation system is used to reduce large-area flicker and line flicker. The second feature is Digital Noise Reduction, which reduces noise in the picture. The third technique is to generate intermediate fields between Fields A and B, by using a motion detection/compensation system that predicts the motion between fields. Toshiba says that this reduces jaggedness and results in smoother motion. DFS has been incorporated in several new Toshiba models, including the 32in. 32ZD08B, which has Dolby Digital audio, and the 28in. 28ZD06B, a Dolby Pro-Logic model.

Toshiba has added component-video inputs to most of its home cinema models. There is also a new range of four rear-projection TV sets with 16:9 displays. Models 56WH08B, 46WH08B and 40WH08B (the first two digits are the screen size in inches) include Dolby Digital audio while Model 40PW03B is a 40in. Nicam set. Another new introduction is the MT1 Mobile Theatre Projector, which provides a maximum display of 250in.: it can be connected to a DVD player, a VCR or a PC.

Sharp has always been a leader in the development of liquid-crystal display technology. It was showing the

Below: The Sharp 28in. widescreen LCD TV Model LC28HD1.

LC28HD1, a 28in. widescreen LCD model. Just 6cm thick with a weight of 10kg, Sharp claims that it has the world's highest LCD resolution (1,280 dots x RGB x 768) and the highest luminance level (450cd/square metre). This has been made possible by a newly-developed 'black' TFT display that includes Super High Aperture LCD technology. Another advantage of the display is its wide viewing angle of 160°, both horizontally and vertically. I was impressed by the fact that the picture quality was good even outside the central 'sweet spot'. In addition the LC28HD1 has a super-thin speaker system developed by Bose. The tuner and AV are separate, enabling the display to be located almost anywhere in the room – on a wall for example.

Sharp was also showing a 60in. rear-projection set which uses Continuous Grain Silicon technology to produce a high-definition, widescreen TV display with a contrast ratio of 300:1 and a brightness level of 850 lumen. Sharp's range of models with Super Flat CRTs includes the 28in., 16:9 Model 66GF-64H which has Dolby Pro-Logic sound and Sharp's own TV Guide. The latter gives information, via a pop-up menu at the bottom of the screen, on present and next (NexTView) programmes for all channels. There's also a timer-setting system that uses the teletext pages to send a control signal to a NexTView-compatible VCR.

LG had several interesting TV products including a 60in. plasma-display model, the PD60Xi, which is compatible with TV and PC inputs. The company is also involved in LCD technology and showed two models with this type of display, the 15in. Model LN15A1 and 22in. FN22A2. The highlight of the LG stand however was an internet fridge! It has a built-in LCD screen that can be used for internet access, TV or a video source such as a DVD player. The fridge has a built-in MP3 player for listening to music downloaded from the internet. A bar-code scanner enables you to order goods from a grocery store via the internet. The internet fridge is already available in the USA, but no UK launch date has been suggested.

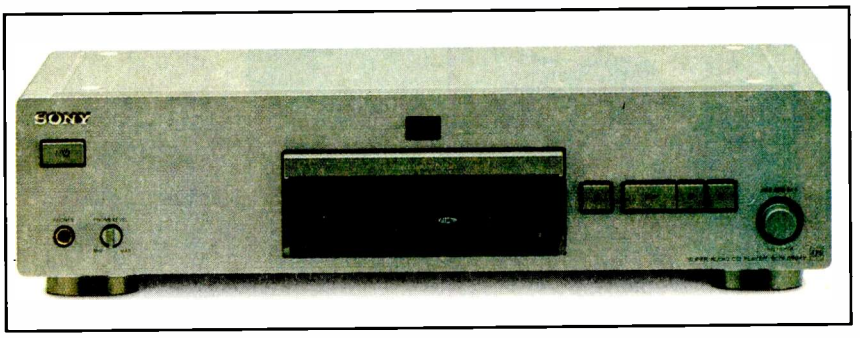
Alba was displaying its 14in. internet TV set, which is in the Bush range. It has integrated web browser software, a modem and a remote-control handset with a built-in keyboard. A picture of this set appeared in Teletopics last month. There will be 14, 21 and 28in.models in this range.

Samsung showed a 50in. TV set that uses Ferro Electric Crystal Display (FLCD) technology. The technology is similar in structure to an LCD. The FLCD molecules are sandwiched between glass plates with polarising filters. When a voltage is applied, the FLCD molecules change their orientation: depending on the switching direction, the result is either to block light or allow it to pass through. The FLCD is claimed to have several advantages in comparison with a conventional LCD. The switching is faster, which means better contrast and resolution. The viewing angle is wider, and the panels are just several cm thick. Samsung plans to launch its FLCD sets in the UK later this year.

Samsung also had on show a number of TV-video combi units, including a model called the Fashion Twin Tuner. This has a 14in. screen, two TV tuners and a two-head VCR with VideoPlus, index search and NTSC playback.

The DVD

Samsung demonstrated a consumer DVD recorder, Model DVDR2000, which it plans to launch in the UK this September. It uses the DVD-RAM system, which is also being backed by Hitachi, Panasonic and Toshiba.



Above: The Sony SACD Model SCDXB940.

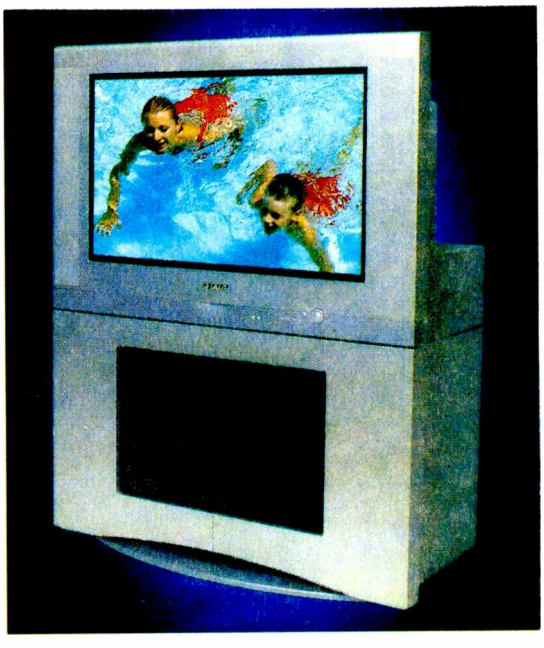
This enables up to two hours of MPEG-2 video to be stored on a 4·7Gbyte disc. The DVD recorder will be able to convert MiniDV digital signals to MPEG-2 video, enabling camcorder material to be stored. Other features include compatibility with DVD-Audio discs, an integrated Dolby Digital decoder, DTS/MPEG-2 audio output and search play at up to x32 normal speed. Samsung also had on show the DVD-C800, a five-disc DVD changer which is compatible with the new DVD-Audio standard. This is to be launched later in the year. LG's Model DVD-350E includes an MP3 audio decoder, enabling users to play music files stored on CD-R or CD-RW discs. Incidentally there will be several types of DVD-Audio players, with some offering six-channel audio and others two-channel stereo sound.

Toshiba launched a couple of Universal DVD players, i.e. models that can play either DVD-Video or DVD-Audio discs. Both provide Dolby Digital and DTS outputs. All Toshiba's DVD players now incorporate a Dynamic Upgrade System, which enables a player's firmware to be changed by inserting a system disc instead of having to replace EEPROMs. Philips and Sharp have also adopted this system, which should make it cheaper and easier to alter a DVD player's operation.

A number of portable DVD players were on show. Sharp's DVL70S weighs 620g and has a widescreen, 7in. LCD panel: it also has Virtual Dolby Surround, and a Digital Gamma Correction system that adds detail in the darker parts of the picture. Sony's first portable DVD player, Model DVPFX1 also has a 7in. LCD screen.

Below: The Sharp 28in. Super Flat widescreen CRT Model 66GF-64H.

Sony's DVDS3000 DVD system consists of a DVD player, a digital amplifier, a tuner, a Dolby Digital decoder, DTS outputs plus five speakers and a subwoofer. The Sony MHCZX70DVD is a mini hi-fi system with a five-disc DVD changer. Samsung's MAX945D DVD Mini System consists of a DVD player, a 3-CD changer, a twin cassette deck and an RDS tuner.



Audio

There is much talk of MP3 in the audio world. It's an MPEG-1, layer-3 audio compression system that reduces CD PCM

Above: The Sony Model DCRTRV20 camcorder, which uses Memory Stick technology to store still pictures.

audio files by a factor of 12, with little subjective change in sound quality. LG showed Model MFPD360, which weighs 60g and has two 32Mbyte MultiMedia card slots. It has full Windows compatibility and a high-speed Universal Serial Bus (USB) port. Vivanco showed an amazingly small MP3 player that weighs just 30g: it has a 32Mbyte memory card. A variety of MP3 players were on display at the Samsung stand, including a prototype unit that plays music and displays photographic images on an LCD screen.

Sony showed audio products that use a different type of memory card, the Memory Stick. The NWMS7 Memory Stick Walkman is designed to store music that's downloaded from the internet, converting it to the Sony ATRAC3 audio compression standard.

Sony was also demonstrating the Super Audio CD (SACD) format which it developed with Philips: this provides better sound quality than audio CD, using a 1-bit recording technology known as Direct Stream Digital (DSD). The first SACD players were launched last year. They were expensive models aimed at hi-fi enthusiasts. This year Sony will launch the SCDX940, which will cost about a quarter of the price of the first-generation models.

Not surprisingly, Sony had many MiniDisc products on show, including the MZR91 which, at 110g, is according to Sony the world's smallest recordable MiniDisc Walkman.

The Sony NWMS7 Memory Stick Walkman can store music downloaded from the internet.

Sharp also showed personal MiniDisc audio products. The MDSR50H and MDSR60E weigh just 191g and offer six and a half hours of playback from a single NiMH rechargeable battery.

There were plenty of audio CD products, such as the LG ADR620 dual-deck audio CD recorder which is compatible with both the CD recordable (CD-R) and CD-Rewritable (CD-RW) formats, and has a x4 high-speed dubbing system that can copy a 60-minute audio CD in fifteen minutes. It also has a sampling rate converter for other digital formats such as DAB (Digital Audio Broadcasting). Akai's CDR070W CD recorder can be used for x4 high-speed dubbing with a CD-R and x2 dubbing with a CD-RW disc.

Samsung showed two products that combine the hi-fi and PC worlds. The NACP50 is a PC Audio system that consists of a docking station and MP3 encoder plus detachable CD and MP3 players. It also has a parallel PC port connector. The MMN7 CD Micro system also has a slot for playing MP3 audio files stored on a SmartMedia card and can in addition play MP3 discs.

Sony displayed a DAB tuner, Model STD777ES, that's also compatible with analogue radio transmissions.

Camcorders

Sharp's VLPD6H Digital Viewcam includes a SmartMedia card for storing still images that can be transferred to a PC. It can also store still images on the memory card during video recording in the picture-in-picture and title-screen modes. The storage system can in addition be used for tape-indexing. The VLPD6H also has a Super Cat's Eye system that uses IR technology to record monochrome images in total darkness – Sharp used a darkened birdbox to demonstrate this feature. Colour recording is possible down to a light level of 0·5 lux. Other features include a zoom microphone and a detachable LCD screen that can be used to control the camcorder from a distance – an optional cable link is required for this operation. SmartMedia images can be transferred to a PC in several ways: by means of a card adaptor that slots into a floppy disc drive; via an RS232 port; or via an i-Link terminal, though few PCs have this type of connection at present.

Sharp also showed its latest Internet Viewcam, Model VNEZ5H, which has a 1·3m pixel CCD imager and stores up to two hours of MPEG-4 video on a 64Mbyte SmartMedia card. Other features include a USB connector and a voice memo recording facility.

Amongst the offerings from Sony there was Model DCRTRV20, which uses Memory Stick technology to store still images, has a 3·5in. LCD screen and a x40 digital zoom.

Samsung's VP065 MiniDV camcorder has both RS232 and FireWire (IEEE 1394) connections.

Satellite Services

Astra demonstrated DC-Sat.Net, a low-cost system designed for 'micro-broadcasting'. This inolves live transmissions to closed networks, for example a chain of night clubs. A videoconferencing system is used to make the broadcast, which is sent via an ISDN digital telephone link to a data centre where a system known as Communi:call transfers it to the Astra satellite system. PCs are used for reception.

A system called Espresso delivers educational material with full-screen video to school PCs via the Astra satelite system. Trials of Espresso have been carried out by fifteen local education authorities.

Grandata Ltd

distributor of electronic components

Line Output Transformers

Part No	Code	Price
ALBA		
3714002	LOT02	800p
043714002J	LOT02	800p
43700000	LOT02	800p
AMSTRAD		
1810951	LOT55	1250p
3714002	LOT02	800p
043714002J	LOT02	800p
43700000	LOT02	800p
AM152591	LOT55	1250p
FERGUSON		
00 D-3-508-002	LOT381	1400p
06 D-3-083-001	LOT82	1100p
06 D-3-083-002	LOT82	1100p
06 D-3-084-001	LOT23	1050p
06 D-3-087-001	LOT23	1050p
06 D-3-088-001	LOT84	1200p
06 D-3-093-001	LOT204	1250p
06 D-3-508-003	LOT276	1200p
06 D-3-512-001	LOT204	1250p
29201-022-01	LOT63	1500p
473197	LOT304	1300p
D 059 / 37	LOT204	1250p
HINARI		
3714002	LOT02	800p
043714002J	LOT02	800p
43700000	LOT02	800p
CF 124 B	LOT67	1250p
CF 124 E	LOT67	1250p
HITACHI		
2424593	LOT44	900p
2432461	LOT169	1250p
2432761	LOT169	1250p
2433453	LOT82	1100p
2433751	LOT01	1050p
2433752	LOT01	1050p
2433891	LOT23	1050p
2433892	LOT84	1200p
2433893	LOT23	1050p
2433952	LOT33	800p

Part No	Code	Price
HITACHI..continued		
2434002	LOT226	1350p
2434141	LOT33	800p
2434274	LOT44	900p
2434393	LOT405	1800p
2434593	LOT44	900p
2435006	LOT401	1500p
2435131	LOT251	1300p
2436201	LOT90	850p
2433891H	LOT23	1050p
MATSUI		
20070	LOT438	1250p
20071	LOT438	1250p
20072	LOT438	1250p
20073	LOT438	1250p
20074	LOT438	1250p
20075	LOT438	1250p
3714002	LOT02	800p
3221008	LOT438	1250p
043714002J	LOT02	800p
043221088P	LOT438	1250p
43700000	LOT02	800p
7140021	LOT02	800p
MITSUBISHI		
731003	LOT51	1300p
334 P 18506	LOT51	1300p
ORION		
3714002	LOT02	800p
043714002J	LOT02	800p
43700000	LOT02	800p
PANASONIC		
TLF 14512 F	LOT39	1500p
TLF 14520 F	LOT40	1500p
TLF 14521 F	LOT39	1500p
TLF 14567 F	LOT39	1500p
TLF 14568 F	LOT40	1500p
TLF 14584 F	LOT41	1550p
TLF 14586 F	LOT42	1500p

Part No	Code	Price
PHILIPS		
3119 108 31260	LOT90	850p
3119 108 31290	LOT73	1000p
3119 108 31440	LOT433	1100p
3119 108 31441	LOT433	1100p
3119 108 31442	LOT433	1100p
3119 198 62930	LOT57	1000p
3122 108 10246	LOT111	1200p
3122 138 36070	LOT111	1200p
3122 138 36072	LOT111	1200p
3122 138 36920	LOT57	1000p
3122 138 36922	LOT57	1000p
3122 138 36923	LOT57	1000p
3122 138 37050	LOT132	1300p
3122 138 37620	LOT90	850p
3122 138 38040	LOT73	1000p
3122 138 38123	LOT395	1200p
3128 138 20200	LOT433	1100p
3128 138 20201	LOT433	1100p
3128 138 20202	LOT433	1100p
3139 128 30400	LOT90	850p
4812 140 10246	LOT111	1200p
4812 140 10369	LOT90	850p
4812 140 10421	LOT90	850p
4822 140 10274	LOT123	1100p
4822 140 10246	LOT111	1200p
4822 140 10306	LOT57	1000p
4822 140 10381	LOT128	1100p
4822 140 10384	LOT127	1550p
4822 140 10406	LOT73	1000p
4822 140 10544	LOT433	1100p
4822 140 10566	LOT433	1100p
AT 2076 / 10	LOT57	1000p
AT 2078 / 21	LOT395	1200p
AT 2079 / 21	LOT395	1200p
AT 2079 / 40	LOT73	1000p
AT 2079 / 99	LOT276	1200p
SAISHO		
3714002	LOT02	800p
043714002J	LOT02	800p

Part No	Code	Price
SAISHO..continued		
43700000	LOT02	800p
7140021	LOT02	800p
SHARP		
RTRNF 1220 CEZZ	LOT39	1500p
SONY		
1-439-286-00	LOT46	1000p
1-439-286-11		LOT46 1000p
1-439-286-12	LOT46	1000p
1-439-286-13	LOT46	1000p
1-439-286-21	LOT46	1000p
1-439-332-41	LOT100	1200p
1-439-332-42	LOT101	1200p
1-439-332-52	LOT100	1200p
1-439-363-11		LOT268 1100p
1-439-363-21	LOT268	1100p
1-439-387-11		LOT311 1200p
1-439-387-21	LOT311	1200p
1-439-416-11		LOT255 1300p
1-439-416-12	LOT255	1300p
1-439-416-21	LOT255	1300p
1-439-416-23	LOT255	1300p
1-439-416-41	LOT255	1300p
1-439-416-51	LOT255	1300p
TOSHIBA		
1810951	LOT55	1250p
2433751	LOT01	1300p
23236098	LOT288	1200p
23236198	LOT288	1200p
23236201	LOT395	1200p
23236245	LOT395	1200p
23236255	LOT289	1100p

Many many more LOPT's in Stock... Please ring for ones not listed

105° c Radial Electrolytic Capacitors

VALUE	CODE	PRICE	PER PACK
10 volts			
470uF	CAP29	120p	10
16 volts			
330uF	CAP30	175p	10
470uF	CAP31	175p	10
680uF	CAP32	210p	5
1000uF	CAP33	210p	10
2200uF	CAP34	525p	10
3300uF	CAP35	500p	5
4700uF	CAP36	610p	10
25 volts			
10uF	CAP37	45p	10
22uF	CAP38	45p	10
47uF	CAP39	48p	5
100uF	CAP40	70p	10
150uF	CAP41	95p	5
220uF	CAP42	120p	10
330uF	CAP43	140p	5
470uF	CAP44	190p	10
680uF	CAP45	315p	5
1000uF	CAP46	365p	10
1500uF	CAP47	390p	5
2200uF	CAP48	200p	2
3300uF	CAP49	220p	2
4700uF	CAP50	365p	2
6800uF	CAP51	390p	2
35 volts			
10uF	CAP52	50p	10
22uF	CAP53	45p	10
33uF	CAP54	50p	5
47uF	CAP55	85p	10
100uF	CAP56	85p	10
150uF	CAP57	95p	5
220uF	CAP58	145p	5

VALUE	CODE	PRICE	PER PACK
35 volts continued.....			
680uF	CAP59	650p	10
1000uF	CAP60	435p	10
2200uF	CAP61	245p	2
3300uF	CAP62	1000p	5
50 volts			
10uF	CAP63	50p	10
22uF	CAP64	70p	10
47uF	CAP65	85p	10
100uF	CAP66	85p	10
220uF	CAP67	175p	10
330uF	CAP68	245p	10
470uF	CAP69	435p	10
680uF	CAP70	490p	5
1000uF	CAP71	525p	10
2200uF	CAP72	325p	2
63 volts			
0.47uF	CAP73	35p	10
1uF	CAP74	35p	10
2.2uF	CAP75	35p	10
3.3uF	CAP76	50p	10
4.7uF	CAP77	35p	10
10uF	CAP78	50p	10
15uF	CAP79	95p	5
22uF	CAP80	75p	10
33uF	CAP81	85p	10
47uF	CAP82	95p	10
68uF	CAP83	130p	5
100uF	CAP84	120p	10
150uF	CAP85	280p	5
220uF	CAP86	280p	10
330uF	CAP87	400p	10
470uF	CAP88	525p	10
680uF	CAP89	500p	10

VALUE	CODE	PRICE	PER PACK
63 volts continued.....			
1000uF	CAP90	540p	5
100 volts			
0.47uF	CAP91	50p	5
1uF	CAP92	85p	10
1.5uF	CAP93	70p	5
2.2uF	CAP94	50p	5
3.3uF	CAP95	50p	5
4.7uF	CAP96	50p	5
10uF	CAP97	95p	10
22uF	CAP98	105p	10
33uF	CAP99	155p	5
47uF	CAP100	175p	10
100uF	CAP101	210p	10
220uF	CAP102	600p	5
470uF	CAP103	600p	5
250 volts			
3M3	CAP104	175p	10
10uF	CAP105	260p	10
47uF	CAP106	435p	10
400 volts			
1uF	CAP107	215p	5
2.2uF	CAP108	225p	5
4.7uF	CAP109	315p	5
10uF	CAP110	400p	5
22uF	CAP111	250p	2
47uF	CAP112	350p	2
450 volts			
1uF	CAP113	280p	5
2.2uF	CAP114	320p	5
4.7uF	CAP115	495p	5
10uF	CAP116	550p	5
22uF	CAP117	415p	2

CD Pick Ups

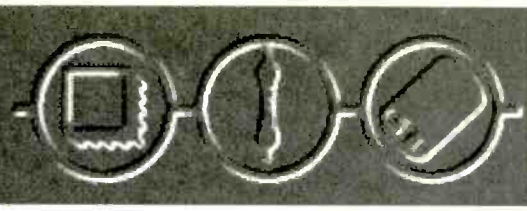
Part No	Price
KSS 152 A	£13.00
KSS 210 A	£10.50
KSS 210 B	£15.00
KSS 240 A	£20.00
KSS 213 B	£11.50
KSS 213 C	£11.50
OPTIMA 6 S	£11.50
OPTIMA 5	£11.50
RCTRTH8151	£20.00
RCTRTH8112	£15.00
CDM12.1	£15.00
CDM12.1 MECH.	£20.00

K.P. House , Unit 15 , Pop In Commercial Centre , Southway , Wembley , Middlesex . HA9 0HB England

Tel : (020) 8900 2329 Email : grandata.ltd@btinternet.com
Fax : (020) 8903 6126 Website : http://www.grandata.co.uk

Grandata Ltd

distributor of electronic components



Satellite PSU Repair Kits

MAKE & MODEL	CODE
ALBA	
SAT6600	SATPSU2
AMSTARD	
SAT250 , SR950 , SRD2000 , SRD700,SRD950 , SRX1002 , SRX2001 , SRX301 , SRX501 , SRX502	SATPSU16
SRD510 , SRD520 , SRD540 , SRD545 , SRD550	SATPSU3
SRD500	SATPSU4
BRITISH TELECOM	
SVS300	SATPSU17
BUSH	
IRD150	SATPSU12
ECHOSTAR	
SR5500 EARLY PSU WITH ADJ.	SATPSU12
FERGUSON	
SRD 5 , SRD16	SATPSU1
SRD4	SATPSU11
SRV1	SATPSU2

MAKE & MODEL	CODE
FINLUX	
SR5700	SATPSU12
SR5100	SATPSU23
GOODMANS	
ST700	SATPSU1
GRANADA	
KR1 , LR1 , LR2 , M/N92MR1/A	SATPSU1
HR 1, JR1	SATPSU2
NR2 , PR2	SATPSU8
M92MR2	SATPSU9
GRUNDIG	
STR1	SATPSU1
GIRD2000 , GIRD3000	SATPSU2
GRD150 , GRD250 , GRD280 , GRD300 , STR200S	SATPSU20
HITACHI	
SR-1050D	SATPSU1
MASPRO	
SRE250S/1 , SRE 350S/1	SATPSU1
SRE250S , SRE350S , SRE450S	SATPSU2
ST5 , ST-12	SATPSU20

MAKE & MODEL	CODE
MATSUI	
RD600	SATPSU20
MITSUBISHI	
ST-PB10	SATPSU1
NOKIA	
SAT1500 , SAT1600	SATPSU2
SAT1700 , SAT2200 , SAT220: SU23	SATP-
PACE	
PRD700 , PRD800 , PRD900 , PSR800 , PSR900 , MRD950 , MRD960	SATPSU1
MSS500 , MSS1000 MRD920 , SS9000 , SS9010 ,	SATPSU10
SS9200 , SS9210 , SS9220 SU2	SATP-
MSS100 , PRIMA	SATPSU8
APOLLO , MSS200 , MS290 , MSS300	SATPSU9
PANASONIC	
TU-SD200	SATPSU1
TU-SD250	SATPSU9

MAKE & MODEL	CODE
PHILIPS	
STU802/05M , STU804 , STU811 , STU824	SATPSU1
STU801	SATPSU2
STU3301	SATPSU20
STU909	SATPSU22
STU350	SATPSU9
SONY	
SAT301	SATPSU10
THOMSON	
SRD11 , SRD 14	SATPSU1
SRD7/8 , SRS3 , SRS4	SATPSU2
THORN	
SAT99 , SAT120	SATPSU1
TOSHIBA	
SAT99 , TU-SD200	SATPSU1
TS540	SATPSU10

CODE	PRICE	CODE	PRICE	CODE	PRICE	CODE	PRICE	CODE	PRICE
SATPSU1	600p	SATPSU4	600p	SATPSU10	1230p	SATPSJ16	1250p	SATPSU22	1050p
SATPSU2	550p	SATPSU8	650p	SATPSU11	650p	SATPSJ17	850p	SATPSU23	650p
SATPSU3	600p	SATPSU9	900p	SATPSU12	1600p	SATPSJ20	600p		

Replacement Video Heads

AMSTRAD

VCR1000,VCR2000,VCR6000,VCR6100,VCR6200,VCR8600, VCR8602,VCR8700,VCR9005,DD8900,DD8904,TVR4

ORDER CODE : VH93 PRICE : £7.00 + VAT

FISHER

FVHP420,FVHP510,FVHP520,FVHP530,FVHP615,FVHP618, FVHP620,FVHP622,FVHP710,FVHP711,FVHP715,.....etc

ORDER CODE : VH16 PRICE : £9.00 + VAT

HINARI

VXL8,9,10,VXL11,VXL19,VXL90,VCR34H,VTV100,VTV200,H13V

ORDER CODE :VH94 PRICE : £11.00 + VAT

HITACHI

VT522,VTM212,VTM620,622,720,722,822,922,925

ORDER CODE : VH400 PRICE : £11.00 + VAT

VT540,VT545,VT546,VT548,VTD660,VTD665,VTM598,VTM640, VTM645,VTM646,VTM730,VTM731,VTM735,VTM736,.....etc

ORDER CODE : VH533 PRICE : £14.00 + VAT

JVC & FERGUSON

BR1600,HRD140,HRD141,HRD142,HRD143,HRD150,HRD152, 8947,8948,3V42,3V44,3V45,3V46,3V47,3V52,3V54,3V55,3V56

ORDER CODE :JVC3HSSVA PRICE: £8.00 + VAT

HRD154,HRD160,HRD170,HRD171,HRD210,HRD211,HRD217, HRD310,HRD320,HRD321,HRD350,HRD521,HRD522,...etc 8950,8951,3V64,3V65,FV10,FV11,FV20,FV21,FV26

ORDER CODE : VH04 PRICE : £7.50 + VAT

HRD725,HRD755,3V43,3V53

ORDER CODE : VH08 PRICE: £18.00 + VAT

8930,8931,8933,8940,3V29,3V30

ORDER CODE : VH200 PRICE: £5.50 + VAT

BR9060,HRD330,337,440,441,637,641,660,670,720,730,740,820 HRFC100,SR3300MS,FV44L

ORDER CODE : VH379 PRICE : £11.50 + VAT

MITSUBISHI

HS349,HSE27,HSE31,HSE32,HSB27,HSB31,HSB32,HSM33, HSM34,35,37G

ORDER CODE : VH324 PRICE : £14.50 + VAT

HSE30,HSB30

ORDER CODE : VH326 PRICE : £14.50 + VAT

HSB12,HSE12,HSE22,HSM16G,HSM18,HSM23,HSM25,HSM30

ORDER CODE : VH380 PRICE : £14.00 + VAT

HSM20,HSM55

ORDER CODE : VH548 PRICE : £15.00 + VAT

HSB52,HSE50,52G,HSM36,50,54,55,57,58,60

ORDER CODE:VH450 PRICE:£27.00 + VAT

NATIONAL PANASONIC

NV300,NV322,NV332,NV333,NV340,NV390,NV2000,NV2010, NV3000,NV7000,NV7200,NV7500,NV7800,NV7850,NV8170, NV8200,NV8400,NV8600,NV8610,NV8620

ORDER CODE : VH10 PRICE : £6.25 + VAT

NV100,NV200,NV370,NV380,NV630

ORDER CODE : VH35 PRICE : £6.00 + VAT

AG5150,AG5250,NVF65,NVH75,NVH77

ORDER CODE : VH405 PRICE : £18.00 + VAT

NVJ30,NVHJ33,NVL10,20,NVL21,NVG30,NVG31,NVG40, NVG130,NVJ37,NVG40,NVG42,NVSD30,NVSD10EE,NVSD11, NVSD2,NVSD30,NVSD35

ORDER CODE : VH41 PRICE : £7.50 + VAT

NV730,NV730F,NV770 4 HEAD

ORDER CODE : VH32 PRICE : £10.50 + VAT

AG6024,NVG33,NVG46,NVL23,NVL25,NVL28,NVJ47,NVJ49, NVJ700PX,NVSD20EE,NVSD400,NVSD44,NVSD45

ORDER CODE : VH42 PRICE : £9.25 + VAT

NVG20,NVG21,NVG22,NVG25,NVG28,NVG200,NVD48

ORDER CODE : VH82 PRICE : £10.00 + VAT

NVG7,NVG9,NV230

ORDER CODE : VH111 PRICE : £7.00 + VAT

NVSD40

ORDER CODE : VH505 PRICE : £10.50 + VAT

NVJ45,NVJ47

ORDER CODE : VH498 PRICE : £10.00 + VAT

PHILIPS

VR6460,VR6520,64VR60,VR6420

ORDER CODE : VH77 PRICE : £7.25 + VAT

20DV1,20DV2,20RW7,21DV1,21DV2,21DV3,2SB01,2SB02,2SB 11,2SB12,30DV2,VR201,VR202,VR203,VR2115,VR212,...etc

ORDER CODE : VH555 PRICE : £46 + VAT

SANYO

VTC5000,VTC5400,VTC600,VTC6000,VTC6010,VTC6500, VTCM10,VTCM11,VTCM20,VTCM21,VTCM25,.....etc

ORDER CODE : VH45 PRICE : £18 + VAT

VHR1110,VHR1150,VHR1300,VHR1700,VHR2300,VHR2370

ORDER CODE : VH121 PRICE : £8.00 + VAT

VHR3200,3270,3100,3110,3150,3300,3400,3310,VHRD500

ORDER CODE : VH122 PRICE : £11.00 + VAT

VHR120,VHR130,VHR14,VHR141,VHR143G,VHR14SP,VHR151 ,VHR15,VHR16,VHR171,VHR220,VHR23...etc,VHRD4400, VHRD4410,VHRD4500,VHRD4600,VHRD4610,VHRD6700...etc

ORDER CODE : VH469 PRICE :£31 + VAT

SHARP

VC671,VC779,VC787,VC790ET,VCA50,VCA501S,VCA505,VCA6 0,VCA602,VCA605,VCA615,VCD806,VCD810,VCD815,VCT610

ORDER CODE : VH240 PRICE : £14.00 + VAT

VC108,208,382,402,405,408,500,550,571,573,581,582,583, VC5W20E,VC600,...etc,VCA10,VCA100,VCA102,VCA103,VCA1 031,VCA103,VCA104,VCA105,VCA106,VCA111,VCA113.....etc

ORDER CODE : VH56 PRICE : £8.50 + VAT

SONY

SLV275,SLV373VB,SLV410,SLV412,SLV427,SLV474

ORDER CODE : VH42 PRICE : £9.25 + VAT

SLVE7,SLVE8,SLVE9

ORDER CODE : VH588 PRICE : £36.00 + VAT

SLV615,SLV625,SLVE600,SLVE700,SLVE800

ORDER CODE : VH590 PRICE : £34.50 + VAT

TOSHIBA

V71,V73,V74,V75,V77,V80,V81,V82,V83,V84,V85,V86,V87,V88

ORDER CODE : VH126 PRICE : £8.00 + VAT

DV90,DV96,DV97,NM3,V108,V109,V199,V200,V202,V205,V207, V209,V80,V93,V94

ORDER CODE : VH127 PRICE : £9.00 + VAT

Many of our video head prices have been reduced.... Please call us for our latest prices !!!

We stock over 650 different video heads covering over 2500 different models for the following makes :

AIWA, AKAI, ALBA, AMSTRAD, BAIRD, BLAUPUNKT, DAEWOO, DECCA, FERGUSON, FISHER, FUNAI, GEC, GOLDSTAR, GRANADA, GRUNDIG, HINARI , HITACHI , JVC , LUXOR , MATSUI ,MITSUBISHI , ORION , PANASONIC , PHILIPS , SAISHO , SAMSUNG , SANYO , SHARP , SONY , TOSHIBA...AND MANY MANY MORE

K.P. House , Unit 15 , Pop In Commercial Centre , Southway , Wembley , Middlesex . HA9 0HB England

Tel : (020) 8900 2329 Email : grandata.ltd@btinternet.com

Fax : (020) 8903 6126 Website : http://www.grandata.co.uk

Grandata Ltd

distributor of electronic components

Remote Controls

Universal Preprogrammed Remote Control

Preprogrammed to cover all major Brands of TV , Video , Satellites and CD Players .

Replaces upto 8 different remote controls

With teletext & fastext functions

Order Code : RC9
Price : £10 + vat

Bulk Prices

5 pieces £45 + vat
12 pieces £96 + vat
24 pieces £168 + vat

Genie Universal Remote Control

Replaces 3 infrared remotes

Covers 1000's of models

Controls TV , VCR and Satellite

Auto Code Search

Simple to use

Order Code : GENIE
Price : £9 + vat

Wizard Universal Remote Control

Easy to use

Fully illuminated keypad

Full learning facility

Modern ergonomic design

Replaces upto 8 different infa red remote controls

Pre-programmed for convienient setup

Order Code : Wizard
Price : £16.50 + vat

We also stock replacement remote controls for 5,000 different models at very competetive prices, contact us for all our remote control requirements . Many of our remote control prices have been reduced.....Please call us for our latest prices

Universal Brand Replacement Remote Controls

Brand for Brand Replacement

Codeless set-up

Teletext and Fastext

Pre-Programmed for the latest models

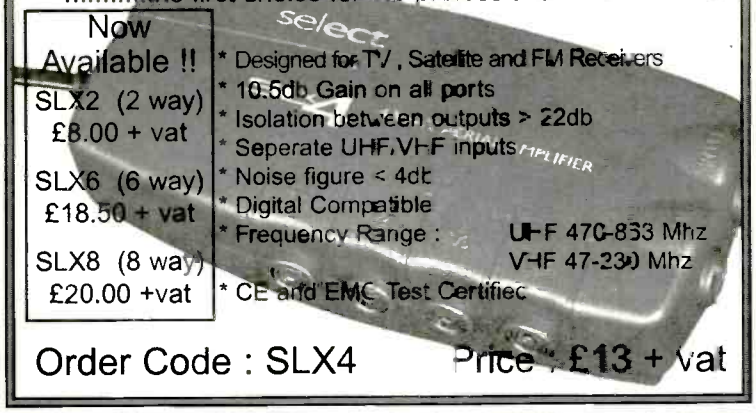
Replaces broken and lost remotes

Brand	Order Code
Panasonic TV	RCUNI01M
Sony TV	RCUNI02M
Philips TV	RCUNI03M
Hitachi TV	RCUNI04
Mitsubish TV	RCUNI05
Nokia TV	RCUNI06
Samsung TV	RCUNI07
Toshiba TV	RCUNI08
Ferguson TV	RCUNI09
Grundig TV	RCUNI10
Goodmans/Alba/Bush TV	RCUNI13M
Matsui/Hitachi/Orion TV	RCUNI14M
Satellite	RCUNI17

Price : £7.50 + vat

SLx4.....4 Way Aerial Amplifier

.....the first choice for the professional aerial installer



Now Available !!

SLX2 (2 way) £8.00 + vat

SLX6 (6 way) £18.50 + vat

SLX8 (8 way) £20.00 +vat

* Designed for TV , Satellite and FM Receivers
* 10.5db Gain on all ports
* Isolation between outputs > 22db
* Seperate UHF/VHF inputs
* Noise figure < 4db
* Digital Compatible
* Frequency Range : UHF 470-853 Mhz, VHF 47-230 Mhz
* CE and EMC Test Certified

Order Code : SLX4 Price : £13 + vat

Magician Sky Digital Remote Control

Operates all SKY digital TV box functions
Operates combinations of TV , VCR & Cable/Satellite systems
Covers 1000's of popular brands
Full teletext and fastext functions
Backlit device indicator keys

Order Code : MAGICIAN4
Price : £10 + vat

Solder Seal Kits / Hot Air Guns

SOLDER SEAL KIT

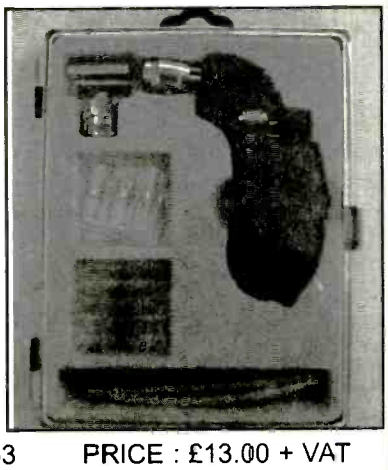
DON'T CRIMP IT ...SOLDER IT !!

FOR QUICK AND SAFE CABLE CONNECTION SOLDERING , GLUEING AND SHRINKING WITH A HOT AIR GUN ALL IN ONE ACTION

HOT AIR GUN WITH PIEZO ELECTRONIC INGNITION

REFILLABLE WITH COMMON LIGHTER GAS

BLOWS HOT AIR UPTO 650C



ORDER CODE: TOOL53 PRICE : £13.00 + VAT

HOT AIR GUN

FLAMELESS...ONLY HOT AIR

IDEAL FOR THE FOLLOWING :

SHRINKING TUBES

SOLDER SEALS

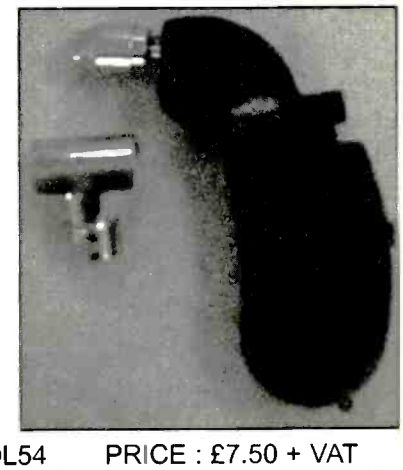
HEATING AND DRYING

HOBBY & MODELLING

BENDING PLASTICS

SMD SOLDERING

BLOWS HOT AIR UPTO 650C



ORDER CODE : TOOL54 PRICE : £7.50 + VAT

Tel : (020) 8900 2329 Fax : (020) 8903 6126

Grandata Ltd

distributor of electronic components

Scart Kits / Scart Cables / Phono Leads

Scart Adaptor Kit (Economy 5 piece kit)

An inexpensive but versatile connector kit for TV , Video , Satellite , Hi Fi & some Camcorder connections.

ORDER CODE : PLG1
PRICE : £4.50 + vat

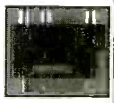
Ultimate Scart Kit (Standard 1[7] piece kit)

A comprehensive & practical connector kit for TV , Video , Camcorder & H Fi (including NICAM Stereo) connections.

ORDER CODE : PLG3
PRICE : £10.00 + vat

Scart to Phono Adaptors

Output
Code : PLG17
Price : £1.00 + vat



Input
Code : PLG18
Price : £1.00 + vat

Scart Cables

Description	Code	Price
Standard 9 Pin Connected (1.5 m)	PLG20	90p
Fully Shielded 9 Pin Connected (1.5m)	PLG21	£2.20
Flat Cable 9 Pin Connected (1.5m)	PLG22	£1.80
Standard 21 Pin Connected (1.5m)	PLG23	70p
Standard 21 Pin Connected (0.5m)	PLG24	85p
Standard 21 Pin Connected (5m)	PLG25	£3.00
Fully Shielded 21 Pin Connected (1.5m)	PLG26	£3.70
Gold 21 Pin Connected 1.5m)	PLG27	£4.20
Flat 21 Pin Connected (1.5m)	PLG28	£3.50

Scart to Phono Cables

Description	Order Code	Price
Scart to scart & 4 phono plugs 1.5m (Stereo 2 way)	PLG37	300p
Scart to 2 phono plugs 1m (Stereo Audio Only)	PLG38	120p
Scart to 2 phono plugs 5m (Stereo Audio Only)	PLG39	200p
Scart to 3 phono plugs Gold 1.5m (Stereo Video 1 way)	PLG40	250p
Scart to 3 phono plugs 1.2m (Stereo /Video 1 way)	PLG41	175p
Switched scart to 3 phono plugs Gold 1.5m	PLG42	300p
Switched scart to 3 phono plugs 1.5m	PLG43	200p

Phono to Phono Leads

Description	Oorder Code	Price
2 phono plugs to 2 phono plugs heavy duty cable 10m	PLG29	300p
Standard Leads and Moulded Connectors		
Phono plug to phono plug 1.2m	PLG30	40p
Phono plug to phono plug 5m	PLG31	90p
Phono plug to phono socket 5m	PLG32	90p
2 phono plugs to 2 phono plugs 1.2m	PLG33	75p
2 phono plugs to 2 phono plugs 5m	PLG34	100p
2 phono plugs to 2 phono sockets 1.5m	PLG35	75p
3 phono plugs to 3 phono plugs 1.2m	PLG36	90p

Transistors / Linear IC's

BU208A	75p	BUT18AF	65p	MJ15003	250p	TIP31A	22p	LM2406T	400p	STR10006	450p	TA8427K	200p	TEA2164	160p	UC3843AN	80p
BU2508A	100p	BUT56A	65p	MJ15004	300p	TIP32A	21p	LM2416T	650p	STR20005	450p	TA8718N	550p	TEA2260	225p	UC3844	70p
BU2508AF	110p	BUW13A	200p	MJ15015	250p	TIP33	50p	LM324	30p	STR40090	350p	TDA1170N	85p	TEA2261	185p	UC3844AN	80p
BU2508D	130p	BUZ80	135p	MJ15016	350p	TIP33C	60p	LM339	35p	STR4211	315p	TDA1175	175p	TEA2262	275p	UC3845AN	80p
BU2508DF	120p	BUZ80AF	200p	MJ15022	400p	TIP34C	60p	LM393	45p	STR440	800p	TDA1180	120p	TEA5101A	300p	UPC1188H	350p
BU2520AF	170p	BUZ90A	180p	MJ15023	400p	TIP35C	65p	LM723	40p	STR441	950p	TDA1518BQ	240p	TEA5101B	175p	UPC1488H	115p
BU2520DF	225p	BUZ90AF	280p	MJ15024	400p	TIP36C	65p	SAA1293	550p	STR44115	475p	TDA1557Q	300p	TEA5170	200p		
BU2525A	325p	BUZ91A	260p	MJ2501	100p	TIP41A	20p	SAB3035	275p	STR451	800p	TDA1558Q	300p	UC3842N	60p		
BU2525AF	220p	IRF510	70p	MJ2955	55p	TIP41C	22p	STK4131	480p	STR4512	400p	TDA2004	150p	UC3842AN	80p		
BU2525D	240p	IRF520	75p	MJE13007	100p	TIP42C	22p	STK4141 II	420p	STR50103A	260p	TDA2005	150p	UC3843	80p		
BU2527AF	400p	IRF530	75p	MJE13009	100p	TIPL791A	80p	STK4142	530p	STR54041	320p	TDA2030	80p				
BU426A	70p	IRF540	100p	MJE18004	125p	AN5151	200p	STK4151	680p	STR58041	250p	TDA2030H	100p				
BU508APH	60p	IRF610	80p	MJF18004	175p	AN5601K	750p	STK4152	650p	STR59041	300p	TDA3562A	260p				
BU508D	75p	IRF620	100p	MJF18006	200p	BA5406	180p	STK4171	900p	STR6020	270p	TDA3653B	80p				
BU508DF	85p	IRF630	75p	MJF18204	350p	BA6209	85p	STK4172 II	680p	STR61001	475p	TDA3653C	85p				
BU508V	110p	IRF640	150p	MJW16206	600p	HA13150A	1150p	STK4191	700p	STR81145	375p	TDA3654	80p				
BUF405A	200p	IRF710	150p	MJW16212	350p	HA13151	875p	STK4332	365p	STRD1706	360p	TDA4565	150p				
BUH1215	450p	IRF720	85p	S2000A3	175p	HA13152	800p	STK5331	300p	STRD1806	360p	TDA4600	200p				
BUH315	200p	IRF730	125p	S2000AF	90p	HA13153A	900p	STK5332	180p	STRD1816	350p	TDA4600 II	160p				
BUH315D	175p	IRF740	90p	S2000N	150p	HA13155	920p	STK5333	650p	STRD4420	550p	TDA4601	120p				
BUH515	200p	IRF820	90p	S2055A	175p	HA13157	950p	STK5337	500p	STRD6108	450p	TDA4605	190p				
BUH515D	250p	IRF830	85p	S2055AF	175p	LA4440	200p	STK5481	470p	STRS6707	1000p	TDA4950	100p				
BUH517	275p	IRF840	85p	S2055N	150p	LA4445	200p	STK5482	285p	STRS6708	575p	TDA8170	170p				
BUH517D	175p	IRF9610	95p	TIP121	35p	LA4460	120p	STK73410	350p	STRS6709	600p	TDA8171	230p				
BUH715	425p	IRF9620	85p	TIP122	30p	LA4461	120p	STK73410 II	500p	STV9379	400p	TDA8172	200p				
BUT11A	35p	IRFBC30	120p	TIP125	30p	LA4705	400p	STK7348	400p	TA8207K	175p	TDA8350Q	275p				
BUT1AF	35p	IRFBC40	210p	TIP127	35p	LA7830	90p	STK73605	375p	TA8215	300p	TDA8362N3	1200p				
BUT12A	80p	IRFZ44	160p	TIP2955	50p	LA7851	200p	STK73907	700p	TA8221AH	600p	TEA1039	150p				
BUT12AF	90p	MJ11015	250p	TIP29A	22p	LM1207N	450p	STK7406	650p	TA8227	250p	TEA2018A	80p				
BUT18A	80p	MJ11016	300p	TIP3055	50p	LM2405T	625p	STK7563F	650p	TA8251AH	700p	TEA2037	200p				

CAN'T FIND WHAT YOU'RE LOOKING FOR ?

Japanese Transisitors , Diodes , Voltage regulators, LEDs,Triacs, Thyristors..etc

RING US AS THIS IS JUST A SELECTION OF THE 50,000 ITEMS THAT WE STOCK

This advertisement is just a selection of our stock.

We also stock the following :

Video Heads , Pinch Rollers ,Belt Kits ,Idlers ,Service Kits , Video Motors , Cassette Housings , Audio Control Heads , Mode Switches , Video Lamps , Satellite Spares , LNB's , Back Up Batteries , Servicing Tools and Aids , Digital Multimeters, TV Switches , Line Output Transformers , Japanese Transistors , Linear IC's , Computer IC's , CMOS and 74 Series and much much more !!!.....All at competitive prices

Please contact us if you cannot find the part you are looking for.

* Please add £1 p+p and VAT to all orders
* All components are brand new
* We accept payment by Access , Switch , Visa , Cheque and Postal Order
* All prices quoted are subject to availabilty and may be changed without prior notice

K.P. House , Unit 15 , Pop In Commercial Centre , Southway , Wembley , Middlesex . HA9 0HB England

Tel : (020) 8900 2329 Email : grandata.ltd@btinternet.com
Fax : (020) 8903 6126 Website : http://www.grandata.co.uk

AUDIO FAULTS

Reports from
Adrian Spriddell
Chris Watton
Kevin Green, TMIIE
P.J. Roberts and
Nick Beer

Technics SLP1200 CD player

Whenever I see one of these monsters I'm tempted to say "sorry, we don't mend cash registers". If you are faced with an intermittent shutdown type of fault, before you dive into the power supply and servo sections check for a dry-joint at the mains transformer header sockets CN2 and CN3. They are on the mains input PCB under the ASC mains insulation card. **A.S.**

Tascam DA30 DAT recorder

There was a low balanced right-hand channel output. I had to replace C234 and C235 (both 100µF) in the balanced amplifier circuit. They had gone low in value – probably because both had been fried when an amplifier output had been plugged into the balanced XLR socket. It happens . . . **A.S.**

Sony DTC750 DAT recorder

This machine damaged tapes. It was suffering from the Amstrad 4600 syndrome. If the tape is being rippled along the bottom edge, before replacing the pinch-lever assembly and exit guide first check that the play torque has not been set too high. **A.S.**

Sony HST-DC01CDM

If the machine fails to record (the fault may be intermittent), check for signal around the CXA1198A chip IC603. If audio enters the chip but doesn't come out again, try the effect of connecting pin 13 to chassis via a 24kΩ resistor. The connection is usually made via two plated-through holes and a printed chunk of carbon that's deposited directly on to the PCB. Not surprisingly, it fails. **A.S.**

Sony DTC1000ES DAT recorder

When tapes are damaged on eject you will find that the cause is almost certainly solidified grease in the mechanism, in particular on the half-load arm bearing – when this fault is present a cassette can be ejected with a loop of tape hanging out. A partial strip down and the usual VCR maintenance measures will suffice. **A.S.**

Sharp CD-C570 Hi Fi

There was no CD unit operation and the drawer was stuck in. The cause was a short-circuit capacitor in the power supply, C823 (47µF, 25V). **C.W.**

Panasonic SA-CH55

There was a simple fault with this nice hi-fi unit: the CD drawer wouldn't open. All other functions were OK. Unfortunately the cause wasn't so simple. The motor drive circuits were OK, and the mechanism worked perfectly. The cause of the fault was eventually traced to the main system control chip IC951 (MN18724RUF). It's a 100-pin surface-mounted device. An expensive repair! **C.W.**

Samsung RCD750 portable audio

This machine was brought to us because of slow tape speed and very poor fast forward/rewind. The cause was traced to diode RD5, which had developed high forward resistance. **K.G.**

Pioneer XR-P470C audio system

The number one cassette deck solenoid clicked away far too many times. In fact it clicked four times, which put the master cam in the wrong position for the tape to be ejected. The cause of the problem turned out to be IC1901, part no. PDC036C. **K.G.**

Aiwa CXNV900K

This machine came in because of total failure to read CDs. The repair was easy: change the laser pickup and clean dust from the rest of the unit. But it came back because of intermittent skipping and failure to read discs. The cause was traced to the white sled drive gear, which had a few slightly damaged teeth. Normal operation was restored once a replacement gear, obtained from a scrap deck, had been fitted. **P.J.R.**

Kenwood DMCJ7R MiniDisc unit

This unit played discs all right but wouldn't record, with "disc error" coming up. Using a laser power meter I quickly traced the cause to a low-emission laser unit – it didn't give sufficient output in the record mode. A new laser unit, part no. T25-0074-08, restored the record function. **P.J.R.**

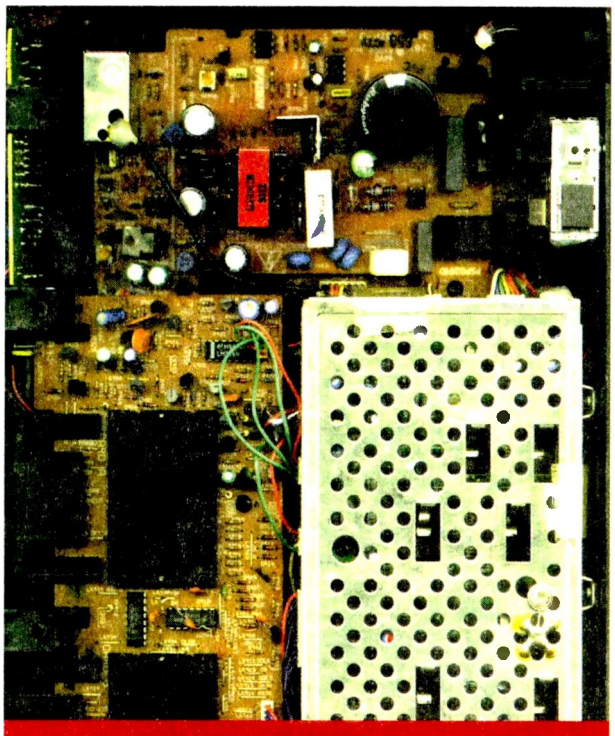
Sony MZ-R55 MiniDisc unit

This very small unit was brought to us because it wouldn't play or record discs. A few simple checks revealed that there was no output from the laser. A new laser unit, part no. X-494-925-61, restored normal operation. It's a very fiddly unit to work on, but nicely made. **P.J.R.**

Sony MX-R3 MiniDisc unit

I've had a few of these units that will play pre-mastered discs or previously recorded material but, with their own new recordings, there is intermittent muting or a more severe fault, failure to recue after editing the TOC, with subsequent loss of all the audio on the disc. The problem has been cured by replacing the optical unit, part no. X-4946-054-1. These small personal units are nice to work on, though first impressions might suggest otherwise. **N.B.**

Satellite WORKSHOP



Jack Armstrong

Digital

Have you upgraded to SkyDigital yet? If so, I'd be interested to know what you think of it. I've been putting it off because I need my analogue card for testing customers' receivers. Also, I'd read some rather bad things about digital TV. The other factor is that it's difficult, because of the investment in test equipment required, for a one-man band to repair digital boxes. There is also the lack of spares – except from Pace. All in all I haven't been very impressed!

A fortnight ago however an installer brought me an analogue receiver for repair. "Oh" he said, "and you might as well have this piece of junk. It's been struck by lightning." With that he handed me a Pace digibox.

Later, I took the cover off and looked inside. It was obvious that a massive voltage surge had come down the telephone line, as the optocoupler was in two pieces. Pace told me that they could probably repair the receiver for a standard charge. Four days later I got it back, fully working.

It took another week to get my free BBC viewing card from Sky. They said they would post me the card but didn't. They posted it the second time I phoned however. In fact they sent two, blaming the problem on their computer. They seem to employ a lot of students during weekends, so it might be better to phone during the week.

The 'BBC card' lets me watch the terrestrial TV channels (except for ITV) plus a few free channels such as Travel. The pictures are noticeably free from the annoying wavy-line interference and graininess I often see with analogue receivers. In fact I'm quite impressed by the sharpness of the pictures, though people tell me that picture quality can be poor when there's a lot of movement – during a game of football for example.

The problem is that with digital TV only one complete picture frame in every twelve produced by the camera is transmitted. In between the digibox computer receives partial information on anything that's changed in the picture, or is left to guess – it's called 'forward prediction'. Add to this the fact that all the information is compressed in other respects and it's a miracle that there's any picture at all.

Then there's the transmitted bit rate per channel used, which comes down to cost. Several channels are squeezed into each transmitted multiplex. As a result, picture quality does appear to suffer at times. ONdigital pictures are reported to be slightly better, with the bonus of having ITV as well.

Further details of the leads and modifications mentioned in this article can be found at the following web page: http://ww.satcure.co.uk/digibox.htm

Dolby Pro-Logic

Here's a tip, whether you have a digital or an analogue receiver. The stereo sound channels with some movies and other programmes, for example *The Simpsons*, contain Dolby Pro-Logic Surround Sound. The technicalities have been explained by Ian Martin in past issues. With a suitable Dolby Pro-Logic amplifier you can stick four loudspeakers around the room and get the full benefit. You have to hear it to appreciate how good it can sound. You can also add a centre speaker instead of using the TV set's speaker. It then sounds even better.

Some time ago I looked at the prices of these Dolby amplifiers. They start at about £300, which is a lot to pay for hyped-up stereo. Last week however I acquired an Amstrad SRD2000 for just £20. No one seems to want analogue receivers any more. Now I hadn't thought about this previously, but you can feed the stereo output of a satellite receiver into the phono inputs of an SRD2000. Press the remote-control unit's 'View source' button until 'View: Line' appears on the front-panel display and, lo and behold, you have Dolby Pro-Logic sound filling the room. Not bad for £20, eh?

The Pace MSS1000 will do the same job. There are lots of them lying around in garages. Maybe the tuner is dead, or the decoder doesn't work. No problem. Fit Relkit 10 to get the power supply working reliably and you have a Pro-Logic amplifier that would have cost you £300. It can, by the way, be used with both analogue and digital transmissions.

Sound/vision Distribution

Something else I often get asked is "how do I get good stereo sound and pictures in my bedroom/lounge/conservatory?" I've tried several solutions that work with both analogue and digital signals and also ONdigital. First, you can buy a transmitter/receiver system from HomeBase: it sends video and stereo audio to a second TV set. This works tolerably well over a short distance, but the picture quality isn't brilliant and can vary as you move near the receiver box. I've

also tried sending the picture via UHF cable as normal but running a thin twin-coaxial cable upstairs to carry the audio. The cable has to be plugged into a separate stereo amplifier with speakers – you can probably buy an amplifier second-hand for a few pounds. You can feed the signals to a Dolby Pro-Logic amplifier or a hi-fi unit if you wish.

The best solution however is a triple coaxial cable that carries the video and stereo audio from the satellite receiver to a stereo TV set. The triple coaxial cable plugs into a scart socket adaptor at each end. Or you can plug the video lead into a TV set and the stereo leads into a separate amplifier.

FTA Digital Channels

A company has just sent me a little box that plugs into a Pace digibox receiver and provides over a hundred free-to-air channels. At under £50 it's a lot cheaper than buying a second FTA digital receiver! Called the DIGImemo, it takes complete control of the digibox and responds to the remote control instead. The functions are extremely limited: you can use up and down and buttons 0-9, that's all. For the price however it could be ideal for the school language teacher who needs access to foreign channels at home, or for the foreigner resident in the UK. A second LNB is required, mounted on a larger dish, for this system.

Continental use of a Digibox

If you have a holiday home on the Continent and sneak across there with your digibox and viewing card the 'G-Mod' conversion is ideal. This tiny module has four wires to solder inside a digibox. It enables you to select either PAL I (6MHz) or PAL G (5·5MHz) audio. A standard UK digibox used with a Continental TV receiver produces no sound unless a scart connection is used.

Pace MSS300

An outside broadcast producer drove all the way from London to visit me. Well, not quite: he was on his way to a 'shoot', and decided to bring along his Pace MSS300 receiver. He had bought and fitted Relkit 9, but the pictures were then worse than before. "So-called Reliability kit" he muttered.

When I tested the unit in the workshop I found that the pictures were partly obscured by horizontal streaks, as if the picture was partly scrambled. A quick look inside revealed the cause. C140 (1,000µF, 16V) next to the tuner had been reversed and had vented, leaving the top bulged. I showed the capacitor to the broadcast producer, who was thus mollified.

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

http://www.ukstay.com/jack

If you have no Internet access you can write to him c/o Television, Room L302, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Please enclose two first-class stamps.

Test Case 450

Mrs Terry, a neighbouring farmer's wife and the proud proprietress of the local-produce stall, rolled on to the workshop forecourt in her LandRover. There was a 21in. Sony set strapped to the passenger seat. TechnoCrat was given the job of bringing it in and filling the job card. "Squashed picture and distorted sound" he wrote. Then he took the set straight to his workbench – times are quiet here at present workwise.

Both faults were present when the set was switched on. The picture height was about seventy per cent of normal, while the sound was at a low level, 'clipped' and distorted. There didn't seem to be any connection between the two symptoms, and the picture was correct in all other respects.

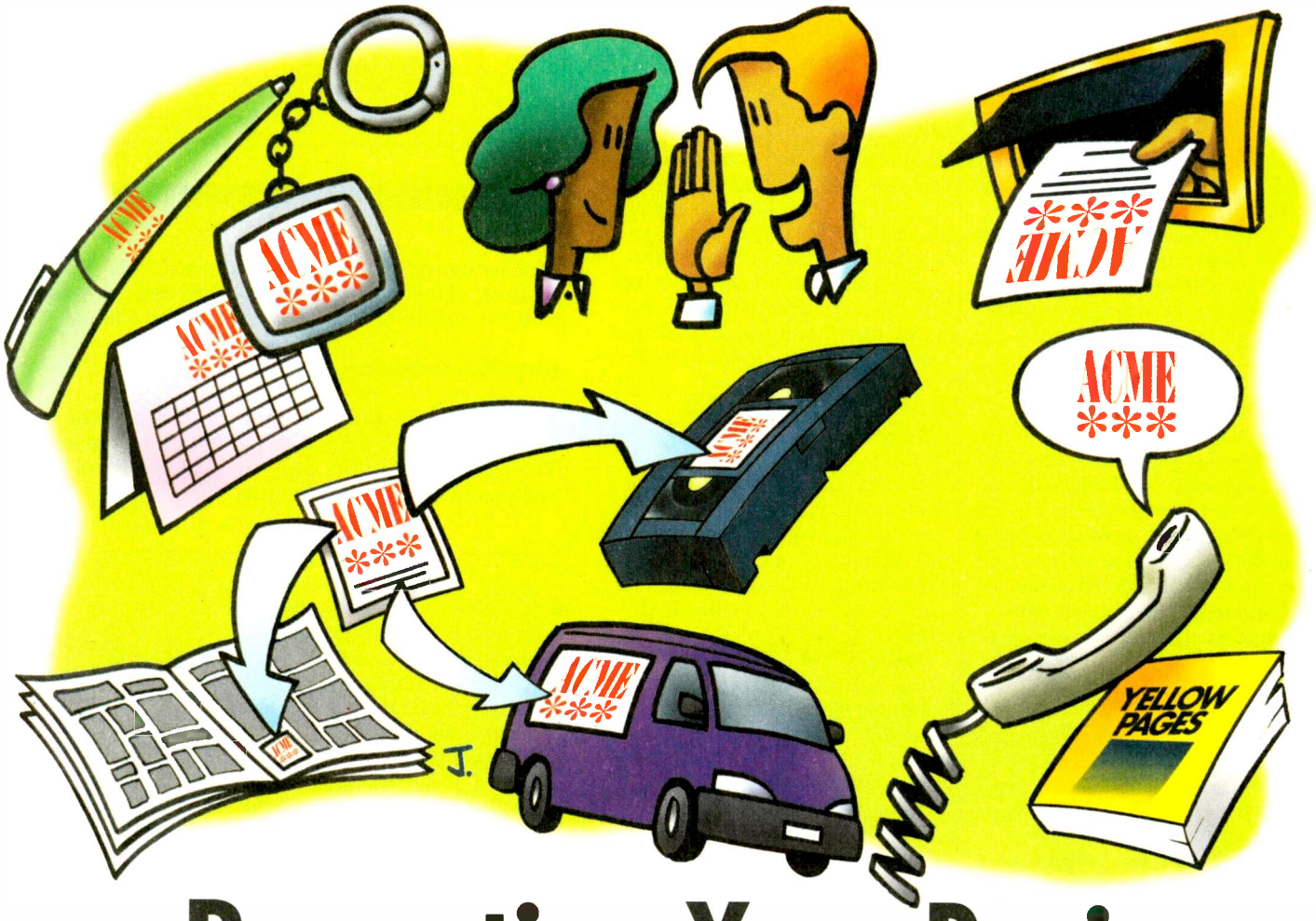
When TechnoCrat got to work with an oscilloscope he soon found that the audio waveform at pin 12 (AF output) of the multi-function chip IC101 was of low amplitude, with its peaks heavily clipped. The DC voltage at this pin was way below the 2·4V shown on the circuit diagram, so components such as the 6MHz ceramic filter could be ruled out. As the 5V supply at pin 29 was OK, TechoCrat suspected the chip itself. In fact it was OK. He discovered that the 5·6V protection zener diode at pin 15 was leaky. A replacement restored normal sound: on then to the height fault.

There didn't seem to be anything amiss in the field output stage and the picture, though of reduced amplitude at the top and bottom, was perfectly linear. An oscilloscope check on the waveform at pin 7 of the video processor chip IC301, where the field oscillator resides, showed that its amplitude was decidedly on the low side: 1·1V peak-to-peak instead of the 1·8V peak-to-peak specified in the manual. Was there a height control? No: the height and many other settings are stored in software in the EEPROM IC002.

The customer's remote control unit can be used to gain access to the set-up menu. TechnoCrat had no difficulty in resetting the height to the correct level. In fact at maximum (63) there was considerable overscan. This suggested that the cause of the problem was an incorrect memory setting rather than a fault in the field timebase or its power supply. Anyhow the set was now working correctly in every respect. TechnoCrat left it on soak test while he spent few hours on field service calls. It was nice to get out when the weather was so bright.

On his return to the workshop TechnoCrat was dismayed to find that all was not well with the Sony set. In fact there was no sign of the picture or sound, though power was still applied. TechnoCrat switched the set off then on again. The picture was now back, with undistorted sound, but the height was reduced and the width was excessive! It was turning out to be one of *those* faults. The fact that another visit to the set-up menu enabled him to restore a correctly sized picture did little for TechnoCrat's morale.

What could be altering the EEPROM settings? And what had wrecked the audio-line protection diode? There were no dry-joints in the power supply or the 5V regulator circuit, and an assault on the PCB with a heavy-handled screwdriver brought nothing to light. By mid-morning next day a correct diagnosis had been achieved. What was ailing the Sony set, and what was the cure? For the answer, turn to page 499.



Promoting Your Business

Do local residents know about your business and what you can offer? There are many ways of building awareness, without which you may not survive – and certainly won't thrive. Paul Smith, who has tried most of them, outlines the pros and cons

There are many ways in which you can increase business for a local repair service. Some represent good value for money while others may not even provide a full return on your investment.

The best promotion for any service-type business is word-of-mouth referrals – when a satisfied customer points others in your direction. It costs nothing, and usually means that the new client has a positive attitude towards you before you even do any work for them.

To expand your customer base further, or if you have only recently set up in business, you may need to advertise your business. There are several ways in which this can be done.

Advertising

The first is to use leaflet drops. Flyers, usually A5 size, can be delivered to households in your area, either personally – if you have time on your hands – or with newspaper deliveries, by the post office or firms who specialise in this. Typical costs are as follows: to print one colour on a single side, £180 per 10,000; to deliver, from £20 per 1,000. If a peel-off sticker is included on the leaflet, this form of advertising will provide new customers even years later.

The second possibility is to place a box advertisement in the service section of your local newspaper. This works best if the wording is kept to a minimum and the copy is repeated with every edition of the paper. Costs vary depending on the number of copies printed, but discounts (typically 20 per cent) can be obtained if you pre-book your advertisement to run for a specific period of time. Typical cost for a weekly paper is £15.

National newspapers can now accommodate regional advertising, but a large geographical area is still involved. Hence this approach would mainly benefit a company with several branches.

If you provide a specialist service, for example the repair of multi-layer PCBs or the supply of technical manuals, consider an advertisement in the appropriate trade or hobby magazine. These magazines are national or even worldwide, and are suited to businesses conducted by mail-order

Video covers are a possibility:

most video rental stores carry advertising on their cassete cases. Expect to pay about £10 per week for an average/large store, with a minimum commitment of two years (£1,000). Discounts of up to 20 per cent should be possible when the total is paid in advance. You may also be entitled to free tape rental and a poster inside the store. Contact the local manager.

Local business directories list all the services in your area. They are produced by Chambers of Commerce, local councils or business agencies, and an entry may be free. If payment is required, check on distribution numbers and method of provision, for example door-to-door or held in public buildings. Schools, doctors' surgeries and hospitals also provide information, e.g. booklets, that is paid for by advertising.

A single-line entry in *Yellow Pages* is free for each business number registered. If you provide services that are listed under different categories in the directory, use the free entry for one and pay for display advertising in the others. Cost depends on area coverage. For a 6cm box, expect to pay about £500 a year.

Some voluntary groups, including advice centres, maintain a list of local service providers they can recommend – as well as one for businesses to avoid. Go for the former!

Placing a poster or card in a shop window (display advertising) is cheap – about 50p per week. Signwriting or magnetic boards on the side of your field service vehicle can bring instant business from neighbours while a call is being made. A label on each repaired appliance will also ensure that your telephone number is ready to hand for existing customers.

Contracts

Places where large numbers of TV sets and VCRs are held, such as hotels, hospitals, nursing homes and schools, can be the source of a regular supply of work. A formal contract may not be necessary, so long as the person responsible for requesting service knows where you are. A letter or telephone call, followed perhaps by a personal visit, is normally sufficient to obtain business. If you repair or decode car radios, pass your details to local garages.

Table 1: Comparison of business promotion methods.

Method	*Cost*	*Response*
Leaflet drops (flyers)	Moderate	Very good
Newspapers	High	Very good
Magazines	High	Good
Video covers	High	Poor
Directories	Free-high	Good
Local agencies	Free	Moderate
Display advertising	Low	Good
Contracts	Low	Good
Trade customers	Low	Very good
Press releases	Free	Moderate
Gifts	Moderate-high	Moderate
Talking Pages	High	Poor

Trade Customers

Independent retailers that do not employ their own engineers usually subcontract out their servicing work. Payment for repairs under guarantee does not carry a high profit, but check on the supply of free manuals and technical back-up. A retailer that does employ an engineer may need to pass work out at busy times or require specialist services, for example the repair of camcorders.

Press Releases

Send details of any activity that shows your business in a positive light and/or is newsworthy to your local newspaper as a 'press release'. Examples could be 'local charity benefits from fund raising' or 'special opening times during holiday periods'. Send the details as soon as possible after the event, or with plenty of notice for something that's scheduled to take place. If appropriate, provide a photograph.

Gifts

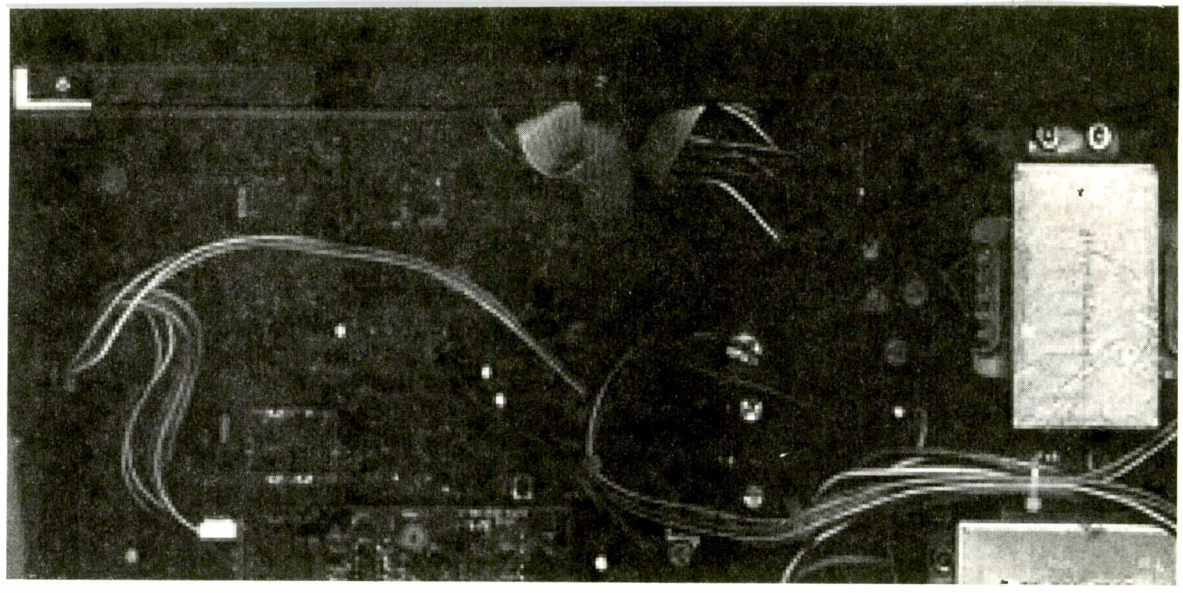
Pens, keyfobs, calendars and diaries can carry your message and telephone number. They make handy loyalty presents for your customers. Prices start at about 25p for each pen, which includes engraving. Contact National Pen Ltd. on 0990 134 204.

Talking Pages

This is an associate company of *Yellow Pages*. You pay between £20-£30 per month to be on-line, with a minimum commitment of one year. Potential customers use a freephone number and are given details of three local businesses that may be able to provide what they need.

In Conclusion

To expand or, in some cases, just to survive you need to promote your business. During the last decade or so I've tried each of the methods outlined here at various times. They all work, but to a varying degree. I have found that the cheaper or free methods of advertising are more successful than those costing hundreds of pounds. Table 1 shows this.



Satellite Notebook

Reports from Hugh Cocks and Michael Maurice

BBC Prime

BBC Prime, an entertainment channel for Europe and Africa, has been running for a number of years. It started life as BBC TV Europe back in 1989. If you have access to the internet, you can find more information on it at www.bbcprime.com

The channel is available as part of various encrypted digital packages, and also as a stand-alone channel for private customers across Europe. These are the people who will be affected by a change that will shortly take place.

In recent times the signal has been transmitted in D2-MAC form, with Eurocrypt scrambling, via Intelsat 707 at 1°W – it transferred there from the Intelsat craft at 27·5°W in 1997. Transmission of the D2-MAC signal is due to end in mid-May, after which the channel will be available only in digital form via Hot Bird 5 at 13°E. The digital signal has been transmitted for several years, but has been used mainly by cable companies and digital package providers who receive and redistribute it.

The digital encryption used is Viaccess. The easiest receiver to use is the Nokia 9800 with embedded Viaccess – a second card/conditional-access slot is available for other systems. An external Viaccess module can be used with other receivers. I understand that more manufacturers will have receivers with embedded Viaccess in the near future.

The BBC Prime digital transmissions are at 11·131GHz, with vertical polarisation, the low symbol rate of 5,632 and 3/4 FEC. It's a standalone digital signal – referred to as a single channel per carrier, or SCPC, signal – in contrast with the more common multiple channel per carrier system used by SkyDigital etc.

The Nokia 9800 will do a 'network search' to find all channels available at 13°E. Alternatively the BBC Prime signal parameters can be entered directly. The receiver should then go straight to BBC Prime. Apart from Bloomberg UK and NBC Europe there aren't many other clear digital English-language channels available via Hot Bird at present. Digital free-to-air signals seem to change continuously – for up-to-date channel information go to www.lyngsat.com if you have internet access.

After going through the contract application routine with the BBC a card will arrive. When you insert it in the Nokia receiver's card slot pictures should immediately appear. Information on the card subscription is available from a menu, and card authorisation is updated every month. If the card is removed from its slot, the picture takes a relatively long time to disappear. These features are similar to MAC operation. **H.C.**

Diplexer Problems

Mr MacPherson had reception problems after buying a new widescreen TV receiver, apparently because the cables behind the TV cabinet had been disturbed. He gave us a call in desperation.

The cause of the problem seemed to be to do with a wall-mounted UHF/satellite IF diplexer. When the cables connected to this were moved, the sparklies present on the analogue Sky News signal varied dramatically. There was a mass of wires behind the cabinet. A UHF amplifier could just be seen buried beneath the 'spaghetti'.

I decided that the best course of action was to pull the cabinet out, try to find out what all the wires were doing, then start afresh. After some detective work I discovered that the incoming terrestrial TV signals were fed to the satellite TV receiver's RF input, see Fig. 1(a). They then went to the small UHF distribution amplifier. One output from this was connected to the main TV set. The other output went to the previously-mentioned UHF/satellite IF diplexer, which was connected via a single coaxial cable to another diplexer under the stairs. This was connected to the cable from the dish (satellite IF) and a four-way UHF splitter that fed other TV outlets around the house.

The cause of the trouble was soon found to be poor braiding contact at the coaxial cable input to the wall-mounted diplexer from the UHF amplifier. The problem was cured by replacing the coaxial plug at the end of the cable. Because of the intermittent braid contact, the high-gain UHF amplifier must have been going slightly unstable, producing interference in the satellite IF band and thus the varying sparklie effect on the screen.

As the incoming terrestrial TV signals were strong I decided, to prevent any further interference, to fit the UHF distribution amplifier in the cupboard under the stairs and install a two-way RF splitter after the satellite receiver, with one output feeding the main TV set and the other going to the distribution amplifier at its new location. A scart lead was added between the satellite receiver and the TV set to

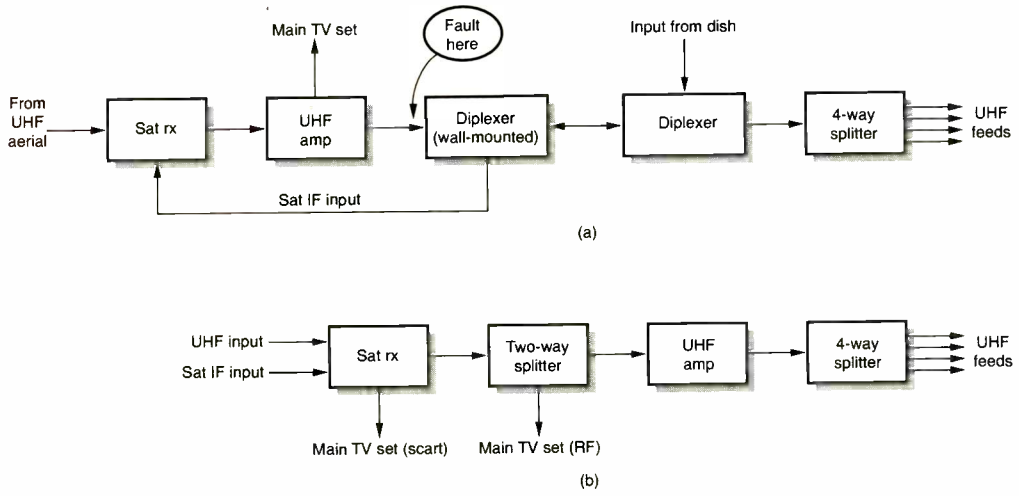


Fig. 1. Original signal connection/distribution arrangement (a), revised arrangement (b). See diplexer problems.

give improved satellite picture quality. Fig. 1(b) shows the revised arrangement.

Pace PRD800

The picture went off after half an hour – but only when the cabinet was fully assembled! When the fault was present the receiver wouldn't respond to remote-control commands, and if you retuned the TV set you got a blue screen. I first suspected the Nicky chip, but this was blameless. I next tried replacing the microcontroller and EEPROM chips, which were also innocent. The cause of the fault was the microcontroller chip's 4MHz crystal X1. **M.M.**

Amstrad Digiboxes

I've come across several cases where herringbone patterning has been experienced on terrestrial channels following the installation of a SkyDigital receiver. The digital receiver has been the cause of the interference – proved by unplugging the box and looping the aerial feeds through. In one case the Amstrad digibox was replaced with a Pace box. This cleared the problem. **M.M.**

BT SVS300

This receiver was dead after a power cut. The primary side of the power supply resembles that in earlier Amstrad receivers. Once the 200µF, 35V and the two 1µF, 63V electrolytic capacitors had been replaced the receiver was OK. **M.M.**

Nokia SAT780

This receiver was dead because water had got in via the aerial cable. It had eaten through the mains filter choke and damaged diodes DS612-615. The receiver worked once I'd replaced these items, cleaned out the RF converter and replaced one of its connector pins.

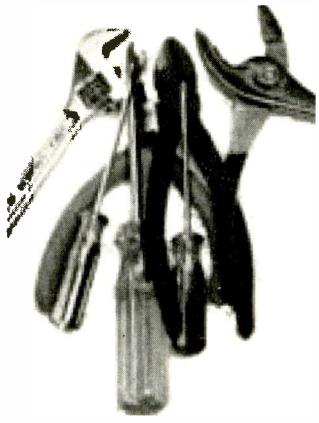
A few weeks later the receiver was brought back, again because it was dead. This time there was 330V across the mains bridge rectifier's reservoir capacitor and the chopper transistor but there were no other signs of life. Nokia has a kit which consists of about twenty components including the semiconductor devices. Fitting this kit provided a complete cure. **M.M.**

Pace MSS500

The customer phoned to complain that his receiver wouldn't decode most of the encrypted Sky channels, including the soft-encrypted ones such as Ch. 5 and QVC. I would feel guilty about charging someone just to carry out adjustments in the customer menu. So, having established that the customer knew about the menus, I told him to check the contrast, which should be set at 4 or more and which I normally set and store at 7 or 8. Five minutes later the grateful customer phoned back. All was now well. **M.M.**

Pace PRD800

The fault with this receiver was present on encrypted channels only. When the receiver had warmed up there was a scrambled picture with no decoder messages (card removed). In this version there was a TEA2029C chip on a sub-PCB that's connected to position U18 on the main PCB. It's used as a sync separator. Heating and freezing this chip made the fault come and go, but a replacement failed to cure the fault. Eventually I removed the chip and its PCB and fitted the original type TEA2130 (part no. DS173019). I also replaced crystal X7. A prolonged soak test proved that the decoder was now working correctly. **M.M.**



John Edwards' Casebook

Naiko CTVN2097NTX

The nice young man at the other end of the phone said his TV made cracking noises and "didn't smell nice". He explained that it would be only a minor problem, because the set was just out of warranty. As he lived within a mile of the workshop, I offered to collect it at no charge.

When I switched the set on the line output transformer produced a beautiful firework display. The familiar aroma of ozone filled the air. Provided there had been no damage to anything else and I could obtain a replacement transformer, it looked like a routine job. As with so many of the sets that come into the workshop nowadays, I'd not come across this brand before. But I found, by luck, that the transformer is readily available from HRS.

So I phoned the nice young man to give him the price details, expecting a simple yes or no to go ahead (usually no these days). Instead, I was subjected to a barrage of questions.

"It's only two days out of warranty, can't you get the maker to foot the bill?"

I explained that I couldn't.

"This is bloody ridiculous. I'm not paying anything. It must have been faulty from new. What do you think?"

"I try not to."

"OK. Can you write me a letter to send to the maker explaining what's wrong with the bloody thing?"

"Certainly. I charge £25 for a technical report."

I thought the phone was about to explode. Then he turned on me.

"You're all the ******* same. Talk about watching each others' back."

I knew that the job had gone pear shaped and that nothing I could say would alter the situation. So I invited him to collect his set at no charge.

"What! You collected the bloody thing, you ******* well bring it back."

I've been thirty years in this trade, trying to give good value for money. From time to time there has been abuse from customers, and I've regarded this as just part of the job. But my attitude has changed over the past couple of years. Now, sometimes, I let go and tell the punter exactly where to put his property. I feel much better afterwards, and there's less chance that I will suffer a heart attack through bottling up all my aggression.

Strangely, on this occasion it calmed the situation down. The young man came to collect his set and actually apologised for being so rude. Now there's a first!

Saisho CT144R

There was no red in the display. After quickly exonerating the circuitry on the tube base panel I turned my attention to the TA8659AN colour decoder/timebase generator chip, which produces RGB outputs at pins 41, 42 and 43. Voltage checks showed that there was 3V at pins 42 and 43 but nothing at the red output pin 41. The obvious thing to do was to replace the chip, but after doing so there was still no red.

I then connected the colour-bar output from a pattern generator to the aerial input socket and sprayed around the chip. As I'd hoped, the red colour bar appeared then just as quickly disappeared. More careful spraying of individual components, with pinpoint accuracy, revealed that one of the three 0·4µF capacitors connected to pins 44, 45 and 46 was very touchy. These are clamp reservoir capacitors. I decided to replace all three, after which there was no further trouble with the colour.

JVC C21M3EK

The line frequency was way off and the field scan did not quite reach the bottom of the screen. I marked the position of the HT preset control's wiper, then increased the HT. Once it had risen by about 15V the picture became normal.

When I checked the components in the power supply I found that the only discrepancy was with R421. It read about 5Ω instead of 0·68Ω. As I didn't have the correct value in stock I fitted two 1Ω resistors in parallel. Bingo! The picture was back to normal with the wiper of the HT preset restored to its original position.

Beko 20320NX

The symptom was most alarming, and at first sight the cure was not all that obvious. Not to me, anyway.

There was severe line tearing at the top of the picture, extending across the full width of the screen. This tearing gradually diminished as the scanning proceeded downwards. At about the centre of the screen the effect had the appearance of a faint hum bar or horizontal striation that extended across two thirds of the picture width. The picture was normal from there to the bottom of the screen. Most odd.

The cause of this strange symptom was the 220Ω resistor that's connected across the scan coils, on the neck of the tube. It was open-circuit.

Alan Dower Blumlein

Of the men who were responsible for the development of the Marconi-EMI high-definition television system in the early 1930s, the name of Alan Dower Blumlein stands out. He was one of the most remarkable and significant engineers of the twentieth century. Yet, following his death in 1942, his work was shrouded in secrecy. He received neither obituary nor tributes. This article is based on Robert Alexander's book, which is the first comprehensive Blumlein biography

Bernard Greenhead with the prototype Emitron camera at EMI Hayes, 1935.

Shortly after 4.20 in the afternoon on Sunday, 7 June 1942 – a glorious summer's day, clear skies, warm sunshine and perfect visibility for flying – a Halifax bomber crashed into the steep hillside of a valley just north of the River Wye near the village of Welsh Bicknor in Herefordshire. All of its eleven occupants were killed in the enormous fire that engulfed the aircraft on impact.

Of the scientific personnel who died that day, Alan Dower Blumlein stands out as possibly the greatest loss. "A national tragedy," one of his colleagues would call it. At a time when rapid advances were being made in many fields of science, Alan Blumlein was, without doubt, one of the most brilliant research and development engineers.

Born in Hampstead in June 1903, Blumlein had graduated from City & Guilds in 1921 with a first-class degree in heavy electrical engineering. This in itself would not bear mention were it not for the fact that, by the age of thirteen, the precocious and often eccentric young Blumlein could still not read or write.

He simply found no need to be able to write. As with all things in his life up to this time, if he saw no need, he showed no interest. It was only through sheer determination that Alan Blumlein set himself the task of learning to read detailed reference books on his chosen subject, realising the need for this in order to advance his passion for everything electrical.

After a slow start...

Blumlein's career initially took gradual steps. In 1925, he co-published an elementary paper on electrical principles in *Wireless World*.

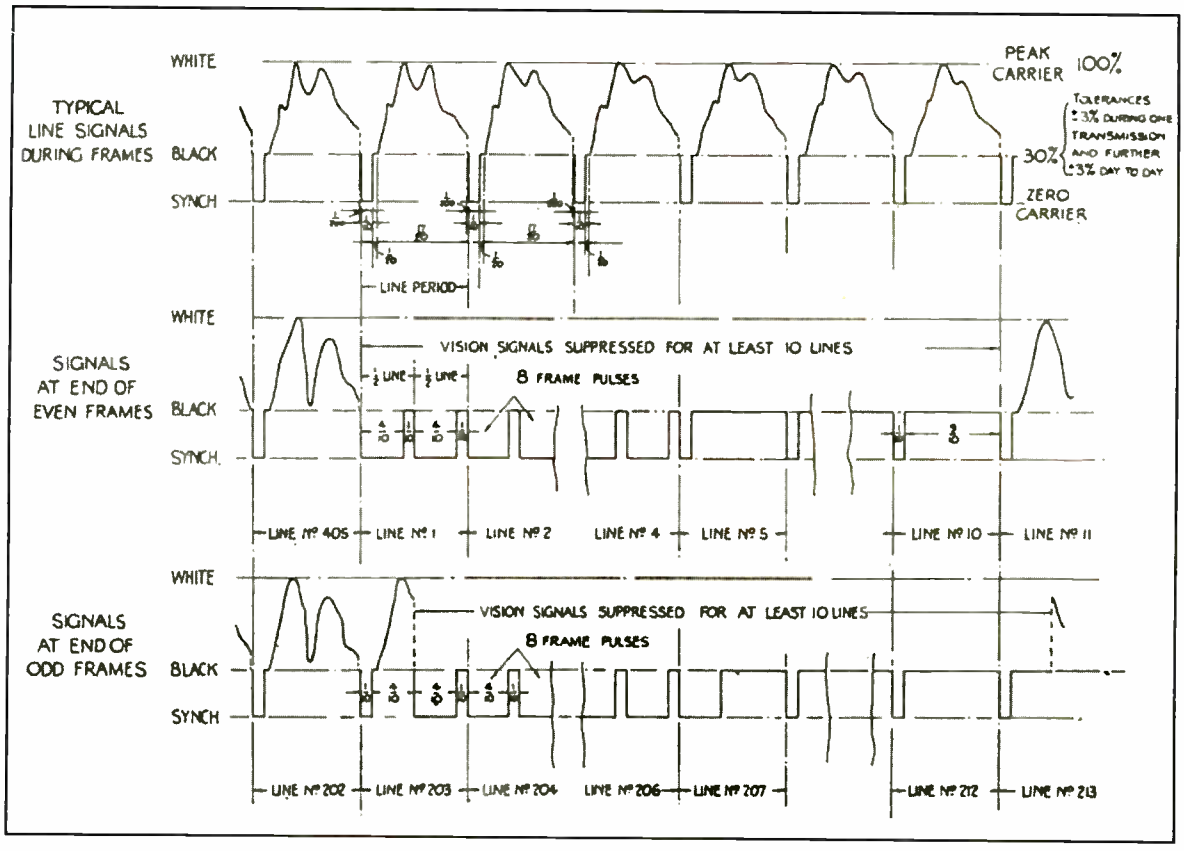
Though presented the following year to the IEE, and subsequently awarded a Premium for the work, Blumlein would only return once to the printed word to enlighten the world about his thinking.

Following a short but eventful career with Standard Telephones & Cables, during which he applied for the first of his 128 patents, Alan Blumlein applied for a position at The Columbia Graphophone Company. This was in early 1929. While at STC he would meet his employer, mentor and later friend, Isaac Shoenberg, who subsequently became Sir Isaac.

Shoenberg was looking for an engineer to design and construct a recording mechanism that would overcome the patent that Bell Laboratories was imposing on everybody in the record making business.

Blumlein set about designing the elements of a recording and reproducing system. By 1930, this system had successfully bypassed the Bell patent and went on to earn Columbia a fortune.

One day in 1931, while at the



The Marconi-EMI high-definition television system transmitted waveform.

cinema with his fiancée Doreen, Blumlein enquired of her if she had noticed how the voice of the person on the screen only ever came from one place. Not being of a technical nature, Doreen said that she had not. "Well, I have a way of making the voice follow the person", Blumlein replied.

This casual remark was the first indication of the train of thought which would lead to Alan Blumlein's 'Binaural Sound' patent – arguably his best – and certainly to become one the most important advances in audio engineering of the twentieth century.

But humans have two ears!

Binaural Sound is of course known today as stereo. It works on the basis that human beings have two ears which, because of their position at each side of the head, receive sound at slightly different times.

Alan Blumlein ingeniously accommodated the basic concept of binaural sound using electronic circuitry and two loudspeakers. Unfortunately, it was so far ahead of its time, in 1931, that many of his colleagues at EMI did not realise its full potential. EMI had been formed earlier the same year when Columbia and HMV had merged.

Blumlein continued with this work for several more years. He made the first stereo recordings and also the first stereo films before binaural was shelved for technical reasons.

Quest to develop TV

By this time, EMI had become involved in the quest to develop a television service.

In 1934, the government formed a committee to investigate the potential of television. This committee concluded that a British television service should be developed by the end of 1936.

Two companies stood out among those tendering systems for the television service. Baird Television, founded by John Logie Baird, was one of them. He had persisted with a mechanical projection method. Despite its ingenuity this system produced poor quality pictures and was inflexible.

The other company, Marconi-EMI, had decided to work with an all-electronic method of picture transmission and reception. It involved cathode-ray-tube technology, which was then still in its infancy.

Several seemingly insurmountable problems presented themselves to these pioneers. Not least of these was that in many cases the entire electrical circuitry of the system needed to be invented from scratch.

Luckily, EMI possessed an extraordinary set of individuals who, as a engineering team, managed to invent, construct and demonstrate a fully working television system in the now quite unbelievable period of just fourteen months.

As leader of the team in charge of developing the circuitry for the new system, Alan Blumlein had possibly the most exacting task. Yet from this period of his life more than half of his 128 patents were to emerge, with many of them critical to the eventual 405-line television system that the BBC adopted.

November 1936 saw the start of a

Chain Home

Chain Home was a series of 300-foot high radio transmission and reception towers which started to appear at strategic points along the coastline of Britain from late 1937. Eventually they stretched from Scotland in the North right around the coast as far as Cornwall.

Constructed during the last few years of peace, the Chain Home system was finished just in time for the outbreak of war in September 1939. It played a vital role during the Battle of Britain the following summer.

The system gave enough of an early warning for the RAF Spitfires and Hurricanes to intercept with great accuracy and speed the attacking German aircraft as they approached.

three month trial involving transmissions from Alexandra Palace. The Baird and Marconi-EMI systems transmitted on an alternate basis.

By spring 1937, following the conclusion of the trial, the government and the BBC chose the Marconi-EMI system which had proved far superior to Baird's.

Who invented television?

It is a curious irony that to this day many consider John Logie Baird to be the inventor of the television. Baird never actually claimed this. His mechanical television technology proved to be impractical for a high-definition system.

It was the team at EMI, whose numbers included Alan Blumlein, that should be given the credit for the 'invention' of what we know as television.

As a testimony to the team's work, 405-line transmissions actually continued until 1986, much as they had during those first trials at Alexandra Palace some fifty years earlier. Originally, the 405-line service was only intended to run for a few years before being updated.

With war in Europe looming, much attention was being directed towards a method of early warning against attack from the air.

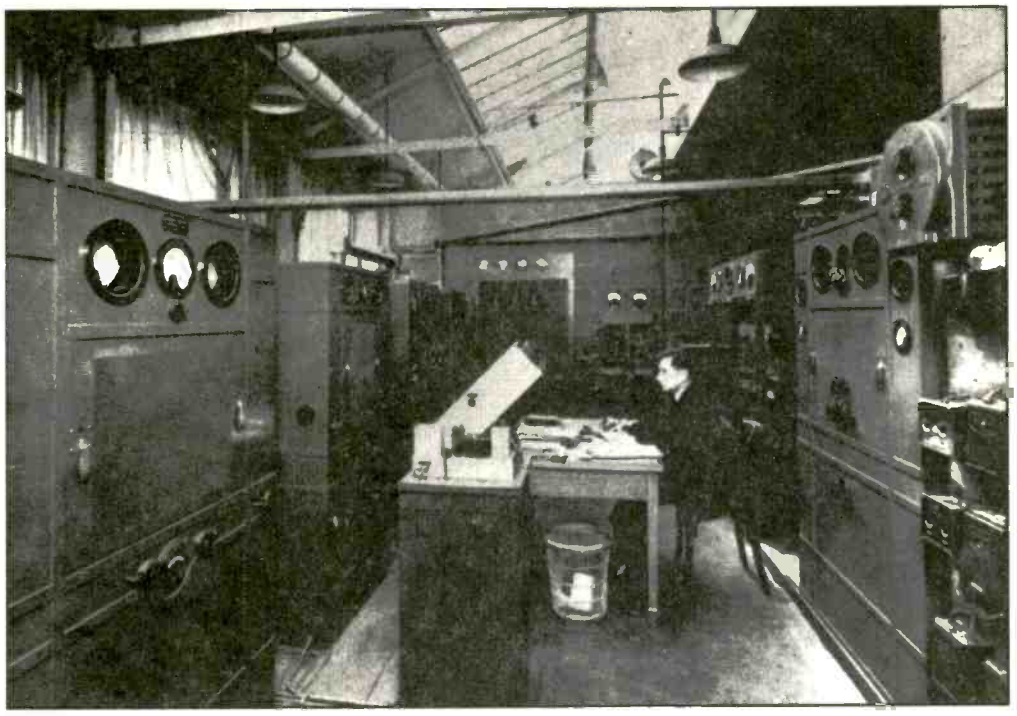
The first practical method of electronic radio detection finding – or Radar as it would eventually be known – had been demonstrated by Sir Robert Watson-Watt in early 1935. These experimental radio detection finding systems were shrouded in great secrecy. They, and their subsequent developments, had led to the construction of the Chain Home system described in the panel.

Yet no obituary followed his death

Following his death, Alan Blumlein's work was shrouded in secrecy. No obituary appeared and no tribute was given. For many years, various people promised a biography of this most extraordinary engineer, but none was forthcoming. As time passed, those who knew him personally grew old and died; and today but a few remain.

Imagine a world that did not have a record of Faraday, Whittle, Maxwell, Edison or Bell. Given time, Alan Dower Blumlein will receive the credit he deserves. It was for this reason that I wrote his biography.

Without a doubt, Alan Blumlein is one of the most brilliant engineers of the twentieth century, and one that the twenty-first century will finally recognise.



The prototype Marconi-EMI transmitter being assembled at EMI Hayes, 1935, before installation at Alexandra Palace.

The Marconi-EMI system at the opening of the London Television Service, Monday, 2 November 1936. Left to Right: Lord Selsdon, chairman of the Television Committee; Major Tryon, Postmaster-General; R. C. Norman, chairman of BBC; Alfred Clark (standing) chairman of EMI.

BOOK TO BUY

Post your completed order form to:-

Jackie Lowe, Room L514, Quadrant House,
The Quadrant, Sutton, Surrey, SM2 5AS
Phone your credit card order: 020 8652 3614
Fax your completed order form to 020 8652 8111
UK Price: £17.50 Europe £20.00 ROW £22.00
Paperback price includes delivery

How to pay
(Blumlein) paperback

❑ I enclose a cheque/bank draft for £_____
(payable to Reed Business Information)

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

Credit Card No: Expirey Date:

_____

Signature of Cardholder_____

Send my order to: (please use capitals)

Name_____

Address_____

_____

_____

Post Code_____Tel:_____

This book is the definitive study of the life and works of one of Britain's most important inventors who, due to a cruel set of circumstances, has all but been overlooked by history.

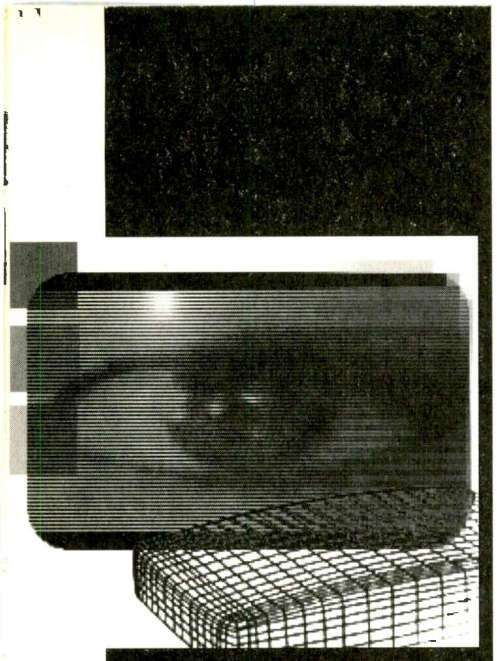
Alan Dower Blumlein led an extraordinary life in which his inventive output rate easily surpassed that of Edison, but whose early death during the darkest days of World War Two led to a shroud of secrecy which has covered his life and achievements ever since.

His 1931 Patent for a Binaural Recording System was so revolutionary that most of his contemporaries regarded it as more than 20 years ahead of its time. Even years after his death, the full magnitude of its detail had not been fully utilized. Among his 128 patents are the principal electronic circuits critical to the development of the world's first electronic television system. During his short working life, Blumlein produced patent after patent breaking entirely new ground in electronic and audio engineering.

During the Second World War, Alan Blumlein was deeply engaged in the very secret work of radar development and contributed enormously to the system eventually to become 'H2S' – blind-bombing radar. Tragically, during an experimental H2S flight in June 1942, the Halifax bomber in which Blumlein and several colleagues were flying crashed and all aboard were killed. He was just days short of his thirty-ninth birthday.

For many years there have been rumours about a biography of Alan Blumlein, yet none has been forthcoming. This is the world's first study of a man whose achievements should rank among those of the greatest Britain has produced. This book provides detailed knowledge of every one of his patents and the process behind them, while giving an in-depth study of the life and times of this quite extraordinary man.

Contents



TV Fault Finding

Reports from
Kevin Green, TMIIE
Glyn Dickinson
Andy Barkley
Paul Smith
Michael Dranfield
Michael Maurice and
Pete Gurney, LCGI

Philips L7.2EAA Chassis

A number of these sets have come into our workshop, all with the same fault: the set starts up for a split second, with the front LED lighting then going brighter, after which the set shuts down. In every case R3451 has been open-circuit because of failure of the field chip IC7401.

It's worth checking D6468 as well, and we have recently been informed of an upgrade to the field circuit: add a 51V zener diode between pins 4 and 5 of IC7401, with the cathode to pin 5. **K.G.**

Mitsubishi CT25M1TX

The symptom gave the impression that there was a fault in the field timebase, as the field was very unsteady and tended to roll. But there was also a bend in the verticals at high contrast levels, suggesting that the cause lay elsewhere. In fact the culprit turned out to be C906 (47µF, 25V) in the power supply. **K.G.**

Sharp 51AT-15H (5BSA chassis)

The cause of most odd faults with these sets, such as field cramping, patterning, poor or no remote control action or intermittent line output transistor failure, is C713 (1,000µF, 16V) in the power supply. It's the reservoir capacitor for the –10V line. You will usually find that it looks distressed. It's a good idea to fit a replacement whenever one of these sets comes in for repair. **G.D.**

Samsung CI593CN

This new set came in as DOA – Dead On Arrival. When it was checked there was obviously power and EHT. Then a blue screen suddenly appeared and the set could be tuned. While on test the volume counted up to 100, then the channels started to count down.

I started to suspect the microcontroller chip, but all was well when I disconnected the front panel controls. Unusually, the five controls are part of a resistive ladder – not unlike old wired remote-control systems. I discovered that the cause of the problem was the volume down switch, which was varying in resistance. To be on the safe side I changed all five controls. **G.D.**

Matsui 20V1R (Grundig CUC7301 chassis)

This set was almost dead: there was a slow, tripping noise, and the LED was flashing. When a dummy load was connected to the HT supply the output voltage fell to zero, so the chopper circuit was investigated. I eventually found that the HT preset R654 (470Ω) was open-circuit. **G.D.**

Bush 2157NTX (Onwa chassis)

This set had low HT rather than the high HT we have come to expect. The cause of low HT can be the 0·68Ω resistor in series with the HT rectifier. On this occasion however the voltage at the input to the HT switching circuit was correct (112V) but the voltage at its output was low. The 2SC2335 switching transistor didn't look too pleased about the situation. The basic cause of the fault was the 100kΩ resistor in the switch's drive circuit – it had gone high in value – but I replaced the 2SC2335 and 2SA1013 transistors as well as they had been overheating. The fault could occur with any set that uses an Onwa chassis with this on/standby switching circuit. **G.D.**

Philips 14PV170/05 televideo

There was a chicken-and-egg problem with this set: was the cause of the trouble in the VCR or the TV section? The symptoms were no picture and a tape stuck inside, with the mechanism pulsing. After a short while the tape would load, then start lacing and unlacing with the front LED flashing. Luckily my first move was to disconnect the supply to the line output stage, after which the video mechanics worked normally. A new (and fairly expensive) line output transformer was required. **G.D.**

Hitachi C2564TN (G100 chassis)

We frequently get these sets with a short-circuit line output transistor (Q703) and/or a faulty diode (D704) in the EW modulator circuit. These items are on the separate EW subpanel. A new BU808DFI transistor and BY228 diode usually restores the set to life – but not for long. The culprit is the EW filter coil L651 on the power PCB, though the subpanel should be thoroughly inspected for dry-joints and the EW loading coil L650 and transistors Q651 (BU801) and Q652 (BC548B – on the power panel) checked.

A quirk of this set is that if teletext is selected and the aerial is

then disconnected, the picture will slowly expand as the line frequency decreases. It then stabilises but Q703, which runs hot normally, overheats under these conditions – or with no signal input. The line timebase frequency takes a second or two to settle after signal interruption: any longer and crystals X519 and X520 need to be replaced as they can also cause failure of Q703.

For reliable repairs in the line output stage it's vital to use parts supplied by Hitachi. **G.D.**

Alba CTV841 (Late Onwa chassis)

There was no picture. When the setting of the first anode control was advanced there was an overbright but good picture. This suggested a fault in the beam-limiter circuit, where R430 (180kΩ) was found to be open-circuit.

To be on the safe side I uprated the electrolytic capacitors in the power supply at the same time. **G.D.**

Mitsubishi CT28BW2B (EE3 chassis)

For a smeared, low-contrast picture, or a virtually white screen with flyback lines, check R686 on the tube base panel. The value is usually 1·8kΩ. **A.B.**

Sharp SV287XH

This set would shut down to standby at switch on. There was also a smell of burning. Close inspection of the PCB led me to R518 (a 2·2Ω safety resistor) which emitted a small wisp of smoke each time the set tried to start.

This resistor is in the supply to the LA7831 field output chip IC501, which had failed because C521 and C522 (both 100µF, 35V) had gone open-circuit. **P.S.**

Hitachi C2846TN

The customer's complaint was that for the first hour the set would shut down to standby every few minutes. After that it remained on all day. I dealt with the usual dry-joints at the voltage regulators, but the problem persisted. During the course of a PCB examination using a strong magnifying glass I discovered a dry-joint at R719 which, with R718, forms a potential divider to monitor the voltage conditions in the line output stage for the protection system. The set was shutting down because of an increase in the voltage at the gate of thyristor Q704 whenever R719 in effect became open-circuit.

It is worth removing the chassis from its plastic housing before dry-joints are tackled in this series of models, as some potential problems are obscured by the cross supports. **P.S.**

Sharp DV59083H (D3000 chassis)

This set would trip because of high-voltage arcing from the line output transformer. Once the LOPT had been replaced the set would still shut down because R628 (1kΩ) and R746 (22kΩ) in the beam-limiter circuit were high in value. The set remained on when these resistors had been replaced, but produced a dull, barely visible picture. The cause was C606 (0·22µF) in the beam sensing circuit. C606, which is connected between pins 6 and 7 (chassis) of the LOPT, was leaky: it had presumably been damaged by the original arcing. **P.S.**

Samsung CI5013T (P58SC chassis)

This set was dead though there was 320V across the mains rectifier's reservoir capacitor and at the collector of the chopper transistor. A visual check revealed that C816 (2,200pF, 1kV), which is connected in parallel with the chopper transistor, was split. In addition, C808 and C813 (both 100µF, 16V) were low in value and C817 (100µF, 25V) was open-circuit. Once these capacitors had been replaced the set came on in standby. When I pressed the channel-up button the set came on, but there was a distinct lack of contrast and the control had no effect. R210, which is part of the beam-limiter system, was open-circuit. Its value is 120kΩ (133kΩ in 14in. versions). There was a good picture once this resistor had been replaced. **P.S.**

Alba CTV3400

This set had top field foldover – it was worse from cold. The cause was traced to the HT voltage, which was low at 96V. There was 115V at the collector of the standby switching transistor Q507, but its base voltage was only 96V. The driver transistor Q506 turned out to have an open-circuit junction. A 2SA1013 proved to be a suitable replacement. **M.Dr.**

Sharp C66CS-D8H

This set was dead with the line output transistor getting red hot.

We've had these symptoms before with the 51cm version of the chassis, the cause being the line output transformer. As there was no voltage at the tube's EHT connection, it seemed reasonable to assume that the transformer was indeed faulty (with a short-circuit rectifier diode fed from the LOPT there is usually some voltage at the EHT connector). But the diagnosis turned out to be an expensive mistake, as a replacement LOPT made no difference.

The cause of the fault was eventually traced to D609 (1N4933). It had a high forward resistance that could be varied by pulling the lead-outs (while monitoring with an ohmmeter). Strangely, this diode supplies the collector of one of the transistors in the line driver stage, from a winding on the LOPT: there was a squarewave drive at the base the line output transistor, but no EHT output was produced by the transformer.

As D609 can read OK but be faulty when passing current, I would recommend its replacement whenever a set fitted with the CS chassis comes into the workshop. **M.Dr.**

Philips CP90 Chassis

If the crowbar thyristor 6696 fires intermittently from cold, with the result that the set trips, and there is no HT supply fault, replace C2700 (4·7µF, 63V) which decouples the thyristor's gate. **M.Dr.**

Sharp 51AT-15H (5BSA chassis)

A reduced supply voltage to the MC44007 multifunction chip IC801 (video and chroma processor and timebase generator) is the usual cause of incorrect line frequency with these sets. On investigation however the first item I noticed was C713 (1,000µF, 16V) in the chopper power supply. It had turned black and was open-circuit. But after replacing it the fault was still present. Further checks revealed that most of the reservoir capacitors in the power supply were faulty: C712 (220µF, 16V), C714 (470µF, 10V), C716 (100µF, 16V) and C719 (470µF, 35V) all had to be replaced, also C604 and C622 (both 220µF, 10V) in the line driver stage.

As this set had been brought in by another dealer I don't know where it had come from, but its internal appearance gave me the impression that it had been running 24 hours a day. **M.Dr.**

Ferguson D59F (ICC9 chassis)

If one of these sets won't come out of standby, unsolder pin 19 of the STV2160 colour decoder/timebase generator chip IV01 and try again. If the set now comes on, the cause of the fault is in the trip circuit. The culprit is usually TP66 (BC858B), even if it tests OK. For good measure however I usually replace TP67 and TP69 (both type BC848) as well. They are all surface-mounted transistors. This fault can also be intermittent.

Don't forget to resolder pin 19 of IV01. **M.Dr.**

Sharp DV5132H

This set wouldn't come on and the front LED was flashing between red and green. It came on when the Nicam board was unplugged, but with no on-screen graphics. This was a red herring however – one that caused me a lot of wasted time. A Nicam panel from a similar set was tried, but the fault condition remained as before. The cause of the trouble was eventually traced to the 0·33Ω safety resistor R751 in the power supply (secondary side). When I checked it I got a reading of 0·66Ω.

Obviously the cause of the fault was current limiting in the power supply. This seems to be one to watch out for. **M.Dr.**

Sony KVM2121U (BE1 chassis)

There was lack of sync for the first twenty minutes or so: once the set had warmed up there was a good, stable picture for the rest of the day. Checks showed that video was entering the text board but not coming back out, and that the 12V supply was low at about 8V. After spending some time carrying out checks in the 12V regulator circuit I came to the conclusion that the SAA5231-V6 video processing chip IC02 was the cause of the fault. A replacement confirmed the diagnosis. **M.M.**

Sanyo CB5957 Mk. 2

I've had this fault twice now: it looks like intermittent low tuner gain. The cause is dry-joints in the IF section's screening can. The procedure to adopt is as follows: unsolder the can, at the print side of the board; resolder all the joints at the top print connections inside the can; refit the can and resolder it at the print side of the board. All should then be OK. **M.M.**

Hitachi C2114T

There was no picture and no sound. Checks showed that all settings – brightness, contrast, colour etc. – were at zero. Obviously the EEPROM chip was empty. As this was a trade repair and I was to go on a course the next day I told the trader to reset everything and see what happened. Usually replacement of the EEPROM chip is the only long-term solution. **M.M.**

Panasonic TX2461 (U5W chassis)

It's odd how the same component produces different symptoms in different chassis when it fails. In this case the symptom was odd colours, the culprit being the degaussing

posistor. The 96009 posistor usually blows the mains fuse when it fails in Ferguson and Philips sets. It doesn't do so with Panasonic sets – I've had three with the same fault. A replacement posistor restored correct colours. **M.M.**

Ferguson 51K5 (ICC5 chassis)

The symptom was intermittent loss of sound. The set had obviously been elsewhere: nearly all the joints on the sound module and in the power supply and line output sections had been resoldered. Pity whoever it was didn't check the headphone socket, where all the joints were poor. After resoldering the connections I gave the set a soak test. This proved that the sound was now OK. **M.M.**

Sanyo CBP2872 (ED1 chassis)

This set produced a mosaic-like picture. Video, sound and deflection processing is carried out digitally in this chassis. One of three chips could have been the cause of a fault like this: the VCU (video codec), DTI (digital transient improvement), or PVPU (PAL video processor unit) chip. Scope checks on the data lines showed that one of them was down, but it was hard to pinpoint which one as they all work together. As it turned out, the PVPU2204 chip IC502 was the cause of the trouble. **M.M.**

Philips CTX Chassis (20in set)

There was no sound – and the sound mute switch hadn't been pushed in! In fact the loudspeaker had failed. It's no longer available, but an alternative from RS Components, stock code 267 6895, fitted perfectly. My customer was delighted with the clearer sound obtained from this 10W speaker. **M.M.**

Salora M chassis

The symptoms with this set, which uses digital signal processing, were incorrect colour phase and the colours running through. It was akin to trying to reset the colour reference oscillator in a standard PAL chassis. But going into the service mode then setting up the reference oscillator didn't lock the colours. I eventually discovered that someone had replaced the PVPU (PAL video processor unit) chip with the 2204 type, as found in many Sanyo sets, instead of the 2203 type. The fault was cured by fitting the correct chip then setting up the reference oscillator. **M.M.**

Sharp 66AS-05H (4BSC chassis)

This set had gone off with a burning smell, no picture then later no sound. There were no signs of an obvious burn up however. At switch on I noticed that field collapse could be seen briefly before the set started to trip intermittently. A quick check on the voltages around the field output chip IC500 was inconclusive, but when the chip was removed it fell in half. This had been the cause of the smoke, so further checks were carried out to look for a possible reason for its demise.

My ESR meter showed that the flyback boost capacitor C506 (100µF, 35V) had an impedance of 15Ω. It was also found to be slightly leaky when checked conventionally. Replacement of these two items cured the fault, but it's a mystery why none of the safety components had failed. **P.G.**

Alba CTV10R

This set is fitted with the well-known Nikkai Baby 10 chassis. The complaint was an unstable picture after an hour or so. When the fault put in an appearance the picture overloaded and there was also a pronounced AFC problem. The cause was obvious when I removed the tinplate shield from beneath the IF IC. The video demodulator's tank coil T102 and the AFC tank coil T104 were both dry-jointed. Resoldering produced a perfect picture. **P.G.**

Onwa K9228

There were few signs of life apart from a tripping power supply. The cause was quickly traced to the BU508AF line output transistor Q402, which was short-circuit. The reason for its failure became apparent while I was fitting a replacement: the adjacent 4·7nF, 1·6kV tuning capacitor C417 had a visible bulge in its casing. On test it proved to be open-circuit.

When there is line output stage failure in one of these sets I usually check the 2SA879 HT switching transistor Q903 before completing the repair. It tends to go short-circuit when there's a fault in the line output stage. The net result is that the set works but won't go into standby, producing instead a blank white raster with flyback lines. As usual it was faulty. A replacement completed the repair.

I have found that a BF470 works satisfactorily in this position when a 2SA879 is not available. **P.G.**

Mitsubishi CT2146 (Euro 6 chassis)

The complaint with this set was intermittent patterning on the screen, sometimes faintly in the background, sometimes obscuring the picture altogether. It took some time for the fault to put in a regular appearance – it usually vanished the moment the back was removed and the chassis cooled down slightly. Once the fault did appear more regularly, the cause was found by using a scope to check the supply lines. The culprit was C920 (470µF, 25V), the reservoir capacitor for the 15V supply fed to the 12V regulator. It was going open-circuit intermittently, more so as its temperature increased.

With sets that use this chassis it's advisable to replace all the electrolytic capacitors in the power supply and to check those in the field output stage for signs of leakage. **P.G.**

Toshiba 2812DBT

Lack of width was the complaint with this set. Apparently the width had decreased progressively over a period of about a month. It had now settled down, with a gap of about two inches at each side of the raster and slightly ragged edges. In this chassis the EW correction circuitry and the line driver stage are on the DPC board, which is at the rear right. All adjustments for width etc. are made by software – there are SDA and SCL lines to the TA8739P deflection correction chip IC371.

Some quick voltage checks showed that the 12V and 27V supplies to the board were both present and correct and that the EW driver transistor Q422 had approximately the correct 9V at its collector. It's not the easiest board to work on, with many screening plates that obstruct access. I decided to remove it for further checks, suspecting that the semiconductor devices were probably OK but that there was a dried-up electrolytic somewhere. So some ESR checks were carried out – what did we do before these meters became available? C372 (2·2µF), the ramp capacitor connected to pin 15 of the chip, produced a reading of 20Ω, but the real culprit was C424 (4·7µF, 100V) which is connected in parallel with Q422: it was open-circuit. Replacement capacitors, of the 105°C type, cured the fault. **P.G.**

'Electronics, Electrical & Mathematics Principles V6'

If you are looking for an easy and enjoyable way of studying or improving your knowledge of electronics then this is the software for you.

CD-ROM

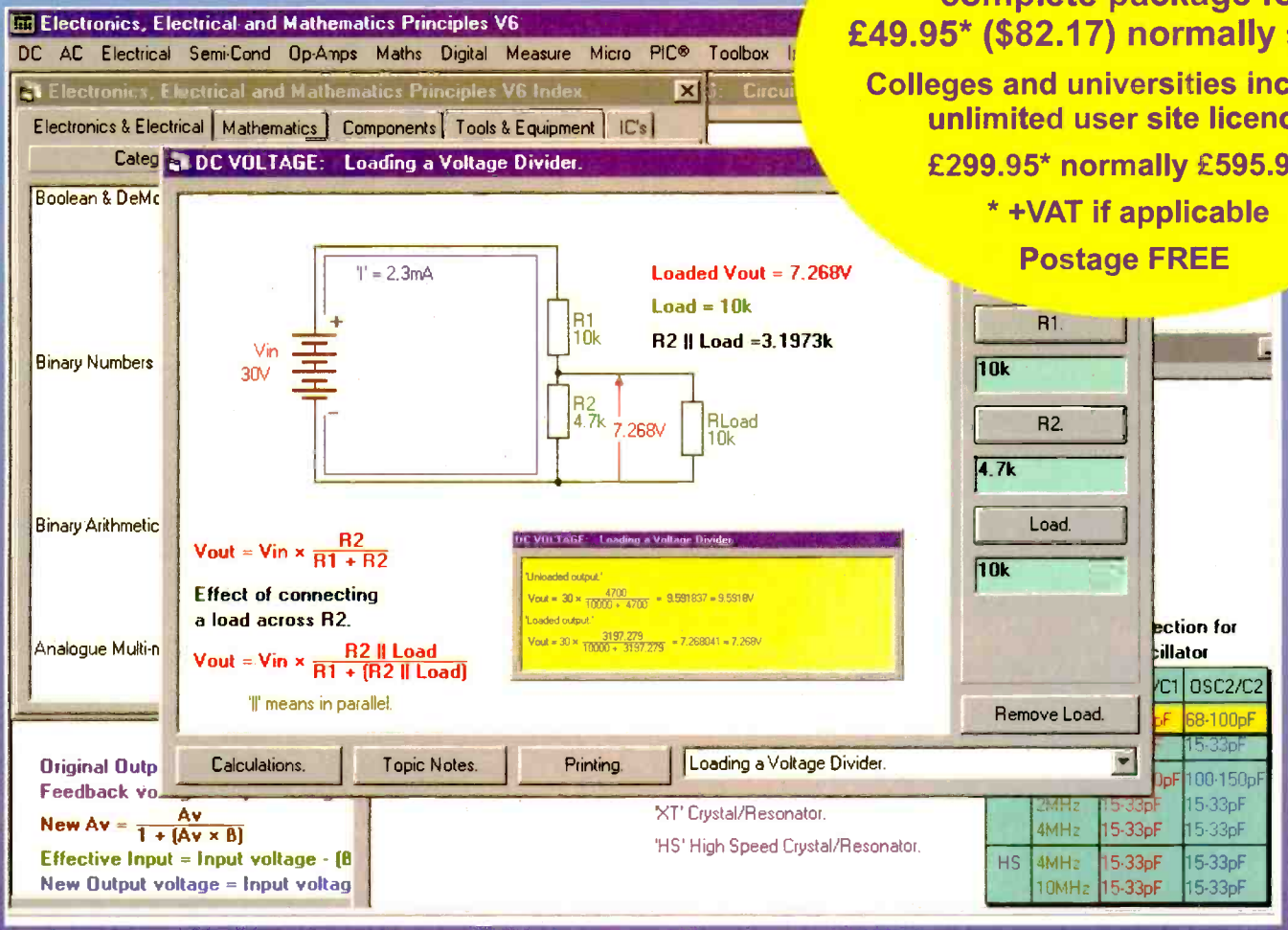
Students and Hobbyists the complete package for £49.95* ($82.17) normally £99.95*

Colleges and universities including unlimited user site licence.

£299.95* normally £595.95*

*** +VAT if applicable**

Postage FREE



Features.

Analogue.
Digital.
Electrical.
Microprocessors.
PIC Microcontrollers.
Mathematics.
Electronics Toolbox.
Components and Equipment Dictionary.
Fully interactive graphics, graphs and calculations.
Single page colour printing.
Full Windows integration.
Explanatory text.
Hundreds of Electronics & Maths formulae with worked examples using your inputs.
All calculations are shown.
Default values on startup.
Easy to use, no prior knowledge assumed.
Comprehensive menu and indexing.
Covers college courses from entry to university level.

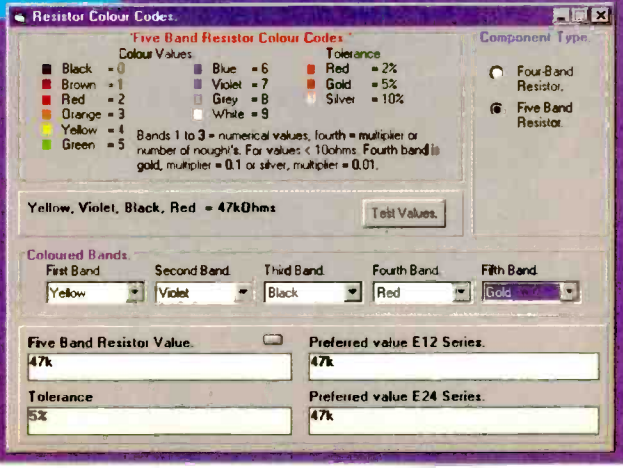
"Electronics Principles is a well thought out and comprehensive program that is also easy to install and stable in operation. It can be wholeheartedly recommended."
Robert Penfold. Everyday Practical Electronics magazine.

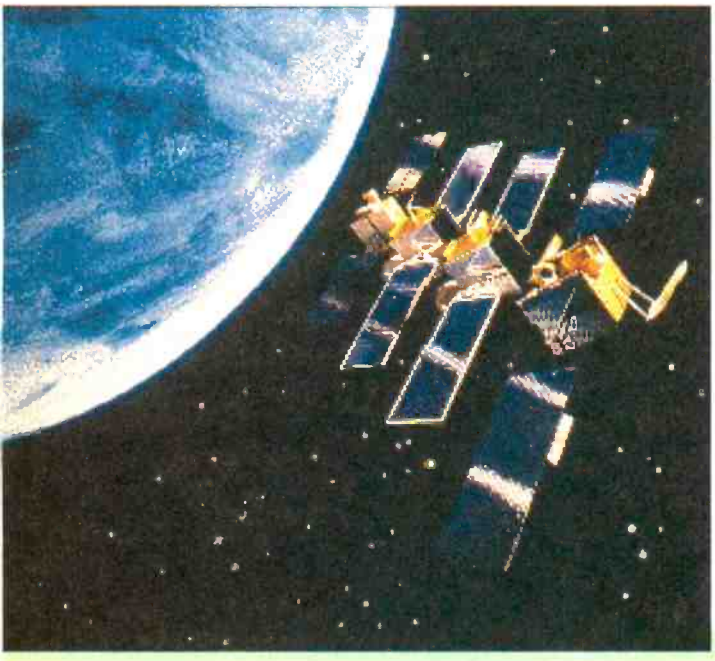
www.eptsoft.com

Please telephone or visit our web site for a list of over 900 topics from Ohm's Law to PIC' microcontrollers.

eptsoft limited. Pump House, Lockram Lane, Witham, Essex. UK. CM8 2BJ.
Tel: 01376 514008. Fax: 0870 0509660 info@eptsoft.com

Switch, Delta, Visa and MasterCard payments accepted - please give card number and expiry date.
Cheques and P.O. made payable to eptsoft limited.





Terrestrial and satellite TV reception. News from abroad. Developments in the satellite field. Roger Bunney reports

DX and Satellite Reception

There was a sudden upturn in Mid-March, with increased propagation via the F2 layer throughout the 30MHz range, just going as far as 40MHz. Maximum usable frequencies reached the upper 30MHz range from the 18th, with transatlantic communications appearing via my scanner during mid-afternoon, reverting more to Spanish at the end of the afternoon. One domestic utility base station complained to a mobile that his receiver was faulty with interference and the instruction "must get the damn thing repaired"! Very low-level ch. R1 video buzz was audible that morning on the scanner.

F2 propagation into the low 40MHz range continued until about the 24th, with various communications messages received. As usual, it was almost impossible to identify the source of anything as just street names, never the town, are given. When checking WWCR at 5MHz on the 24th I discovered that the sunspot count had reached 236 the previous day. This is high by the current cycle 23 standards. For those who use a scanner, the following tip from a recent issue of the RSGB magazine *RadCom* is worth noting: check at 50·499MHz for the Cyprus beacon 5B4CY: this is an ideal indicator of single-hop F2 reflection into the UK from about 2,200 miles.

The only reports of terrestrial DX-TV reception came from Peter Schubert (Rainham), who logged an unidentified low-level ch. E3 SpE signal on the 11th and noted a tropospheric lift on the 19th, with UHF signals from the Netherlands. He also sent in a TV Guide for the Canary Islands. This shows that there's channel TVE-1 regional programming at certain times (Izana ch. E3): *Telecanarias 1* from 1455-1520 on weekdays, and *Telecanarias fin de Semana* from 1330-1400 at weekends. From 1400-1455 daily there's the network *Telediario-1* from Madrid via satellite, with versions 2, 3 and 4 at 2000, 0015 and 0230 hours. These appear to be the only regional offerings other than two editions of *Noticias Las Palmas* via another commercial channel. In total there are five terrestrial channels, with transmissions throughout the 24 hours.

Finally, George Gaskin reports from Gibraltar that the TVE Band III network is alive and well despite internet information which suggested that chs. E7-12 were to close at the end of December 1999 for reallocation to DAB. But the Spanish *Emision Experimental Prueba DTT* analogue colour-bar transmissions in ch. E29 have ceased.

A Sky News digital link during the Pope's visit to the Middle East. Reception via Eutelsat W2 (16°E) at 11·123GHz H. SR 5,632, FEC 3/4.

Satellite Sightings

In contrast with the terrestrial DX scene, satellite activity was more plentiful than ever during March. I feel that it's taking over from terrestrial DXing. There are many advantages: all year round reception; it's cheapish to run; domestic entertainment is provided; and my dish, which in no way resembles Jodrell Bank, sits on the ground, minimising its intrusiveness and the interest of neighbours and planners. The advent of the digital era, with new techniques (and frustrations), has been managed without too much difficulty, which is encouraging.

As I predicted earlier in the year, we are now seeing a dramatic reduction in the number of analogue outside broadcast feeds.

Such feeds are now rare, being used mainly by French and German broadcasters. There are regular German NDR analogue offerings as regional programme inserts in the early evening via Kopernikus DFS 2 at 28·5°E.

Brightstar fed impressive helicopter pictures of the Team Philips catamaran listing heavily on the evening of the 29th, as the St Mary's lifeboat towed the £4m craft back to the Scillies. This was via NSS K (21·5°W) at 11·550GHz H (SR 5,632, FEC 3/4). While trawling through the transmissions from Eutelsat W2 (16°E) during the late evening of the 27th, looking for news from Moscow after the elections, I found a new programme channel from the Balkans. Fortunately I was in the auto-tune mode and the very strong signal locked. It's at 11·019GHz H, the service ident being 'OBNiH'. FEC is the usual 3/4, but the symbol rate is unusual – 3,123. Programme material carried the ident 'OBN' in the corner, and captions indicated that the origin was Sarajevo, Bosnia.

The air waves livened up during the Russian elections, with transmissions via Eutelsat II F3 (36°E) from APTN Moscow at 11·679GHz H and Reuters/BBC sharing 11·600GHz H, in both cases with the usual 5,632 SR and 3/4 FEC. APTN carried the service ident 'MSC11 Moscow ch. 8' but was just at the digital threshold with my receiver, the result being occasional breakup and pixellation. Both services have small studios in the same building – the views from the windows revealed the same domed buildings, at different angles. With several outgoing feeds during a major event, the practice now seems to be to call them path 1, path 2 etc. In this case APTN was path 1, Reuters/BBC path 2.

Having been involved in national election broadcasting during a previous job, I found the Russian election night TV production fascinating – I watched the Russian PTP channel at 3·675GHz via Gorizont 31 (40·5°E). There were no Swingometers, instead tense discussions around tables, with a single radio stick microphone being passed around.

Roy Carmen noted a face from the Soviet political past via Eutelsat II F3 on the 20th, when Michel Gorbachev spoke during a conference on water irrigation. The transmission, at 11·675GHz H, was uplinked from the Netherlands – the service ident was 'UNITED HOL 75A'. He also noted a rare analogue uplink via NSS K (21·5°W) on the 31st. This was from Italy (I-63 AREZZO) at 11·676GHz V with the audio at 6·60MHz, from 1800 onwards.

Just down from the APTN circuit via Eutelsat II F3, at 11·665GHz H, I saw a rehearsal for a Honda cars corporate presentation on the 27th. Interesting that the picture was squashed, suggesting a 16:9 image jammed into 4:3. As the time approached for the presentation proper to start, the SISLink operator hit the scrambling button and all content was lost.

There was extensive coverage of the Pope's visit to the Middle East. On the 22nd BBC UKI-229 provided material for UK breakfast programming via Eutelsat II F3 at 11·600GHz H. On the same day there was similar OB coverage at 11·582GHz H. APTN path 2 Jerusalem was fired up at 11·684GHz H (5,632, 3/4): interesting that the service ident was 'SATLINK MILLENNIUM' – commercial trucks seldom change the service ident. A summary of the tour, the first time a Pope has visited Bethlehem and Palestine, was carried by 'Digital Video' at 11·123GHz H (5,632, 3/4, PIDs 308/256) via Eutelsat W2 (16°E) on the 26th.

While the Pope was travelling in the Holy Land, President Clinton and President Assad of Syria met at Geneva to discuss the Middle East situation. There was coverage via Eutelsat II F3 on the 25/26th. The CNN path 1 feed was at 11·055GHz H while the 'US TV pool Geneva path 2 used 11·064GHz H, both with NTSC colour. Technical ops for path 1 used SISLink 29 capacity via UKI 418B.

The EU summit in Lisbon was in full swing at the same time but received little coverage from UK media. APTN Lisbon provided evening summaries via NSS K (21·5°W) at 11·675GHz H (5,632, 3/4, 308/256).

Although Eutelsat II F3 is a prime source of news feeds, there are others. Intelsat 801 at 31·5°W for example. On the 24th TES 42 ANGLIA TV was feeding a live programme insert from a doctor's surgery from 1900 at 11·997GHz V (5,632, 3/4). This end of 801's frequency spectrum can be very active, especially at weekends with sports material. BT often uses 10·987GHz H with TES 20 UKI-255. Football matches from around the UK find their way to Sky Sports, Isleworth via 801 at 11·997GHz H.

The NTL logo via Eutelsat W2 (16°E). From the Winchester teleport.

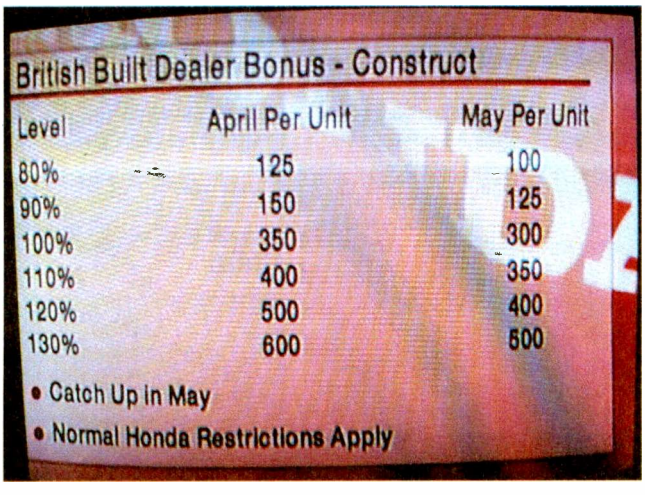
INSAT 3B and AsiaStar were

A typical SISLink test pattern and identification. Signal received via Eutelsat II F3 (36°).

launched by Ariane rocket V505, flight V128, in the early hours of the 22nd. The latter satellite will provide radio programming at 1·5GHz (L band) for Asia, as a companion to AfriStar. As with previous launches from Kourou, there was live coverage via the Astra (19·2°E) Bayerischer Rundfunk analogue transponder at 11·141GHz H (in clear PAL with audio at 7·02 and 7·20MHz). This is well worth a look if you don't have to go to work next morning – the programme usually ends at about 0230 or later.

Terrestrial News

USA: The FCC seems to be adamant that there should be no change from 8VSB to CODFM modulation for digital terrestrial TV transmissions despite further evidence, from NBC, that the US standard is less reliable in difficult locations than the European one. The NBC carried out tests from WCAU-DT Philadelphia ch. A67, running at 150kW, comparing 8VSB and CODFM over a three-week period. The resulting measurements confirmed earlier tests carried out by NBC at Baltimore.



Seen during a Honda corporate presentation via Eutelsat II F3. This digital signal appeared at 11·665GHz H.

USA Digital Radio is working with the Swiss company Digital Radio Mondiale to develop a global standard for converting analogue AM broadcasting in the MW band to digital form. The name iDAB has been suggested for a system that would enable digital transmissions to be introduced while maintaining existing services at their current frequencies. Services would be expanded to include local news, data distribution and internet access.

Brazil: After six months of digital test transmissions using three different modulation standards, the Brazilian ABERT group has recommended that CODFM be adopted in Brazil. The main advantages claimed are better service area coverage; improved pictures in comparison with existing analogue ones; better performance in areas prone to reflection; carriage of HDTV; and mobile reception possibilities.

UK: The ITC is delaying the issue of RSL-TV licences (analogue) to encourage the spread of digital terrestrial TV. As more digital multiplexes come into operation, the problem of interference to existing analogue services increases.

WAP: Here's something new, Wireless Application Protocol (WAP). It's a form of wireless internet access for mobile use, enabling internet information to be accessed using a mobile handset. A WAP language called WML is used in conjunction with specialised hardware and software. So it says in the handout, anyway!

Satellite News

The EBU is seeking companies to carry out research on a means of 'watermarking' digital broadcasts to protect video and audio material from high-quality digital piracy. Meanwhile the EBU has developed a simple scrambling system for transmit/receive equipment used with EBU circuits. It will be available shortly from several manufacturers. Tests of the BISS (Basic Interoperable Scrambling System), which is based on the DVB common scrambling algorithm, have been completed. The EBU expects ITU approval in early autumn.

Despite the growth of cabling for major traffic routes, BT Broadcast Services is to open a new teleport at Marina del Rey, California, to provide links across the Pacific and the American continent and on to Europe, in both the C and Ku bands. The teleport will also serve transcontinental fibre networks and supplement existing teleport capacity at Washington. Fibre-optic cabling is now installed over the major communications routes, is totally secure and is less expensive that satellite links. Most transatlantic telecommunications are provided by undersea cable while TV uses satellite links. Cable laying in the Pacific region is on the increase, with major capacity due to become available in early 2003. A BT spokesman has pointed out that fibre costs are dropping by sixty per cent year-on-year. Despite the assertion that satellites cannot compete, new ones are being ordered!

Intelsat has ordered from Matra Marconi Space a new satellite to be called NI-Alpha 2. It will go into orbit at 1°W.

Eutelsat has launched a new free-to-air digital package via 13°E, at 12·149GHz V (SR 27,500, FEC 3/4). The Sitcom package will provide Alice (home/lifestyle), Nuvolari (motor sports), Leonardo (Italian lifestyle) and Espresso (culture plus travel).

Hot Bird 2 shut down for nine hours on the 22nd. The cause is not known – a meteor hit has been denied. The satellite was returned to operation by using back-up capacity.

The Italian pay-TV group Stream is to relaunch an 18-channel digital package; TF1 (France) is to start two new channels (financial and women's interest).

The EBU's new channel Night Trade provides cultural programming from several Scandinavian and central European broadcasters. RAI (Italy), TVE (Spain) and France Television are to start a new channel that will operate in much the same way.

The UK radio group GWR has contracted Kingston TLI to transmit five new digital radio channels via Astra 2A. They are Classic Rock, Planet Rock, Classic Gold, Core and The Mix.

A Korean company has pirated the Chaparral dual C/Ku band Corotor feed system. Units are on sale in Hong Kong/Singapore at a third of the price of the original.

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: A UAA2001 tuner control IC for the Ferguson TX98 chassis. Also a remote-control unit for the Goodmans 1425RS 14in. portable. Please phone Rick Simmons on 0771 457 8251 or e-mail mortis1@genie.co.uk

Wanted/for disposal: Does anyone have a collection of *Practical Wireless* magazines, from about 1930-1970, they would like to see go to a true collector? I have for disposal two JVC HR-FC100EK dual VHS/VHS-C VCRs and a Sharp vertical record player. Michael Dranfield, 6 Calesdale Close, Buxton, Derbyshire SK17 9RH. Tel. 01298 73 492 (after 7.00 pm).

Wanted: Circuit diagram and layout for the VJB06112 PCB used in later versions of the Panasonic NV7000 VCR. Mike Cooper, 53 Trethosa Road, St. Stephen, St. Austell, Cornwall PL26 7PZ. Tel. 01726 822 280.

Wanted: A Goodmans 149TT portable TV in working order. Also a circuit diagram (photocopy OK) for the Weir SMM1005/12 power supply unit. R.S. Rosier, 3 Downs View Road, Maidstone, Kent ME14 2JB. Tel. 01622 761 391.

Wanted: A motor for the Harvard Model 880 8-track stereo player. The motor is made by Nissei Electric Co., Ltd. Details of motor are: Micro motor NE-A4R-33. Also require a Garrard type E magnetic pickup for a single-speed 78 RPM record deck circa 1947, or equivalent. Please write to Peter Carlton, 44 Morwenna Park Road, Northam, Bideford, Devon EX39 1EQ or e-mail pcarlton@fdn.co.uk

For disposal: *Radio and Television Servicing* books from 1966-67 to 1986-87. Offered free of charge. Phone Stephanie Rae, Centre Librarian, Milton Road Centre, Edinburgh on 0131 657 7209.

Wanted: Circuit diagram (photocopy OK) for the ICPI 72G9140 colour monitor – also address of the manufacturer/distributor. W. Walsh, 58 Cowal Place, Dunoon, Argyll PA23 7PX. Tel. 01369 70 7995.

Wanted: Station select module SBX-M904A(E) for the JVC Model CS2180EK (BX11 chassis), or information on a source of a new one. Present module tunes OK and display flashes when Memory is pressed, but settings are not stored. Have changed all electros without improvement. Derek Minns, phone 01725 510 279 or e-mail makoraminns@hotmail.com

For disposal: *Television* magazines from September 1977 to August 1982 plus a few other random issues. Offers please to Alistair Dunsmore, 21 East Croft Ratho, Midlothian EH28 8PD. Tel. 0131 333 2610 or e-mail al.dunsmore@tesco.net

Wanted: VTF-056 ceramic filter module for the Pioneer PD70 CD player. Phone Tony on 01262 603 281 or e-mail alternative-electronics@bridlington.co.uk

Wanted: Main PCB for the Mitsubishi Model CT29B2STX, working or not. J. Clarke, Leicester. Phone 0780 362 6148.

For disposal: A Sobell Model T348 and a Pye Model CT72 (working), also a large box of TV valves. M.J. Hobby, Horsham. Phone 01403 791 005.

Wanted/for sale: Require memory card(s) for the Amstrad NC100 Notepad (JEIDA/PCMCIA), 1MB. Have for sale a full set of *Television* magazines from October 1976 to December 1999 (24 years). Reasonable offer accepted. Ian Purves, 9 Overbrook, Hythe, Southampton SO4 5BE. Tel. 023 8084 5476.

Wanted: Bush hybrid colour set, e.g. CTV25, CTV167, Murphy CV2510, CV2511 etc. Any condition considered. Phone Mike on 01395 274 227 or e-mail mdb@permanent.co.uk

Wanted: IC type TDA1071 for the Roberts RM33 radio. Eric Kempshall, 109A Portland Road, Hove, East Sussex BN3 5DP. Tel. 01273 382 001.

Wanted: Instruction manual and remote control unit for the Toshiba V703B VCR (VideoPlus). Mohammed Iqbal, Citivision, 226 City Road, Roath, Cardiff CF24 3JH. Phone/fax 02920 496 815.

Wanted/for disposal: Require the following printers for spares: Epson Stylus 400 and Stylus 500, and Olivetti JP450. If you are scrapping any of these, please phone me. I have for disposal Brother HL-8e laser PCBs (all OK) and a number of faulty, complete VCRs (for spares – phone your model number). Peter Forshaw, South Yorkshire. Tel. 01226 753 413 or e-mail peter@4shaw.fsnet.co.uk

Wanted: Circuit diagram for the Manor Supplies colour-bar generator circa 1985/6. Garry Riley, 2 Winton Street, Lockwood, Huddersfield, West Yorkshire HD1 3SW. Tel. 01484 328 296.

Wanted: Working main panel no. PWB1138 94-18 rev. 3 and video board no. 94-19 rev. 4 for the Smith Corona 14in. monochrome monitor Model OM143VN – manufactured by Orion Electric Co. T. Thirsk, 15 Daisy Way, High Lane, Stockport SK6 8EF.

Wanted/for disposal: Does anyone have connection details and/or wiring and circuit diagrams for the BT/GPO Plan phone system 64/2A? I have for disposal a number of old service manuals (mostly Thorn) and various technical bulletins. They are free to anyone who can collect them. Andrew Tebbutt, Saltburn, Cleveland. Tel. 01287 678 625 (answer phone most of the time – leave a message and I'll call back).

For disposal: Require a good home for two Sanyo Betamax VCRs, a VTC5000 fully working and a VTC5150 not fully working. D.R. Hawkins, 9 Hodge Close, Devizes, Wilts SN10 3RU. Tel. 01380 727 265.

Wanted: Upper cabinet and front panel in grey for the Sony SLE7UB VCR. Must be in mint condition. Or complete machine considered. A.C. Griffin, 89 The Ridgeway, Sedgley, W. Midlands DY3 3UN. Tel. 01902 880 063.

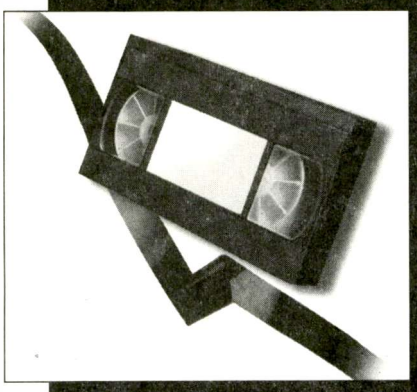
Wanted: Complete microprocessor board for the Ferguson 3V54/55 VCR or a microprocessor chip type HD614042S DSS. Graham Brooks, 6 Perry House, Perry Fields Way, Burnham SL1 7HB. Tel/fax 01628 669 567.

Wanted/for sale: Require a remote-control handset for the Orion 14in. colour portable Model W1450E. Have for sale a Hameg dual-beam oscilloscope in very good condition with instruction manual and set of probes, £50. Phone M. Payne on 0191 537 2062.

Wanted: Chopper transformer for the Ferguson TX100 chassis, part no. 06D3-082-001, new or good second-hand, and a remote-control handset, LCD-screen type, for the Sharp VCA45HM VCR. R. Dimmock, Telethon TV and Video, 71 Churchfield Road, Liverpool L25 3SE. Tel. 0151 487 5113.

Wanted: Photocopy of the EHT and drive oscillator circuit for the Tektronix type 647 oscilloscope; also an EHT lead, tripler and focus potentiometer for the Bang and Olufsen type 7720, Beovision 5102/7102/8102. Roy Coates, 35 Tetbury Hill, Avening, Tetbury, Glos GL8 8LT. Tel. 01453 832 720.

Wanted: Amstrad VCR4700 VCR, complete machine or main PCB, any condition, for spare parts. Call David Robinson on 0115 910 7211 or e-mail DavidJRob@talk21.com



VCR Clinic

Reports from
Eugene Trundle
Ronnie Boag
Mike Leach
Paul Hardy
Michael Dranfield
Chris Watton and
Michael Maurice

Toshiba V703

This was an unusual fault: the tape was chewed immediately after the cassette had been taken on to the deck. This machine 'shuffles' the tape on receipt. During the first (backwards) phase of this shuffle the tape rode upwards and out from between the capstan and the pinch roller. The cause of the trouble was the pinch roller, which was worn. Part number is 70322504. **E.T.**

Tatung DVR744N

There was no E-E sound with this machine. The cure was to replace the non-volatile memory chip and carry out reprogramming. **R.B.**

JVC HRJ600

The complaint with this machine was intermittent failure to eject a tape. When I checked the mechanism I found that there were damaged teeth on the relay gear and drive arm assembly. The cause of this would have been a faulty mode state switch. Replacement of these three items cured the fault. **R.B.**

Panasonic NVFS100

This machine left a loop of tape out when eject was selected. The cure was to remove, clean and refit the quarter-load arm. Part number is VXL1857. **R.B.**

Sanyo VHR279

The complaint with this machine was failure to erase previously recorded sound. Scope checks brought me to the audio/control head which was open-circuit. **R.B.**

Nokia VR3786

There was no scart switching when a tape was inserted and play was selected. The cause of the fault was the MM1117XF video switching chip IC2202 on the back PCB. A replacement cured the fault. **R.B.**

Samsung VI611

Intermittent loss of the clock display was the complaint with this machine. The cure was to remove glue in the C3, Q1 area. This had become conductive, and as a result the –24V supply was low. **R.B.**

Sony SLVE70

There was no RF audio in the E-E and playback modes. The scart sound was OK. I initially suspected a modulator fault, but this possibility was quickly ruled out as a buzz was obtained when the modulator's audio input pin was touched. Scope checks then showed that there was no output from the XLH7776K audio processor chip IC101 on board HF34. A replacement chip cured the fault. **M.L.**

Hitachi VTM510E

If the problem is low, buzzy E-E sound, replace C2727 (22µF). This capacitor causes various audio symptoms when faulty. Use of heat and freezer usually confirms the diagnosis. **M.L.**

Samsung SV603B

When the right-hand start sensor becomes dry-jointed the symptoms are no front loading or the cassette housing permanently trying to eject the tape in the housing. I've had the fault with several of these and other similar machines. It's a quick fault to repair as the mechanism assembly comes out easily, also the main PCB on which the sensors are mounted. A quick solder up usually cures these symptoms. **M.L.**

Hitachi VTM740

There was no sound recording, though the sound from the previous recording was erased. All that was present with a new recording was tape hiss – and a picture. Scope checks around the XRA7767A audio processor chip IC401 revealed that audio was present at pin 20 but not at pin 25, the record amplifier. The chip was out in no time, and a replacement from a scrap machine was fitted. This made no difference! A record detector stage within the chip is externally decoupled by C408 (4·7µF, 35V) which proved to be the culprit. It had leaked – the smell was a sure clue. **M.L.**

Toshiba V228

The drum speed varied intermittently. When the machine was cold it worked all right. When it was warm, or when the tape was changed, the drum speed would take off at a phenomenal rate. The machine would have to be left to cool down for a while before the drum speed returned to normal.

I found that tapping around the lower drum, and pressure on the main PCB, would instigate the fault. This suggested dry-joint problems on the PCB, but this was not the cause of the fault. It took a while to establish that the cause was the drum stator coil, which is mounted on and soldered to the main PCB. The leads from the coils were not soldered to the pins that are soldered to the PCB: they seemed to be just twisted clumsily around the pins and made very intermittent contact.

A good clean up and soldering secured the connections. Then,

when the coil assembly was remounted on the main PCB, the machine worked normally. **M.L.**

Hitachi VTF660

The blue mute would come on in the E-E mode because the video signal was of low amplitude. In addition the playback picture was very poor. As with most modern VCRs, the video signal path is complicated. But scope checks revealed that the video signal at pin 57 of the HA118203F video/audio processor chip IC201 was poor and crushed. A new chip cured the fault.

It's worth noting that the machine can be run with the deck mechanics removed when there's an E-E fault. As the mode switch is mounted on the main PCB instead of the deck, the VCR won't shut off to standby. Just make sure that the mode switch is in the eject position before you switch on. **M.L.**

Panasonic NVFS88

This S-VHS machine wouldn't accept a cassette. When a tape was inserted it went in but was immediately ejected. Moving the mechanism manually proved that there wasn't a deck problem. I eventually found that the eject button on the control door was stuck down. It was freed by cleaning around the edge of the button. **P.H.**

Ferguson FV72LV

This machine damaged tapes and a check showed that there was no take-up or supply reel rotation. The cause was the pulley, which had split, on the capstan motor. It's not available as a separate item, which makes repair quite expensive. Fortunately most FV6X/FV7X models use the same motor, so I was able to use a pulley from a scrap machine. **P.H.**

JVC HRJ715

This machine was found to be dead after a power cut. The power supply wouldn't start until C12 had been replaced. I used a replacement rated at 105°C. **P.H.**

Panasonic NVSD44

Tapes would sometimes get jammed in this machine. As they wouldn't eject, the customer had tried to 'fix' the problem himself. Fortunately he hadn't done any damage. The coupling on the mechanism motor was in good condition, and the mechanism worked reliably when driven by hand. The cause of the trouble was the mode switch, which was heavily contaminated with oil. A replacement switch cured this intermittent problem. **P.H.**

JVC HRS6800

This S-VHS machine produced a snowy display, with a crease line sometimes present in the picture. I was told that cleaning improved matters, but found that with both VHS and S-VHS playback there was no output from one video head. A new upper drum was fitted but didn't cure the fault. I then realised my mistake and replaced the 3·3µF surface-mounted capacitor on the drum motor. This cleared the fault. **P.H.**

Panasonic NVFS88

I've found it necessary to replace the complete upper and lower drum assembly in a number of these machines. The symptom has been a loud hum after the machine has been in use for a few minutes. It's intermittent, and usually happens only from cold. The noise gradually gets worse and also affects the picture. The hum can sometimes be stopped or started by gently tapping the deck near the drum.

When the drum comes to rest it's clear that there's something amiss with the bearings, because the drum slows down prematurely with a pronounced rubbing sound. A complete replacement drum unit cures the fault, but it does mean an expensive repair. Don't throw the old unit away, as the motor PCB is not available separately. This does fail and is easy to replace. The upper drum is also useful as a cheap alternative to a new one. **P.H.**

Sharp VCM321

This machine didn't erase the previous sound track. Investigation showed that the cause of the fault was the DTC323TK transistor Q652, which was open-circuit. It's a surface-mounted digital transistor that turns on the bias oscillator transistor Q651 by connecting its emitter to chassis. **M.Dr.**

Mitsubishi HSB12

The playback picture was good but the E-E picture was very poor, with weak sync. The cause of the fault was C2X2 (10µF) which is located near the booster module, right in the corner of the PCB. **C.W.**

Bush VCR8150

This VCR had an intermittent fault that eventually became permanent, loss of erase bias. The machine had sometimes recorded the sound with gaps in it, leaving the previous sound in the gaps. This situation had become worse, until there was no sound recording and the picture was marred by flickering colour produced by previous video information that should have been erased.

Checks on these mid-mount units are not easy, as the deck is not secured to the PCB when it's removed from the case. I decided to remove the deck and the supply to the erase bias circuit. I then fed this circuit from a 12V bench supply. A scope check showed that the oscillator ran for a second then stopped. The culprit was C410 (47µF, 16V). Normal operation was obtained once this capacitor had been replaced. **C.W.**

Ferguson FV201LV

This VCR would sometimes work. At other times it would accept a tape then make a few odd noises. On inspection I found that the head drum didn't rotate when the fault was present – it just jerked a few times. The cause was not stiffness but the fact that the tacho detector GT001 was dry-jointed. **C.W.**

LG P434I

There were various peculiar faults with this machine. In particular when play was selected the E-E picture was still present but was dim and rolled. If another function was tried, such as search or still, the off-tape picture appeared briefly then the E-E picture returned. When stop was pressed the E-E picture became clear again. If you get this problem, replace CP19 (1,000µF, 10V) in the power supply. **C.W.**

Panasonic NVG21

This machine would occasionally switch itself on, then not switch off. In addition the stations were sometimes not there. Normal operation was restored by replacing all the electrolytic capacitors on the secondary side of the power supply. **C.W.**

Salora SV601

This VCR was suffering from the effects of liquid spillage. I cleaned the board thoroughly then replaced the M5218L chip, which was badly corroded. After that the machine worked, but there was no audio erase bias. This fault was cured by replacing the audio erase coil. A new damper arm and mode switch completed the repair. **M.M.**

Triacs in Vacs

Many vacuum cleaners nowadays incorporate a motor-speed control system. The arrangement is triac-based and generally easy to repair. J. LeJeune describes the circuitry and repair procedures

Most vacuum cleaners now incorporate some form of motor-speed control arrangement, conveniently placed for easy accessibility – and ready to go wrong. Repair of such systems is usually simple, if you can obtain the parts. It can provide a useful source of repair income.

Two main types of vacuum cleaner motor-speed control circuit are in use, with either a rotary or slider control mounted on the body of the cleaner, or a 'remote' control mounted on the handle of the suction hose.

Control-on-cleaner systems

The type of motor-speed control system with the potentiometer on the body of the cleaner normally consists of a straightforward triac circuit, with the triac driven by an *RC* phase-shift circuit to produce a variable triggering time. The circuitry used varies in complexity, but the answer is to know of a basic circuit that will work in almost any situation. Thus when disaster strikes and the control PCB is a charred mass, you can build a new and completely satisfactory replacement quickly.

Fig. 1 shows the basic circuit I use. It will work with most cleaners, and is trouble-free. Variations on the theme are possible, to suit different values of control potentiometer. But however this may be, and whether the control PCB is still usable or has been cremated, you can fix the problem.

Since the triac is a semiconductor device, it normally fails short-circuit – unless a short-circuit motor makes it act like a fuse. If the motor is running at full speed and cannot be controlled, the triac is nearly always short-circuit. Quite often the triac's gate is controlled by another semiconductor device, which may also have failed.

In some circuits for example a diac is used to shape the pulse that triggers the triac. The diac is a bidirectional diode which switches on when the voltage across it, in either direction, reaches about 30V. In the basic circuit shown in Fig. 1, it would be inserted between the junction of R2/C2 and the gate of the triac. A neon lamp, like those used in touch-tune circuits in older TV sets, will also serve as a trigger device, though the breakover voltage is more like 90V in each direction. Use of either of these trigger devices will modify the circuit's control characteristics.

RV1 is nominally 47kΩ, but its value can be increased to up to 220kΩ before any abruptness in the speed control is noticed. The value of C1 and C2 can be reduced when RV1 is over 100kΩ – 47nF is a suitable value. The value of RV1 is seldom lower than 47kΩ – a lower value will result in lack of low-end speed control.

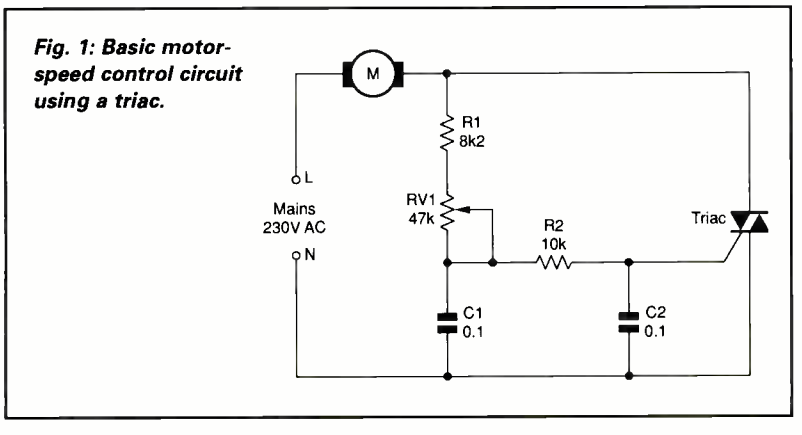


Fig. 1: Basic motor-speed control circuit using a triac.

Triac replacement

The selection of a replacement triac requires a little thought. Many cleaners now have motors rated at up to 1,500W, which means a full-speed current of about 6·5A (assuming a 230V mains supply). Clearly a 6A device would not last for long, so a 10A type should be fitted.

For reliable operation a heatsink is advisable. Some manufacturers pay only lip service to this, supplying a small fin to which the triac is bolted. The assumption here is that most cleaners get only intermittent use, so there is not time for excessive temperature build-up in the switching device to occur. Certainly provision of a heatsink is a problem, as space is at a premium in many cleaner bodies. A neat solution is to place the heatsink

somewhere in the airstream, though the air leaving the cleaner is usually quite hot. As a general rule, the device should not be allowed to operate at temperatures in excess of 80°C.

Interference suppression

Finally, make sure that the interference suppression components are doing their job. Air-cored inductors are normally very rugged and fail only when the current-carrying capacity of the winding is exceeded. Ferrite-cored inductors are susceptible to damage however, as the core is brittle and liable to shatter. The capacitors should be of the X or Y type, with an AC rating of 250V or higher. Some manufacturers fit a suppression module.

A handy check on whether the suppression circuit is working is to operate an MW radio within ten feet of the vacuum cleaner, running at low speed. A 100Hz buzz indicates that things are not as they should be.

Remote speed-control systems

Remote control means that the motor-speed potentiometer is situated in the handle of the hose. The control will also switch the motor on and off. To satisfy safety requirements, an optocoupler is used to isolate the control from the mains supply. This device is hard-wired to the control board, the connecting cable running the length of the hose from the handle to the machine end. A two-pin plug-and-socket arrangement, integral with the hose coupling, enables the hose to be detached from the machine and stored separately.

Fig. 2 shows the basic arrangement for 'remote control'. An isolation transformer, T1, is used to supply AC to the phase-adjustment control circuit, providing a supply of 6-12V. A triac is again used to regulate the motor current, but the circuit is more complex because of the optocoupler used for mains-isolation purposes.

Experience with this type of arrangement shows that in many faulty control modules the triac has failed, going short-circuit, and has damaged the optocoupler as well. Because the optocoupler has to provide trigger pulses on both half cycles of the mains supply, it is a special type that's not found readily in the catalogues of spare parts suppliers. More specialist suppliers will have them however. Look under triac drivers in the optoelectronics segment of the relevant catalogue.

Most machines that incorporate a controller of this type have similar fault possibilities to the machine-body mounted type. The wiring between the control module and the hose-handle slider control is prone to failure however, since it's incorporated in the length of suction hose. The hose is flexible and is susceptible to careless handling – it may be trodden on or overstretched. The slider control itself is often not of the highest quality and, being subject to frequent use, its life is short.

Replacement potentiometers are not easy to obtain, the manufacturer in many cases being coy about supplying spares. So it may be necessary to resort to repair of the defective slider. Printed-circuit repair paint is useful in this respect, but the repair process is tricky and requires patience and a steady hand.

In some control handles the PCB uses small eyelets to provide the equivalent of a plated-through hole. Soldering the eyelets before reassembly of the unit is a wise precaution.

Triac types

Triac failure is common with remote-control machines, and can only be put down to inadequate device specification. Experience suggests that a replacement should be generously rated. Snubber components should be checked. 'High-commutation' devices do not require a snubber network and should be replaced with a similar type.

Other triacs are of the high gate-sensitivity type, which are normally designed to be triggered by a 5V driver. You generally find them in the more sophisticated type of cleaner.

The range of triac features has increased in complexity over the years and is now as bewildering as that with transistors. It is no longer possible to say "a triac is a triac".

In conclusion

The incidence of control-circuit failure is moderate, occurring more often with inexpensive imported cleaners. Repairs to these could be simple and lucrative, with the added advantage that a successful and speedy repair to an everyday household product frequently brings the customer back to your business with other, more challenging repairwork.

The circuitry used is very basic and well within the capabilities of a TV engineer. The inbred caution that TV engineers have with live mains is also an advantage when undertaking this type of work – they don't have to be told to remember to isolate the circuit from the mains supply before touching the body or pins of the triac.

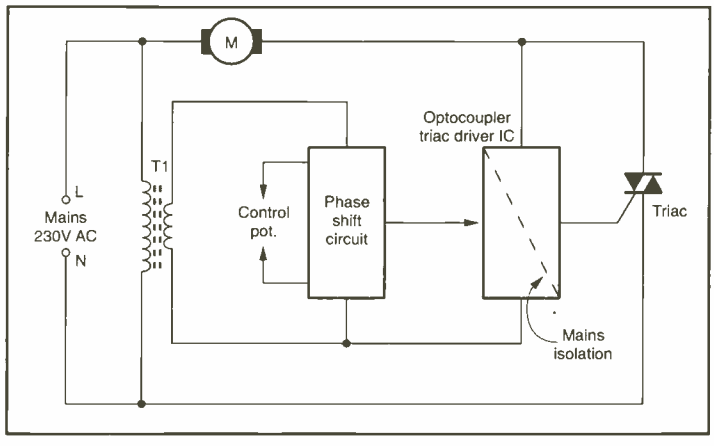


Fig. 2: Basic arrangement of a 'remote' motor-speed control system. Component values and configurations tend to vary.

WEB SERVICE

Amstrad

http://www.amstrad.co.uk

http://web.ukonline.co.uk/clifflawson

Amstrad now has its own official web site covering current products. For information on older products the Cliff Lawson web site is essential viewing.

All Tech Tips

http://www.skyeinteractive.net/techtips/

Another US technical tips site which deals with subjects related to repair of the whole range of consumer electronic items. The site is being updated and plans to include current repair articles, books on repair, schematics and links to manufacturers technical repair sites. There's also a chat room.

Anatekcorp

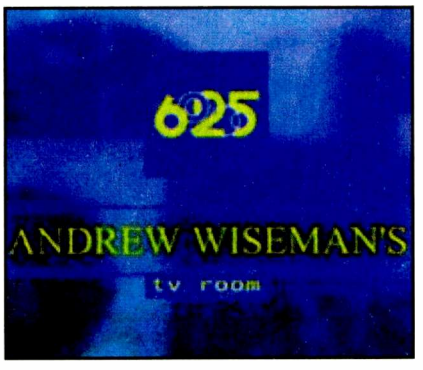
http://www.anatekcorp.com/

A US site selling computer databases of fault reports and schematics, but it has some interesting articles for free download - you can even submit your own. There's a technicians forum but you have pay $60/year to be a member.

Andrew Wiseman's TV Room

http://625.simplenet.com

An informative personal site about TV past and present. There's a discussion about the future of digital TV. There's also a logo gallery where you can listen to the old BBC and ITV intros, and see logos from cult programmes such as the Prisoner and Dr Who. You can even watch old public information films (although I had a problem connecting to the server). There are useful sections explaining Digital Television and Programme Delivery Control for video recorders (thanks to Laurence Day for bringing this site to my attention).



Baird 30 Line Recordings

http://www.dfm.dircon.co.uk

For history buffs and the curious here's a fascinating site containing early TV recordings and their background.

BBC

http://www.bbc.co.uk/info/reception

http://www.bbc.co.uk/enginfo

If you need any help with your reception go to this site – both of the addresses point here. There's special advice for people with loft installations, and caravaners and boating enthusiasts.

Darren Meldrum's Home Page

http://www.meldrum.co.uk/mhp/index2.html

This excellent site is dedicated to television especially the bits in-between – the announcements, idents and, for the nostalgic among you, the Test Cards. It also contains some useful links to other sites (as do many other sites).

Doknet Service manuals

http://www.doknet.com

This Dutch site says it has 350,000 service manuals and 1 million service parts.
You interogate the data base by filling out an order form, with the "request" box ticked, and then wait for an email to arrive back on your computer. However,
an on-line index would be useful and maybe on-line downloading of the manuals.

Electronic Repair Tips

http://elmswood.guernsey.net/index.html

Here's growing source of free repair tips shared by visitors to the site. You can search by manufacturer or type of equipment. A short description of the fault is given and you can click for further details. However, my only criticism is that when you click to go back from a fault you seem to lose your original results list.

ICHE

http://www.iche.com

See Bill's problem page which is a forum for enginers and technicians to post their problems, tips, advice etc to. All submissions are at Bill's discretion.

MB21

http://www.mb21.co.uk/index.html

Another enjoyable site with a "telenostalgia" section about the technical aspects of television. There's also a section on transmitter sites, teletext "then and now", and a "rough guide" to widescreen television

Newsgroups

uk.tech.broadcast

uk.tech.digital-tv

uk.tech.tv.sky

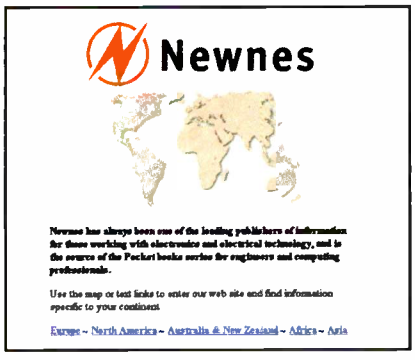
If you have never got into newsgroups then these are worth a look.
You"subscribe" (free of charge) to a newsgroup through your e-mail software (eg. Outlook Express). If it's not obvious how to do it then check out the help section on your Internet Service Provider's front page. Newsgroups are like notice boards where subscribers can send an

Email to be viewed by everyone else.They are generally a source of help and advice, with plenty of humour too! Maybe there should be a TV engineer specific newsgroup called "uk.tv.engineers". Any thoughts? (thanks to Iain Dobie for this information)

Newnes

http://www.newnespress.com

Check out this site for the latest book titles on TV & Video Servicing and Technology and their famous Pocket Book series. You can shop on-line and

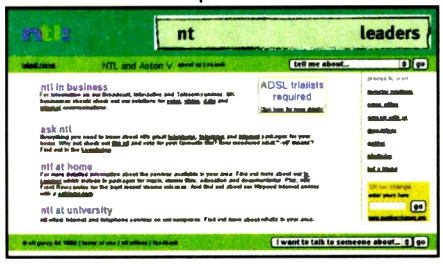


also register for an Email service to tell you when relevant new titles are published.

NTL

http://www.ntl.co.uk

Go to this site for information on NTL's Broadcast, Interactive and Telecom services, including packages for home area by area. There's also a useful transmitter site map and database,



giving locations and information. The site also contains useful documents, which describe digital TV, interactive TV and digital Radio. There's also a useful contacts list.

M.C.E.S.

http://www.mces.co,uk

The MCES site gives details of our range of service including Tuners, Video Heads, RF & IF Modules plus latest prices and special offers.

Pace

http://www.pace.co.uk/trade/index.htm

The Pace site has a product finder. On servicing, there is a restricted access area for Pace retailers and service partners. If you are a member of the trade and you deal with Pace products you can apply for access by following the instructions. The free access area contains some useful Frequently Asked Questions and links to other useful sites such as the Lyngemark Satellite Chart at http://www.lyngsat.com.

Philips

http://www.philips.com

http://www.semiconductors.com/products/

Take a look at the impressive Philips home page which leads to a product listing and detailed information. Perhaps more useful to the technician is the semiconductor data "tree" where data sheets can be downloaded on all Philips integrated circuits.

Servicing Advice

http://www.repairfaq.org/REPAIR/F_Repair.html

Here are some frequently asked questions about servicing consumer electronic equipment, with a US bias. But there's some good material on monitors and CD players and CD-ROM drives. (thanks to David Edwards for this information)

Satcure

http://www.netcentral.co.uk

Packed with frequently asked questions (FAQ) about common faults and cures for faulty satellite receivers and decoders. Repair kits, upgrade kits, spare parts, surplus components plus links to other satellite information sites. Also audiophile components, electronic hobby kits, dolls house and model railway electrical stuff, a beginners' electronics course and lots of other information that will keep you occupied for days! The entire web site is also available on CD for just a £5 note.

Taxan

http://www.taxan.com

http://www.valuevision.co.uk

Look here for information on Taxan monitors and their new Valuevision range, with information on servicing, spares and latest software drivers.

Texas Instruments

http://www.ti.com

Data is also available from Texas Instruments where you can quickly search their site for the information you need. Quality Electrical Direct http://www.qed-uk.com Here's a new retail site with a very interesting feature - not only can you purchase from a huge range of consumer goods but you can also request price information on your mobile phone. For example, you could be looking around your local branch of Dixons and see something you want. You can then send a message to QED via the Short Message Service (SMS) on your mobile phone to request a price and delivery from QED. The information is send back to your phone including how many they have in stock. It will be interesting to see if this new E-commerce approach succeeds.

Timecast

http://realguide.real.com/stations/

Television of the future? This site contains listings of TV and Radio stations available on the Internet. There are quite a few TV stations of US origin available to watch. The video quality isn't very good at the moment, but this is sure to improve. There are also some fixed cameras positioning in locations ranging from game park, high streets and people's houses - not exactly captive viewing! But an interesting

thought - are PCs and TVs going to eventually "get married"?

Transmitter Alignment Programme

http://www.tvtap.mcmail.com

This site contains the timetable of work on the TV Transmitter Adjustment Programme or TAP. The programme's aim was reported earlier in Teletopics, but briefly it is to maintain existing analogue services as work progresses on digital television UK "to fulfil official regulatory licence requirements". When transmitters are being worked on there are local messages.

Televes

http://www.televes.com/ingles/ingles.htm

Televes website was launched as an

easier way to keep in contact with our World-wide Network of Subsidiaries and Clients. This site is constantly updated with useful information/news plus you can download info on our range: TV Aerials & accessories, Domestic and Distribution amplifiers, Systems Equipment for DTT and Analogue TV, Meters and much more.

UK Electrical Direct

http://www.uked.com

For a comprehensive on-line directory, buyers guide and resource locator for the UK Electrical Industry look at this site. Many of the companies listed have links to their own web sites, making this a one-stop shop for a huge amount of information.

UK Mailing List Group

http://www.egroups.com/list/uktvrepair

Following on from the newsgroup discussion last month there is a UK Email group for TV technicians where you can send an Email to everyone in the group. There's just over 30 people in the group at present. For more details and how to register look at the egroup home page. Just a general comment though - you do have to be careful who you give your Email address to so that you can avoid "spamming" - that is getting lots of unwanted Email about dubious Russian site (amongst others).

Reed Connect

http://www.reedconnect.net/

Another free internet access site, this time from Reed Business Information. However the site possesses a useful UK People and Business Finder, with an e-mail search. There's also business news and local information, and some good links to directory sites.

Repairworld

http://www.repairworld.com

Repairworld is a sophisticated US based fault report database which is updated bi-weekly. It operates on a subscription basis and describes itself as an "affordable solution for all technicians". There is apparently no minimum number of months for which you have to subscribe. You can see some samples of the material for free, monitors, VCR, DVD and Camcorders being of particular relevance to UK users. The site even provides a "chat room" where you can talk via your keyboard to others "in the room".

Answer to Test Case 450

– see page 473 –

Next morning Mrs Terry's Sony set provided a sure clue to where the problem lay. Its picture tube flashed over inside, at which point the picture and sound went off. When they returned, the scan geometry was incorrect. Would the set need a new tube to put it right? In fact no.

One reason for tube flashovers is excessive EHT voltage, which in turn depends on the HT applied to the line output stage. In this set the HT voltage, developed by D606 and C620 in the power supply, should be 118V. TechnoCrat found that the voltage across C620 was in fact 127V. But there's no preset control in the power supply for HT adjustment. Once again a question mark hung over the man and the telly!

After some thought TechnoCrat decided to replace the three electrolytic capacitors C607/08/10 in the circuitry on the primary side of the power supply. When he had done this he found that the HT voltage on the secondary side measured 116·9V. The EHT was now presumably a little lower than before.

This was not quite the end of the story however. Amongst the Sony service bulletins TechnoCrat found a reference to flashover problems in the early life of this and similar models. Four modifications were described. Once these had been carried out there was no further trouble. In the intervals between harvesting her fruit and vegetables and selling them, Mrs Terry new enjoys trouble-free viewing.

NEXT MONTH IN TELEVISION

Identifying failed capacitors

If you thought that the health of a capacitor could be determined by measuring its capacitance, Cyril Bateman's article on checking capacitors in situ will come as an eye-opener.

The Sony Centre

Sony has opened a new European HQ, the Sony Centre, at Potsdamer Platz in Berlin. George Cole visited the Centre recently to see some of the company's latest developments in video and audio technology, including DVD and SADC products and items that use the IEEE 1394 (FireWire) digital interconnection system.

Modern Projection TV

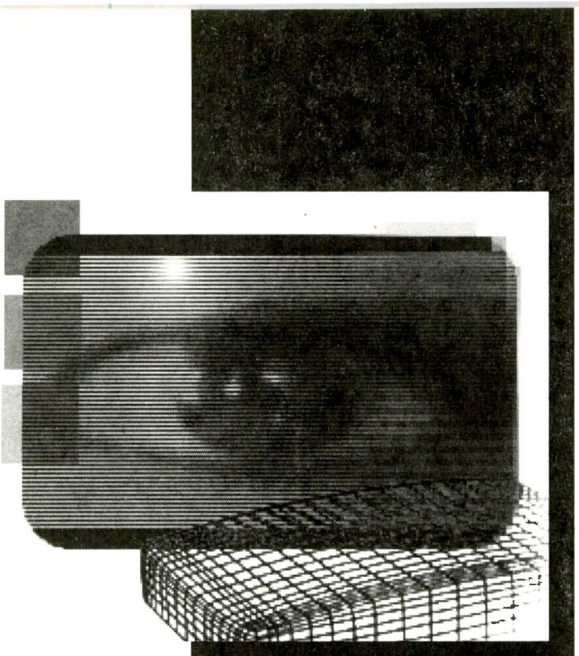
Modern projection TV systems are compact and provide much improved performance. Edgar Beddow describes the techniques commonly used, both CRT and LCD types.

DVD update

Delegates to the DVD summit, which was held this year in Dublin, were shown many future DVD developments including NUON, an interactive DVD format, web-connected DVDs and a new optical storage system. George Cole reports on these and other developments.

PLUS ALL THE REGULAR FEATURES

Published on the third Wednesday of each month by Reed Business Information Ltd., Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. **Filmsetting** by JJ Typographics Limited, Unit 4, Baron Court, Chandlers Way, Temple Farm Industrial Estate, Southend-on-Sea, Essex SS2 5SE. **Printed** in England by Polestar (Colchester) Ltd., Newcomen Way, Severalls Industrial Park, Colchester, Essex CO4 4TG. **Distributed** by MarketForce (UK) Ltd., 247 Tottenham Court Road, London W1P 0AU (0171 261 7704). **Sole Agents** for Australia and New Zealand, Gordon and Gotch (Asia) Ltd.; South Africa, Central News Agency Ltd. ***Television*** is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed by way of Trade at more than the recommended selling price shown on the cover, excluding Eire where the selling price is subject to currency exchange fluctuations and VAT, and that it shall not be lent, resold, hired or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.



Monitors

Reports from Ian Field and Russ Phillips

Viglen CA1426LT

"Blows fuses" the job card said. When I opened the monitor for inspection I found that the PCB fuse was intact, while the grime inside showed no evidence whatsoever that there had been any disturbance. Although it's possible for the mains filter components to cause problems with the fuse, the situation cast doubt on the accuracy of the job card's description.

I eventually found that the monitor would shut down randomly after several hours. Switching off and on again would reset it, and it would then continue to work for a few more hours. But each time I restarted the monitor it had cooled down.

After several attempts to catch it in the act, I was just returning to the bench when I saw the raster narrow slightly then vanish. This time switching the monitor off and on did not restart it – until it had been left to cool down. Despite this, use of heat from a hairdryer failed to instigate the fault even though the whole chassis was becoming so hot I feared I might be about to cause a new fault. Anyway, the cause of the problem was clearly not component failure at the running temperature, for example a leaky semiconductor device, and almost every component had already been subjected to a wiggle test. In this respect I had paid particular attention to the tall electrolytics on the secondary side of the power supply. Their leads can part from the solder fillet without any visible sign of distress.

Despite this I decided to rework the soldering. But as I was removing the chassis something fell out and bounced on the floor. It was a small UNC screw from a hard-drive cover, and could easily have fallen through the top ventilation slots. I'd found the culprit.

This chassis is the later version of the **AST LR14**. They both use a Trinitron tube and have MOSFET-switched scan/EW loading capacitors. The notorious C322 in this version is a resin-dipped 8·2nF, 1·6kV component that gives trouble only when dry-jointed. **I.F.**

Tatung CM17MKR

"LED on, otherwise dead" it said on the job card. The power supply module slots into the side metalwork, and most of the connections are accessible. I found that the mains supply was present at the module and came back out to go to the standby power supply PCB, but there were no DC outputs. Removing the main panel's HT connector did not result in the power supply starting, so out it came. Both pins of the chopper transformer's primary winding were dry-jointed, and continued use had produced a fair gap around them because of spark erosion. After cleaning and resoldering them I turned the PCB over to inspect the top side.

C829 (47µF, 100V), which is associated with the 74V rail, had a badly shrunk plastic sleeve. Although it produced a very good ESR reading it felt light, suggesting that most of its electrolyte had been lost. So I replaced this item and added an 0·22µF, 100V Mylar capacitor in parallel to reduce ESR loss through self-heating. A convenient mounting position is on top of R836, which is in parallel with C829. The electrolytics connected to pins 7 and 8 of the UC3842 chopper control chip were both OK, and the two 56kΩ start-up resistors were in good condition.

Once the power supply had been refitted the only remaining problem was how to get a decent grey scale from the rather tired CRT. **I.F.**

Belinea 104010

This monitor's power supply was pulsing. I soon found that the 2SK1917 B+ supply pulse-width modulator MOSFET Q001 was short-circuit. Because this is a shunt, flyback-converter type regulator circuit, it had applied a short across the chopper power supply, hence the pulsing. Flyback-type B+ PWMs are so much safer than the old series-chopper 'buck regulators' which supply maximum voltage to the line output transformer when they fail. I have yet to find one that has damaged the power supply, though I've come across a power supply fault that damaged the B+ PWM regulator – the UC3842 control chip was not regulating.

I've had several of these monitors that have shown signs of weak CRT emission despite being little more than a year old. I consider it wise to replace C167/8, using either extra-low ESR types or adding shunt 0·22µF Mylar capacitors. It is also worth upgrading the heater supply rectifier D151 (Liteon UF2003), which is rated at only 2A, to a 3A diode such as a UF540X or 31DFX type. Because of the high peak current involved, the forward voltage drop across the rectifier considerably exceeds 0·7V. Most monitor manufacturers use heater rectifiers rated at 3A, sometimes more, even though this is many times the rated heater current. **I.F.**

Edge Technology KTX:M1454D-L

This monitor was dead with a smell of burning that lingered. The customer mentioned that it had blown the mains plug fuse as well as its own fuse, and had made the PC shut down. The MOSFET Q101 (IRFIBC40G) on the primary side of the power supply was short-circuit, and two of the bridge rectifier diodes had been destroyed. Source resistor R106 had survived, but the

12V gate protection zener diode ZD101 was short-circuit. This often means that the '3842 control chip has not been damaged. But as the overall situation was beginning to suggest that there had been regulation failure, for which the chip could have been responsible, this item was added to the list of replacements.

The supply at pin 7 of the SG3842 chopper control chip U101 is decoupled by two electrolytics in parallel instead of a single one, no doubt to reduce the ESR. They are C109 (100µF, 35V) and C110 (47µF, 35V), and proved to be OK when checked with an ESR meter. The error voltage reservoir capacitor C112 (4·7µF, 50V) had an ESR of greater than 2Ω however, so a replacement was fitted. On the secondary side of the supply D121 (FUF5406) was short-circuit.

Further examination revealed that the 2SC5297 line output transistor Q302 and the UF5407 flyback diodes D305/6 were charred while the EW modulator transistor Q406 had a hole blown in its casing. This made it impossible to read the full type number. My best guess was that it had been a 2SD669A or 2SD679A. As I had neither in stock I measured the maximum voltage developed across the collector-emitter terminals with no transistor fitted and got a reading of about 56V. A search through the selection tables for a device that met this requirement identified type 2SC669A. With one of these transistors fitted and the other items replaced it was time to try the monitor.

It powered up all right, but there were still EW faults. Q404/5 (both 2SA733) were found to be short-circuit and replacements produced an improvement, but the EW and trapezoid controls still did nothing.

With no service manual, I had to resort to operating the front panel buttons while monitoring each pin of the microcontroller chip in turn until I could identify the relevant DAC outputs. The EW DAC output is at pin 35, and is fed via a network of components to pin 10 of the LM1296 chip U401. The parabola output is at pin 11 and controls Q401/3 (both 2SC945). The latter was short-circuit. Once this transistor had been replaced the monitor worked correctly.

Further inspection revealed that R424 (680Ω) was discoloured. It didn't seem to be creating a problem, but in the interests of reliability a replacement was fitted. While reassembling the case I noticed that the swivel base was a sloppy fit and, as I was coiling the signal cable around it, the swivel bit fell off! The two parts are held together by a nylon ring that clips on to a circle of locking tabs. These were either worn or had been badly formed, as almost any movement resulted in the ring slipping off. Since the space inside the circle of locking tabs is quite round, I found a surplus electrolytic capacitor that was a tight push-fit in the round hole with the nylon ring fitted. The swivel base didn't fall off after that! **I.F.**

Elonex MN034P

The complaint with this monitor was erratic start up. It was definitely not a Philips-manufactured MN034P. Initially I thought that it looked very similar to one of the Amstrad models, but there were also strong similarities to the Belinea 104010, except that this was an earlier model with rotary controls.

The inside of the monitor was thick with convected exhaust particulates and looked very toxic. It could well have been that this was causing sufficient leakage around the EHT system for safety shutdown to be activated. As well as being toxic, a polution layer as thick as in this monitor is a potential fire hazard. So the job started with a thorough clean up.

Once I could actually see the PCB I noticed that C155 (470µF, 35V) had been inserted incorrectly, with one leg through one of the holes provided for ventilation. When I got round to powering the monitor it sat there pulsing as if there was a short-circuit somewhere. But no, this is a quirk of the design. The chassis produces an imitation of a serious fault condition when the sync input is interrupted! Some time was wasted checking the B+ PWM circuit and the line output stage before I realised that the signal plug had been pulled out during the struggle.

Although this was a fairly old monitor, in which a worn CRT is only to be expected, replacement of the electrolytics in the heater supply should help, with 0·22µF Mylar capacitors added as necessary. **I.F.**

AOC CM335

The complaint with this monitor was no blue in the display. A very annoying feature of this model is the manufacturer's obsession with the use of hot-melt glue on the CRT base panel. What I removed from this one will save me buying any for months! As the monitor worked, I tried to soften the glue by running it for a while. But in the end the only way of separating the base from the CRT was to cut the glue with a scalpel, which I dipped in white spirit to help prevent it sticking to the glue.

Once the CRT base was off and apart, the RGB output transistors were found to be in need of fresh solder. The CRT base socket had good soldered joints at all pins, but the latter had been inserted into the PCB only just far enough to be soldered to – no wonder so much glue was needed to hold it on! **I.F.**

AOC 4N1V

This monitor showed no signs of life. Both pins of P401, which leads to the square loop of wire that's mounted on top of the scan assembly, were dry-jointed and had arced. As this inductance is in series with the line scan coils, the break in the circuit here resulted in the monitor shutting down. On the component side the plastic body of the connector was badly discoloured, and the metal contacts had been annealed with the result that they were no longer springy.

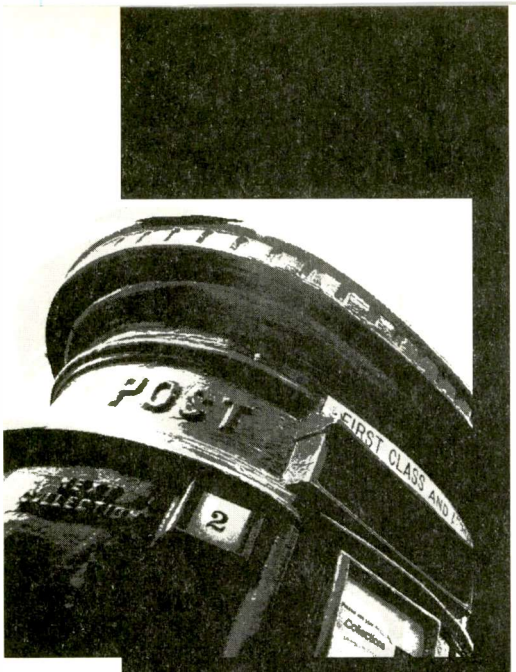
The cure for this problem, which I have had from time to time, is to obtain a suitable replacement connector from scrap equipment and graft it on in place of the damaged one, with the help of some heat-shrink sleeving to ensure adequate insulation. Correct polarity is important. The plug is non-reversible, and as a warning one of the wires has a small, round sticky red label on it. Just in case this fell of during the repair, I cut one wire first and fitted the new connector lead to it before cutting the other wire to remove the old connector completely. **I.F.**

Viglen CA1428LE

This monitor came on all right but the contrast didn't work. The cause was dry-joints, especially on the CRT base PCB and in the line output stage, and the fact that TR411 (BC557) was short-circuit. It's located near the LOPT. **R.P.**

Elonex AS4G

This monitor was dead with the 2SK1117 chopper transistor short-circuit. Note that it's a FET device. When you get this fault the HA17384 chopper control/drive chip should also be checked. **R.P.**



Letters

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

Future of Terrestrial TV

In a recent issue K. Cummins mentioned that the BBC no longer lists new relay stations. If you look at the BBC R&D internet page however it's said that as 99·4 per cent coverage has been achieved no new analogue relay stations are planned. Fair enough, but what will be the position with digital services? It seems unlikely that such a wide coverage will be possible. Thus some people, who at present pay their licence fee, will loose all terrestrial reception after the analogue switch off.

In areas such as South Wales, where terrestrial transmission is difficult, will the digital service providers be willing to pay for full coverage, given that there may be few potential takers other than in the larger towns/cities? As broadcasting comes to be seen less as a public service and more as part of the wider communications and information industry, I can't see that terrestrial broadcasting has much of a future, whatever the technology.

Mark Davies,
Merthyr Tydfil, S. Wales.

Replacing SM Chips

I've used the following method of unsoldering 84-pin surface-mounted chips very successfully.

First, use desoldering braid to remove any surplus solder from the pins.

The next step is to thread a very fine wire, consistent with the strength required, behind the pins on one side of the square chip, see Fig. 1(a). Anchor the wire at one end. Apply an ordinary soldering iron to two or three pins at the other end of the wire, then pull it gently so that it lifts the pins that have been heated. Keep moving the iron along the row of pins, heating two or three at a time, and keep pulling the wire. Let the iron do the work of detaching the pins from their tracks, using the wire to detach the pins physically as you pull it under the pins. In this way each row of pins can be detached very quickly in one go.

When fitting the new IC, use a drop of glue to hold it in place then use a very fine-pointed probe to locate each pin on its track. Instead of soldering each pin separately, apply solder along a row of pins, at their tips, without bothering about the pins being bridged. Use desoldering braid to remove bridges between the pins. The idea is shown in Fig. 1(b). You will find that the pins solder firmly. If necessary, test with a probe. Use fine-gauge solder.

I hope other readers will find this tip helpful.

Christopher Deus,
King's Lynn, Norfolk.

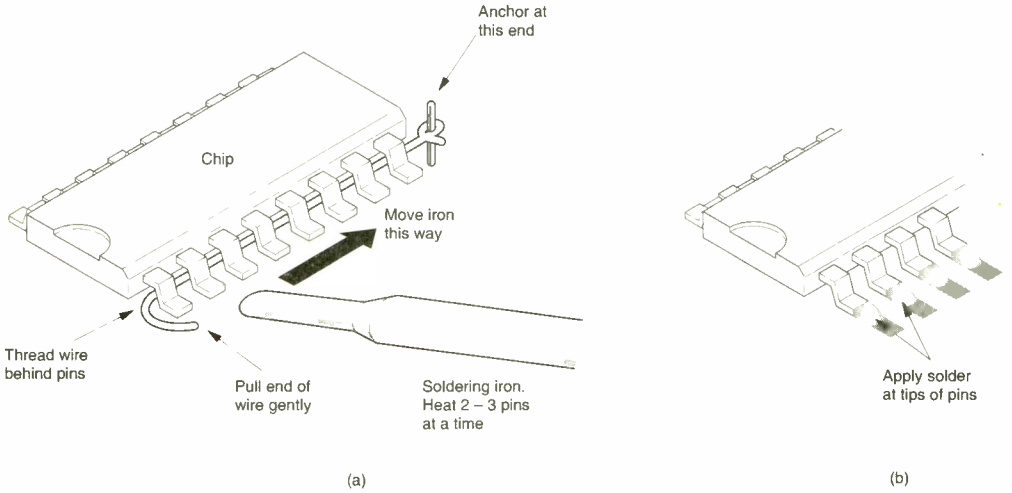


Fig. 1: Use of an ordinary soldering iron and a length or fine wire to remove a multi-pin surface-mounted chip (a). When fitting the replacement, apply solder at the tips of the pins as shown at (b).

The Schottky-barrier Diode

In VCR Clinic, March, Tim Edwards mentioned replacing a BYV10-20 diode (DP06) in the Ferguson FV71LV with a BYD33D. I don't know what role DP06 performs, but I do know that a BYV10-20 is a Schottky-barrier diode and that a BYD33D isn't. It's quite likely that the chopper power supply uses a MOSFET transistor and that DP06 is its Vgs protection diode. A Schottky diode is often preferred in this position because it imposes less capacitive loading on the gate drive waveform, enabling a higher switching frequency to be used without loss of efficiency. For the purpose of gate protection a Schottky diode is as good as a zener diode. When its PIV is exceeded, the BYV10-20 produces a much harder short-circuit than a zener diode, so the BYV10-20 is much more likely to prevent damage to the chopper control chip should the MOSFET blow up.

Tim Edwards said he obtained a reading of 300Ω with the BYV10-20. This does seem to be a bit low. I tried with a couple of different

DMMs, one auto-ranging and the other a manual rotary-switch type, and obtained huge differences in resistance readings, both forward and reverse. A selection of Schottky-barrier diodes produced forward resistances ranging from 500-900Ω, and reverse resistances ranging from 15kΩ (with a very large rectifier) to 120kΩ. A quick-test continuity tester I have always gives a faulty reverse leakage indication with Schottky-barrier diodes. Fortunately they are readily identifiable using the DMM diode-test function. Four different DMMs I have tried all gave a forward-voltage reading of between 0·175-0·22V, with an out-of-range reverse-voltage indication for a healthy Schottky-barrier rectifier.

If I am right about the function of DP06, the circuit will appear to operate normally with an ordinary diode but the MOSFET and chopper-control chip will not have the same protection. In addition the device's junction capacitance will load and hence round the edges of the gate-drive squarewave: the slower switching transition times will increase the MOSFET's dissipation.

The nearest equivalent to the BYV10-20 is the 1N5817. The most important parameter is the 20V reverse-voltage rating. In the event of a MOSFET going open-circuit gate-to-source, or rupturing the source-current sensing resistor, a BYD33D will not stop the full 320V appearing at the chopper control chip's output. There is likely to be severe damage to the primary side of the power supply.

Again I'm only guessing, but if the designer decided to use a Schottky-barrier Vgs clamp diode to reduce the capacitive loading, the value of the gate feed resistor is likely to be lower – as low as 6·8Ω instead of the more usual 47-100Ω.

Ian Field,
Letchworth, Herts.

Multi-LNB use

Martin Pickering has an excellent way of enabling a Pace PRD800/900 satellite receiver (and clones) to use two LNBs: the simple circuit for this can be found at his web site (www.netcentral.co.uk/satcure/prd.htm, see sections 4 and 19). Here's a less simple, less versatile way of going about it. But when the two methods are combined up to four LNBs can be used.

I have added the two modifications to my Goodmans ST700 receiver, which has already been upgraded to 199 channels using another kit from Martin Pickering. I use only three LNBs, but have included information that enables four to be used. I simply use the MSD (Most Significant Digit) in the drive signal for the display to indicate that a channel above 99 has been selected. In this way my circuit (see Fig. 2) splits the 199 channels into two groups: Martin's circuit can then provide a further choice of two from each group by way of the menu system.

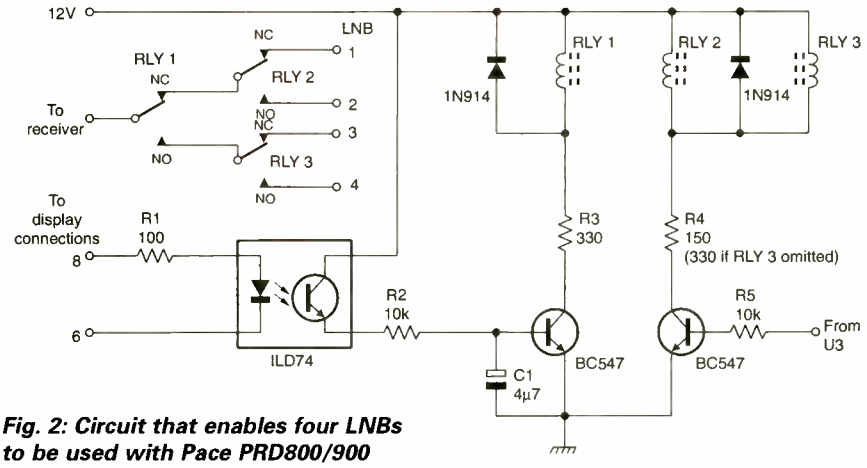


Fig. 2: Circuit that enables four LNBs to be used with Pace PRD800/900 series satellite receivers.

The display is not fitted in the ST700, but the PCB has a place for it. As the display is multiplexed, the signal needs to be smoothed. Hence the 4·7µF capacitor C1. I have fitted a DIN socket on the rear panel for the signals to exit but, if you are happy with bringing wires out at the side of a scart connector, you will not need to remove the PCB (unless you are fitting Martin's 199-channel upgrade at the same time). Once you remove the top and front panels you will have access to everything you need.

The positive supply is obtained from the output of the 7812 voltage regulator. Pin 1 of the display is the end nearest to the middle of the PCB. I mounted the components on a piece of stripboard with eleven strips by seven holes, strip side up, fixed to the PCB with double-sided foam tape. Any layout will be OK.

The relays are a special RF type, RK1-12V (12V, 720Ω), made by Matsushita. The relays and diodes are housed in a small box close to where the LNB signals enter the house. Only the one coaxial cable and the three-way signal cable go from this box to the receiver.

I used an ILD74 optocoupler because it was to hand, but any type should work. If you use one with more gain, the value of R1 could be increased. R5 replaces the 100Ω resistor in Martin's circuit. If you use only three LNBs, simply feed the third LNB signal to the normally-open contact on relay one, leave out relay three and use a 330Ω reistor in position R4.

A.R. Knight,
Farmoor, Oxford.

Rejuvenating Trinitrons

While browsing through some back numbers of *Television* I came across Les Austin's articles on CRTs, in particular on rejuvenation. I've used the technique successfully on a number of occasions with ordinary tubes, but recall a comment that it is not possible to rejuvenate Sony Trinitron tubes. I did try it once, without success. Does anyone know why rejuvenation doesn't work with Trinitron tubes? Incidentally, does anyone know what happened to the TV Engineers' chat line e-mail dad@deathsdoor.com

Derek Minns,
Fordingbridge, Hants.

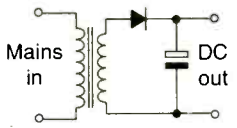
Theft of Service

With reference to the letter on theft of service (April), I suspect that every TV engineer and tradesman in the country (including myself) will agree with Michael Maurice. It is indeed a grey area. What about customers and corporations that steal your knowledge over the phone and then sort out the problems for themselves or go elsewhere? At the end of the day however it is not the loss of money that is paramount but the betrayal of trust.

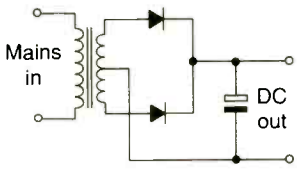
John Stacey,
South Molton, Devon.

Free with this issue of *Television*, four 1.5A 1N5399 diodes

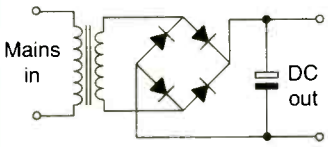
Simple power supplies



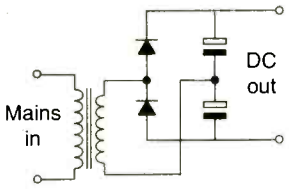
Half-wave rectifier – use where simplicity is paramount and high 50Hz ripple isn't a problem.



Full-wave rectifier needs a centre-tapped transformer but produces an output with much less ripple than the half-wave rectifier. Ripple is 100Hz, assuming 50Hz mains, hence easier to smooth.



Bridge rectifier doesn't need a centre-tapped transformer to produce a clean output and although it uses four diodes, these only need to have a voltage rating of half those needed for an equivalent full-wave rectifier.



Voltage doubler. High ripple and poor regulation but useful for low-current applications where a suitable transformer isn't available.

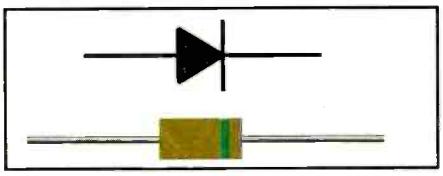
Outline rectifier circuit characteristics.

Circuit	Input voltage (rms)	Output voltage no load	Approx. output voltage full load	Rectifier peak inverse voltage	Rectifier current
Half wave	E	√2×E	E	2√2×E	I
Full wave	E+E	√2×E	1.2E	2√2×E	0.5I
Bridge	E	√2×E	1.2E	√2×E	0.5I

Free with this month's issue is a pack of four 1N5399 power rectifier diodes. These diodes are excellent general-purpose rectifiers, ideal for use in power supplies and regulators.

1N5399 specifications

Forward current	I_o	1.5A
Peak inverse voltage	PIV	1000V
Forward voltage @1A		1.6V



Your 1N5399 diodes are sponsored by Semiconductor Supplies International – the distributor with 20 000 hard-to-find items from stock. http://www.ssi-uk.com, e-mail sales@ssi-uk.com, fax 020 8643 3937, tel. 020 8643 3937.

Semiconductor Supplies International Ltd

Dawson House, 128 - 130 Carshalton Road, Sutton, Surrey, England, UK. SM1 4TW
Telephone: 020-8643 0829 (Accounts Dept.)
020-8643 1126 (Sales and Technical Queries)
Fax: 020-8643 3937 (For International use +4420)
e-mail: sales@ssi-uk.com Web: ssi-uk.com

WILTSGROVE LTD

28/29 River Street, Digbeth, Birmingham B5 5SA
Tel : 0121 772 2733 Fax : 0121 766 6100
e-mail : sales@wiltsgrove.co.uk

CORDLESS 'B' Grade PHONE

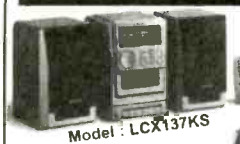
- User friendly MMI
- Memory Dialling
- Tone Dial switchover
- Register recall
- Key tone On/Off
- Baby call
- Handset lock
- Incoming call priority
- Call transfer
- Call time display
- Paging handset feat.
- Different ring tones

Phones are supplied in original packaging

SPR-5100 Cordless Phone **£29.99**

WIDESCREEN TV
JAPANESE GRADED STOCK
28" from £279.00
32" from £439.00

AIWA Brand New Stock



Only **£59.99** each
Model : LCX137KS

Only **£99.99** each
Model : NSXSZ20KS

GRADED STOCK

Jamo SPEAKER RANGE

JAMO D-165	£37.99	each
CORNET 165	£34.99	each
STUDIO 170	£69.99	Per Pair
SURROUND 160.	£39.99	Per Pair

REC-800 Multi-Region DVD Player
Millennium BARGAIN **£159.99** inc VAT

SATIN GOLD FINISH. COMPLETE WITH REMOTE CONTROL, AUDIO/VIDEO LEADS & 12 MONTHS G'TEE

EX-RENTAL STOCK TELEVISION'S
Plastic Black Cabinet :-
21" Remote from £29.99
21" NICAM Text from £34.99

Electra AWM1100 Eco Spin *AutoWash* -Washing Machine
(G r a d e d S t o c k)

£129.00 +Vat
with 12 Months On-site Guarantee

Power Supply : 230V-240V 50Hz » Heater : 1950W

» Main Motor : Tumble 200Watts,Spin 550rpm 450Watts,1100rpm 450Watts.

» Spin Speed : 550 or 1100rpm.

» Height :84.5cm. » Width : 59.5cm. » Depth : 55.0cm. » Capacity : 4.5Kg (10lb).

» Water Supply : Hot or Cold.

SONY GRADED TELEVISIONS IN STOCK !

WHITE GOODS
NOW IN STOCK
RING FOR DETAILS

TELEVISION BARGAINS
GRADED STOCK IN THE BOX - AS GOOD AS NEW

ALL SETS ARE IN WORKING CONDITION

Description	1+	5+
14" CTV R/C	£42.50	£39.99
14" Text R/C	£49.99	£44.99
21" CTV NICAM	£74.99	£69.99
28" CTV NICAM	£129.99	£119.99
28" Widescreen	£184.99	£174.99

QUANTITY DISCOUNTS AVAILABLE !

Panasonic 4 Speaker Surround Package

Surround sound speaker package. Power : 15W

Contents :
- *2 x Front Speakers*
- *2 x Rear Speakers*
- *2 x Front connector wire*
- *2 x Rear connector wire*

Package Price : **£29.99**

CDTV50
5" COMBINED PORTABLE TV/CD PLAYER

Amstrad

1+ Only **£34.99**
5+ each **£29.99** each

GRADED STOCK

- 5" Black & white TV
- Top loading CD player
- Repeat play
- MW/FM stereo radio
- 20 track programmable CD
- Skip mode

SPARES AVAILABLE FOR THE FOLLOWING BRANDS :

AWIA, ALBA/BUSH, GOLDSTAR, FERGUSON, LG, TOSHIBA, THOMSON, HITACHI, JVC, DAEWOO, HINARI, NIKKAI, BEKO, SANYO, TATUNG, THORN, SONY, PHILIPS, PANASONIC, DECCA, PYE, GEC, CROWN, SAMSUNG, MITSUBISHI, GOODMANS, GRANADA, GRUNDIG, NOKIA, FIDELITY, ITT, MATSUI & MORE.....

TRADE ONLY. Offers subject to change without prior notice. Items Subject to Availability, Carriage and V.A.T.

Freefax Orderline : 0500 55 05 05

Service Link

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

PHONE 0208-652 8339 **FAX 0208-652 3981**

The prepaid rate for semi-display setting is £15.00 per single column centimetre (minimum 4 cm). Classified advertisements £2.00 per word (minimum 20 words), box number £22.00 extra. All prices plus 171/2% VAT. All cheques, postal orders etc., to be made payable to Reed Business Information. Advertisements, together with remittance, should be sent to Television Classified, 12th Floor, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

SERVICE MANUALS

Thousands of models available
For most UK European, Far East and USA makes

Service manual prices

B/W TV	**– £6**	**CTV/VCP**	**– £10**
VCR	**– £15**	**Camcord**	**– POA**

Service sheets/circuits also available for some models
+data for satellite, audio and camera
**** 50+ CTV PSU Circs Compilation (A4) – £10 ****
Please telephone to check availability
Payment by Cheque/PO only please
Add £2 P/P etc, to order total. Do not add any VAT.

D-TEC
PO BOX 1171, FERNDOWN, DORSET NH22 9YG
Tel: 01202 870656

Elusive faults - Fixed!!

E.C.S. Celebrates 10 years supplying service data, Helping engineers complete repairs in record time.

New release: Edition 23 Fault Index books.

Now Available Edition 23 of the Television Magazine Index Covers **over 14,000 Television, Video, Satellite, Camcorder & Monitor faults,** Large easy to read A4 format The latest addition to a **highly acclaimed & recommended series.** In daily use in workshops around the world !!
ISBN 1 898394 30 X ***Edition 23: Complete set £14.75***

Brand New: Fault indexes on disk - Version 1.9

Latest faults together with ***all data*** from ***all*** previous versions, Covering a **MASSIVE 22,500 !! Television, Video, Camcorder, Satellite, CD & Monitor faults** listed in 20 years of Television.
Version 1.9: Indexes on Disk £17.50
Low cost updates are available for all Book & Disk fault indexes.

SPECIAL OFFER: Kwik Tips Fault Database

A valuable service resource for workshops large or small, **Kwik Tips Version 1.1** is our ***LARGEST FAULTS & REMEDIES database EVER,*** Compiled from **over 20,000 !! Entries** & covering **1,435 Chassis & Models,** This concisely Edited TV & Video repair database will easily pay for itself with just one repair.
Kwik Tips on disk: Millenium offer price - only £22.95

Latest release: Model / Chassis / Equivalents book.

The latest **Best Selling *3rd Edition*** of the Equivalents guides containing **7,500 ENTRIES** covering **TV Models to chassis and Television, Video, Camcorder, Satellite & Monitor Equivalents.** comprehensive A4 book.
ISBN 1 898394 29 6 ***3rd Edition Equivalents £6.95***

E.C.S. (Est 1985)
Technical Publishing

316, Upton Road,
Noctorum, Wirral,
Merseyside. CH43 9RW
Tel / Fax 0151 522 0053

Please add £1.75 P & P to total (Europe £2.75, r.o.w please enquire).

SERVICE MANUAL LIBRARY

£5 loan fee any Service Manual or keep for £10 (even if priced £50 or more). Lifetime membership £99. FREE Manual listing dozens of 1000's of models audio, tv, video, etc. cross referenced to correct manufacturer's chassis (£9.95 on its own). We trade other manuals so that members can get new manuals for only the cost of postage.

Phone 01357 440280 (fax 440384) for full details or write to: INFOTECH, Midlinbank Farm, Ryelands, Strathaven, Lanarks ML10 6RD. World's largest stock of Service Manuals (TV VCR Combis, Test Eqpt, Audio, CD, Satellite, Dom Eq) Complete Repair Data (Not the few faults offered everywhere else) & Technical Literature. ***Any items asked - free quote - free gift with every order during 2000.***

SPECIAL OFFER UNTIL END OF APRIL 2000
Any 20 full service manuals from stock (1 at a time or in any quantity you wish) only £199 including 1st class post. Includes those priced at £50/£60!!!
Includes FREE Data Reference Manual.

100's of offers and prices FREE on request
Practical Radio Repairs for £2 (free with any other order)
Any of the famous McCourt or Tunbridge TV Repair Manuals for only £5 each - all for £29 post free till end 2000.
Any 10 complete VCR chassis fault/repair manuals from our list for only £25 - with all circuits £49.99
ACCESS, CONNECT, DELTA, EUROCARD, MASTERCARD, SOLO, SWITCH, VISA, etc.
£2.50 postage any non-free order.

Fryerns

Service Information **FES** Circuit Diagrams

TV's, VCR's
SATELLITE
AUDIO & HI-FI
Most Models Covered

Prices are from £4.00 + £2.50 P/P
1 item – total £6.50 inc
2 items – total £10.50 inc
3 items – total £14.50 inc
4 items – total £18.50 inc

Payment by credit card or Postal Order for next day delivery.
Cheques to clear.
Tel/Fax 01206 211570

2 The Lodge
Easthorpe Green
Marks Tey, Colchester
CO6 1HA

NEW FAX BACK SERVICE NOW AVAILABLE
TEL/FAX A.T.V. on
0114 285 4254

SAT/CTV Circuits	**£5.00**
VCR Circuits	**£7.00**
CTV Manuals	**£10.50**
VCR Manuals	**£14.50**

(P/P add £2.50 to each order)
419 LANGSETT ROAD, SHEFFIELD S6 2LL

CLASSIFIED TEL:0208 652 8339

SERVICE MANUALS

Available for most equipment.
Check out our web site at
http://www.mauritron.co.uk/mauritron/
for the full listing of the thousands of manuals we have
or send 4 x first class stamps for our catalogue and index on disc.

Mauritron Technical Services
8 Cherry Tree Road, Chinnor
Oxon OX9 4QY
Tel: 01844-351694. Fax: 01844-352554
Established since 1986

SERVICE MANUALS
Have you ever turned away work for want of a Service Manual?
Have you ever bought a Service Manual and never used it more than once?
Then why not join ...
THE MANUALS LIBRARY
For details and membership application form write, phone or fax:
HARVEY ELECTRONICS
43 Loop Road, Beachley, Chepstow, Gwent, N16 7HE
Tel: 01291 623086 Fax: 01291 628786
Visa: Access accepted

WANTED

TOP CASH PRICES PAID FOR VALVES
e.g. KT88, PX25, EL37, DA100 and Valve Tester VCM163
Ask for our free Wanted List
WIDE RANGE OF OBSOLETE VALVES AND SOME CRT STOCKED
Visitors please phone for an appointment
billingtonexportltd@btinternet.com
Billington Export Ltd,
Billingshurst, Sussex RH14 9EZ
Tel: 01403 784961 Fax: 01403 783519

REPAIRS

accént
TECHNIC
CAMCORDER REPAIRS
Collection and delivery anywhere in the UK.
All makes, fast service.
Phone free for details.
Fax: 01905 796385
(0800) 281009

COMPUTER SERVICING FRANCHISE
£6,900 + VAT
UPGRADE & REPAIR PCs
Full Training, Support, Marketing, Manuals, Software and Hardware
targettechfix.com
Tel: 020 8687 0420
HIGH PROFIT MARGINS!

FOR SALE

SWITCH - IT - ON
TV, Video, DVD
Technical Sales/Repairs
DVD Upgrades
Trade and Public
Tel: 0208 764 6638
Fax: 0208 764 6166

LINEAGE

AVO MULTIMETER Model 8, £45.00. 500 volt megers £30.00. Prices plus VAT and p. & p. Send SAE for lists of surplus instruments and scopes etc. A. C. Electronics, 17 Apleton Grove, Leeds LS9 9EN. Tel: 0113 249 6048.

PRIVATE RETAILER has excellent part exchange colour televisions and videos to clear. Tel 01494 814317.

SPARES & COMPONENTS

RCS VARIABLE VOLTAGE D.C. BENCH POWER SUPPLY

£45 INC VAT - POST & INS £4
Up to 20 volts DC at 1 amps continuous, 1.5 amps peak
Fully variable from 1 to 20 volts.
Twin voltage and current meters for easy read out.
240 Volt AC input. Fully smoothed.
RADIO COMPONENT SPECIALISTS
337 WHITEHORSE ROAD, CROYDON, SURREY, UK
Tel: 0181 684 1665
Lot of transformers, high volt caps, valves, speakers, in stock. Phone or send your wants list for quote.

Do you have a web site?
If the answer is yes then why not let our readers know about it by advertising in our new Web Directions Pages
If you would like to know more then please give me a call.
Pat
Tel: 020 8652 8339
Fax: 020 8652 3981
E-mail:
Pat.bunce@rbi.co.uk

RECRUITMENT

PRC
HI-FI & VIDEO
SERVICE ENGINEER
We are a leading electrical retailer based in the Forest Gate (London) and Ilford (Essex) area, and are currently looking for a service engineer with a wide experience of servicing audio/visual equipment. These include major brands such as Sony, Panasonic, Toshiba, Philips and others.
You should be qualified to City & Guilds 224 or equivalent. Manufacturer training available.
Applicants must be organised, conscientious, self-motivated and possess good communication skills. A current driving licence is essential. Excellent package available depending on experience.
Please send in your CV stating current salary details to:
John Digwell
PRC HI-FI & VIDEO
450 Romford Road, Forest Gate, London E7 8DF
Tel: 020 8552 2523

Are you looking for a top flight mobile TV/Video A/V engineer with up-to-date technology?
I am available for contract work to corporate companies.
My location Northern England/Midlands.
Reply to Television Magazine Box No 7971

ADI
The Force Behind The Image
Field Service Engineers Locations Nationwide
ADI specialise in the design and installation of complex audio/visual systems. Due to continued growth in our service commitments, we now require experienced TV/Video service engineers to complement our existing service team. You will be able to repair down to component level, be qualified to C&G 224, have a willingness to learn new technologies and the drive and ambition to develop your skills in electronic servicing.
In return, we will offer full training, company vehicle and an attractive salary package.
If you are keen to learn about the more exciting side of TV, please apply in writing enclosing your CV and current salary details to:
Personnel, ADI Business & Leisure Systems Ltd, Pittman Court, Pittman Way, Fulwood, Preston PR2 9ZG
www.adigroup.co.uk

Experienced TV Service Engineer
West of Ireland
* Repair of major branded consumer products
* Modern busy service centre based in Galway City
* Permanent position
* 1 Yr experience required
* Cert/Dip in electronics a distinct advantage
* Immediate start
Ring John Sullivan
353-91-778154 9-11am only
or email: Shane @ oconnors.i.e

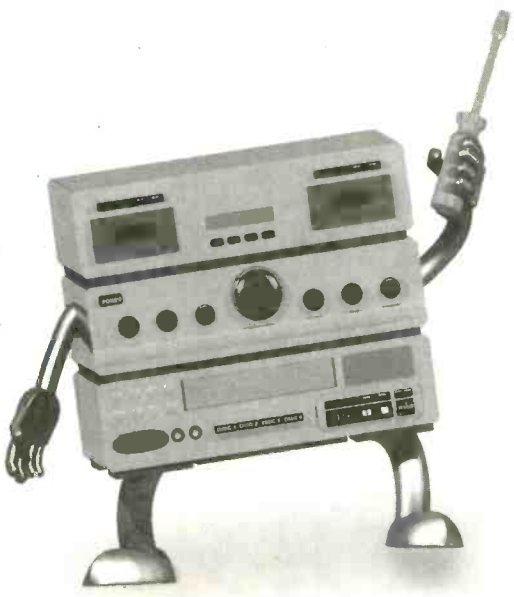
TWO ENGINEERS
Required for busy expanding Service Company.
One TV/VCR Engineer
One Camera Engineer
Both minimum 5 years experience. Qualified to C&G 224. Knowledge of Sony product would be an advantage. Both positions come with competitive salary and pension scheme.
Apply in writing to:
S. Thomas Service Manager,
1532 Coventry Swan Centre,
Yardley,
Birmingham B26 1AD

EXPERIENCED FIELD/BENCH ENGINEER
required by small family business
A good knowledge of all makes of TV, VCR, Audio equipment repair essential
Please apply in writing with CV and current salary.
Ticehurst Ltd
39 High Street, Heathfield,
East Sussex
Telephone: 01435 862222

Are you urgently looking for:
TECHNICIANS
BENCH ENGINEERS
FIELD SERVICE ENGINEERS, etc.
Then why not let Television Magazine help you find the right person that you are looking for.
Call Pat Bunce on
020 8652 8339
020 8652 3981 (Fax)

CLASSIFIED TEL: 0208 652 8339

Switch over to Comet!



Comet's mission is to provide an after sales service that is second to none. To achieve this mission Comet need individuals who are dedicated to our customers, respect their colleagues and are committed to delivering the best in customer service. If you possess these qualities we have the following exciting opportunities at our Coatbridge Customer Service Centre.

Workshop Engineers

£Competitive + Benefits

A high level of technical repair ability gained through experience in repairing electrical brown goods products, will enable you to maximise the quality of customer service. You should possess a flexible, team orientated approach and be willing to share knowledge with colleagues both in the workshop and the field operation.

In addition to a competitive basic salary, Comet provide a host of benefits including bonus, pension scheme, and, after a qualifying period, share save scheme and free medical health insurance. Furthermore, you will be entitled to staff discounts at other Kingfisher Group companies – including B&Q, Woolworths and Superdrug.

If you possess the personal qualities and technical skills we're looking for, and you're ready to share our commitment to putting the customer first, please write enclosing a brief career history, to:

Sarah Wild, HR Administrator,
Comet Group plc, Unit 5,
City Park Industrial Estate,
Gelderd Road,
Leeds LS12 6DR

Closing date for applications:
Friday 16th June 2000

COMET

Comet is an equal opportunities employer and welcomes applications from all sections of the community

CLASSIFIED TEL:0208 652 8339

Product Support Engineer

TV, Audio & Video

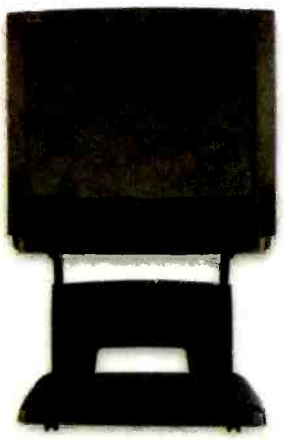
WHEN THINGS GO WRONG, YOU'LL SEE IT RIGHT THROUGH

Bracknell

Panasonic UK Ltd is a world leader in the manufacture and distribution of high quality audio and visual products such as TVs, Videos and Hi-Fis. But even the most sophisticated systems can go wrong, which is why we have established one of the best after-sales services in the industry.

We're now looking for a qualified engineer to join our lively repair team. You should be a keen, hard-working and enthusiastic team player, with a real flair for problem solving. You'll be working on either TV, audio and video products.

To succeed you will need a relevant qualification, and at least 2 years' practical repair experience across the appropriate product range.



£Competitive Salary

This will have involved using oscilloscopes, meters and soldering equipment as well as fault-finding and repair to component level.

In addition to a competitive salary, you will enjoy an exceptional benefits package, including private health insurance, contributory company pension scheme, life assurance, staff product discounts, subsidised staff restaurant and on-site sports facilities.

If you're looking to play a key role in this vital area of our operations, please send your CV and salary details to: Claire Garner, Personnel Department, Panasonic UK Ltd, Panasonic House, Willoughby Road, Bracknell, Berkshire RG12 8FP.
Tel: 01344 853074. Facsimile: 01344 853704.
Email: claire.garner@mail.panasonic.co.uk
Or apply on-line via our website.

Panasonic

www.panasonic.co.uk

TEMPO

COMPUTERS • MULTIMEDIA
TV • VIDEO • HI-FI • DOMESTIC APPLIANCES

Due to our continued expansion we are looking for experienced engineers to service our wide range of leading brand products.

Bench Engineer (Brown Goods) & PC Bench Engineer

Based at our Tottenham Service Division

We need skilled engineers to service our wide range of leading brand products.
You must be organised, conscientious, with good communication skills.
Technical qualifications are not essential, but applicants must have a good technical aptitude.

Tempo is already one of the top 5 electrical retailers in the country with huge expansion plans.
Secure your future with a company that's going places, by sending your CV to:

Chris Cartey, Tempo Ltd, Unit 3, Lockwood Industrial Estate, Millmead Road, Tottenham, London N17 9QP

or telephone either Chris or Mahendra Patel on 020 8365 1906 for further information.

DON'T SIGN ON THE DOTTED LINE UNTIL YOU TALK TO TEMPO

FIELD SERVICE ENGINEER

Europe's leading distributor and retailer of professional photographic, digital and multi media equipment has a vacancy for an experienced, reliable and self motivated Field Service Engineer.

Working from our ***new Manchester branch*** and covering the Cheshire area, you will specialise in servicing and repairing all makes of televisions, video and audio equipment.

A full driving licence is essential.

Starting salary circa £13,000 + benefits + company vehicle.

Please apply in writing with full CV to Lena Pirnie, Personnel Officer.

KJP CALUMET

Bradbourne Drive, Tilbrook, Milton Keynes, MK7 8AJ.

Closing date:- 31st May 2000.

Europe's Leading Professional Imaging Source

WANTED . . .

MAINTENANCE ENGINEERS

TRANS WORLD INTERNATIONAL

With
– a minimum of 3 years experience in TV/video repair
– good computer skills
– an interest in working in the broadcast sector

Trans World International is the world's largest independent television production company and we are looking for maintenance engineers to join our team maintaining and repairing our broadcast equipment. If you have the right background in maintenance engineering and would like to move into the broadcast sector, we will give you all the necessary training.

Working in television studios, edit suites and audio facilities at our West London premises, the position is shift based and includes some late night and weekend working.

Please send CV to Karen Mullins, Head of Post Production, TWI House, 23 Eyot Gardens, London W6 9TR.

MISC

Shop Closed Down!
Everything must go!
Over 300 New/Secondhand TV's, VCR's. Hi-Fi's
Non working
Plus over 100 new boxed remote controls.
List available
£1,500
Tel: 01341 281139
(daytime)

inStore ELECTRICS LIMITED
1043 Leeds Road
BRADFORD BD3 7DB
Tel: 01274 665670/660196
Fax: 01274 665246

MANUFACTURERS NEW GRADED STOCK
MINT IN ORIGINAL PACKING
EVERYTHING FULLY GUARANTEED

- New 28"/32" on Digital Silver TVs
- New Design 14" / 20" / 21" / 25" Combis different features and colours available.
- Award winning Wide Screen TVs fantastic in Blue / Green / Silver
- Audio • DVD • CDR • Cameras • Fax • MWO

BUILT-IN COOKERS / FRIDGES / LAUNDRY
CREDIT CARDS WELCOME • 48-HR DELIVERY

CLASSIFIED TEL:0208 652 8339

Special Offer Sale – 20 Remote Controls £20.00 (mixed all well known brands)

FERGUSON ICC 7 HAND SET £3.00

FERGUSON VIDEO

FV90 LV HAND SET £3.00
FV80 LV HAND SET £3.00
FERGUSON
BATTERY CONVERTER TA606 £15.00
24V DC/240V AC £15.00
BENCH POWER SUPPLY VARIABLE
0-30V 3A-TWIN METERS P/P £5.00 ea £50.00
BRIDGE RECTIFIERS 10 FOR £1.00
BURGLAR ALARM KIT full description £7.00
CAMCORDER-UNIVERSAL BATTERY 9.6V – 1400MA FOR JVC-PANASONIC-PHILIPS £5.00
CAMCORDER-RIPOD SHOULDER POD £3.00
CAPACITORS:-
1IN/2KV, 2NZ/2KV, 4NZ/4KV EACH 15p
5N6/2KV, 6N2/2KV, 9N1/2KV EACH 15p
35V-22UF, 50V-4.7UF, 50V-100UF EACH 25p
AA BATTERIES 1.5 VOLT
STC ALKALINE 10p
DESOLDER PUMP £2.00
DIGITAL CAPACITANCE METER CMC200 200PF-20MF £28.00
FILTERS – 455 & 480 EACH 10p
GAS SOLDER IRON-PORTASOL HOBBY £10.00
INFRA RED DETECTOR WIDE/SHORT ANGLE WITH RELAY £5.00
INFRA RED RECEIVER-MATSUMI MINIATURE £1.00
MILLI VOLTMETER-ELECTRONIC-LEADER LMV-181A 40V A/C IN-IMV F/S £5 P&P £5.00
IMV-300V CALIBRATED – COST £225.00 £5 P&P
COLOUR TV BATTERY CONVERTER IN 24VDC TO 240V OUT £15.00
MODULATOR-TUNABLE SATELLITE-TV £1.00
PANEL-IK2-FM2211 STEREO £5.00
PANEL-CVC80-POWER £5.00
POSITOR 18 2 PIN 20p
POSITOR-2322 662 98012 50p
POWER SUPPLY – 12V DC & 24V DC-REGULATED £2.00
POWER SUPPLY-REGULATED 3-12V 500MA £5.00
PSU AC 12V 500MA £1.50
PSU AC 9V 1A £1.50
QUARTZ HALOGEN – 500W 200V FOR OUTDOOR LAMPS £1.00
R.S. SAFE BLOC £5.00
RELAYS-SUB MINIATURE 25p
SATELLITE TUNER UNIT – 2427611 .... BASE BAND/VIDEO OUT £3.00
SCART TO 4 PHONO LEADS 1.5M £3.00
SCART TO 6 PHONO LEADS £3.00
SCART TO "D" PLUG £1.00
SCART TO SCART LEADS – ALL PINS CONNECTED – 1.5 METRES £2.00
SOUND 5.5MHZ MPM 1000T £1.00
SOUND 6.0MHZ MPM 1040 £1.00
TRANSFORMER-RS ENCAPSULATED MAINS 0-120V-0-120V PRI 0-9V-0-9V SEC £1.00
TRIPLER KT3/K30 £4.00
TRIPLER – UNIVERSAL £5.00

AMSTRAD

HEAD AND DRUM – 6000 £12.00
HEAD AND DRUM – NICAM £12.00
PANEL-CLOCK DISPLAY – 8.900 £5.00
PLASTIC FRONT WITH FLAP – 8.900 £3.00
POWER SUPPLY-VS1000-VS1100 £5.00
POWER SUPPLY, LONG OR SHORT CHASSIS 1991/1992 MODELS £3.00
POWER SUPPLY – SWITCH MODE – DOUBLE DECKER £5.00
20 OFF MIXED NOKIA ITT
SALORA FINLEX SERVICE MANUAL £10.00 POST 4.00
MAINS ADAPTOR 12V AT 500 M/A NEGATIVE CENTRE £1.00
NEGATIVE CENTRE £1.00
POSITOR EQV 98009 – SALE PRICE 25p

FERGUSON

ADAPTOR – VPT – TEXT – VA354 £2.00
AC MAINS & BATTERY-VA365 P/P £3.00 ea
CAMCORDER BATTERY, HIGH CAPACITY 9.6V 1800MA-VA310 £3.00
CAMCORDER BATTERY CHARGER 9.6 VOLTS VAZ65 EACH £6.00
CAMCORDER CAR ADAPTOR CHARGER – AND BATTERY-VA308 £5.00
CAMCORDER LENS 2 OFF – TELE-CONVERSION LENS x1.4 & x0.7 £1.00

CARDIOID CAMERA MICROPHONE-VA SUPER 218 TELESCOPIC BOOM & STAND £5.00
CHASSIS-TX80-NEW-NO TUNER P/P £5.00ea £15.00
CHOKE-MAINS INPUT-TX9-TX10 £4.00
CHROME BOARD-ICCS I/Cs U4647TKF OR HA11498 £6.00
DECK AND CAPSTAN MOTOR:- FV61LV, FV62LV, FV67LV, FV68LV EACH £30.00
FV70B, FV71LV, FV72LV, FV74LVX EACH £30.00
FV77HV £30.00
FV31R £12.00
HEAD AND DRUM
MODULATOR-SATELLITE-T1040-SRD3/4 £2.00
PANEL-10 MIXED FROM TX9 TO ICC5 £20.00
PANEL-DECODER-ICC5 £5.00
PANEL-FRONT-TX100 £4.00
PANEL-IF-TX9, TX10 £4.00
PANEL-REMOTE AND POWER SUPPLY FV31R DISPLAY P/P £2.00ea £5.00
PANEL-REMOTE-TX9, TX10 EACH £5.00
PANEL-REMOTE-TX10-540/01 £5.00
PANEL-REMOTE-TX10, WITH BATTERY AND 4 I/Cs – 1544-033C £7.00
PANEL-REMOTE TX90 – 139.001 I/Cs M293B1 AND MS1000 £10.00
PANEL-REMOTE TX100 I/C M293B1-SAA5012 £5.00
PANEL-REMOTE TX100 WITH STAND-BY BATTERY AND I/Cs £5.00
PANEL-TI228B TEXT FOR TX89, TX98, TX99, TX100 £6.00
PANEL-TX90 THORN FRONT – – 8 BUTTONS 01M4-515-002 £5.00
PANEL-TUBE BASE-ICC5 £5.00
PANEL-TUBE-BASE-TX89, TX98, TX99 £5.00
PANEL-TUNING 1509G-TX9, TX10 £5.00
POWER SUPPLY 12V-3A FOR VIDEOSTAR CAMERA PP3 £4.00
PUSH BUTTON UNIT-TX85, TX86 – 8 BUTTONS £5.00
RECEIVER – INFRA-RED – ICSL486-TX100 50p
TRANSFORMERS-SWITCH MODE:- TX85, TX86, TX89 EACH £4.00
TX100 £5.00
473190-00, 40153000 EACH £5.00
ICC5 3112-338 326842 £4.00

HITACHI

DECODER-TELETEXT PC232A5 – ISSUE 4 £15.00
HEAD AND DRUM – 620E £12.00
MAINS SWITCH WITH STAND-BY £50p
MODULATOR No 5587881 £5.00
OSCILLOSCOPE 20MHZ DOUBLE BEAM – V212 £188.00
PANEL-TELETEXT G8P – ISSUE 6 £10.00
PANEL-TELETEXT PC315-11 – ISSUE 7 £15.00
PANEL-TEXT-VT753E £20.00
POWER SUPPLY TV SWITCH MODE STR 4211 ISSUE 10 £8.00
POWER SUPPLY VIDEO SWITCH MODE VTM312ELM £10.00
THICK FILM-HM9204A £3.50

HOSIDEN

TUBE BASE – MIXED 10 for £1.00
AA Batteries made by STC Group of Companies 10p each

ITT

IF MODULES:- 5827-01-51, 5827-03-51 EACH £3.00
5828-04-10, 5829-02-58 EACH £3.00
5929-03-41 EACH £3.00
TELETEXT CONVERSION KIT £3.00
CORE 2 90° ITT TEXT PANEL £3.00

1996/7 MATSUI

VIDEO DECK COMPLETE P/P £5.00ea £16.00

MATSUI – ORION

DECKS WITH HEADS – D1096 VXA110 VP 9401 £16.00
HEAD-VSR1500 = ORION D2096 £5.00
PANEL-MAIN-VSR 1500 P/P £5.00ea £3.00
POWER SUPPLY-VSR 1500 £5.00
POWER SUPPLY & REG – TYPE STK 5343-VP9501 £8.00
POWER SUPPLY-SWITCH MODE-1500 £3.50

PHILIPS

DECODER-TEXT-K40-KT3 £6.00
IF PANEL FOR CP90-CP110 £5.00

TEXAS

NICAM BOARDS MK II £3.00

SAMSUNG TECU5983 VA24A
VHF-Tuner with Aerial Socket
Fit most new TV's £5

35-VICK DESOLDERING BRAID 1.5 meter
Size AA (2), Size AB (3), Size BB (4) £1

5 VIDEO HEADS *FOR* £20
Amstrad 6000, Amstrad 8900. Heads & Drum

FERGUSON NICAM MODULE III
Art No 989 591-E00 £5

L.O.P.T.

36061, 36162, 36362, 36383, 36481
36482, 36761, 36831, 36832
36943, 36962
2432211, 2432351, 2432491, 2432851
2432871, 2432981, 2432984
2433952, 2434141, 2434393
2434451, 2434492
2435016, 2435062
2435064, 2435085, 2435121
2435372, 2435701, 2436773
2436792, 2436795, 2436797, 3216001
243066, 243063
3220029, 3714016, 47003481
AT2076/78, AT2076/88, AT2078/25
AT2077/81
DST81N243/472593-00
DST85B235/47328700 & /40153200
DST88N234/400086AD, &/47805200L
DST88N234/47320041, &/47317590
DST186N243/473058-00
TFB3035D, TFB3069D, TFB4023AD
TFB4039AD, TFB4066AD

ALL LOPTS £5.00

FERGUSON
TX9
TX10
TX85, TX86
TX89, TX98, TX99
Y260781
FSTY260482
LOPT RED SPOT
LOPT WHITE SPOT & YELLOW SPOT

PANASONIC
TC2203, TLF 1456B
TLF1457B, TLF701/6

TOSHIBA
TFB 3035D, TFB 4023AD, TFB 4032BD
TFB 4038AD, TFB 4110AD
TFB 3089D, TFB 4088AD

VIDEO DECKS

AIWA 1500
MATSUI VXA 1100
MATSUI 1500
ORION D1094
ORION D1096
ORION D2096 ETC
ES POST WITH HEADS EACH £20.00
CAPSTAIN MOTOR FOR ABOVE DECKS £15.00
AND HAND SETS £3.00
4 HEAD DECK FOR 1500 £20.00
20 HIGH VOLTAGE CAPS 1500V – 2000V MIXED £1.00
VIDEO PATTERN GENERATOR MODEL T9535 240V
MAINS SMALL £5.00
PAL TV ADAPTOR – RGB IN UFH OUT £5.00
MOTOR 12V 10p

HANDSETS

AMSTRAD
4600 £3.0
4700 £5.00
6000 £15.00
6800 £4.00
UNIVERSAL £3.00

DECCA
NICAM LCD £4.00

FERGUSON
BSB £1.50
FV41R/3V59
FV41R/FV42 – FV51-52 £10.00
ICC5 £7.00
IK2000, IK7000 EACH £4.00
SRD2, SRD3, SRD4 EACH £1.00
T780 £2.00
TV/SATELLITE WITH FST £3.00

HITACHI
CPT2158 (NO REPLACEMENT) £5.00
VIDEO RM933E VIDEO PLUS £30.00

MATSUI
1500 £5.00
VSR 1500 £4.00
VX3000 £3.00
3000/ORION – TV AND VIDEO £2.00
RC = PACE 900, FERGUSON, SONY, GRUNDIG £5.00

MITSUBISHI
RM35 – VIDEO £5.00

NOKIA
RC202 £4.00
VP9401
D1096
VXA1100
AND VIDEO PLUS

ORION
TV AND VIDEO £2.00
VIDEO WITH LCD – 1992/93 MODELS £5.00

PANASONIC
EUR51142 £10.00
TC1632, TC1642, TC2232 EACH £8.00
TX2034, TX2044, TX2200, TX2234 EACH £8.00
TX2244, TX2300, TX2636, TX3300 EACH £8.00
RC201 – TV – REPLACES TNZ1411/2

PERDIO
PV 1188 £3.00

PHILIPS
NEW TYPE UNIVERSAL £8.00 (3 In 1)
RC4001

SAMSUNG
HANDSETS, TV & VIDEO – 12 TYPES EACH £3.00

SANYO
UNIVERSAL VIDEO £3.00

SIEMENS
TV/VIDEO – 1994 MODEL £5.00

THORN
9000, 9600, TX9, TX10, TX1000 TEXT AND NON-TEXT EACH £10.00
CPT1408T, CPT2176, CPTZ178 EACH £5.00
CPT2476, CPT2478 EACH £5.00
TEXT, REPLACES PHILIPS KT3, K30, K4 ETC U/V £8.00
PHILIPS 3 IN 1 HAND SET £8.00
FERGUSON WITH TEXT IKZ CHASSIS P/P £5.00 £10.00
TX86 CHASSIS P/P £4.00 £10.00
ORION AND MATSUI CARRIAGE 1500 TYPE D1096 ETC £6.00
SANYO LOPT P/P £2.00 4 FOR £5.00
240V ADAPTOR 9V AC 1A £1.00

COMPLETE REPAIR KIT, CLUTCH AND PINCH ROLLER, IDLER D2906 £7.00

TUNERS

IF TERC8-022A TBJZA-00ZA-ALPS £3.00
SATELLITE SXT2302180968 £3.00
SATELLITE WITH BASE BAND MIN SXT2302234 £4.00
SMALL UNF/VHF £3.50
VHF/UHF – TEKE4-112A £4.00
4944
U321, U341, U342, U343
U344, U411, U412, U944 £2 EACH
U743, 7744
AMSTRAD
UE33-BO1 £3.00
MRF7-7E33
MATSUI ORION VIDEO TUNER IF £5.00
FERGUSON
IF2105-RE £5.00
MTP2011-AP00 £5.00
UHF – ICC5 £5.00
VHF – ICC5 £5.00
TX85, TX86, TX89, TX90 EACH £4.00
TX98, T99, TX100 EACH £4.00
ORION
1500 – UE33 BO9 £4.00
PANASONIC
SMALL UHF/VHF £3.00
FERGUSON
DOUBLE SIDE NICAM £10
ICC5 NICAM SINGLE BOARD ICC5 £10
SHARP
TUNER AND IF 1810587 PA1 UK £3.00
TATUNG
UNIVERSAL 205 OR EQUIVALENT WITH AERIAL SOCKET £3.00

MOTORS

HITACHI
CAPSTAN 150E £3.00
MATSUI
CAPSTAN I/C NO. M56730 ASP £15.00
2 TYPES 1995 TO 1997 MODELS MATSUI VIDEO DECKS WITH CAPSTAN MOTOR AND HEAD P/P £5.00 £20.00
MITSUMI
MOD MRF7-UF32 £5.00
MOD TMUG3-103A £5.00
MITSUBISHI
CAPSTAN-HSE41-I/C M51782ASP £2.00

Treble A Batteries12 for £1

7805	20p	2SD1432	£1.00	BU204	60p	BUT11AF	50p	BYW29/50	15p	HD6140425J	50p
7806	20p	2SD1453	£1.00	BU205	75p	BUT12A	20p	BYW95	10p	HD6140815	£1.00
7809	20p	2SD1576	£1.00	BU206	£1.00	BUT13	£1.00	BYW95C	10p	HE4528BP	15p
7812	20p	2SD1577	£2.00	BU207	£1.00	BUT18AF	£1.00	BYW562A 100V	8p	HEF4029BP	20p
7812F	20p	2SD1802T03	15p	BU208	80p	BUT71/800	15p	BYX10	10p	HEF4093	20p
2SC940	£1.00	2SD1878	£1.00	BU208A	£1.50	BUW11	40p	BYX38/300	25p	HGA1124A	50p
2SC3795	£1.00	2SK1460	£1.00	BU208D	90p	BUW84	60p	BYX55/350	10p	HM6264	
2SC3973B	£1.00	2SK1464	£1.00	BU222	£1.00	BUX39	£1.00	BYX55/600	10p	ALP-15	£3.50
2SC4313	£5.00	2SC4891		BU326	£1.00	BUX84	50p	BYX71/60	20p	IK7ST 6931 B1	£3.00
2SC4589		1500V/15A	£2.00	BU407	40p	BUX84AF	50p	BYZ106	10p	IN5401	3p
10A/1500V	£2.00	AN5521	£1.00	BU508A	90p	BUY49	20p	BZW-C110	5p	IR106A	10p
2SC7350	15p	AN5551	£1.00	BU508AF	£1.00	BY187	5p	BZW83-C20	3p	L298N	£4.00
2SD200	£1.00	AN5831	£2.00	BU508D	80p	BY208-800	8p	CA3123Q	50p	LA7830	£1.00
2SD401	40p	BC550C	20p	BU508DF	£1.00	BY228	15p	CD4555BE	20p	LA7831	£1.00
2SD716	£1.00	BDV648	50p	BU705	£1.00	BY229	6p	CLE871A	£5.00	M708 ABI	£1.50
2SD787	30p	BDV658	50p	BU801	50p	BY255	5p	FE3B	4p	M708 LBI	£1.50
2SD789	30p	BF8695	20p	BU806A	£1.00	BY299-200	15p	HA1140	£1.00	M37204ECSP	£1.00
2SD820	£1.00	BF870	20p	BU807	50p	BY299-800	30p	HA1185	£1.00	M58658P	£1.00
2SD868	75p	BPW41	15p	BU808DFI	£1.00	BYT71-800	15p	HA1196	50p	MN650	£1.00
2SD880	30p	BT Phone Batterys	£1	BU824	50p	BYV19-30	15p	HA11485ANT	£1.50	S13522V	£1.00
2SD1264	50p	BU105/04	80p	BU826	£1.00	BYV28-200	15p	HA11804INT	£1.50	SAA1061	£3.00
2SD1266	£1.00	BU108	£1.00	BUK444/800	£2.00	BYV95B	10p	HA513385PI	£2.00	SAA3018	£1.00
2SD1398	£1.00	BU124	50p	BUK445/600	£2.00	BYV95C	12p	HA513385P3	£2.00	SAA5010	£2.00
2SD1415	£1.00	BU126	80p	BUK454/600	£1.00	BYV96D	10p	HCF4520	50p	SAA5231	
2SD1427	£1.00	BU180A	65p	BUT11	50p	BYW20-08-9	£1.00	HCF4520BE	50p	(TEXT)	£2.00

No accounts — No Credit Cards

SENDZ COMPONENTS

63 BISHOPSTEIGNTON, SHOEBURYNESS, ESSEX SS3 8AF.

Tel: 01702 338894 Fax: 01702 338805

Specific P/P charges are PER ITEM • For UK addresses add P/P to order then 17.5% VAT to total. This applies to EC unless VAT No. is given • Exports – P/P at cost • Postal Order/Cheque with order. Unless otherwise specified add £1.70 P/P to SMALL ORDERS + Additional P/P for HEAVIER GOODS. Technical information by telephone only • Government/School Orders on official headings. Callers to shop – 212 London Road, Southend-on-Sea. Open Saturday Only 10-12noon – 2-5pm.

PLEASE ADD 17.5% VAT TO BOTH THE GOODS TOTAL AND P/P CHARGE

IIIM means MORE

The stunningly successful UNI range of replacement remote controls continues to improve with the addition of the new 'M' series Uni's which include the MENU function found on most modern televisions. Plus, the range expands further with the introduction of Uni remote controls for Goodmans, Alba, Bush, Matsui, Saisho, Hinari and Orion television brands.

IIIM means MENU

Added versatility to this already superbly adaptable product range – but at no extra cost!

RCUNI 01M
Panasonic with Menu function

RCUNI 02M
Sony with Menu function

RCUNI 13M
Goodmans/Alba/Bush with Menu function

RCUNI 14M
Matsui/Saisho/Hinari/Orion with Menu function

RCUNI 01M	Panasonic + Menu
RCUNI 02M	Sony + Menu
RCUNI 03M	Philips + Menu
RCUNI 04	Hitachi
RCUNI 05	Mitsubishi
RCUNI 06	Nokia
RCUNI 07	Samsung
RCUNI 08	Toshiba
RCUNI 09	Thomson/Ferguson/Telefunken/Saba
RCUNI 10	Grundig
RCUNI 11	Sanyo
RCUNI 12	Sharp
RCUNI 13M	Goodmans/Alba/Bush + Menu
RCUNI 14M	Matsui/Saisho/Hinari/Orion + Menu
RCUNI 17M	Analogue Satellite Uni + Menu

For more on our range of Uni, Replacement and Universal Remote controls, call Philex Now!

Philex Electronic. Tel: 020 8202 1919 / 07000 PHILEX Fax: 020 8202 0015
e-Mail: sales@philex.com Website: http://www.philex.com

PHILEX ELECTRONIC

QUALITY ASSESSED ASA ISO 9002 CERT NO. 12702 UKAS QUALITY MANAGEMENT 010

A.R.D. ELECTRONICS

'Our aim is your next order'

The easiest way to source parts is with our

600 PAGE FREE USER FRIENDLY TRADE CATALOGUE

It has comprehensive technical information with pictures to help in product identification.

All products are clearly and logically presented to make the items easy to find.

We have a highly trained and caring staff and perfect systems to try and make every contact with A.R.D. Electronics a pleasurable and problem free experience.

- Aerials & Audio Accessories
- Batteries & Accessories
- Cable & Accessories • Capacitors
- Computer Components & Accessories • EHT Components
- Electrical Accessories
- Filters/Surge Protectors
- Fuses & Holders
- Games Consoles & PC Game Accessories
- Intercommunication Equipment
- Loudspeakers & Accessories
- Optoelectronics
- Power Supplies & Adaptors
- Relays • Remote Control Handsets
- Remote Control Konig Cross Reference Chart
- Resistors, Positors & Trimmers
- Satellite Spares & Accessories
- Security Products Semiconductors
- Service Aids • Soldering Equipment
- Stands & Brackets
- Storage Systems • Switches
- Test Equipment • Tools • Transformers
- Video Accessories • Video Heads


Warehouse at Altham

In response to your requests we have changed our delivery charge policy.

The UK's favourite distributor again leads the way by launching a new Customer based initiative. We now provide

FREE

DELIVERY ON ALL ORDERS OVER £20

EASY ORDERING

Open a Trade Account today or pay by Credit Card.

We accept Visa, Mastercard or Switch

VISA MasterCard BACs

A.R.D. Gains ISO9002 Accreditation

ISOQAR QUALITY ASSURED FIRM ISO 9002

UKAS QUALITY MANAGEMENT 026

Certificate Number 2152/99

To further enhance our aim of becoming the Industry's preferred choice for electronic and electrical components and accessories, we are proud to have developed systems that meet ISO9002 requirements. A.R.D. have always been fully committed to Quality and Service for all our customers and this recent award reflects our desire to keep improving.

The appointed third party assessor noted that **NO non-conformities were found in our systems.** It is a remarkable achievement to have gained total conformity to ISO9002 in only our second year of trading

A.R.D. Electronics Plc, Shorten Brook Way, Altham Business Park, Altham, Accrington, BB5 5YL e-mail: sales@ardelectronics.com

Tel: 01282 683000 Fax: 01282 683010

Trade Website: www.ardelectronics.com