

JUNE 1991

£1.80

TELEVISION

SERVICING·PROJECTS·VIDEO·DEVELOPMENTS

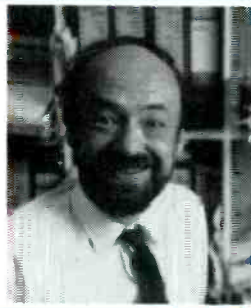


Viewdata Systems and Terminals
Intermittent Fault Detector Unit
Satellite TV Polarisers and LNBS
TV and Video at the Trade Shows
Comb Filter Operation • DX-TX
VCR Clinic • TV Fault Finding



PARTS PROBLEM?

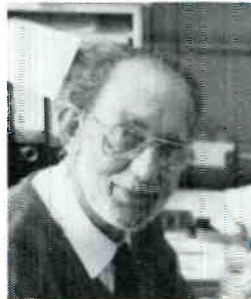
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Phone David Allen
0734-876444



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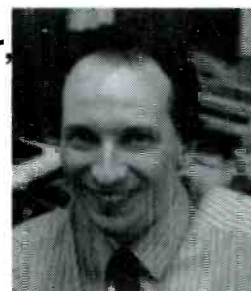
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Phone Philip Pratt
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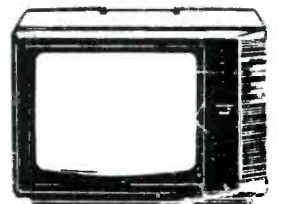


Amstrad, Akai, Fisher,
Mitsubishi, Moulinex, Goldstar,
JVC, Nat Panasonic, Pioneer,
Matsui, Saisho, Samsung,
Salora, Sanyo, Sony, Toshiba,
Yamaha and many others.
Phone Mike Curtis
0602-870789



**COPS CATCHES
THE PARTS
THE OTHERS
CANNOT REACH
AT PRICES
THE OTHERS
CANNOT MATCH**

VIEWDATA
PRESTEL
PHILIPS
MOVIES
Willow Vale
COPS



14in SCREEN
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BUILT IN MODEM
PRINTER PORT
RS232 PORT
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PORT
TAPE RECORDER
PLAYPORT
SECURITY KEY
SWITCH
BRITISH MADE
BSI APPROVED
BT APPROVED

**RECONDITIONED
TERMINAL**
£238
+ VAT

INTEREST FREE CREDIT
SUBJECT TO %APR

This business terminal is a unique concept, it exploits the latest technology within a television receiver.

A microprocessor is used to guide you through a wide choice of features simply and quickly. Options are presented on the screen in the form of menus which invite you to select Teletext, Prestel or any computerised order processing facility for which you have access to, i.e. *Willow Vale COPS*, Philips MOVIES, Sharp VIEWDATA, National Panasonic, Hitachi, etc.

The system is open ended in that future facilities can be catered for in the programming of the micro-processor, such as cable TV, video disc and in house data systems.

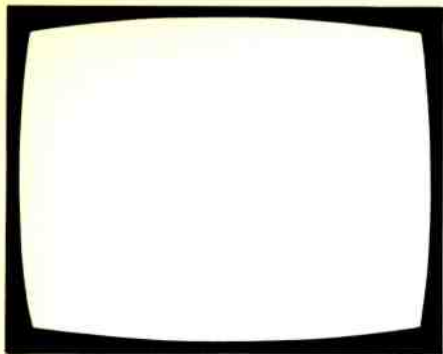
A typewriter style keyboard is supplied and allows you full composition and editing facilities in LOCAL EDIT mode and pages of text can be transferred from the internal memory to cassette tape, to a printer, or downline at will. Clock display and timer, time out, stand by mode, security key with locking key, telephone number memory bank are all standard.

ACCESS 24 HOURS A DAY - 7 DAYS A WEEK

NO PROBLEM



The Parts Distributor
who says YES



TELEVISION

June
1991

Vol. 41, No. 8
Issue 488

On sale May 15th

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All correspondence regarding advertisements should be addressed to the Advertisement Management, "Television", King's Reach Tower, Stamford Street, London SE1 9LS. Editorial correspondence should be addressed to "Television", IPC Magazines Ltd., King's Reach Tower, Stamford Street, London SE1 9LS.

INDEXES AND BINDERS

Indexes to Vols. 37 and 38 are available at £1 each from the Editorial office (address above). Photostats of the indexes to Vols. 31-36 can be supplied at 80p each.

Binders that hold twelve issues of *Television* are available for £4.50 from Television Binders, 78 Whalley Road, Wilpshire, Blackburn BB1 9LF. Make cheques out to "Television Binders".

SUBSCRIPTIONS

An annual subscription costs £21.60 in the UK, £25.50 overseas (by surface mail – ask for airmail quote if required). Send orders with payment to Quadrant Subscription Services Ltd., Oakfield House, Perry Mount Road, Haywards Heath, Sussex, RH16 3DH.

BACK NUMBERS

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QUERIES

We regret that we cannot answer technical queries over the telephone nor supply service sheets. We will endeavour to assist readers who have queries relating to articles published in *Television*, but we cannot offer advice on modifications to our published designs nor comment on alternative ways of using them.

this month

- 557 Leader**
- 558 Understanding Comb Filters** *J. LeJeune*
A filter with a comb-shaped response is required to separate interleaved signals. How a delay line plus add and subtract networks performs this action, with specific reference to a TV set's colour decoder.
- 559 Intermittent Fault Detector Unit** *Steve Cannon*
An easy-to-build circuit that gives LED or buzzer indication when an intermittent fault occurs at a circuit point being monitored. Saves having to tie up more expensive bench equipment.
- 560 Long-distance Television** *Roger Bunney*
DX conditions and reception and news from abroad. Also products of interest for DX work.
- 562 CD Player Casebook**
Reports from Mike Leach, Ian Bowden, Nick Beer and P.J. Roberts, G1VUV.
- 564 Teletopics**
News, comment and developments.
- 566 Viewdata Terminals and Systems** *Roy Baines*
How the viewdata system operates, the basic elements of a terminal and a review of the setmaker/distributor databases available in the consumer electronics servicing field.
- 569 Next Month in Television**
- 570 VCR Clinic**
Reports from Eugene Trundle, Ed Rowland, Stephen Leatherbarrow, Donald Bullock, Nick Beer, Steve Cannon and Mick Dutton.
- 572 Test Report: Semah Signal-strength Meters** *Roger Bunney*
Two signal-strength meters, one for u.h.f. and the other for satellite TV, are ruggedly built, perform well and offer good value.
- 573 Satellite TV Aerial Systems, Part 3** *Derek J. Stephenson, B.A., I.Eng.*
Operation of the various types of polariser in use, their advantages and disadvantages; what goes on in the low-noise block; common LNB faults.
- 576 Letters**
- 578 Servicing the Panasonic G Deck, Part 2** *Nick Beer*
Notes on the electrical side of the Panasonic machines that use this deck, with a faults list.
- 581 Steve's Camcorner** *Steve Beeching, T.Eng.*
The problems of estimating, and why it should be charged for. Plus some tricky faults encountered.
- 582 Fifty Years in Radio and TV, Part 6** *Harold Peters*
The coming of colour, 1967-77. Production engineering at Pye, Lowestoft: the changeover to single-standard sets and the arrival of i.c.s and varicap tuners.
- 586 TV Fault Finding**
Reports from Philip Blundell, AMIEE, Jeff Herbert, Stephen Leatherbarrow, Mick Dutton, Ian Bowden, Nick Beer, J.R. Cutts and Steve Cannon.
- 588 TV and Video at the Trade Shows** *George Cole*
The latest innovations in the TV, video and digital audio fields reviewed.
- 591 Test Cast 342**

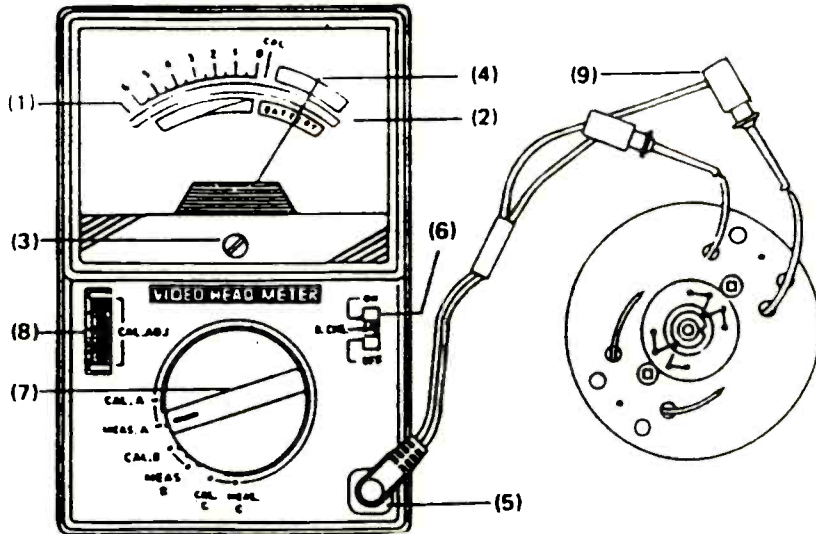
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		6845	290p			4N31	90p
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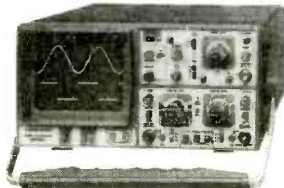
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HM203-7 20MHz STANDARD



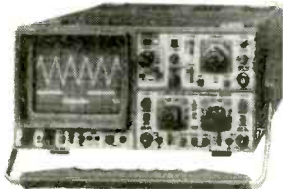
- SPECIFICATION**
- * 2 Channels
 - * Bandwidth: DC - 20MHz
 - * Sens: Ch.1, Ch.2, 1mV/cm
 - * Timebase: 0.1s - 20ns/cm
 - * Triggering: DC - 40MHz
 - * Active TV - Sync - Separator
 - * Variable hold-off
 - * Trigger LED Indicator
 - * Calibrator: 1KHz Square wave
 - * Component tester
 - * Plus many features

Price £338.00 + £59.15 V.A.T. FREE Specialist Carrier Delivery

SPECIFICATIONS

- * 2 Channels
- * Bandwidth: DC - 60 MHz
- * Sens: Ch.1, Ch.2, 1mV/cm
- * Timebase: 2.5s - 5ns/cm
- * Triggering: DC - 80MHz
- * Active TV - Sync - Separator
- * After delay trigger
- * Sweep delay
- * Delay line
- * Trigger LED Indicator
- * Calibrator: 1KHz & 1MHz Sq. Wave
- * Component tester

HM604 60MHz UNIVERSAL



Price £610.00 + £106.75 V.A.T. FREE Specialist Carrier Delivery

HM1005 100MHz UNIVERSAL

3 CHANNELS - UP TO 6 TRACES

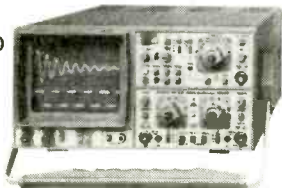
- SPECIFICATION**
- * 3 Channels
 - * Bandwidth: DC - 100MHz
 - * Sens: Ch.1, Ch.2, Ch.3, 1mV/cm
 - * Timebase A: 2.5s - 5ns/cm
 - * Timebase B: 0.2s - 5ns/cm
 - * Triggering DC - 130MHz
 - * After delay trigger
 - * Delay line
 - * Trigger LED Indicator
 - * Overscan LED Indicator
 - * Active TV - Sync - Separator
 - * Calibrator: 1KHz & 1MHz Sq. Wave

Price £792.00 + £138.60 V.A.T. FREE Specialist Carrier Delivery

HM205-3 20MHz DIGITAL STORAGE

SPECIFICATION

- * Digital Storage
- * Analogue real time (Same as 203-7)
- * Bandwidth: DC - 20MHz
- * Sens: Ch.1, Ch.2, 1mV/cm
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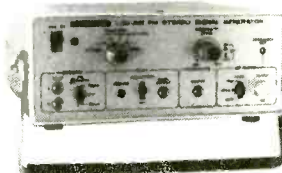
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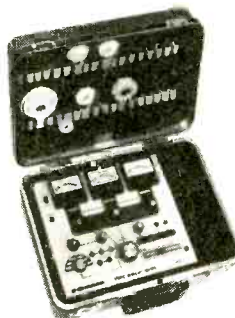
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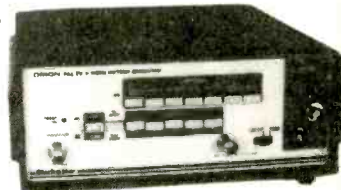
More than 50 pattern combinations can be selected, including those for testing static and dynamic divergence, video amplifier linearity, colour purity, general colour performance, focus etc.

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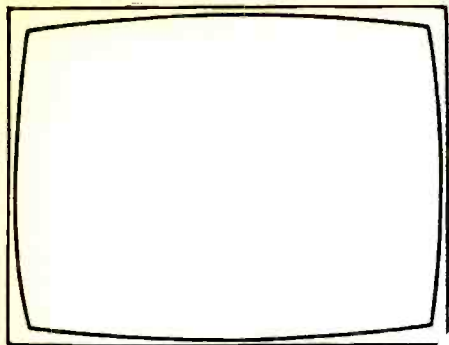
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TELEVISION

Marketing and Distributing Spares

Has the end of the road come for the traditional setmaker's service department? Not quite, since setmakers have to support their appointed dealers. But it's pretty obvious, and understandable, that setmakers would like to be shot of the responsibility. After all, running a manufacturing plant and marketing sophisticated consumer electronics products is not quite the same sort of activity as supplying one-off spares, often low unit-cost items. The latter calls for a quite different approach. This is not to say that manufacturers can't do it efficiently. Most do, and have had many years to develop the required expertise. But it's a difficult business that involves a lot of effort, and it costs. In the highly competitive High Street, the price of the finished product is all important. So setmakers, whose profitability is always under pressure, are not too happy about parts of their businesses that simply add to the overall costs and call for high manning and considerable investment. It is fortunate for the setmakers that a number of firms have stepped in to provide spares marketing and distribution services. By now the big five are well enough known by their initials - CHS, CPC, HRS, SEME and WVE.

The thing that has sometimes puzzled us is how such firms can make a go of this sort of business when, to the setmaker, it's simply an unwanted additional cost. Those in servicing often complain about the cost of spares. While there are notorious cases of exorbitant pricing, the fact is that most of the time apparently high prices simply reflect the costs involved in providing a spares service. Just think of it: booking in an order, checking credit status, checking availability and price, generating the stock and invoicing paperwork, the physical process of searching for parts and assembling them for despatch, the packing and carriage costs not to mention the cost of holding stocks in an orderly manner and monitoring them for reordering. Very often the cost of providing the service is far higher than the cost of the item required.

So how does anyone manage to make a profitable business out of supplying to the trade one-off spares, especially as this is itself now a highly competitive business? The answers relate to know-how and investment. The computer has made a huge difference in this field but a computer, however sophisticated and whatever its capacity, is only as good as the system of which it's a part. You clearly have to get the whole system right before the computer can be asked to take over the detail work of keeping track of stocks and orders and the invoicing and payments procedures.

We learnt a great deal about how to run such an operation efficiently during a recent visit to CPC plc at Preston. Whilst orders can be placed in several ways, the vast majority are phoned in. So it was impressive to see the number of well-educated young ladies who man the lines. On average, each deals with some 200 orders a day. The record achieved by one of them was well over 300. When you think of all the hassle, if-ing and but-ing, maybe this and maybe that which can be involved in phoned requests for spares, how on earth do they achieve such figures, especially when many calls are for checks on prices and availability and information on back orders? Well, obviously it helps to have competent, motivated - CPC believes in bonuses at all levels - and well-trained order takers, but the only way in which they can achieve order rates like this is with the backing of a powerful computer system. CPC has made a considerable investment in computerisation. As a result, the sales ladies can check on accounts and credit, then on stock position and prices, and take orders instantly. They can also call up information on alternative parts and prices and see exactly what the stock position is, what's on order and when it's due in, and the situation with back orders. It's all done at the touch of a button. Whoever designed the system and got it up and running has a considerable achievement to his credit.

CPC's use of technology to run an efficient business goes further than the computer however. Extensive use is made of bar coding. As we all know, it's very easy to get long part numbers wrong. No problem when you use a bar code instead, with its automatic reading. Bar codes are also used to indicate who handled an order and when, so that a complete check on every aspect can be made - the bar code readers are linked to the computer of course. Automation extends to the packing section, where we were intrigued by the suction system that delivers, at the flick of a switch, those plastic bits that fill out the box.

All this is only one side, though the largest, of the business. Technical back-up has to be provided, then there's the major matter of sourcing parts. In a highly cost-conscious field it's essential to be able to offer parts at favourable prices. This means checking with sources world wide. It also means checking what's offered, since we all know the problems that pattern parts and such like can cause. You can't make a go of this sort of business unless you are sure about the quality of the parts stocked.

The success of the "big five" has proved that it's possible to distribute spares and make a reasonable profit. But it calls for investment in training and in computers and handling equipment. This is clearly why such companies can manage when most setmakers simply seem to want to give up. At the end of the day we remain in some awe at the success of the component distributors in coping with this field. Think of the huge numbers of models, let alone parts, that have to be kept on record and/or in stock, the alternatives that may be available, the brand links and so on - and the fact that new lines have to be added daily.

A point that warrants mention is the use of viewdata. There seem to be mixed views about this. It's undoubtedly helpful to be able to call up information on your own terminal. But it doesn't save time compared with a quick and efficiently handled phone call and can be a lot more expensive. It rather looks as though for the foreseeable future it will remain a matter of preference.

EDITOR

John A. Reddihough

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COVER PHOTO

This month's cover photograph shows a viewdata terminal in use at Clearview of Seaford, East Sussex. Our thanks to Clearview for their assistance.

Understanding Comb Filters

J. LeJeune

Comb filters have been used in colour TV receivers in the UK since the start of PAL colour transmissions in 1967. The description "comb" refers to the filters's frequency response. The receiver's colour decoder section uses the filter to provide accurate separation of the two transmitted colour-difference signals, U (weighed B - Y) and V (weighed R - Y), and also to correct, in conjunction with the line-by-line PAL signal phase changes, for phase errors in the received signal.

The frequency spectrum of a stationary TV picture consists mainly of clusters of energy that occur at line-frequency (f_h) intervals. Closer examination of the spectrum shows that there are further energy clusters at each multiple of the line frequency, and that these are accompanied by smaller components at field-frequency intervals. Fig. 1 illustrates this.

There is very little signal energy between these clusters. Strictly speaking, this comment applies only in the case of a stationary picture with no diagonal content, but in practice with a moving picture the energy clusters are only slightly wider.

The frequency of the colour subcarrier used with UK PAL transmissions is 283.75 times the line frequency plus 25Hz. This works out at 4.43361875MHz. The quarter-wave offset (283.75 instead of 284) gives rise to the frequency spectrum shown in Fig. 2, with the U and V signals spaced by a quarter of the line frequency at each side of the luminance signal (Y). Obviously the luminance signal components occur at multiples of the line frequency (f_h). The U subcarrier is at 283.75 times f_h , the nearest cluster of luminance energy being at 284 times f_h . In the PAL system the phase of the V signal is shifted by 180° on alternate lines, which equates to switching the U subcarrier by 0.5 f_h . Thus the V sidebands are, as shown, separated from the U sidebands by 0.5 f_h . This handy frequency separation of the U and V signals means that a comb filter can be used to separate them in the receiver prior to detection, the Y signal having previously been filtered out.

Comb Filter Action

A comb filter with the required characteristics has the response shown in Figs. 3 and 5. Successive peaks and troughs coincide with the U and V signal components. The response resembles the teeth of a comb, hence the name.

Realisation of such a filter using high-Q tuned circuits would call for some 150 tuned elements, with each tuning point separated at line frequency. Hardly a practical arrangement!

Use of a delay line in conjunction with add and subtract networks provides a practical means of implementing such a filter. The idea is illustrated in Fig. 4. The delay line has a delay time of 283.5 times the number of colour subcarrier cycles per line, i.e. 63.94325 μ sec. You might think that 283.75 would be correct in view of what was previously said, but for the add and subtract networks to provide the correct response the delay line must contain either an exact number of subcarrier cycles or an exact number plus a half cycle - which way you arrange this determines which of the two signal components you get from the add and which from the subtract network.

By adding and subtracting the direct and delayed signals

you get a series of signal maxima and minima. With the delay time set as outlined above these maxima and minima coincide with the clusters of subcarrier energy. This is because when an exact even number of half cycles is present within the line the direct and delayed signals will be in phase and will add at B while cancelling at C. If an extra half cycle of subcarrier is included in the line a phase shift of 180° will have been introduced. As a result this time the direct and delayed signals will cancel at B and add at C.

As the frequency is varied above or below the nominal subcarrier frequency, peaks and nulls will occur at multiples of the line frequency. The null points are sharply defined, giving critical "tuning".

The use of a comb filter for U and V signal separation followed by synchronous detection gives a high degree of separation between the two signals. With the PAL system the comb filter is also used to provide correction for phase errors that would otherwise result in the display of incorrect colours on the screen. The key to this is the 180° phase shift of the V subcarrier on alternate lines. As a

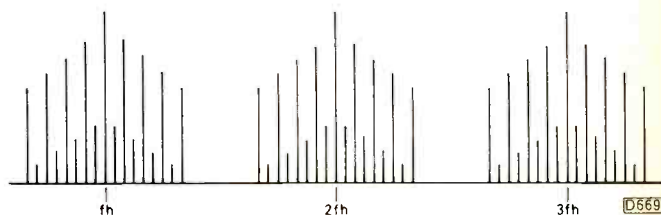


Fig. 1: Video signal spectrum.

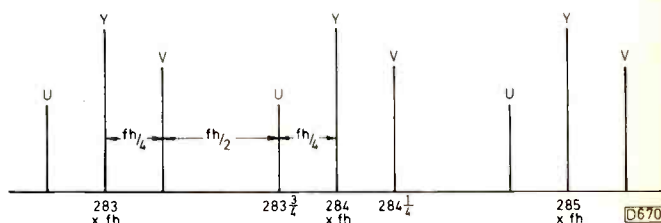


Fig. 2: PAL signal frequency spectrum. Note the quarter-line offset.

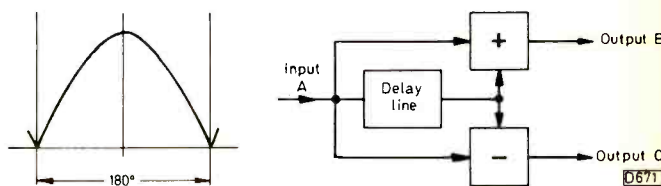


Fig. 3 (left): Basic comb filter response (one lobe only).

Fig. 4 (right): Arrangement of a delay-line comb filter.

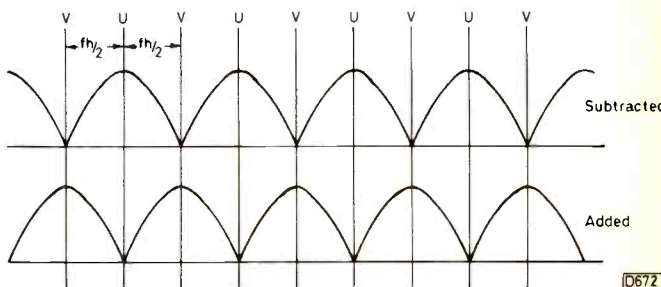


Fig. 5: Comb filter response for U and V signal separation.

result, any phase error also alternates. Adding and subtracting averages out the error. What this in fact achieves is to convert the phase error into a proportionate amplitude decrease in the U and V signal components, i.e. instead of incorrect colour there's a negligible loss of colour saturation.

Changes

Delay lines have undergone changes since the early, cumbersome types of 1967. In the early lines there was a single signal reflection within the glass block. Subsequently the use of multiple reflections enabled the size of the delay line to be decreased substantially. A more recent innovation is the use of "bucket-brigade" delay lines, which employ charge-shifting technology (the principle used in solid-state image sensors). These introduce little or no loss, are easier to manufacture and more robust. They are being used in VCRs for separation of the luminance

and chrominance signals and also for dropout compensation and in noise-cancelling systems.

Summary

To summarise on the use of a comb filter for U and V signal separation in a colour decoder, use of a delay line of suitable length enables interleaved signals within a spectrum of frequencies to be separated. The output from the delay line is mixed with an undelayed signal in a summing circuit on the one hand and a subtraction circuit on the other (to subtract you invert one signal and add). Successive filter rejection points are separated in frequency by $1/T$ MHz, where T is the line's delay time. The filter's outputs are complementary, the peaks in the summed output occurring exactly where the troughs occur in the output from the subtraction network. This is true over a wide range of frequencies above and below the nominal centre one.

Intermittent Fault Detector Unit

Steve Cannon

Of all the faults we get, either in the workshop or in the field, I'd say that about a third are intermittent. Some of them put in an appearance only once or twice a day. Some are even shyer! Most engineers will probably have had similar experiences. They will also be familiar with the irate customer who complains that his set has been returned three times but is still faulty. And there's nothing worse than taking the back off a set when the fault is present only to find that it immediately clears, not to return until the next day.

It's very rare for us to be able to connect test equipment to a suspect part of the circuit permanently for eight hours a day. Sooner or later it will be required for something just as important. To help with this problem I devised the fault detector unit described here.

Use

The circuit is shown in Fig. 1. By making a permanent connection to input one you can use the unit to check when a particular d.c. voltage being monitored disappears. This is very useful for monitoring h.t. lines, control voltages, etc. Alternatively input two can be used to check when a

voltage that is normally zero, for example the blanking input of a video chip or the gate of an over-voltage thyristor, rises. When the voltage at this point goes high the detector gives a fault present indication.

Only one input can be used at a time. With input one, the six-way switch provides suitable tapping down for the input voltage. This input was initially designed for monitoring 5V and 12V rails. The six ranges provided in the final design are as follows: 1, 5V; 2 up to 15V; 3 up to 30V; 4 up to 75V; 5 up to 150V; 6 up to 250V.

Circuit Operation

Circuit operation is simple. When using input one, the voltage at the base of Q1 is set at 4.7V by the series resistor and the zener diode D1. C1 charges to approximately 4V via D2 and R2. Thus Q1 is held in the non-conductive state. If the input voltage suddenly disappears, Q1's base voltage falls to zero and it will turn on because of the charge still held by C1. The conduction of Q1 fires thyristor Q2, the current flowing via the thyristor lighting LED D3. If you prefer an audible indication, a 9V buzzer loudspeaker can be used in place of D3. Should the input voltage reappear a moment later Q1 will cut off but Q2 will remain in the conductive state. It can be reset only by depressing switch S2, which is of the push-to-break, release-to-make type.

If input two is used, Q2 will fire as soon as the input voltage goes high.

Personally I find it preferable to have an audible fault indication.

Building

It's simple to build the circuit on a piece of Veroboard. Apart maybe from the switches and (if used) buzzer, most parts will probably be available in the used parts box.

Intermittent faults can be nightmarish to deal with. I'm not saying that this detector unit will solve all headaches, but I'm sure that anyone who decides to use it will have fewer sleepless nights and irate customers.

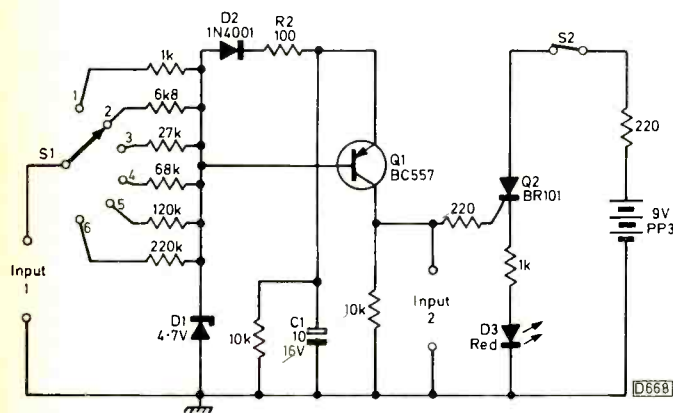


Fig. 1: Circuit of the intermittent fault detector. A buzzer can be used instead of the LED - don't use both. The resistors are all rated at 0.5W.

Long-distance Television

Roger Bunney

Following the incredible DX reception during February, with many an exotic signal received, March came in like the proverbial lion. After two weeks it was more like the exiting lamb, when reception became really flat. As the Easter weekend approached we hoped that the prevailing high-pressure system would give tropospheric propagation a lift, but there was only a slight improvement, with fragmentary reception of Scandinavian Band III/u.h.f. signals on the east coast. The excellent weather continued until Easter Monday, when rain and winds swept most of the country and the improvement ended.

F2 layer reception continued into the first two weeks of March, the highlight being identified reception of Thailand ch. E2 and Australia/New Zealand on the 3rd. For solar observers the progress of two large sunspot groups across the sun was of interest since they relate to current reception conditions (never look at the sun directly – always project the image on to a white card). The highest count of the present sunspot cycle, 418, occurred at the end of January, the intense activity continuing well into February.

The F2 log is as follows:

- 3/3/91 TSS (USSR) ch. R1; RCTV (Dubai) E2; IRIB (Iran) E2; RTM (Malaya) E2; Australia ABMN and DDO, both ch. 0; ZTV (Zimbabwe) E2; VOK (Voice of Kenya) E2; three New Zealand channel 1 carriers received via scanner.
- 4/3/91 Thailand E2; IRIB E2; RCTV E2.
- 5/3/91 IRIB E2; RCTV E2; ZTV E2.
- 6/3/91 TSS R1; IRIB E2; plus two E2 signals via scanner.

RCTV was received on the 7th, 8th, 11th, 12th, 16th and April 2nd; VOK was received on the 9th and 10th.

SpE propagation was relatively quiet during the month, the log being as follows:

- 5/3/91 TVE (Spain) E2, 3; RAI (Italy) IA.
- 7/3/91 TVE E2; +PTT (Switzerland) E2.
- 10/3/91 TVE E2.
- 11/3/91 TVE E2; NRK (Norway) E2.
- 24/3/91 ARD (Germany) E2; TVE E2.

TVE E2 was also received on the 12th, 14th and 18th.

The Thai reception on March 3rd was by Tim Anderson: the characteristic “3” in a circle logo provided identification. As previously mentioned, Tim is working on computer video enhancement. The signal is recorded then enhanced using frame-store techniques. So far he’s managed to lift a rather poor quality signal (P2) to P3 or P4 in terms of picture quality assessment. P1 quality test patterns have also been improved.

My thanks to Tim Anderson (St. Leonards), Simon Hamer (Powys), Roger Fussell (Torpoint), Brian Williams (Penarth) and Ryn Muntjewerff (Holland) for sending in reception reports.

Robert Copeman (Victoria) and Anthony Mann (Perth) report incredible reception in Australia, with daily F2 and evening TE giving signals from Europe, China, Thailand, the USSR and Malaya — during the evening of January

27th Anthony received Chinese signals as high as ch. C4. He mentions that Thailand often transmits colour bars from around 0630 GMT – this could assist with identification in the UK.

Signal Identification by Channel Offsets

The use of a scanner to check the exact carrier frequency is a great help in identifying stations that use frequency offsets. From information supplied by various scanner-owning DX-TV enthusiasts we’ve compiled the following list of known offsets. It’s not complete, and additions would be welcome.

Australia ch. 0: DDO (WIN TV) 46.172MHz; ABMN 46.240MHz.

New Zealand ch. 1: Three transmitters use 45.240, 45.250 and 45.260MHz. We are uncertain about their locations.

Thailand ch. E2: 48.240MHz is in use.

Iran ch. E2: Two transmitters use 48.245 and 48.258MHz.

Ghana ch. E2: 48.247MHz is in use.

Zimbabwe ch. E2: 48.260MHz is in use.

Ch. E2 with no offset (Dubai, Kenya) is 48.250MHz. Kenya does not use VITS.

Reducing Band I Interference

Brian Williams has been experimenting with methods of reducing interference in Band I, in particular interference induced in the coaxial downlead. He initially made the connection between the dipole and the unbalanced downlead with a quarter wave of flat twin, taped to the aerial boom, via an FX1588 toroid with two sets of four turns each in series wound around the toroid then to the downlead. This removed braid induced interference immediately, giving much cleaner Band I reception. His latest suggestion is to make a direct connection at the dipole to a ferrite balun transformer, then introduce series toroids if necessary at each end of the downlead. Brian has also taped about five turns of coaxial cable around a radio ferrite rod, using this as a series attenuator at the receiver end – it worked well.

Brian comments that earth runs are also important and that connection to a “real” earth reduces interference though the length of the main earth wire is important. It seems to work as a series resonant trap in Band I. So it’s worth experimenting with a direct earth lead instead of relying on the mains earth connection – but don’t earth a set with a live chassis.

News Items

France: Considerable financial difficulties are being experienced by the Antenne-2 and France Regions-3 networks, which have asked for government aid. A specific RTL-France programme is to start shortly, with agreement from the French broadcasters.

Czechoslovakia: It seems that as a result of financial problems the OK3 network will be closed down rather than sold. A service of sorts, known as TA3 (Tatras 3 or TV Antenna 3) will continue in Slovakia however. A few OK3 relays are still coming into use. The new Prague TV/f.m. tower is at present being tested. The 19kW transmitters will give 90kW e.r.p. on chs. R37 and R51. There are some new identifications on the Prague ch. R26 test card, “PHA 26” and “2SR-P”.

Hungary: MTV has called for additional funds. It has been transmitting a lot of western material lately – from Disney, the BBC and ARD.

Belgium: The Egem ch. E46 and Schoten ch. E62 BRT-

TV2 transmitters have been modified for Nicam operation. Brussels ch. E25 is due for modification next, followed by Oostvleteren ch. E55. The PM5544 test pattern carries an appropriate caption. BRT Radio 3 is used for sound.

Tanzania: The government has decided to extend TV coverage to the whole country. At present there is only a local service in the capital.

Egypt: Several satellite TV programmes are being transmitted, including Children's Channel/Discovery, CNN and the French CFI service.

Seychelles: Jude Rene, senior engineer at Radio Television Seychelles, tells us that contrary to an international listing the TV network operates in Band III only.

Spain: Test patterns displaying the word "Forta" indicate that the next transmission is an inter-regional one. There's a new ch. E4, 1kW transmitter in operation at Lages, Terceira Island, Azores.

Lithuania: During part of the evening CT-2 transmits the German SAT-1 channel.

BBC: The first BBC TV World Service transmission took place on March 11th – a thirty minute news programme that was sent via several satellite feeds.

Satellite TV

Signal levels have risen considerably now that the Eutelsat II F2 craft is in operation at 10°E: Turkish Magic Box/Star 1, which was previously on an east spot beam giving a very low signal in the UK, now provides noise-free signals. The transponders on this craft have all been leased for cable TV services, news gathering etc. by Danish, French, German, Italian, Spanish and Turkish users. Eutelsat II F3 is due for launch this August – most of its sixteen transponders have already been leased – followed by II F4 in February 1992 and II F5 in summer 1992. By the end of 1992 Eutelsat will be operating 100 transponders, including twenty on the still operational series I craft. I F4 has been moved to 4°E for use by the Euteltracs mobile communication system.

There are now news feeds from the two US BBC bureaux twice a day via the PAS-1 satellite at 45°W – look on 11.47GHz.

The Australian Aussat service, which is in financial difficulty, is to be sold.

Ian Waller (Lincoln) reports dramatically improved reception since installing a larger C band dish. Saudi signals are now noise free and the Afrovision feed service, offering items such as Sudan and Zimbabwe, has appeared out of the snow.

Computer Programs

Many DX-TV enthusiasts are now using computers for station lists, making calculations and for logging etc. We've received details of two computer programs relevant to TV reception.

Dave Shirley has produced a program for the Amiga and IBM compatible computers. It consists of a TV-DX log that includes date, time, start time, end, channel, station, conditions, picture quality (P1-5) and a remarks section plus two starter defined fields for one's own use. There's log search, station location by channel, station sightings etc. All options can be printed out, including a full reception log. The program, designed as a 'shareware utility', is available to UK purchasers for £3 inclusive, on either 3.5in. (Amiga) or 3.5/5.25in. (IBM) disc. Orders can be sent to Dave at 93 Alfred Road, Hastings, East Sussex TN35 5HZ. Sounds like good value if you're into

AERIAL TECHNIQUES

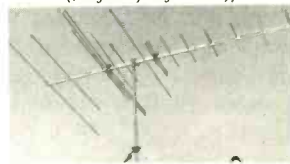
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computers. A more extensive TV-DXers' program is being developed.

Baylin Publications has introduced a program entitled "TVRO System Analysis and Antenna Aiming" for satellite engineers and those involved in installation work. It's written by Greg Grissom and is in two parts. The "aiming" part gives you the elevation and azimuth for all the satellites above your horizon once you feed in your site co-ordinates. The program is updated several times a year to take into account changes. With the "analysis" part you feed in information such as dish size, LNB and equipment noise performance, location, etc. then receive an indication of system reception quality, fade margins, path loss, G/T, C/N, S/N etc. complete with VDU graphics. There's C band as well as Ku band coverage. The program costs £35 in the UK (plus £3.50 by air to Continental locations) and is available on 3.5 and 5.25in. discs for IBM compatible PCs using DOS3.2 or higher. Consideration is being given to offering the program on 3in. CF2 discs for use with Amstrad computers, but this would not be until mid-summer. Baylin Publications can be contacted at 24 River Gardens, Purely, Reading, Berks RG8 8BX. telephone/fax 0734 414 468. Send two first class stamps for a product brochure.

Satellite Hardware

Racal-MESL has sent us samples of a couple of new state-of-the-art products. The Ku band LNP (low-noise polariser) is an integrated feedhorn, polariser and LNB. It's completely watertight, even when immersed in hot water, the single connection being via a rear-mounted F socket which also takes the supply. The conversion gain is

at least 50dB with a typical noise figure of 1.3dB. Three r.f. amplifier stages are used, also an i.f. amplifier. The low insertion-loss ferrite polariser is based on Racal's PS45 range, giving cross-polar rejection figures of typically 18dB. The LNP45 is intended for use with offset dishes.

Racal has also introduced an efficient integrated feedhorn and polariser for fitting to your own LNB with standard WR75 flange interface. This is coded PS45818F and is again for offset dish use.

A noisy LNB with voltage-switched polariser can be replaced by the LNP45 to give improved results with greater rain fade protection. Alternatively the LNP45 can be used as the basis of a new TVRO system.

Enquiries should be sent to Racal-MESL Ltd., Lochend

Industrial Estate, Newbridge, Edinburgh EH28 8LP, telephone 031 333 2000.

European HD-TV

The choice of an HD-TV standard for Europe is becoming a highly political matter. Philips, Thomson and the French government have been pushing MAC as the basis of a system, but other groups support a digital system using signal compression achieved by newly developed 40Mbit/sec chips. These groups argue that the MAC approach is already obsolete, and that digital compression technology could save considerably on bandwidth compared to MAC. This approach could also be used for simulcast HD-TV and 625-line transmissions.

CD Player Casebook

*Reports from Mike Leach,
Ian Bowden, Nick Beer and
P.J. Roberts, G1VUV*

Sony CDP-M35

At switch on the tray would open very fast and the turntable would rotate extremely fast. There were no other functions and the open/close button would not close the tray. This situation is indicative of a fault in the power supply, so voltage checks were made. We soon found that PS902, an N15 circuit protector, was open-circuit. It's in the supply to the 79M05 voltage regulator. As the replacement immediately blew there was obviously a direct short-circuit. The voltage regulator checked out o.k. but the 1,000 μ F, 6.3V capacitor across it, C904, was shorted. Replacing this item cured the fault and after replacing the loading belt and cleaning the laser lens the machine performed perfectly. **M.L.**

Akai CD-A30

This full-sized machine suffered from a fault reported in these pages before. The diodes in the power supply would fail after about half an hour, the result being that the disc span very fast and the sled assembly moved to the outside of the disc and stayed there until the machine had cooled down. Replacing the diodes cured the problem but we then found that there was occasional intermittent failure to read a disc.

One thing I always do when a machine won't read a disc is to check whether laser focus action is evident, i.e. does the laser move up and down? In this case it didn't but the focus drive waveform was present. This indicated that the fault was in the laser assembly itself. With this machine the plastic cap around the laser lens can be removed to gain access to it. A very light drop of thin oil on the lens pivot provided a cure in this instance. I must stress that only a very small drop was required — any more could have ruined the laser. **M.L.**

Sony CDP-M35

The complaint with this machine was skipping. We found that it was worse at the beginning of a disc. Another point we noticed was the noise level — there was more than the normal servo noise. When the tracking gain was very slightly decreased from its initial position there was wild jumping. A slight increase cured the problem.

We removed the mechanism and tried spinning the spindle motor by hand. With the mechanism held vertically there was just brush and commutator noise. When the

mechanism was held horizontally however there was a rattle from the motor and the vibrations from it could be felt through the mechanism plate. A new motor assembly was therefore ordered. The motor, disc table and mechanism plate are supplied assembled, so the laser unit, the guide rail, drive gears etc. have to be transferred. After doing this the machine behaved normally: when the tracking gain was reduced gradually the servo would just "cut-out" instead of introducing disc jumping. **I.B.**

Pioneer PD4300

This machine wouldn't play discs at all, including TOC reading. In the test mode everything was o.k. until you tried to close the tracking servo — it wouldn't. The electrical adjustments were all o.k. and servo checks were inconclusive. For a very new machine the case was rather battered, so I decided to check the grating adjustment. The diffraction grating had indeed moved, but trying to reset it was most difficult — it wouldn't stay where it was put. A new laser unit presented no such problems.

During a soak test we found that in about one time in ten the drawer failed to open. This was because the disc stabiliser was stiff in its upward movement. It thus held the disc clamper arm down against the disc and tray, preventing it from moving. The disc stabiliser is pivoted across the tray. We found that the plastic housing for the arm was stressed at its right-hand pivot (opposite the clamper pivot side). It thus fouled the arm as it moved. Relocation is easy. **N.B.**

Goodmans GCD530

Whilst working on one of these players recently I discovered one or two things that might be of interest to others. First, if you change the laser unit you must perform the focus and tracking offset adjustments (FO, VR3 and TO, VR5) before trying the player. Otherwise it will just sit there and do nothing. Note that you adjust the focus offset for 200mV positive with respect to the zero volts d.c. level. If you don't have a Goodmans laser unit in stock you will find that the Sony KSS150A will fit and works just as well, though you may have to reduce the focus gain setting a small amount.

It's also important to check the r.f. amplitude with a good disc. Adjust the laser power (VR4) for 1.8V peak-to-peak. **P.J.R.**

Teletopics

TRADE SCENE

The latest figures from the British Radio and Electronic Equipment Manufacturers' Association show that 1990 was a good year for CTV exports from the UK – the best ever in fact. Over two million sets worth some £471m were exported, an increase of £200m over 1989. Imports fell to £200m from £243m in 1989. Demand in the UK fell by 10 per cent to 3.4m however. The UK's trade deficit in VCRs fell slightly to £48m.

Ferguson's fourth annual report on the UK consumer electronics market fills out the picture and adds background information on consumer attitudes based on a survey of 1,000 families. Of the colour sets sold in the UK in 1990, 1.75m were large-screen models (19in. and over) and 1.7m were small-screen sets. The total was the lowest since 1983 and represented a loss of a million sets since the peak in 1988. At retail prices the 1990 CTV market was worth £1,070m. Sales of large-screen sets fell by eight per cent while small-screen set sales declined by eleven per cent. Average prices in both cases rose, by six per cent to £435 for large-screen models and by three per cent to £184 for small-screen models.

Only one per cent of large-screen sets were basic models: 99 per cent had remote control, 79 per cent had teletext and 18 per cent had Nicam. Sales of Nicam sets were an encouraging feature, more than tripling to 300,000. Despite Nicam services being available over nearly three-quarters of the country however, and extensive advertising by many setmakers, consumer awareness of Nicam remains low. The Ferguson survey showed that less than three out of ten consumers were aware that high-quality sound was available in their area.

VCR sales in 1990 declined by six per cent to 2.15m. The average price fell by two per cent to £326. Ferguson found that a significant proportion of those in the survey did not find VCR programming easy: 30 per cent either never set the machine to record or found it difficult to do so, the number rising to 40 per cent among those over 45.

Camcorder sales growth continued in 1990, with an increase of a third to 370,000. At an average price of £815 the market value was some £300m, virtually the same as the small-screen TV market. Prospects continue to look good, with nearly a third of those who took part in the survey expressing interest in buying a camcorder – double the level of interest in satellite TV!

Satellite receiver sales increased to 700,000 in 1990.

During the year to February 22nd Comet's profits declined by 58 per cent, to £7.6m.

Transmissions from the Hannington transmitter now have Nicam sound.

SATELLITE TV

BSkyB has put to the European Commission an offer to transmit wide-screen D2-MAC signals via the Marco Polo satellite, broadcast simultaneously with its PAL transmissions via the Astra satellite – but only if the Commission pays the additional cost of over £5m a year per channel. It is prepared to start with the two movie channels and add the sports channel if interest is sufficient. EC telecommunications ministers are to meet on June 3rd to decide on a new satellite broadcasting directive to succeed the one that expires at the end of the year. The present directive is that European satellite TV trans-

missions in the DBS band should use MAC coding. There is considerable debate at the moment on what would be the best way forward to HD-TV in Europe.

The Independent Television Commission is to invite bids for up to three new channels to be broadcast via BSKyB's Marco Polo satellite. Advertisements are likely to appear later this year. It's understood that the channels would provide specialist rather than general interest programmes and that use of the MAC standard will not be a requirement. BSKyB will receive a nominal rent for the channels and provide broadcasting facilities at a market rate.

According to the latest *Financial Times* Satellite Monitor, satellite TV sales during March increased slightly to 52,000. Following the BSB/Sky Television merger, plans to allow two satellite dishes per house have been dropped.

Amstrad has introduced a dual-output LNB with an integrated feedhorn. It will enable a single dish installation to feed two receivers, the voltage at each output controlling the polarisation via that feed. Thus separate programmes can be watched with no polarisation restrictions.

In Japan, NHK will increase HD-TV transmissions to eight hours a day this autumn. A new satellite, called BS-3b, is to be launched during the summer. Sharp is now selling an LCD projector that can display HD-TV pictures up to 200in. wide.

Comet has won a summary judgement against BSKyB for breach of contract. An interim payment of £185,000 has been awarded. The remainder of the claim is to be assessed at a future hearing – Comet is claiming damages of £10m. Under its contract with BSB Comet agreed to order 50,000 satellite receivers by February 2nd, 1991, and would order a further 50,000 units for subsequent delivery. BSB would meet some of the interest costs and there were plans for a joint promotional campaign. BSKyB is to appeal. The case is the first of at least four from electrical retailers and four more from manufacturers of BSB receiving equipment.

The Granada Group is expected to take over the Sky Direct rental operation. The arrangement involves over 200,000 satellite TV rentals. Granada's rental business at present has some 2.5m customers.

SERVISCOPE RE-OPENS

The administrator Touche Ross has finalised the sale of 24 of the 51 Serviscope depots to a new company, Cauligo Ltd., which will trade as Serviscope. The new company will provide a nation-wide service on the mainland but not in Northern Ireland, with depots at Rotherham, Chatham, Merton, Mill Hill, Worthing, Harold Hill, Ipswich, Bristol, Cwmbran, Eastleigh, Plymouth, Reading, Brierley Hill, Coventry, Salford, Preston, Liverpool, Kilmarnock, Broxburn, Scunthorpe, Leeds, Nottingham, Peterborough and Thornaby. The company's headquarters will be at Rotherham (telephone nos. 0709 562 246/221). Touche Ross is still trying to dispose of the other depots.

Serviscope's previous parent company Computec, now in receivership, also operated a TV assembly plant at Cumbernauld. This has been bought by the Hong Kong based Luks Industrial. It will continue to make Akura sets, Osaki sets for Rumbelows and sets for Tandy.

TRADE NEWS

MCES Ltd. has published a series of four wallcharts that provide details of the services offered by the company, including a new satellite tuner and LNB repair service. The video head and tuner lists are extremely useful to have for reference. Those in the trade can obtain copies of the

wallcharts free by phoning MCES on 061-746 8037 (fax 061-746 8136) or writing to MCES at 15 Lostock Road, Davyhulme, Manchester M31 1SU.

SEME's spring 1991 trade catalogue is now available. It should make ordering of VCR spares in particular easier as it includes exploded diagrams of ten different decks with full descriptions of the parts and the appropriate SEME codes on the opposite page. For quick reference there's a panel listing the decks used by the various brands. The new catalogue has 488 pages and includes details of the company's seventeen reps with contact numbers.

The HR range of line output transformers, marketed by CPC PLC, has been tested and approved by the British Standards Institute at Hemel Hempstead. The range offers good quality at keen prices. For further details of the HR range of BS Approved transformers and prices contact CPC PLC, 180-200 North Road, Preston, Lancs PR1 1YP. Telephone 0772 555 034, fax 0772 201 905.

HRS Electronics plc, Birmingham, has introduced a free fax number, (0800) 212 179, for the benefit of its customers. There have been additions recently to strengthen the HRS management team, and the company has relaunched its Planet brand of accessories.

WHAT'S NEW?

Research and Technology Ltd., Leyton Industrial Village, Argall Avenue, London E10 7QP (0372 372 666) has introduced a 17in. monochrome monitor, Model MM17/1, for use in CCTV security and surveillance systems. It's the first of a new range of colour and monochrome monitors that are to be introduced during the next few months. The 17in. screen is large enough to give a good, viewable image with quad operation - the outputs from four cameras can be seen simultaneously - while the unit is small enough to

allow multiple mounting in a console of reasonable size. A full two-year guarantee of both the circuitry and tube is offered. The wrapround zintec steel case provides good protection and minimises interference while the black, non-reflective epoxy powder coating and integrated hood reduce unwanted reflections in the screen.

CRT Displays Ltd., Aitken House, Academy Park, Gower Street, Glasgow G51 1PP (041 427 4333) is now UK distributor for the nVIEW Spectra full-colour LCD projection panel which has 640 x 480 resolution and offers 4,096 colours. The price is £5,295 plus VAT. Amongst the other display devices marketed by the company there are large-screen video/data/graphic projectors manufactured by Esprit Image Systems. These high-brightness, tubed projectors offer many features depending on model. These include variable line scanning (15-42kHz), digital convergence for setting-up ease, on-screen help menus and operating status and diagnostics via an LCD on the handset.

The new VX600 from ITT Instruments, 344 Edinburgh Avenue, Slough, Berks SL1 4TU (0753 511 799) is a compact, portable TV measurement receiver offering field-strength measurement on all the v.h.f. and u.h.f. bands plus the satellite and f.m. radio bands, a spectrum analyser and a TV monitor for video and sound quality testing. Field-strength indication is via an on-screen bar graph, backed by an audio tone.

The 1991 vintage audio and radio components catalogue is available from The Vintage Wireless Company Ltd., Tudor House, Cossham Street, Mangotsfield, Bristol BS17 3EN (telephone 0272 565 472, fax 0272 575 442) at £1.50 inclusive of post in the UK, £1.95 post paid surface mail overseas or £4.50 by air mail overseas. The catalogue has 67 A4 pages packed with details of vintage components.

Table listing various electronic components and their prices, including sections for BELT KITS, ELECTROLYTIC CAPACITORS, CERAMIC FILTERS, TV AND VIDEO SPARES, and J.J. COMPONENTS.

Viewdata Terminals and Systems

Roy Baines

When British Telecom introduced its Prestel service it was thought that within a few years domestic users would be in a majority. On the whole however viewdata has become a mainly business medium. With both public and private systems being available the range of facilities that can be used increases daily. They include services for garages, insurance companies and travel agents, and over the past few years the services have been extended to include the TV servicing industry. Philips (Movies), Sony, Panasonic, Hitachi and Sharp, also distributors such as Willow Vale (Cops) and Charles Hyde (Chess), all operate viewdata systems, giving service departments access to technical information, the ability to find part numbers and to place orders while receiving order confirmation, stock position and price details.

Terminals

Access to these systems is possible in various ways. Dedicated viewdata terminals are available at prices from about £300. Viewdata adaptors that convert to r.f. and plug into any TV set, computer and modem, such as the Spectrum and Prism VTX5000, offer another option. At present the second-hand market is being flooded with ex-rental Philips/Pye G11 sets: several of these models, such as the G26C675, G22C708, CT408 and CT494, incorporate viewdata facilities. They are standard domestic TV models with teletext and an added viewdata panel. The panel is still available from Philips (part no. 4822 212 27492) but beware – the retail price is over £500. These models had to be “down line loaded” by the Prestel centre. This involved making an appointment with the centre for them to ring you, connect your terminal to the line and feed your identification (ID) numbers down to the terminal. I’m told that this facility is not at present available but that its reintroduction is being considered. There’s also a system called Prestest. You can use this unassisted and it does the same job but is available only to dealers and service departments that are registered with BT for the purpose. I’ve not been involved with programming a G11 terminal since “down line loading” ended, so if anyone has details of another way we’d be interested to know about it.

Viewdata Principles

We’ll now take a look at the basic principles of viewdata. A viewdata terminal (see Fig. 1) is in effect a slave unit linked to a mainframe computer that holds accessible information. On connection to the mainframe the user is requested to feed in a set of ID numbers and, usually, a password that then “logs on” the terminal. Most terminals can be programmed with the required ID and telephone numbers, thus making connection automatic. When you are linked to a chargeable database the ID is used for billing. Communication is via a telephone link, and this is usually made by a plug-and-socket arrangement. More recent terminals have a flat white plug known as a type 600: the older units, including G11 sets, have a jack plug known as type 96A. When on line the user incurs telephone charges as if making a normal telephone call. A large number of databases have local telephone numbers so that you are charged for the call at the local rate.

Certain mainframes, such as Prestel, also charge for certain pages of information – anything from 1p upwards.

Before the digital viewdata signal is transmitted via the public switched telephone network (PSTN) it has to be modulated. The reason for this is that the telephone line’s bandwidth is only 300Hz to 3kHz. Thus without modulation the signal would be severely distorted and attenuated. Modulation is carried out in the modem (modulator/demodulator), see block diagram shown in Fig. 2. To allow simultaneous two-way transmission of data, tone modulation known as frequency shift keying (FSK) is used. With this system different frequencies relay data to and from the terminal and database. The frequencies used are as follows: database to terminal, logic one = 1,300Hz, logic zero = 2,100Hz; terminal to database, one = 390Hz, zero = 450Hz.

The baud rate, i.e. the rate at which data is sent, is usually 1,200/75: because of the larger amounts of information it relays the database sends data at 1,200 bits per second while the terminal, with smaller amounts of data to send, does so at 75 bits per second.

Any terminal connected to the PSTN must appear to be a telephone. This means that to seize and hold a line it must present a d.c. resistance of 300Ω. When a number is dialled a short of approximately 40Ω is placed across the line. Continuity is interrupted to signify dialled numbers. If the terminal shares a line with a telephone a closed relay is used: on seizing the line the terminal opens the relay and disconnects the telephone. There are strict isolation rules to ensure that unsafe voltages don’t reach the phone lines – a BT approved isolation transformer must be used. Zener diodes, gas discharge tubes and fuses may also be fitted in the line terminal unit (LTU) – see Fig. 3.

Dialling

Both auto and manual dialling are possible with most units. Auto dialling involves programming the unit with the required telephone numbers. Manual dialling is much the same as with a telephone, the required number being called up each time it’s needed. In both cases pulses are sent to the LTU to activate dialling. When the database responds it sends a tone back to the terminal. These “log-on” tones are the only audio you hear, the audio section being muted the rest of the time. BT has laid down an audio level specification – if too high the audio would cause crosstalk and possible conversation breakthrough.

Logging on

Once access to the database is obtained the log-on process begins, with the database sending a 1.3kHz tone. The terminal modem then generates a carrier detection tone to tell the decoder that access has been achieved. The terminal next generates a 390Hz tone that’s sent to the database. When the database receives this it sends an FSK signal back, requesting the terminal to send its ID number. On Prestel it’s now mandatory to have an additional four-digit password. Once this is recognised by the database the log on is complete and the system comes into use. With some systems there are closed-user groups, additional IDs or registration being required to obtain access to certain

information. These can be used by companies for intersite communication.

Coding System

As with teletext, the data is encoded in accordance with the ASCII format. Each code word consists of seven data bits plus one parity bit, making one byte. Even parity is used, the opposite to teletext. There are also stop and start bits, making ten bits per character. These stop and start bits are required because of the variable transmission times between characters. The stop and start bits are at logic one and zero respectively. When no data is being transmitted the rest state is logic one, i.e. there's no change from the stop bit of the last character to the start bit of the next one. When the decoder detects a change from logic one to logic zero it prepares to accept data.

As an example of viewdata coding Fig. 4 shows the ten-bit code for R. The non-return to zero (NRZ) system is used, i.e. the signal does not change state between similar logic levels. Fig. 5 shows the modulated signal for R: this signal is ready for transmission via the PSTN and must be demodulated before it can be used by the database or a terminal.

Modem Operation

When the modem receives an FSK signal it first passes this through a high-pass filter (see Fig. 2). There are two reasons for this, first to assist in reducing line noise and secondly to stop FSK being sent from the terminal to the database affecting the received data. At this point the carrier detect section produces a logic one to indicate that a carrier is being received. The FSK itself is then limited to produce a squarewave that can be processed by the digital circuits. Each zero crossing is counted, the number of pulses counted during a half cycle depending on its duration. With a lower frequency (logic one) a larger number of pulses are counted than with a higher frequency (logic zero). More division then takes place and the result is a signal whose mark-space ratio varies in accordance with the received data. A low-pass filter converts the varying mark-space ratio to signals for feeding to the decoder.

Viewdata Compatible Teletext

The whole system is controlled by a microcomputer chip, with the programme held either internally or in a separate ROM. Incoming serial data goes to a programmable communication interface adaptor (PCIA) which buffers the data and removes the start and stop bits before converting the data to parallel form. As the data comes in it's stored in a memory which addresses the character generator that produces the display. This system is called viewdata compatible teletext (VCT) and uses the teletext chips. Timing for the read and write functions is generated by the timing chip (TIC) that generates sync for the terminal.

IDs and telephone numbers are stored in an EAROM. After conversion from parallel to serial form they go to the PCIA.

Write/Protect Switches

Most models have their own particular way of accepting phone and ID numbers. One thing to watch out for is the write/protect switch in earlier terminals – it disables the programming facility when in the protect position. The two

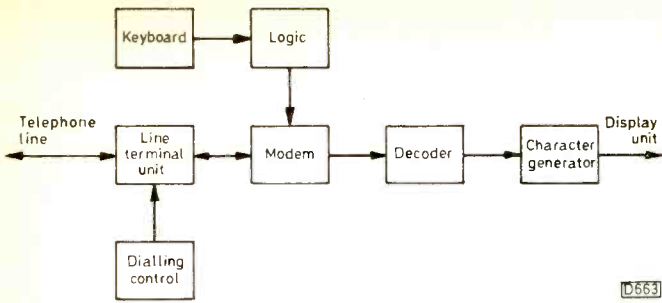


Fig. 1: Basic viewdata terminal arrangement.

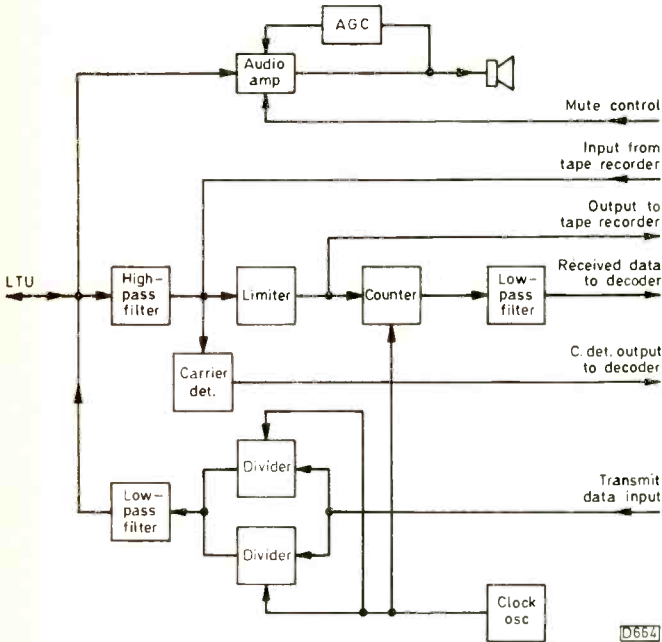


Fig. 2: Modem block diagram. An audio cassette recorder

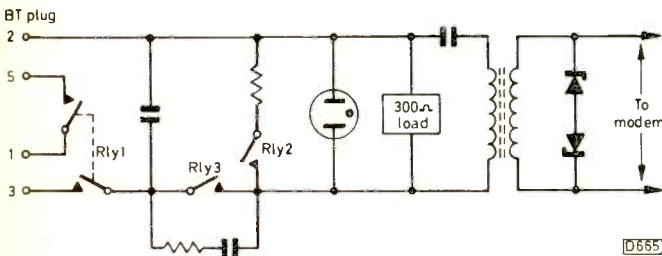


Fig. 3: The line terminal unit.

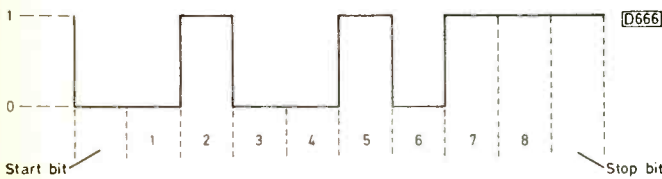


Fig. 4: Ten-bit code for R.

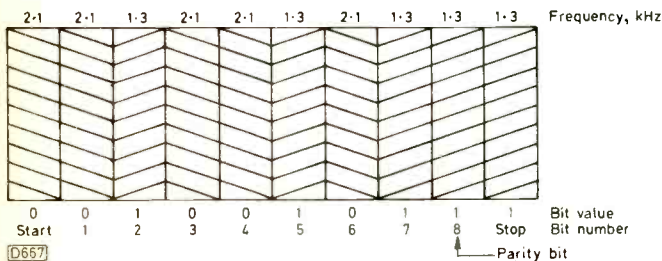


Fig. 5: FSK signal for R.

models that have this facility are the Sony KTX9000 and the Philips 3605 terminals, both of which are available on the second-hand market. The Sony model is straightforward, with a slide switch at the top of the small control panel on the right-hand side of the set. With the Philips model things are not so easy (surprise, surprise!). The top cover of the plinth has to be removed, after which you will find that the switch (SK1) is at the top front of the uppermost PCB. For protection the switch is turned anticlockwise.

Help and Demonstrations

If help is needed in registering for Prestel you can contact the Prestel Helpdesk on 0442 237 237. Alternatively information can be obtained from page 333 if you have access to another terminal already registered for Prestel. If you wish to have a look at what the service has to offer there's a demonstration page that can be obtained using a test ID – a number that can be used for testing is 081 618 1111. After dialling this number you will be asked to enter your ID. Enter 444 444 4444 then, when asked for the password, enter another 4444. This allows you to view some of the facilities available on Prestel and Micronet. The latter service is the database for computer buffs: for a subscription charge it gives access to loads of software etc. At the time of writing the annual Prestel registration charge is £92 for domestic users, £137.95 for business users.

DATABASES

We'll round off this article with a survey of the databases available for domestic electronics servicing use.

Philips

The Philips Movies database is rich with information on consumer electronics and also domestic appliance items. You can order chargeable and advance replacement items (subject to validation): the system advises on availability and price, both retail and non-account. If you have a reveal button pressing this gives the account price of the item displayed. Part numbers can be found from the model number, and service information, modifications and tips can be viewed. Advice on difficult faults can be sought via response frames, and messages can be sent to all Philips departments.

Still under development is a feature called Phases which, using interactive response frames, takes you through a fault-finding procedure. At present it deals with only CD players and SOPS power supplies, with more promised.

The system can help a busy accounts department with information on account status and credit. You can check the stage reached with all orders that have been placed, and view back orders. The system can be a bit slow at certain times of the day, but Philips seem to have solved past problems with response speed. On the whole this database offers all that a service department needs and is a shining example of the facilities that all manufacturers could provide if they put their minds to it. There's a local call facility via the Istel computer. The ordering facility is also available on Prestel.

Sony

The Sony database is also available through the Istel network, enabling you to take advantage of local call rates. With the Sony system you can check on price and

availability, but only if you have the part number. You used to be able to send messages to the spares department. This was useful for part number queries but the facility has been withdrawn. Accounts information is available, and there is also a sale order section. No technical information is available. The database doesn't offer as much as you would expect from a major manufacturer, but it's adequate if you require it only for ordering.

Sharp

The spare parts menu on the Sharp database has a look-up section. By feeding in the model number this provides a list of the most common parts with their part numbers. The part enquiry service enables you to check on price and availability. One thing I've found annoying is the need for the part number to be exactly right, including hyphens and differentiation between the letter O and zero – with Sharp part numbers this is quite a task. Receipt of ordered goods is extremely fast – in fact the response to an order for an in-stock item is the fastest among the major manufacturers. Technical bulletins for all products are available for viewing on the screen, but there's no message facility.

Panasonic

Panasonic's system is another one that offers just about all that a service department could ask for. Information that can be obtained includes sales, account status, credit limit, discounts, advertising and sales promotion material, message facility by department and a bulletin board that enables anyone using the system to leave a message for anyone else who uses it. There's a comprehensive fault guide on the spares and service menu – it's basically the same as the useful fault-guide books that Panasonic has issued to its dealers in the past. Service manuals can be ordered and the price and availability of spares can be checked. Service advice and technical bulletins are available. The frames have very fast response times and items ordered via viewdata are supplied free if under a certain limit. The only drawback is that there's no local call facility.

Kenwood

Kenwood is planning to start a service which could be in operation by the end of this year or early next year, via the Istel network for local call access. There will be a notice board but no account details initially. A technical database is to be built up and it's proposed that the general format will be similar to that used by Philips and Panasonic, giving use compatibility between the systems. If this is the case it should be a winner.

Toshiba

Toshiba uses the Fastrak system to give access to its database at local call rates. The service section enables you to order parts, check on availability, release held orders, check order status and obtain technical data. There's a unique feature: by feeding in a part number you get a list of all the models that use it. Although this is impressive, the only use I can think of is if you receive a part and can't recall which item in the workshop it's for. The technical data file is useful if you are stuck with a fault: you can look through a series of lists for the model concerned, then select the fault category, e.g. power supply, line timebase etc., which provides a list of all known stock faults in the

area. The order part facility enables you to search for a part by description.

The feature I've found especially useful, for example when giving estimates, is that you can select all the parts you require and then be shown how much they cost, what the handling charge is, the VAT and the final total before you decide whether to order. Remember that Toshiba don't supply standard resistors and capacitors even though they are listed in the service manuals. A message service is available, but not to individual Toshiba departments.

Hitachi

Hitachi also uses Fastrak for access to its database. Facilities offered include order entry, price and availability. If you don't know the part number you can find it by feeding in the model number. This can be a slow process however, because once you obtain the model concerned from various lists there follow on average forty pages of spares to go through to find the part you require. Not too hot if the part number is on page 40! Order status can be looked at to see whether despatched, back ordered or accepted. You can also cancel accepted orders. A fairly new addition is the tech line database that gives access to faults and modifications by model then area of fault. There's no message facility.

Willow Vale

Willow Vale calls its system Cops - computer ordering parts system. The database is comprehensive and parts can be ordered 24 hours a day. You can choose order despatch from Manchester, Nottingham or Reading and there's a choice of delivery system - first class, Securicor, Datapost etc. at the appropriate cost. You can view and amend back orders, and when checking on price/availability you can use the Willow Vale order code, the manufacturer's part number or a description of the part. Technical bulletins are available from Ferguson, Grundig, Philips and Sharp, with updates.

A nice feature is that you can place advertisements on the system free (yes) if you have anything for sale, and there's a mailbox to other account holders. It's the only system that stresses the importance of leaving it correctly instead of just disconnecting the line, which ties up the modem and prevents other users from gaining access. If you do disconnect incorrectly, expect a message next time you connect telling you that you've been naughty. Considering that this is a distributor system rather than a manufacturer's one it's very good all round, with good response times. The only drawback is that there's no local call facility.

Charles Hyde

Charles Hyde calls its system Chess - Charles Hyde express system for spares ordering. It enables you to place orders and delete or amend previous ones and leave a message for CHS. The system is rather slow as you are taken through various lines of items to choose from. Ordering can be by CHS order code, manufacturer's part number or a description of the item. You are advised of the stock position before placing the order so that you can decide whether it needs to go on back order or not. The system is o.k. if you have only a few items to order and know the codes. Otherwise it's slow and could be costly in phone time as there's no local call facility.

next month in

TELEVISION

● SERVICING THE MITSUBISHI EURO-4 CHASSIS

The Euro-4 chassis is interesting in having, amongst other things, two chopper power supplies, both isolated. Models using it include the CT2131BM and CT2531BM. John Coombes reports on various fault conditions that can occur.

● TEST REPORT: BECKMAN DM27XL DMM

This unit is more than just a digital multimeter since it measures frequencies from 10Hz to 20MHz, capacitance from 1pF to 20 μ F, has extensive semiconductor device test facilities including d.c. gain and incorporates a built-in 20MHz logic probe. It has been designed with the needs of TV/video/microcomputer service engineers in mind. David Botto reports.

● HITACHI CTV SERVICE BRIEFS

Following our recent Service Briefs features we've been taking a look at information from Hitachi on CTV models. Coverage includes some items picked up on recent courses.

● VIDEO EQUIVALENTS

Cloning is common in the video field, so that parts and manuals are common to a number of brands. The problem is to know which! Information has been coming in since a reader raised the matter some months back in our correspondence column. Next month we'll start to pass some of this on.

● SATELLITE TV LINK BUDGET

Derek Stephenson continues with the link-budget calculation, in practice a string of calculations can help you to predict the suitability of a given dish/LNB combination for reception from a particular transponder. It's a useful exercise, particularly if you prefer to put together your own systems from individual units.

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VCR Clinic

Reports from Eugene Trundle, Ed Rowland, Stephen Leatherbarrow, Donald Bullock, Nick Beer, Steve Cannon and Mick Dutton

JVC GR-C7

This little machine gave only monochrome playback. Its recordings were in black and white too when checked with another VCR, though there was a confetti effect on both. Since the E-E colour was fine the implication was that the VCR section was faulty in a stage common to both record and playback. We found that there was no 5.06MHz input to the main converter because bandpass filter BPF2 had gone open-circuit.

E.T.

Matsui VX800A

All functions worked except eject. When the eject button was pressed the carriage would jam and the power supply would then shut down. The cause of the trouble was eventually traced to the castellated coupling on the motor: it had slipped down the spindle, and was fouling the motor housing. Gently easing the coupling back along the spindle allowed the motor to turn freely again, and after doing this the machine ejected without trouble.

E.R.

Amstrad VCR4600

The capstan speed varied, the result being wow on the playback sound. Replacing IC302 (BA718) provided a complete cure.

E.R.

Amstrad TVR1

A fault we've had on several occasions with these TV/video combinations is intermittent operation of the various VCR mechanical functions – fast forward, rewind, etc. The usual cause of this trouble is malfunction of the mode switch. A cure can usually be effected by dismantling the switch assembly, cleaning and retensioning the contacts and applying a small amount of Servisol before reassembling. It's essential to use the correct size of Phillips screwdriver when doing all this as the small retaining screws are usually quite tight and their heads are easily damaged. If cleaning fails to the cure problem, as is sometimes the case, the switch must be replaced.

E.R.

Fisher FVHP710

This machine worked to an extent but lacked any trace of a display or channel indication. Checks at IC101 (LC6502B-633) showed that the supplies were present and the clock oscillator worked, but the reset line (pin 19) was in a permanently low state. The reset pulse is produced by Q009/Q010 on the preset/tuning board. The transistors were healthy but C017 (0.01µF), a disc ceramic capacitor across the reset line, measured 5kΩ. Replacing this cured the problems as the chip could now initialise.

S.L.

Amstrad VCR4600 and VCR4700

A VCR4600 came in with no video in the E-E mode though the sound was normal. Playback pictures and sound weren't affected. After checking the various supply lines I hooked a scope to the video output socket. Nothing resembling a normal signal was present here. As many things could have been responsible I decided to apply an external video signal. This produced normal results and exonerated most of the signal circuitry, i.e. the

video/sound switching chip, the luminance chip etc., at one go. Attention was thus turned to the front end. As the tuner was unlikely to be responsible and the supplies to the i.f. can were normal this latter unit was replaced. Again no luck. When pin 8 (video output) was lifted however the video returned, so the fault wasn't far away. In fact the output coupling capacitor C817 (1,000µF, 6.3V) was leaky. In the VCR4600 Mk. II and VCR4700 the circuit reference is C710.

S.L.

Hitachi VT17

The tape would sometimes stop moving. This intermittency made diagnosis a long and difficult job. Eventually the fault continued long enough for me to see that the capstan motor stopped. Further investigation showed that the cause was dry-joints within the five-pin plug and socket at the nearby control panel. Resoldering and cleaning put an end to this elusive and time-consuming fault.

D.B.

JVC HRD230/Ferguson FV12L

Another easy job I thought – the customer complained that the machine's operation was haywire and my tests confirmed this. I replaced the STK5841 chip and the machine seemed to be all right, but on soak test it went haywire again. This time attention was directed to the mechanics, which were found to be dry and stiff. After removing the mechanism baseplate and cleaning and lubricating the mechanism the machine worked well.

D.B.

Ferguson 3V55/JVC HRD120

This machine came in because of dirty heads. It was given the usual wash and brush up, but after reassembly it didn't work. At switch on the left-hand spool and the capstan rotated for five seconds then the machine shut down. After a good deal of exploration I found that CPI on the main panel was open-circuit. A few days later I had another of these machines with exactly the same trouble. It seems that we need protection from these circuit protectors!

D.B.

Fisher FVHP905

We're gathering experience of the mechanical troubles that occur with these machines. With this one it seemed that the idler was the cause of tape transport troubles, but after fitting a replacement rewind and fast forward were still a little erratic and in the play mode the machine sometimes squealed and stalled.

I found it necessary to fit new loading and capstan belts and to lubricate the cog and worm system and the spool spindles. Incidentally, before embarking on this type of repair, remove and save the little idler tension spring on the cassette side of the deck. It's easy to lose this, particularly if you don't know it's there, and you may never guess why the machine refuses to play while rewinding and fast forwarding perfectly.

D.B.

Ferguson 3V57 etc.

For some time now we've experienced problems associated with dried and hardened grease around the mode cam,

guide bases, etc. In recent cases of mode problems – usually showing up as the mechanism being out of sync and the motor and belt running (and usually squealing) against the clutch – it has been necessary to replace the motor in addition to carrying out the grease treatment. It tends to become lazy. It's best to replace the motor as an assembly, with the cam and bracket pregreased. This saves a lot of time and mess and the assemblies are reasonably priced.

N.B.

Ferguson 3V31/JVC HR7650

The problem with this machine was noise in the bottom inch of the picture – though there were a couple of clear lines below the noise. The tracking control, and adjustment of the guides, had no effect. It looked more like head switching point trouble. Judicious adjustment of the ch. 1/2 switching positions showed that the ch. 2 adjustment had no effect. The drum magnets were all present, the head hadn't been moved, nor had the drum flywheel. When I carried out checks around the drum servo I found that C53 in the pulse amplifier circuit was dry-jointed. A new set of loading rollers was also required.

N.B.

Hitachi VT64

This machine intermittently thought that eject had been pressed when in fact the operate button had been selected. There's nothing very complicated about the switch matrixing circuit. Most of the switches go to the syscon chip via the matrixing resistive ladder network RA9001, which is on the function switch PCB along with the switches themselves. When a switch is pressed a series of resistors is connected to chassis and the syscon chip and its decoding i.c. work out which key has been selected. The faulty item was in fact the operate switch, which had gone resistive. This fooled the syscon by in effect altering the resistance in the matrix ladder. Come back the piano-key Ferguson 3V(0)!

S.C.

Panasonic NV-G21B

The capstan speed was very slow and the tape counter was permanently counting or, as you could call it, free-running. The symptoms were present in both the record and playback modes while in pause the tape counter still incremented at ten to the dozen. We carried out a scope check on the control pulses at the audio/control head during record and found that they were missing. After a lot of head scratching we eventually discovered that the servo pack was shorting to chassis a link in the control pulse path. Normal operation was restored after relocating the servo pack and insulating the link.

S.C.

Toshiba V83

The sound was being recorded but not the video. It wasn't just a matter of head cleaning as we initially thought. Checks showed that the REC 7V supply at pin 6 of P202 on the head amplifier pack was missing. The regulated 12V supply was correct but there was no output from the record buffer transistor Q131 because its feed resistor R165 (22Ω, fusible) was open-circuit. Replacing this item restored normal operation.

S.C.

Panasonic NV-L20B

The customer's complaint was of distorted sound. It was a highly intermittent fault but we found that the E-E sound

became distorted and that the distortion could be recorded. Many things were replaced, including the tuner and the r.f. converter, all to no avail. When the machine had been in the workshop for a while the fault seemed to occur more often and we noticed that the luminance was shaded when it was present. This showed up more with the grey-scale bars from the pattern generator. On the hunch that the two faults were related we replaced IC701 (M51366SP) on the TV demodulator pack. This cured both problems.

S.C.

Hitachi VT64

This machine kept stopping in play or record, but the problem was extremely intermittent. Various mechanical items had already been changed, including a faulty capstan motor which we've known to cause this problem, but the fault persisted. The cause of the problem turned out to be totally electronic – that plague of all electronic equipment, dry-joints. Several were found around the 9V regulator Q605 on the servo board, also on R699. After resoldering these the problem had been cured permanently.

S.C.

Toshiba V85

Incorrect line sync in the cue and review modes is a fault we've had on several occasions with these machines. Each time we've found that replacing the TD6360N servo chip IC501 has provided a cure.

S.C.

Panasonic NV-G40B

This machine worked perfectly until its owner moved and tried to tune to another transmitter. It would search, and the stations could be seen as they passed, but the machine wouldn't lock. A look at the circuit suggested to us that the timer chip was responsible for channel search and wasn't receiving sync pulses back to say that a station had been found. We confirmed this when we carried out a check on the sync detect line at pin 11 of plug 7501 and found that it didn't alter. We then moved back to the sync detect chip where the voltage at pin 9 went low when a signal was detected. The route from this chip to the front panel is a devious one right around the board via several chip resistors. One of these had never been soldered at one end.

M.D.

Sharp VC681

The customer had for some time complained about intermittent operation – the machine would occasionally refuse to eject a tape. We'd soak tested it on a couple of occasions but had not been able to find anything wrong. Now the machine was back in the workshop with a note to say that the tape couldn't be ejected. After releasing the tape manually the machine worked perfectly. We suspected problems with the mode switch but decided to check out the mechanics. When we stripped down the master cam we found that there was considerable wear on the inner surface. As a result the mechanism would occasionally stick. We had no further problems after replacing the master cam. Alignment is critical and has to be followed exactly.

M.D.

Sentra GX8000

A common problem with these machines is failure to initialise. It can be cured by replacement of C821 (0.1F) in the reset circuit.

M.D.

Test Report: Semaht Signal-strength Meters

Roger Bunney

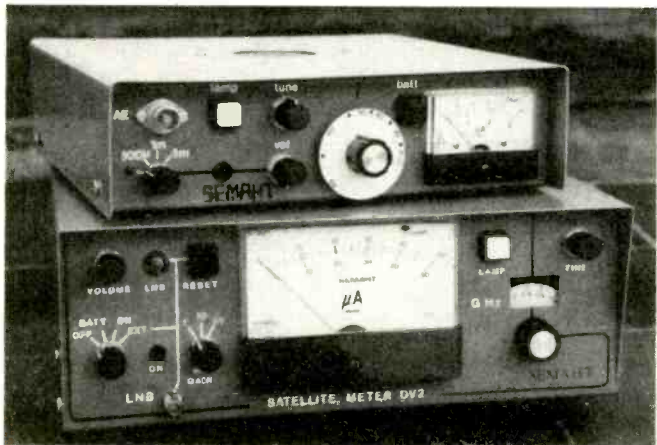
We have recently had for review two new field-strength meters from Semaht. The smaller one covers the u.h.f. bands while the larger one is intended for satellite TV installation work. Both units are ruggedly built and competitively priced.

UHF Meter

The u.h.f. meter is housed in a $9 \times 9 \times 2.5$ in. hammer-grey steel case and is relatively heavy at over 5lb. Control of the instrument is simplicity itself. In the upper left-hand corner there's a standard, surface-mounting Belling-Lee socket for the input from the aerial. The rotary range switch beneath this also acts as the on/off switch, the ranges being 0-0.3mV, 0-1mV and 0-5mV (0-3mV with early production versions). A nearby red LED shines brightly as soon as the meter is switched on. The lamp on/off locking push-button switch is positioned above the red LED: it lights a miniature bulb within the meter movement. Moving to the right you next come to a couple of rotary controls for volume and fine tuning. Maximum volume is rated at 500mW from an internal loudspeaker. The main tuning control is a smooth, rotary type whose dial is calibrated from ch. 21 to ch. 68 over 270° : the white dial is just under 2in. in diameter, with markings every five channels. This channel marking is adequate for installation work with the four-channel grouping system used in the UK.

The calibrated meter on the right-hand side is a high-quality movement fractionally under 2.5in. wide. The only other front panel item on the initial version is a black, non-locking battery test button which enables you to check the state of battery charge on all three ranges. At the rear of the case there are a standard chassis-mounting Euro socket for NiCad battery charging from the mains and an adjacent red neon that lights when the mains supply is connected for charging. In later production models this neon indicator is on the front panel. A hard-wearing, dark blue leatherette case with a non-adjustable shoulder strap is provided for external (rooftop) use: a Velcro self-adhesive strip fixes the flap that covers the meter's face.

I found the unit attractive and very easy to use. The dark blue front panel with its white lettering is easy to read in dim conditions. Signal measurements are simple and can be achieved quickly using only the main tuning control.



The two Semaht meters reviewed.

Fine tuning allows for a more precise adjustment. The meter would also be suitable for use in a measuring or testing facility, but for this purpose stick-on feet should be added to prevent damage from protruding bolt heads underneath it.

Coverage is roughly 460-860MHz, the selectivity of the meter being such that the vision and sound carriers can be tuned in individually and easily. The TV sound may seem to be distorted because slope detection is used: this doesn't matter for installation work and has the advantage that a.m., f.m. and unmodulated carriers can be monitored. The small loudspeaker is mounted on the upper part of the case.

On a full charge the internal NiCad batteries will run the meter continuously for three hours. Recharging takes twelve hours, i.e. overnight, via the internal mains charger. According to the manufacturer it should be possible to achieve up to thirty charge/recharge cycles before replacement of the NiCad batteries is necessary.

I feel that the lack of a headphone socket is a serious omission. Loudspeaker monitoring can be difficult outdoors. A continuous low-level whistle could be heard at higher volume settings. To charge the batteries the meter has to be removed from its case, which is not very convenient – it's a tight fit. It would make life easier to have a small Velcro-lined flap at the rear. We understand that a modified case is being introduced to take this criticism into account. It's unfortunate that the neck strap cannot be adjusted. If you are on the short side, having a long-strapped meter dangling from the neck while using two hands on the chimney is not good news.

Overall however I was impressed with the meter, which is relatively compact, rugged, attractive and easy to use, with no batteries to buy each week. Readings are accurate with both weak signals of less than $100\mu\text{V}$ and strong ones at up to 5mV. Adjacent range measurements compare fairly well – $150\mu\text{V}$ on range one for example reads the same within ten per cent on range two. Very low measurements on a given range relate less favourably on the adjacent ranges, but one would normally operate with at least half f.s.d.

Compared with other u.h.f. signal-strength meters currently available the Semaht one, at £160 plus VAT, represents good value. I'd recommend it for the rigger's van and feel that it would make a nice addition to a keen DX-TV enthusiast's equipment. It would be nice if Semaht would give consideration to a v.h.f./u.h.f. version for DXers, our Irish friends and the Continentals! The meter is available from Aerial Techniques (phone 0202 738 232 or send a s.a.e. for further details).

DV2 Satellite Meter

The Semaht Satellite Meter DV2 is a larger companion to the u.h.f. meter. It's built to the same rugged standards and is intended for dish installers, to give an indication of the signal available from an LNB, to check LNB current and for cable shorts, and for dish alignment. Again the steel case has a grey-hammer finish and the front panel is dark blue with white lettering. A large, 4.75in. high-quality meter movement, with signal-level calibration and a battery check mark, dominates the panel.

The controls call for a bit more explanation than with the u.h.f. meter. A four-position rotary switch has off, battery, on and ext. positions. The battery position gives a battery state indication on the meter. In the on position the meter itself is operative but a second red LED indicator shows that power is not being fed to the LNB. Pressing the adjacent reset switch changes this LED indicator to green and applies 15V to the front panel F socket, thus powering the LNB. The fourth rotary switch position ext. deletes the 15V supply to the LNB socket: it's intended for receiver-to-LNB connection, with the meter still on. The bright 'on' LED remains alight in the on, battery and ext. positions of the rotary switch.

With the version of the meter tried, application of the 15V supply to the popular Marconi LNB switches to vertical polarisation. With later production meters an additional three-position rotary switch on the front panel gives Astra vertical (14V), Astra horizontal (17V) or continuous tuning (17V) selection, making the meter easier to use.

The loudspeaker is mounted in the top of the case, as with the u.h.f. meter, and I heard the same low-level whistle at high volume settings. A pigmy bulb mounted inside the meter movement is controlled by the on/off lamp button on the right-hand side. There are separate tuning and fine tuning controls, the former having frequency calibration on a circular scale inside a window: the dial is marked every 100MHz from 0.9-1.8GHz, with an overlap at each end. Battery charging is again done from the rear, and the same comments and modifications noted for the

u.h.f. meter apply. Both meters come with a mains lead which fits in the wide side pocket. The gain control sets the meter scale readings to 1, 10 or 50mV f.s.d.

If the upper LED indicator remains red when the reset button is pressed it's likely that there's a fault in the LNB or a cable short – excess current is being drawn. At about 500mA the meter cuts off the LNB supply, protecting the satellite system and the meter.

At just over 8lb the meter is heavy. It measures $11 \times 8.25 \times 4.25$ in. The grey leatherette/vinyl carrying case has a wide, non-adjustable neck strap and a Velcro-fixing front panel flap.

Charging calls for an overnight session. Since the meter takes 0.2A without the movement lamp, the continuous running time will be less than with the u.h.f. meter. The manufacturer reckons that up to 300 charging cycles should be possible before the NiCad batteries need to be replaced.

Audio monitoring is the same as with the u.h.f. version. You can hear a signal before there's meter deflection. As the receiver's bandwidth is about 6MHz the audio and video signals can be tuned in independently.

As with the u.h.f. meter, I feel that an earphone socket should have been provided.

I found that the calibration and readings are accurate and like the meter very much. Again it's well made and robust, i.e. suitable for rough use outdoors. It can be recommended for use by dish installers and, with adhesive feet, would also be suitable for the test bench. Aerial Techniques can supply the unit at £375 plus VAT.

My thanks to Semaht for supplying the two units tested.

Satellite TV Aerial Systems

Part 3: Polarisers and LNBs

Satellite TV downlinks use two signal polarisation methods, linear and circular. Linear polarisation, vertical or horizontal, can be used to maximise the channel capacity of a given band of frequencies – 10.95-12.75GHz is used for satellite TV transmissions in Europe. The technique involves the simultaneous transmission of both horizontal and vertical wavefronts. This effectively doubles the number of channels that can be crammed into the available bandwidth, since two channels via the same satellite can share the same carrier frequency. In practice the channels are staggered in frequency to minimise crosstalk between the two polarisation senses. Channels with the same polarisation sense are said to be co-polarised while channels with the opposite polarisation sense are said to be cross-polarised. Fig. 21 shows the two linear polarisation senses: with a horizontally polarised signal the E field is horizontal with respect to ground while with a vertically polarised signal the E field is vertical with respect to ground. Three basic linear polariser designs are in current use. We'll take a look at each of these.

Linear Polarisers

Solid-state probe-selection polarisers employ a pair of probes that are positioned at right angles to each other. One is used to detect vertical polarisation and the other horizontal polarisation. A solid-state switching system, using pin diodes for example, selects the required output. An LNB supply of 14V might select vertical while 18V selects horizontal polarisation. These units tend to be noisy

Derek J. Stephenson, B.A., I.Eng.

and, due to associated losses, relatively inefficient. The main disadvantage however is that they can be used for only single satellite or satellite cluster (e.g. Astra 1A/B/C/D) reception. The reason for this is that with fixed probes no fine tuning or skew is provided.

With electromechanical polarisers an internal servo or stepper motor physically rotates the signal detector probe through 90° in accordance with the polarisation sense selected. These devices are becoming increasingly rare. They work under remote servo or pulse control and give good cross-polar isolation. The main disadvantage is that the moving parts tend to wear and may seize up altogether in cold weather. As with the electromagnetic type to be described next, fine control over skew is possible.

The electromagnetic or ferrite polariser is rapidly becoming the industry standard for both multi-satellite reception and some more up-market single-satellite systems. Operation is based on the Faraday rotation

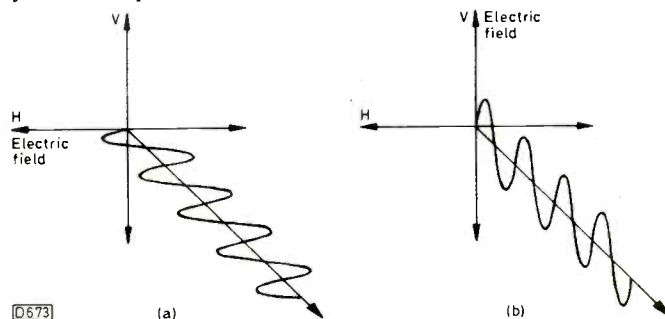


Fig. 21: Linear polarisation, (a) horizontal, (b) vertical.

principle, which twists the orientation of the incoming wavefront as required to that of the signal detector probe in the LNB. This is done by varying the magnitude and polarity of the current flowing through the polariser windings. These polarisers are extremely reliable and have an insertion loss of about 0.3dB.

Satellite receivers designed to operate with this type of polariser provide some sort of fine control (typically $\pm 15^\circ$) called skew over the amount of rotation. If vertically polarised signals are received when horizontally polarised ones have been selected at the receiver, either switch over the wires to the polariser or rotate the whole head assembly through 90° . Cross-polarisation attenuation with such a device is typically 20dB.

Circular Polarisation

Circular polarisation involves spinning the E field so that the transmitted signal is propagated through space in a spiral manner. Again there are two possibilities, right-hand circular polarisation (RHCP) and left-hand circular polarisation (LHCP). With the former the E field rotation is clockwise while with the latter it's anticlockwise.

Circular polarisation can be used in the same way as linear polarisation, to increase the number of channels available from a given satellite. With high-power DBS satellites however it's used for a different reason. With such satellites all channels usually have the same fixed single circular polarisation sense, either RHCP or LHCP. There's no need to extend the channel capacity because power considerations are the main limitation to the number of channels that can be broadcast. Interference is reduced by using opposite polarisation senses with adjacent DBS satellites.

The majority of DBS services operate in the 11.7-12.5GHz band. To receive both RHCP and LHCP with a single linear polariser it's necessary to add circular depolarisation. This can be done by embedding a dielectric slab at 45° in the throat of the feedhorn or polariser. If only one type of circular polarisation is being received however a head unit without a vane or dielectric slab will resolve the signals, albeit with attenuation of about 3dB. More elaborate methods of resolving RHCP and LHCP involve delaying the output of one of a pair of orthogonal probes by a quarter of a wavelength with respect to the other probe: the resultant output yields signals with one type of circular polarisation, reversal of the delay yielding signals with the other type of circular polarisation.

Skew Control

The use of linear polarisation leads to another complication. In addition to the 90° offset for polarisation sense selection, a fine adjustment called skew control, typically $\pm 15^\circ$, is often provided. The reasons for this are first that the vertical E field may not always be truly vertical. It depends on the angular offset between the satellite transponder and the receiving head unit. This error is difficult to calculate – it's mainly a function of satellite/receiver site longitudinal difference. The error is rarely greater than $\pm 15^\circ$. Secondly there's the fact that the amount of signal depolarisation during its downward journey to earth increases with frequency. Finally there's the fact that our old enemy rain can cause considerable signal depolarisation.

Correction for this effect with solid-state switched polarisers is simply a matter of rotating the LNB in its holder for maximum signal strength or minimum cross-

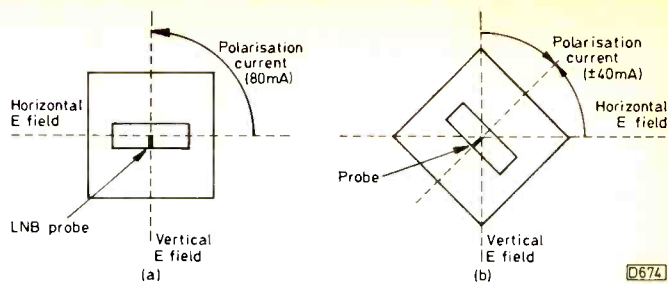


Fig. 22: LNB orientation, (a) square, (b) diamond.

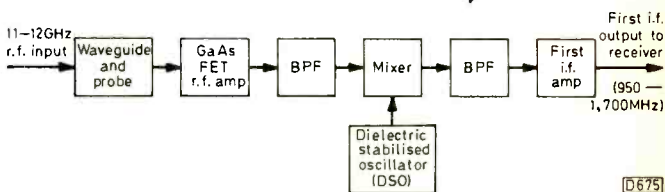


Fig. 23: Simplified LNB block diagram.

polarisation interference. The other types of linear polariser can usually be "fine tuned" from the satellite TV receiver. Such control is not necessary with circular polarisation.

Polariser/LNB Orientation

Electromagnetic polarisers are current-operated devices that usually work at 0-80mA or ± 40 mA to twist the polarity of the incoming waves to suit the orientation of the signal detector probe in the LNB. The former arrangement is shown at (a) in Fig. 22: the major dimension of the WR75 waveguide is horizontal. The incoming waves are either not rotated, giving resolution of vertical polarisation, or rotated through 90° for resolution of horizontal polarisation. The latter arrangement is shown at (b), where the waveguide is diagonal with respect to ground, the waves being rotated by $\pm 45^\circ$ as appropriate. Common terms in use are square or diamond orientations respectively.

Some polarisers can be used in either mode, with the coils designed to handle the extra voltage and current necessary for 0-80mA operation. In such cases the mode of operation is dictated by the control circuitry in the receiver. The diamond configuration is by far the more common arrangement in Europe. If you don't know the orientation or the head is fully assembled when purchased, a clue is that the polariser leads usually exit downwards. Remember to match rectangular waveguides or component parts dimension to dimension: use appropriate adaptors and O rings for any transitions between circular (C120) and rectangular (WR75) waveguides.

The LNB

The function of the low-noise block (LNB) is to collect the incoming, extremely weak, microwave signals, provide initial low-noise amplification, then down-convert the whole block of receivable frequencies to a band suitable for transmission to the main receiver via coaxial cable. The LNB normally has an overall gain of about 50-60dB, after which the law of diminishing returns comes into effect.

Fig. 23 shows a simplified LNB block diagram. The incoming microwave signal is converted to a small electrical signal by means of a probe positioned precisely in the throat of the LNB. This weak electrical signal is then amplified by a low-noise input stage, band-pass filtered and

applied to a frequency-changer circuit. The resultant first i.f. signal is again band-pass filtered then amplified and fed to the receiver via coaxial cable. Tuning to a particular channel is carried out at the receiver by means of a second down-conversion.

The low-noise input amplifier uses a gallium arsenide (GaAs) transistor of the field-effect type. Gallium arsenide transistors have the following three advantages over their silicon counterparts. (1) Electron mobility is much higher, shortening transit times and increasing the maximum operating frequency. (2) Low-power GaAs devices have low leakage currents and dissipate little heat when operating at average outdoor temperatures. This contributes significantly to the low-noise performance. (3) Due to their relatively large band gap GaAs transistors can withstand higher working temperatures. This can be a virtue at certain times of the year when solar radiation is concentrated on the LNB by the dish.

The LNBs used in cheaper packages usually have a noise figure in the region of 1.4-1.8dB. Table 1 shows how the noise figure is related to noise temperature at an ambient temperature of 290°K (17°C) – this is an alternative way of expressing the noise performance of an LNB. Noise temperature (T) can be calculated from the noise figure (NF) via the noise factor (F), using the following two equations: $F=10^{(NF/10)}$, where F and NF are in dB; and $T=290(F-1)$. This gives the noise temperature in °K.

A recent trend has been to the use of HEMT LNBs. These employ a HEMT (high electron-mobility transistor) device in the low-noise input stage. As the name implies, these transistors have even higher electron mobility than traditional GaAs f.e.t.s, the result being a higher maximum working frequency, lower thermal noise generation and consequently a lower noise figure. LNBs of this type are more expensive at present, but noise figures as low as 0.8dB have been quoted. This march of technology is remarkable: not so long since you'd be lucky, even with a yuppy's wallet, to get an LNB with a noise figure as low as about 2.5dB.

Tuning

Frequency conversion is carried out in the normal manner, with a local oscillator and a mixer stage. Doing this with sufficient stability, over such a wide frequency range at outdoor temperatures, was difficult until the advent of the dielectric stabilised oscillator. The entire block of channels in the required band is down-converted to a first i.f. of around 950-1,700MHz. This signal is coupled by the coaxial cable to the satellite tuner module in the receiver. The tuner performs channel selection by down-conversion to a second i.f. which is normally around 479.5MHz. This double-conversion method has three

Table 1: Noise figure/noise temperature at 290°K ambient temperature.

Noise figure (dB)	Noise temp. (°K)	Noise figure (dB)	Noise temp. (°K)
0.1	6.75	1.1	83.59
0.2	13.67	1.2	92.29
0.3	20.74	1.3	101.20
0.4	27.98	1.4	110.31
0.5	35.39	1.5	119.64
0.6	42.96	1.6	129.18
0.7	50.72	1.7	138.94
0.8	58.66	1.8	148.93
0.9	66.78	1.9	159.16
1.0	75.09	2.0	169.62

major advantages. (1) Since the channel selection circuitry is indoors the temperature will be more consistent, reducing the tendency to drift off tune. (2) The second down-conversion, being at much lower frequencies, can use conventional, low-cost tuning techniques. (3) More than one receiver, fed from a common aerial system, can receive any of the co-polarised channels in the block independently.

In times gone by devices known as LNCs (low-noise converters) were used. They were able to down-convert only one channel at a time rather than a block of perhaps 48 channels. Most current LNBs designed for the 10.95-11.70GHz band use a low-side local oscillator operating at 10MHz. Some wideband species are now available however. They can block down-convert more than one band, i.e. 10.95-12.75GHz, which covers the FSS (fixed satellite service), DBS and BBS (business band service) bands. A wideband polariser and feed unit must of course be used. The Marconi DF9605/6/7/8 Ku band feed/polariser units are suitable. They combine a wideband electromagnetic polariser with a wideband polyrod dielectric feed.

Common Head Faults

The outdoor head units used with most popular low-cost satellite TV packages have proved to be a little on the unreliable side. In view of this and other hassles that have plagued the industry some dealers and installers have decided to throw in the towel. The typical grumble is that "there's no money in it". The next generation of equipment is likely to be much improved and more reliable however, so those who stick at it are likely to mop up eventually. Meanwhile there's a large pool of out-of-guarantee repairs to help fatten the wallet.

Most head unit faults are due to rain water seeping in between the waveguide flanges, the F connectors and around the periphery of the feedhorn caps. After dismantling the unit and drying it out with a hairdryer, long-term reliability can be improved by overwrapping or moulding such areas with that pliable, putty-like type of self-amalgamating tape. It's sometimes necessary to change the feedhorn cap if exposure to ultra-violet radiation has made it brittle and cracked. If the pictures are still noisy, sometimes intermittently, after drying out, replace the LNB section. The old Marconi type of V/H switched LNB occasionally fails due to water leakage near the rivets.

Use of certain sealing compounds that contain acetic acid can rot the internal PCB. These compounds were occasionally used by installers to seal the F connector.

Loss of the vertically-polarised channels is a common fault that calls for LNB replacement. When changing an LNB of this type it's sometimes necessary to adjust the a.f.c. offset at the satellite TV receiver to obtain noise-free pictures. Loss of control with electromagnetic polarisers can usually be traced to broken or corroded connections: the polariser itself, being extremely reliable, can almost be ruled out.

Correction

Finally this time a correction to last month's instalment. Under the heading "the orthomodal transducer", "where one LNB is used for channels with vertical polarisation and the other, rotated through 90°, is used for the channels with vertical polarisation" should of course in the former case have read "horizontal polarisation".

Letters

RESPONSIBILITIES AND A WARNING

In the March letters page M.J. Bennett asks about the extent of engineers' responsibility. When a customer brings us a unit for repair we examine it before he leaves the shop and get him to sign that he left it in the present condition. This absolves the engineer of responsibility for things he hasn't been asked to do. You do the work requested and nothing more. The plug top is the customer's responsibility. If you don't make this sort of thing clear you could let yourself in for all sorts of problems.

I'd also like to comment on the letter from C. Barker on spare parts and their prices. While I sympathise with him I'd like to warn about some of the problems you can encounter. For example, I fitted an idler wheel to a Fisher FVHP615. With a service, my charge was £40. After a week it came back with the same problem, no rewind etc. Fitting another new idler provided a complete cure, or so I thought. It was back again a week later and this time I fitted another idler complete with gear assembly. This procedure was repeated a couple more times after which I ordered an idler direct from Sanyo-Fisher. It cost me almost twice as much as the ones I'd been fitting but solved the problem — the machine has been working trouble-free for over a year now. The net result of all this is that it cost me five times what I'd originally charged, and of course I couldn't pass any of this on to the customer. So the moral is that cheapest isn't always best when it comes to TV and video spares. I've had similar problems with head drums for Ferguson and Panasonic models.

D.W. Chadwick,

Dennis's Radio and TV Services, Worksop.

CAMCORDER FORMATS

I was interested in Colin McCormick's letter (April) on formats and standards, particularly with respect to camcorders. While agreeing with many of the points he made I feel that some of them are either a matter of opinion or personal preference, or relate to specific requirements.

With respect to current camcorder formats, it seems to me that customers base their choice on the use intended. The comparison between camcorder formats is similar to that between cine formats — the 16 and 35mm systems coexist peacefully, having quite separate applications.

An ever-increasing number of home video enthusiasts want to do more than simply edit errors from their completed tapes. When it comes to creative editing, quite good results can be achieved with a bit of imagination and the simplest of equipment — video enhancers, edit controllers, jog-shuttle search and genlock are not essentials.

The view that VHS is not a popular camcorder format because of the bulky tapes and machines is again a personal one. VHS-C tapes are not bulky, and if a tripod is used camcorder size and weight are immaterial. Many users prefer a certain amount of bulk and weight to ensure good, comfortable handling, especially if a tripod or monopod is not being used.

I chose a VHS-C camcorder knowing that I would want to edit the tapes. The recording time isn't too short if you use EC45 tapes — not many users would want to shoot

more than 45 minutes of tape at a time. In any case, after editing and copying on to a full-size VHS cassette the end product could be hours long if appropriate.

Although sales of S-VHS equipment have been poor many manufacturers currently have S-VHS models in their ranges. Some, including the JVC HR-D960 and Akai VS-A77, incorporate Nicam stereo. The Mitsubishi HS-B82 Nicam S-VHS machine has excellent edit capabilities with its jog-shuttle dial for accurate tape frame location.

To attempt to influence a prospective purchaser towards Video-8 is not really advisable unless the retailer can establish that his customer has the dexterity, creativity and perception to be able to make the most of a top-quality camcorder. Even if the prospective user has all these qualities he might not wish to produce video recordings of the highest technical and artistic excellence: perhaps more to the point he may not have that sort of money to spend on his hobby. I would suggest that the sort of person who would benefit from Video-8 is likely to be someone who has had a good grounding in cine work and wants to transfer to video. Others, who are content to shoot home videos of the holiday or family-event type, will find that VHS in any form is quite satisfactory.

All in all it's a question of what is appropriate — don't try to sell the customer a sledgehammer if he only wants to crack nuts!

Ivor Nathan,

Southgate, London N14.

SHARP SPARES

Your spares suppliers guide (April) listed several companies who supply Sharp spares. But in most cases the stocks held by these companies are limited to the fast-moving items commonly required. Only one company, Willow Vale Electronics Ltd., is appointed by Sharp. Consequently this firm carries Sharp spares in depth and is consistently able to supply well over 90 per cent of our parts on demand. This supply ratio, coupled with same day despatch, provides a service that's second to none.

Kelvin J. Yue, Group Manager, Technical Support,

Consumer Products Division,

Sharp Electronics (UK) Ltd.,

Newton Heath, Manchester.

EXPENSIVE SPARES

I read with interest Michael Dranfield's letter (May) in which he compared the cost of Hinari and Saisho/Matsui spares. When he said that Hinari parts are much cheaper he wasn't kidding. But these products also appear in the Amstrad range, and this firm really knows how to charge.

I ordered a part for an Amstrad VCR, the pulley assembly middle, part no. AM153203. As it's only a small pulley with teeth I thought it would cost a couple of pounds or so. When it came from CPC I couldn't believe the charge — £33.56. So I phoned CPC who confirmed that the price was correct. I told the young lady that I couldn't pay that — my customer would have a fit when I gave him the bill. She next put me on to the buyer, a very pleasant lady who was very sympathetic. The buyer promised to check whether a mistake had been made and get back to me. Well, I thought, we've heard that sort of thing before. But within an hour she phoned me back to say that she had been in touch with Amstrad to confirm the price, and that it was correct. More to the point she had some good news for me. If I ordered the equivalent Hinari part I could have it for only £1.68, a saving of £31.88. The part arrived within

a day and was indeed the same, with the same marks on the moulding etc. So I sent the first one back and was able to carry out the repair at a realistic price.

No blame attaches to CPC of course. They were very helpful and are main dealers for both manufacturers. Just how can Amstrad justify such a high mark up for a part like this?

So take heed when buying parts for Saisho/Matsui or Amstrad models. It pays to look at the Hinari parts first.

*Roger Alston, Focus TV,
Grays, Essex.*

SPARES FROM CHS

There were inaccuracies in the references to Charles Hyde and Son Ltd. in your spares guide (April). You correctly showed us as being official spares distributors for GEC and Sanyo, but omitted the fact that we are also officially approved spares distributors for Ferguson, Philips, Matsui and Saisho. We are not and have never claimed to be a supplier of spares for Samsung branded products.

We are parts stockists for Hitachi UK Sales Ltd. and have permission to use this company's logo in our literature etc.

Charles Hyde and Son Ltd. is the sole Sanyo spares distributor in the UK, one of the three official Ferguson spares distributors, one of the five official Philips distributors and one of several GEC approved spares distributors. We are one of the top five national spares distributors, covering the whole of the UK with our sales force.

*Freddie Whipp, Sales Manager,
Charles Hyde and Son Ltd.,
Prospect House, Barmby Road,
Pocklington, York YO4 2DP.*

SEE INFRA-RED/COMMENTARY-FREE SOUND

Use of a camcorder seems to be able to let you see very clearly the otherwise invisible output from infra-red remote control units. At least it does with mine, a Sony CCD-F450. Maybe this applies only with CCD image sensors? Perhaps someone could offer an explanation of this apparent light upconverter.

On another subject, now that we have stereo sound transmissions wouldn't it be an opportune time for the setmakers and broadcasters to get together and produce a selectable, commentary-free sound facility for sport, ballroom dancing etc. programmes? I don't know of anyone who wouldn't welcome such a facility — though I haven't spoken to many TV commentators! I'm under the impression that with some international events a common background sound signal is provided, a local commentary being added by different broadcasters in different countries. If so, the facility already exists on the broadcasting side. At the receiver a left-right switch would suffice as the simplest form of selection. The overall cost of such a system would be low and it would probably be a better selling feature than teletext or stereo itself.

*Gus Cusik,
Preston, Lancs.*

HELP WANTED

Could anyone supply a service manual or any technical information on the Philips v.h.f./u.h.f. wobulator type GM2877S? Expenses gladly met.

*Bill Mansell, 12 Dunstan Road,
Thatcham, Berks RG13 3QS.*

Can anyone supply a twelve-button programme selector unit for the Mitsubishi CP1623B? This item is no longer available from the manufacturer.

*Bernard Hunt, 7E Little Hereford Street,
Bromyard, Herefordshire HR7 4DE.
Telephone 0885 482 702.*

Can anyone supply a line output transformer for the Waltham 1401 portable TV receiver?

*B. Battams, 23 Dudley Drive,
South Ruislip, Middx HA4 6QN.
Telephone 081 845 5123.*

Can anyone supply a service manual for a Dawe Instruments r.m.s. valve voltmeter type 612A? All expenses would be paid.

*A.G. Chamberlain,
62 St. Luke's Road, Bournemouth BH3 7LU.
Telephone 0202 521 990.*

Can anyone supply the two bearings for the Panasonic NV333 video head not supplied by Panasonic?

*Michael Purdy, 90 Chancellors Way,
Beacon Heath, Exeter EX4 9DX.
Telephone 0392 68811.*

Can anyone supply a tube base complete for the Sony KV2705UB or KV2706UB? Either base will do, used or new. Sony can't supply.

*T. Kenworthy, 42 Lord Derby Road,
Gee Cross, Hyde, Cheshire SK14 5EN.
Telephone 061 368 3855.*

Can anyone supply combi chokes, circuit reference UA01, part number 525-462, for the NordMende portable colour sets sold by Thorn in this country as model numbers 8180/3787? I have three of these excellent little sets sitting on my workshop floor awaiting the parts — they've been there for months now.

*E. Longton, HTV Rentals, Unit 10, Croft Court,
Butts Road, Thornton, Cleveleys, Lancs FY5 4JX.*

Can anyone supply a line output transformer for the Salora Model 21K77 (K chassis)? There are two numbers on the transformer — FM0502 and BPL7332. Is there an equivalent?

*A. Davis, 55 Pentrepoeth Road,
Llanelli, Dyfed SA15 4HL.*

Can anyone sell me a Grundig VS220 and a JVC HRD220 for spares?

*D.A. Leefarr, Wigmore Cottage, Thruxton,
Allensmore, Hereford HR2 9BD.
Telephone 098 121 409.*

Can anyone supply the following chips, or provide information on them, used in the Commodore 64/Vic 20 computers: 901486-01, 901486-07, 93459?

*Donald Bills, 69 Greenfields Road,
Kingswinford DY6 8EG.*

I was one of the lucky punters able to snip up a Multipoint satellite receiver sold recently by Sendz Components. The problem is that these receivers were modified internally, with a new front-end and Plessey f.m. detector board. Any information on this modification would be appreciated.

*David Widdup, 6 Wigmore Close,
Ipswich, Suffolk IP2 9SW.*

Servicing the Panasonic G Deck

Part 2

Nick Beer

Last month we dealt with basic servicing procedures for the Panasonic G deck and provided a mechanical faults list. This month we'll deal with the electronics used in Panasonic VCRs that use the G deck. First however a point about reassembly.

When refitting the top cage-style lid to the cassette carriage in older models it's important to fit the very short brass screw that also secures the black earth lead in its correct location at the back right when viewed from the front of the machine. Fit the longer brass screw diagonally opposite, at the front left. If these two screws are crossed over the carrier will jam on its way down as the end of the longer screw impedes its travel. We've had this problem on a number of occasions. Even removing the screw won't always correct the problem as plastic flack created by the overlong screw penetrating the moulding will still be present. File flat and fit the correct screw.

Electronic Circuitry

As a whole the electronic circuitry used in the Panasonic models is extremely reliable. The only section that produces any regular service work is the power supply. Two different versions have been used. Fig. 4 shows the circuit in the original NV-G21/G25/D80 series. Models since the NV-G40 series have used a circuit similar to that shown in Fig. 5. Both consist of a chopper arrangement with linear regulation on the secondary side of the transformer.

The earlier power supply tends to suffer from fuse blowing and failure of the linear regulator chip IC1001, type STK5338. In the event of intermittent fuse failure look for dry-joints on the primary side of the circuit. Also check the mains lead and socket for arcing. To check the linear regulator chip, confirm that the unregulated inputs are present at pins 4 and 8 and that the power switching signal from the system control circuit, at pin 6 of P1001, isn't turning its outputs off. If all is well in these respects suspect the chip. As with many machines that use similar chips failure is not uncommon.

There are no real stock faults with the later circuit. Shorts in the mains bridge rectifier D1004 will result in a blown mains fuse (F1001) of course. D1014 going short-circuit will give the no results symptom - this tends to be associated with shorts in D1004. Failure of Q1004 will result in a low voltage on the non-switched 12V line, the symptom being no r.f. loopthrough. The key to successful fault-finding is to use standard TV techniques: confirm that there's no excess loading on any of the secondary rails, check the rectifiers on the secondary side of the circuit, check the start-up resistor network R1002 (82k Ω , 1W), R1003 (82k Ω , 2W), R1005 and R1006 (both 56k Ω), check for a switch-on pulse at pin 2 of Q1001 (C1003, 1 μ F, gives trouble), etc.

One or two other points should be made about the electronic circuitry. First, as with many other Panasonic machines, a lot of these models incorporate r.f. loopthrough cut-off when the machine is in the play mode. Some customers, particularly those who use the machine to feed more than one set, prefer not to have this feature. The appropriate line ("VTR ON") from the system controller can be disabled, for example by disconnecting the collector

of Q6006 in Model NV-G21. Other models can be modified by disconnecting the appropriate pin at the r.f. amplifier. Note that later machines use separate converters and amplifiers.

The solenoid drive circuit in the system control section sometimes gives trouble in the G21/25. Short-circuit driver transistors can be the result of a short across the solenoid coil due to a short in the flexiboard used for the connections.

Audio Bias Adjustment

There are few electrical adjustments. One that is critical for correct operation is the audio bias. The procedure for setting this is the same for all models, though the bias level varies (see Table 1). Fit a short-circuiting phono plug into the audio input socket and set the machine to the record mode. Connect a voltmeter across TP4002 (positive lead) and TP4003 (negative lead). Then adjust VR4002 for the reading shown in Table 1, to within 0.1mV. You don't need to remove the chassis as this preset is accessible through a hole in the PCB, from above. The bias setting has a drastic effect on the sound: it should be checked whenever a machine is serviced, and aligned carefully whenever the audio/control head is changed. The level can drift, causing degradation of the sound quality over a period that may be weeks or months. This can be cured by replacing the head and realigning the bias - the setting will differ with the new head.

Electrical Fault List

Here's a list of electrical faults we've had with these machines.

- (1) **VU meter levels don't tally with a mono signal (NV-D80 only):** Replace the display unit and realign the meter ranges.
- (2) **No video input from the BNC socket:** Check the switch within the socket. It often becomes defective when the

Table 1: Models and audio bias settings.

Model	Mechanism	Audio bias
NV-G21B	G	3.2mV
NV-G25B	G	2.7mV
NV-G40B	G'	2.2mV
NV-G45B	G'	2.2mV
NV-D48B	G'	2.2mV
NV-D80B	G	2.5mV
NV-F65B	G2	2.4mV
NV-F70B	G2	2.4mV
NV-F75B	G2	2.4mV
NV-FS1B	G'	2.5mV
NV-FS90B	G2	2.9mV
NV-FS100B	G2	2.6mV
NV-L20B	G REV	2.4mV
NV-L25B	G REV	2.7mV
NV-L28B	G REV	2.7mV
NV-J30B	G REV	2.7mV
NV-J35B	G REV	2.7mV

Note that Model NV-FS95 mentioned under the heading "Overview" last month should have read Model NV-FS90.

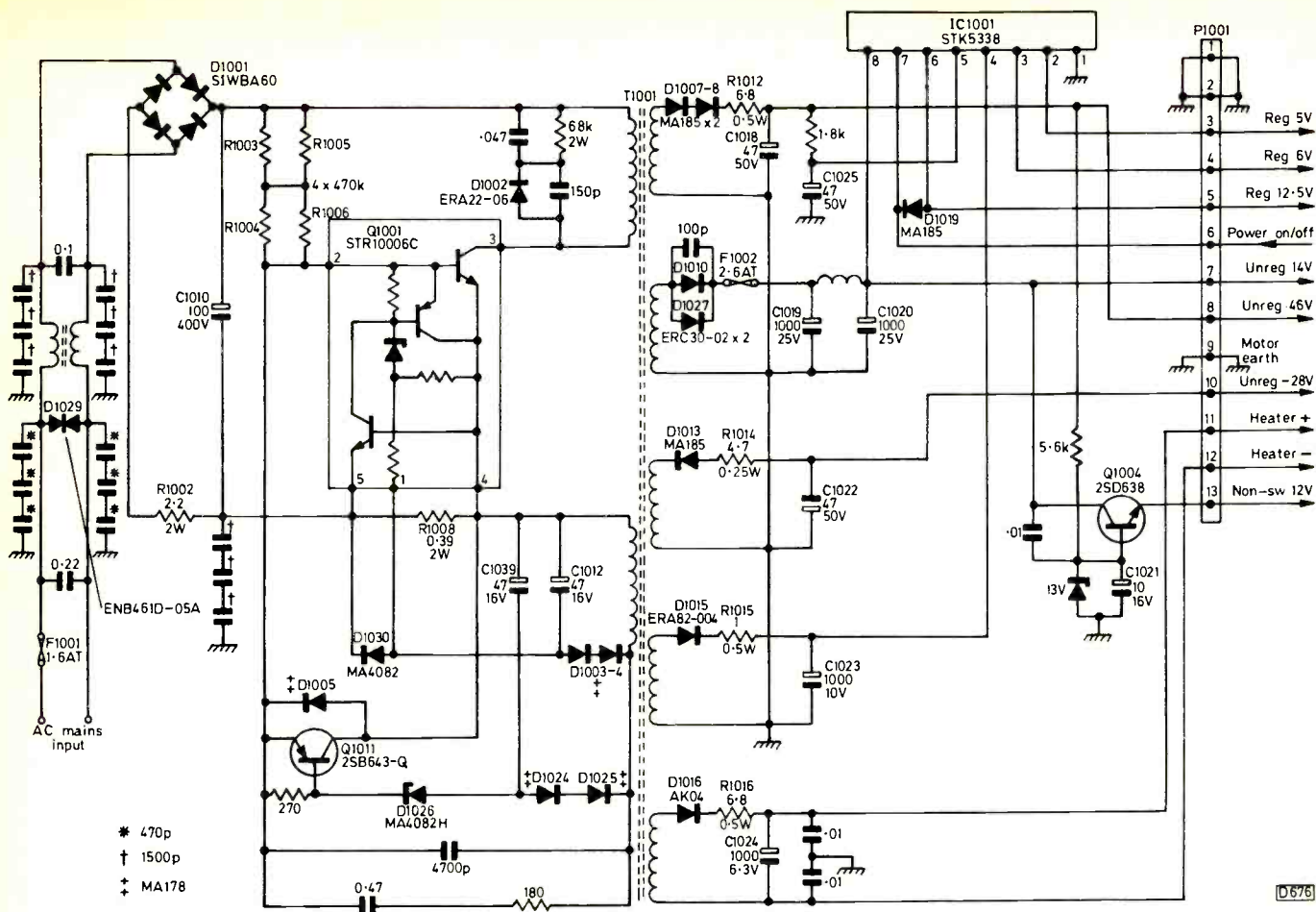


Fig. 4: Circuit diagram of the power supply arrangements used in the NV-G21/G25/D80 series.

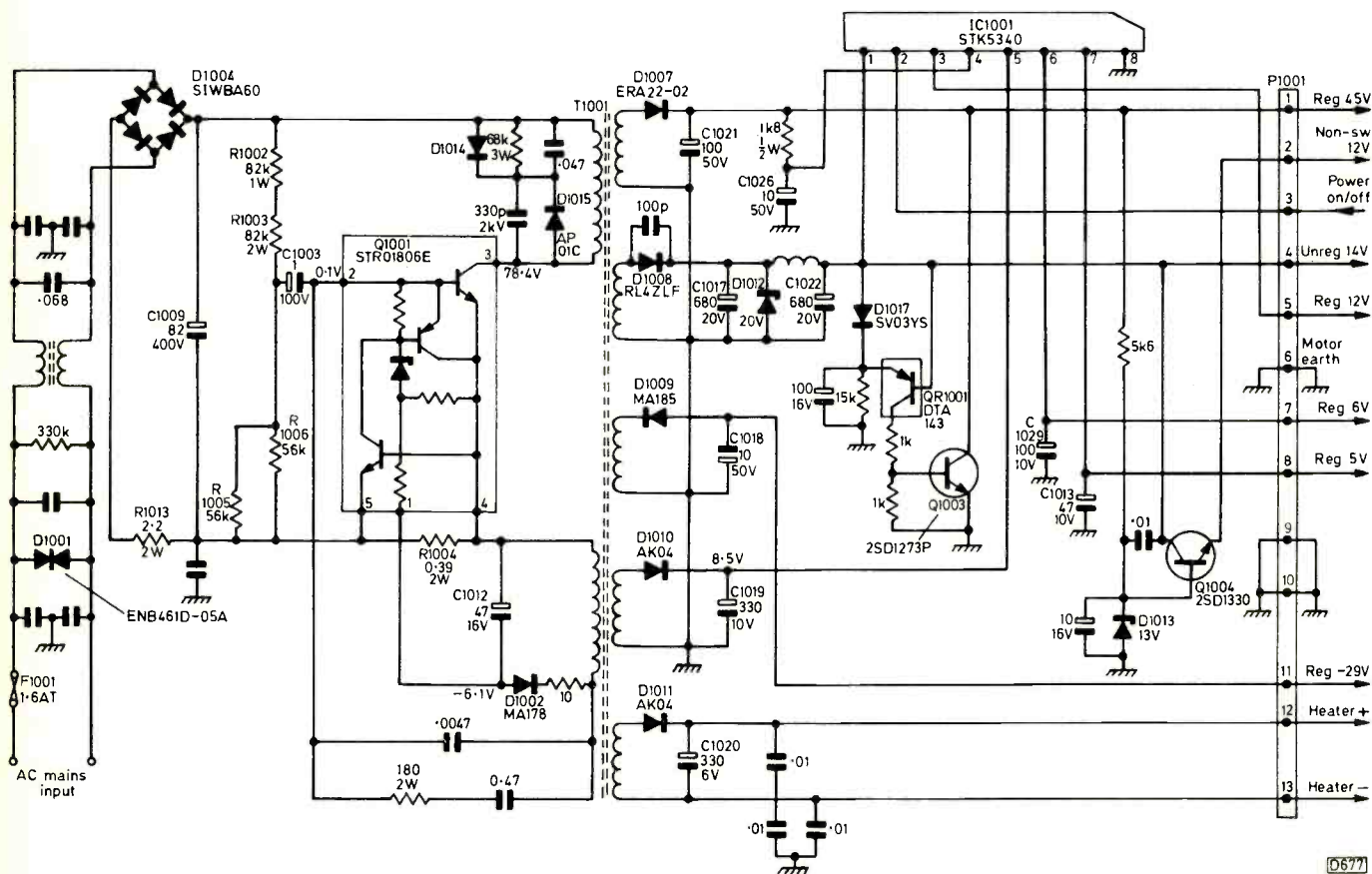


Fig. 5: Circuit diagram of the power supply arrangements used in the NV-G40 series.

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ICS

International Correspondence Schools, Dept. EGS61,
312/314 High Street, Sutton, Surrey SM1 1PR.
Tel: 081-643 9568 or 041-221 2926 (both 24 hours).

socket is used regularly. If the switch is o.k., trace the signal path through the input selector pack, where you will probably find that a buffer transistor is open-circuit.

(3) No vision in any mode via r.f. input, BNC input o.k.: Q3501 and D3502 on the input selector pack open-circuit (many would immediately condemn the r.f. amplifier/modulator).

(4) Switches on but no on/off light display and won't accept a cassette: This applies with the earlier power supply. Cause is no regulated 5V line because the STK5338 chip IC1001 is faulty. If other regulated lines are missing (check at the pins of P1001) this chip could be responsible.

(5) No go: With the later power supply, check for shorts in the chopper chip Q1001. Also check D1014 and D1004. If the mains fuse has blown, check D1004 and the diac D1001 across the mains input – the latter will sometimes be found blackened following a mains surge or a storm.

With models that use the earlier power supply, check the mains fuse F1001 which may have simply died instead of blowing. Check for dry-joints on the power supply PCB and for poor plug-in mains lead connections.

(6) No r.f. loopthrough, later power supply: As mentioned earlier, this can be due to failure of Q1004 in the power supply. It tends to go open-circuit base-to-emitter. As a result, the voltage at pin 2 of P1001 falls to about 5V.

(7) Low r.f. gain, Models NV-L20/J30 etc.: In these machines the r.f. amplifier is incorporated in the tuner, the modulator being separate. We've had quite a few machines with a low-gain r.f. amplifier, necessitating replacement of

the tuner. To do this the TV demodulator pack has to be unsoldered from the main PCB, which has to be removed from the machine. The tuner can then be unsoldered from the demodulator pack. P3001 has to be unplugged to remove the demodulator pack: it's very easy to forget to plug it back, the result being no playback f.m.

(8) R.F. amplifier socket problems, Models NV-G40/45: The r.f. amplifier input and output sockets in these models tend to break. They can often be repaired using a big iron and plenty of solder, but sometimes the PCB in the unit is cracked.

(9) Cutting out on all functions after a few revolutions: Check for loss of the reel tacho pulses. Even if they are present the cause of the trouble is likely to be the opto-interrupter (IC1501) under the take-up spool.

(10) Drum runaway or failure to start: This isn't a common problem but sometimes occurs with the G40 series which uses the cheaper direct-drive units. The Hall-effect devices tend to fail, and you get breaks in the coil PCB, especially around the plug on the DD unit. The Hall-effect devices are not available separately but you could do a transplant if you have an old unit with a different fault.

Remote Control Units

Most early machines came with a fairly standard remote-control handset. The digital bar scanner was introduced with this range of models, and subsequent versions include LCD displays. Later models have combined scanner/handsets. The only common problem is clogging of the small scanner hole through which the red light shines. The nozzle can be twisted off for cleaning. Some models came with a small brush for this purpose, but customers seem to be unable to manage this. The combined units with LCD displays tend to suffer from dirty, carbonised rubber contact mats, the result being dim or missing digits.

The scanner wallets tend to split if roughly handled. The scanner cards can wear, causing loss of codes, again if roughly used.

Spares Sources

Account holders can obviously obtain spares direct from Panasonic. Non-account holders are directed to SEME. Those who have accounts with Willow Vale can obtain many spares as Grundig parts. If this is your chosen source, use the exploded diagram in WVE's loose-leaf catalogue to establish what you want.

Matters Arising

One or two points on the mechanical side, dealt with last month, are worth making. First the underside rebuild because of timing problems is by no means an everyday occurrence. Secondly in later versions (G-Rev/G2) the capstan brake differs slightly and has no retaining slit washer. Thirdly the review motor used in the G2 version can be disconcertingly noisy, but this seems to be normal. A very useful guide that lists characteristics, including part numbers, for the four variants of the G mechanism is now available from Panasonic (part no. VRD8906T101).

Finally here's a correction. In the fault note on the NV-G40 in VCR Clinic, November 1990, the cause should have read the solenoid (VXA2693/VXA3735) not the relay.

Steve's Camcorner

Steve Beeching, T.Eng.

Doing estimates for camcorder repairs is a dangerous game fraught with pitfalls and traps that can be expensive. I therefore decided some time back that if an estimate is requested it has to be worthwhile – worth my while that is to fault find then prepare the estimate. I decided to break down the work involved and look at the costs.

- (1) We first have to book in the faulty camcorder, which may not be operational, give it a job number and generate paperwork.
- (2) The next step is to strip down the camcorder and where necessary restore operation at minimal cost in order to be able to assess the fault.
- (3) We have to ascertain the replacement components that will be required and their cost, including viewdata and telephone line time.
- (4) A written report with costings can then be provided for the owner/dealer.
- (5) Store the equipment.
- (6) If the estimate is accepted we have to order the parts. Again this involves viewdata/telephone line time.
- (7) Fit parts, align and check.
- (8) Find out that you got it wrong. Go back to (2).
- (9) If the estimate is refused, recoup time and component costs for work carried out.

Some service departments provide free estimates. Perhaps they give a "ball park" figure and guess, or maybe they spread costs throughout other repairs that do go ahead. I prefer to be fairer. In my view if an estimate is requested it should be on the basis that if you ask for work to be done it should be paid for.

Pitfalls

Here are some examples of the pitfalls that can arise.

A Panasonic NV-M7 came in with no operation. There was no mechanical reset at power up. After fitting a loading motor drive chip we found that the capstan motor was struggling, there was excessive sound warble and damage to the battery compartment near the capstan motor. We subsequently found that the dealer had dropped the machine.

We estimated for the chip, a capstan motor and battery compartment (£150). This estimate was accepted.

On fitting these items we found that the drum assembly was severely worn. A re-estimate of £450 was refused.

What would you do in such a case? The owner knew about the drum problem but hadn't bothered to mention it because the machine had subsequently been dropped.

A JVC GR-C7 had a jammed loading mechanism due to a loose tape exit threading guide. We fitted new plate springs to restore operation and then found that the video head was broken. So we estimated for fitting a drum assembly.

Note that on this model you cannot replace just the upper drum as the result will be instability – picture wobble and sound warble. Be warned – there are others like it!

Even at this point you can't know whether or not there's a colour record/playback fault unless you have detailed information from the owner. So the list goes on and on.

If a service department gets much of this sort of

estimating to do it's a crash course on going bust – unless estimates are charged for.

Luxor 9255

This machine gave us many headaches. The very intermittent fault symptom was that the sound would vary in pitch, indicating that the capstan speed had slowed right down. The machine would then go off. The owner said that it may power off in standby but couldn't be sure.

After many days of soak testing the initial fault occurred randomly. Based on the available information it seemed reasonable to replace the capstan motor. Naturally this failed to cure the fault! I left Darren to play with the machine and inspect the supply lines. After several hours I was told that just before the power went off there was a ripple on the power control output from the microcomputer chip. A more detailed check showed that the level rose from 5V to 8V with ripple. Thus the problem was caused by the permanent 5V output from the STK5482 regulator chip.

Sharp VC-C10

This camcorder is a clone of the Panasonic NV-M3, with a Saticon tube. There were two faults, an intermittent camera picture and a tracking error at the top of the screen. During the first cursory inspection it was obvious that someone had tried to deal with the tracking problem without success – by replacing the preamplifier and servo chips.

The tracking problem was caused by the video heads switching very late, leaving a noise band at the beginning of the field scan. The servo chip that's responsible for the PG to r.f. switching delay had been replaced. There's a variable delay control connected to one pin of this chip. Checks showed that this variable delay system worked and that the video head switching circuitry in the preamplifier chip operated correctly. So the cause of the fault didn't lie in the electronic head switching system or the delay arrangement in the servo section. As all the deck control functions worked normally we had to consider a mechanical fault. It didn't take us long to come to the conclusion that the PG magnet on the drum assembly was probably displaced with respect to the video heads, and that a new drum assembly would be needed to cure the fault – which it did.

The camera fault was more difficult. When the camera section was screwed to the deck it wouldn't function. When it was removed it did function giving good pictures.

If the camera section was removed from the deck whilst powered and in the fault condition it still wouldn't function – unless the power was removed then restored, which brought the pictures back.

The cause of the fault was in the high-voltage section of the camera's power supply. With the camera section connected to the deck the tube bias and anode voltages weren't present. This was unfortunate as most of the power supply components are on the underside of the PCB and are thus difficult to get at.

Several hours later I'd isolated the cause of the problem to three or four components in the high-voltage, switch-mode soft start-up circuit: one or more of the soft-start components had a dry-joint that was open-circuit when under stress. This stress on the PCB came from the cables bunched underneath it when the camera section was screwed to the deck. Resoldering these surface-mounted components provided a cure.

Fifty Years in Radio and TV

Part 6: The Coming of Colour, 1967-77

Harold Peters

Since the PAL system was the invention of the German engineer Dr. Bruch, the honour of starting the first European colour service was to fall to the West German TV networks. It occurred in the autumn of 1967, with a grand variety show that was taken by BBC-2 over the Eurovision link. The Germans proudly announced that twenty hours of colour a week would follow. In the UK the BBC kept quiet about the fact that live colour broadcasts had started in June, and that over forty hours of colour a week were being transmitted before the German services started. The situation prompted some of us to query the exceptional monochrome quality of Late Night Line-up. "Oh yes" we were told, "Line-up has been in colour for quite some time now to check for compatibility".

While Thorn used all-transistor colour chassis from the start, most setmakers adopted a hybrid design by Mullard. It used valves in the colour-difference, luminance and timebase stages and in the main it worked brilliantly. The dual-standard line output stage generated a nicely regulated 25kV e.h.t. supply at over a milliamp. To avoid neighbourly interference, its four large valves were encased in a heavy steel and mesh screening box. This came to be known to us all as the "smokestack" since well, never mind.

Dual-standard Broadcasting

It was two more years before BBC-1 and ITV joined BBC-2 in colour at u.h.f. This was a blessing in disguise, as it enabled us to take our time over getting to grips with the new techniques. Integrated circuits were by now beginning to put in an appearance in TV sets. They were also being used by the broadcasters in line and field stores for standards conversion. Overnight one weekend the BBC network feeds were all changed from 405 to 625 lines, and from then on each main transmitter had its own line-store converter to generate 405-line pictures. At almost the same time the two networks reorganised their arrangements to cope with the 405/625 duplication, which was to last for a decade and beyond.

The use of transistorised equipment meant that unattended operation was possible at most of the u.h.f. transmitting sites. But although there was co-siting, the two broadcasters had to adopt different approaches. Traditionally the BBC consisted of a "head office with small regional branches". This called for a tree-and-branch approach. The regional basis of the ITV system on the other hand called for a star configuration. The co-sited transmitters were operated on a "landlord and tenant" basis: the two broadcasters each owned roughly half the sites, giving the other leased access. This still happens and works well enough. At first they used to say that you could tell who owned a site by whether the entrance hall was covered with carpeting or coconut matting!

Production Engineering at Pye

By the time that I'd left the retail side and installed myself at the Pye factory at Lowestoft dual-standard sets were in full production. Apart from the need to tackle small problems on the line as they arose, our efforts were concentrated on the single-standard range of models that

were to take over as soon as duplication of the BBC-1 and ITV services at u.h.f. began. Mostly this consisted of removing the dual-standard switching. But an e.h.t. tripler was adopted to get rid of the "smokestack".

When I'd been engaged in the servicing side of the industry my concerns related mainly to the power supply and timebase sections of sets. Consequently it was with these parts of the receivers that I was most familiar. Murphy's Law saw to it that at Pye I was put straight into the i.f. and small-signals section, where overnight I was plunged into a world of bandpass tuned circuits, vestigial sideband filters and group delay responses. Not just for system I either, but also for the Continental B and G systems, since a good proportion of the sets were to be exported. I was lucky in joining a good, well-knit team of production engineers who put the product first.

Many of you on the domestic and retail side of the industry may wonder what exactly production engineers do! In short, they take the brainchild of the boys in the laboratories, conceived with the aid of all sorts of fancy equipment, and make it possible to mass produce this quickly, simply and cheaply. This production engineering work includes the test methods to be used. If you are involved early enough, there's the chance to go back to the designer to suggest minor changes to the basic specification "if we did it this way we could use our semi-band winding machine: this would raise the coil's Q by ten, does it matter?"

Years of field servicing had given me enough tact and diplomacy to last a lifetime, which was just as well as it was going to be needed. The previous merger of Pye and Ekco had left us with two experts in each subject. From time to time the production engineer would have to mediate between them. Cost was all important. Save a penny off each receiver and you became a hero for a millisecond. But what really disturbed me was the low priority assigned to serviceability. To get a servicing improvement adopted in a set it had to make factory assembly easier and cheaper at the same time. Looking at some of today's chassis, I get the impression that setmakers bother even less about the man in his van.

Because I'd been used to field servicing, and also to writing for *Television*, I collected two extra responsibilities. One was as secretary to the newly-formed Service Committee, a group set up to improve factory-field relations. The other was as factory librarian, to collate at a central source the mass of publications previously spread all over the place. As any librarian will tell you, the minute all books are tidily arranged in a room of their own people no longer consult them but ask the librarian instead!

The Dutch Connection

Being used to magazine deadlines made it easy for me to turn out readable minutes quickly. This got me to meetings that I wouldn't normally have attended. (A meeting is the employment of several experts at full pay plus expenses so that only one of them at a time can earn his keep.) As time progressed and we became more involved with Philips more Dutchmen from Eindhoven attended our meetings. They spoke excellent technical English, but made their important decisions quietly in Dutch. When it came to

passing the coffee round I would ask "met of zonder suiker" (with or without sugar). It was instructive to see their reaction. They would never speak a word of Dutch for the rest of the meeting.

The Dutch deserve credit for being excellent linguists. But, as you would expect, they express themselves somewhat differently from us. It tends to show in their service manuals. At Pye we fought to keep our manuals as English as possible for as long as practicable. Our insular ways sometimes produced some asperity in the correspondence. We would maliciously use archaic English phrasing. For example, "this having been done" left them wondering whether we'd done it or not, but I digress.

Duplication of services at u.h.f. was upon us, and with nearly everything in colour on all three channels sales of the single-standard range rocketed. Aided by a generous government budget, television hit its third boom (after the coronation and the coming of ITV).

Video Recording

Video recording had by now become the rule rather than the exception with the broadcasters. The techniques used made it impossible to distinguish between recorded and live programmes.

Plans were being laid in Japan and Holland to make video recording something that you could do at home. Up to now studios had used two-inch wide tape which was scanned vertically. Before long smaller decks that used one-inch tape and helical scanning took over and could even be accommodated in an OB van or car. When acceptable results had been achieved with a scaled-down version using cassettes of half-inch tape VCRs began to appear on our side of the business, initially for schools and commercial use. The upper management at Lowestoft made some home trials of early Philips N1500 machines but they came our way only when they broke down, which was quite frequently.

I once caught a glimpse of the factory test pattern played back via one of these VCRs. It impressed on me the belief, which I hold to this day, that while we were all doing our nuts to get the best possible pictures from the national networks the average viewer would be quite content with the reproduction quality offered by a home VCR.

Single-standard Colour

Domestic video was not to be with us for another few years however. Meanwhile we were kept busy changing viewers over to single-standard colour sets. At Christmas times our stocks became so depleted that dealers' small vans gathered around the despatch bay waiting for sets to come off the line with their valves still warm.

While our first single-standard colour set was still in the prototype stage a small metal disc was dropped into my hand with the comment "don't blow this up, there are only five in the county". It was our first i.c., and beside it was our first varicap tuner. The chip, a TBA350, replaced the intercarrier sound stages which we'd just laid out nicely in the available space. By carefully gathering together all the components that this item made redundant we were able to impress visitors with the amount of material, and space, saved by using the chip. It was the varicap tuner that provided the greatest benefit however. It removed all the mechanical problems associated with ganged capacitance tuning, made a.f.c. a doddle and opened up the possibility of remote control. Its only problem, which is still with us, is the non-linear voltage/channel relationship. This makes

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a.f.c. less effective at the higher end of the band than from ch. 36 down.

Field Work

Because of my servicing background I was delegated to visit dealers who had unusual problems. There was also a trip to Finland where our monochrome set of the time had been sent to their "Test House", a forerunner of the BEAB scheme. The Finnish testers checked for unsafe features by applying standard test fingers under pressure to knobs and ventilation slots. They tried to set the receiver alight and to wreck it in general. If the set failed any of these tests my job was to fix it so that the test procedure could continue. A batch of colour sets that for some reason didn't meet Scandinavian requirements found their way to Dublin, where I got involved in converting them back to standard I so that the lads could watch the programmes from Divis and Wenvoe - Telefis Eireann had not yet started to transmit in colour. These trips augmented my detestation of flying. Counting wartime trooping, I've spent about a hundred hours in the air. But the only trip that proved to be uneventful was a five bob one from Clacton airstrip.

We had by now forged a close technical link with a dealer, Roy Snelling, who operates in the heart of the Norfolk Broads. His firm was handling as many of our products as the larger multiples. Its premises consist of a converted and modernised laundry in the middle of a field near his home. By the time that I came to know him he'd become one of the largest dealers in Broadland. Most of his trade is derived from personal recommendation. His passion remains to keep abreast of technology, and our two-way exchange of technical information with him provided me with the opportunity to compare our product in service with the competition whilst taking laboratory-type readings.

More Technology

There was no stopping the advance of the technology now. Chips were taking over from transistors in the small-signal sections of the receiver. Our next colour decoder was on a board a quarter of the size of its predecessor. It had four chips and when the decoder didn't work they all pointed to each other and said "it's him". One day the owner of one of our earlier sets complained about slow field flyback: there was a series of twinkling lights across the top of his picture. The teletext era had begun.

TV Fault Finding

Reports from Philip Blundell, AMIEE, Jeff Herbert, Stephen Leatherbarrow, Mick Dutton, Ian Bowden, Nick Beer, J.R. Cutts and Steve Cannon

Philips CP110 Chassis

Repeated failure of the BUT11AF chopper transistor is a common problem with these sets. It can usually be cured by taking the following steps. Replace the BUT11AF and the TEA1039 chopper control chip, increase the value of C2661 to 2,200 μ F, remove C2657 if fitted, replace the CNX62 optocoupler and fit a 39 Ω resistor (part no. 4822 050 23909) in parallel with coil L5656. If the mains bridge rectifier has failed, fit 1N5061 diodes. Finally check that resistors R3658 (120 Ω) and R3659 (100 Ω) in the chopper transistor's base circuit haven't changed value. **P.B.**

Grundig CUC2401 Chassis

This set had no sound. The audio stage was working and the dealer had already replaced the TBA130 chip on the i.f. board. By injecting a 6MHz signal I discovered that the TBA130 wasn't working, though volume commands were present on the I2C bus line, the mute (koin) line was normal and the chip's supply was present. The internally generated supplies were missing however as C2276 (470 μ F) was short-circuit. **P.B.**

Philips CP90 Chassis

This set was dead, with no output from the power supply. There was a short-circuit across the 95V h.t. line but it didn't go when the scan coil plug was disconnected. C2695 (2.2nF), the protection capacitor connected in parallel with rectifier diode D6695, was short-circuit. **P.B.**

Philips 21CE5554 (2B Chassis)

This set wouldn't come out of standby. A quick look at the chassis showed that it had had a memory battery at some stage though this was not present. Now this late version of the 2B chassis (AG07) is fitted with an EAROM, X2402, and therefore doesn't need a battery. Suspecting that someone's attempt to fit one had damaged X2402 I decided to replace it. Normal operation was then obtained. **P.B.**

NEC PX1200K

After about an hour's use the small picture-in-picture became unstable. The top part would lean over to the right then the picture would eventually disappear altogether. ZD1 on the pip panel, a 5.1V zener diode that provides a stabilised supply for the 30MHz clock oscillator, proved to be the cause of the fault. **J.H.**

Philips CTX Chassis

This set came in with the now very common flat 2-4V battery on the remote control board. When this battery is flat the set becomes very forgetful of the various analogue settings, i.e. tuning, volume, colour etc.

After replacing the battery we found that there was no sound. The TDA2611A audio output chip's supply was missing because R3170 was open-circuit. When a replacement was fitted it quickly burnt up and went open. The cause of this was the audio output coupling capacitor C2182 (470 μ F, 16V) which had gone short-circuit. I then

remembered having had to replace this electrolytic on many occasions before, so I fitted a 25V type as a precaution. **S.L.**

GEC C1502

If the symptoms are field roll, which may or may not be intermittent, and loss of colour when the sound level is increased check the value of R817 (0.82 Ω) in the 13-6V supply to the TBA820 audio output chip. It tends to go high in value. **S.L.**

Luxor SX9 Chassis

Line driver transistor failure is becoming a common problem with these sets. It's a special type, BD419, available from NCS. If the problem is encountered it's best to change DH01 (1N4448), CH03 (68nF), RH02 (150 Ω), RH03 (6.8 Ω), CH02 (22 μ F) and, in stubborn cases, the line driver transformer LH01. It's also possible that RN19 (1 Ω) in the power supply has failed.

It's also vital to check the soldering to the large copper heatsinks, as these form earth continuity paths. The most important one is the print land in the area of the line oscillator chip.

When servicing these sets it pays to check the soldering on the chopper transformer, particularly at pin 1, the condition of the capacitors in the power supply and the condition of the mains switch. If you have difficulty getting a BD419 a TIP48 is an unofficial alternative. **M.D.**

Sony KV2096

There were two faults with this set. First, field foldover at the bottom of the picture with bent verticals at the edge. Secondly, red shading around white verticals. The cause of the first problem was C527 (470 μ F) which had become leaky. The second problem was due to loss of the focus voltage as R853 (1k Ω) had gone open-circuit. Though diode D852 measured o.k., when we removed it from the panel we saw that there was a split down its side where it was going short with the high voltage across it. **M.D.**

Toshiba 261T4B

The customer's report was that the set went off to standby while he was watching. We soon found that the line output transistor was short-circuit. A replacement was fitted and checks were made for shorts in the line output stage. As everything seemed to be o.k. we crossed our fingers and switched on. The sound came on but there was no picture and a nasty rattling noise came from the line output transformer. A check on the h.t. showed that it was low at 70V. We suspected a short in the transformer, but everything ran very cool. The next step was to check the various supply voltages on the secondary side of the transformer, to see if any were being loaded down. The 12V and 8V lines were low and the 140V line was at zero. Rectifier diode D143 was o.k. but the safety resistor R481 was open-circuit. Replacing this restored the picture and after setting up the focus etc. we were just about to refit the back when we noticed that there was slight line tearing. This could be made to come and go by flexing the PCB.

The cause turned out to be dry-joints around the line driver transformer. **M.D.**

B and O MX2000 (31XX Series)

This set would intermittently show severe field contraction, with no sound and the raster at peak white. If almost any part of the chassis was touched the fault could be made to come and go. Some careful prodding was required to find the most sensitive area. We then found that there was a dry-joint at RL28, the 1.5Ω 13V supply feed resistor. **I.B.**

Panasonic TC202G

The complaint was of intermittent field roll. It showed up after the set had been running for several hours on soak test. We noticed that it occurred only when there was a dark picture, e.g. on fades to black between programmes. The field would then roll together with the increase in black level. A scope check at the sync separator output (pin 14 of IC501) showed that there was no output at all when the fault was present, even though the sync content of the video input to the chip showed no change. Cold checks on the associated components then revealed that R508 (680kΩ), which is connected between pins 14 and 16 of IC501, had risen in value to over 900kΩ. **I.B.**

Panasonic TX1 (Alpha 1 Chassis)

Very intermittently this set would appear to flick off tune, then take a couple of seconds to settle down again. Sometimes the screen flashed bright blue when the fault started while at other times it blanked. We left a scope connected across the main secondary supply and after several hours the fault occurred: as expected, the supply collapsed momentarily. We shifted the scope to the non-isolated side of the supply to keep a watch on the chopper output of IC801, at pin 3. After a long wait, a momentary break could be seen in the spiky squarewave chopper waveform, with a flat 300V d.c. present. This confirmed that the chopper transformer's primary side was o.k. and that the chip itself was going open-circuit intermittently. **I.B.**

Ferguson SRA1

At least the handset that comes with these units is fairly reliable! This one was the exception. There was no infra-red output due to an open-circuit 1MΩ resistor (there are no circuit reference numbers). This proves that it's often worthwhile looking into a remote control unit rather than simply supplying a replacement. **N.B.**

Samsung CI537V

The only stock fault we've had with these sets, which have been popular for rentals, is failure of the TDA2653A field output chip. As you'd expect, the result is a blank screen. In each case I've found that almost no heatsink compound was used. After fitting a new chip with adequate compound I've had no further trouble. **N.B.**

Philips K30 Chassis

This set was stuck on channel 1, the remote control unit having no effect – neither did the manual controls ten minutes after switch on. The standby light would start to glow dimly and the set would then go into the standby mode, with channel 1 still displayed and much mush

coming from the speaker. Changing the text and remote control boards had no effect. Even the harness was checked. We then turned to the text power supply where we found that the 15V regulator IC005 was faulty. Replacing this restored normal operation except that we then had tripping which was cured by replacing the power supply. Had the faulty power supply killed the regulator? **J.R.C.**

Philips CP90 Chassis

A blank raster with no sound was the complaint with this set. We found that the 11.5V supply was missing at the cathode of thyristor 6726 in the standby circuit. It wasn't switching on therefore. The thyristor checked out o.k. but we found that diode D6733 (BAV19) was open-circuit. Replacing this restored normal operation. **J.R.C.**

Panasonic TX28W1 (Alpha 2W Chassis)

This set had been installed a few days previously. The customer's complaint was that the picture had a faint line of shading down the right-hand side. In the workshop however the picture looked perfect. I was then told that the fault showed up only when the lighting was subdued. After turning out all the workshop lights I found that the fault was exactly as described with low brightness or in the AV mode. Well, we couldn't work on the set in pitch darkness, and after switching the lights on and off a couple of times Pobs wasn't becoming too pleased – he was working on one of his favourite Philips C Rap VCRs and it wasn't doing his concentration any good at all. So a quick call was made to Panasonic who advised us to check a few electrolytics (what else with Panasonic?) on the secondary side of the power supply, as apparently some leads didn't get pushed through the board fully during production. After a lot of desoldering and resoldering we found that the negative lead of C858 (1,000μF, 25V) wasn't making proper contact with its solder land. The set worked perfectly when the lead was pushed through the PCB correctly and resoldered. **S.C.**

Toshiba 211T4B

The trouble with this set was ringing on any vertical lines at the top of the screen. It seemed likely that a decoupling capacitor in the line timebase could be the culprit so we started by bridging the electrolytics associated with the line oscillator in IC501. This soon proved to be fruitful when we discovered that C408 (10μF, 35V) was defective. It decouples the 12V supply to pin 33 of IC501. **S.C.**

Hitachi C2118

This brand new set was dead apart from the fact that the h.t. voltage was rather higher than the correct 112V. This suggested that there was no load on the power supply because the line output stage wasn't being driven, i.e. that there was a line oscillator or driver fault. In fact there was no line drive from the timebase generator chip. The reason for this was the fact that the voltage at the X-ray protection pin (overvoltage sensing) was high, shutting down the chip. If the voltage at this pin rises above 0.6V operation of the chip ceases. The 200V RGB output stage supply from the line output transformer is sensed via a potential divider consisting of 270kΩ and 51kΩ resistors and a zener diode. Checks in this area soon revealed that the 51kΩ resistor (R716) appeared to be open-circuit. Only

one leg needed to be desoldered because the other one wasn't making contact at its solder land. After picking it up off the floor, refitting and resoldering it normal operation was restored. S.C.

Panasonic TC1465 (Z1 Chassis)

Is it just me, or do others find they get the jobs that all and sundry have previously had a go at? This set was one such case. Pobs had started out by doing a repair in the power supply. Then, in his own words, it "went into self-destruct while it was running". Rob next decided to try his luck but quickly put it back on the floor. I do believe that even John Wayne around the corner may have parked his spurs in front of it at some time. But it doesn't matter. The job has to be done, and who's to do it? Yours truly.

As a result of all this several components had been changed. But the set was dead, with no h.t. on the secondary side of the power supply but a healthy 250V at the STR55041 chopper chip IC801. After checking various components in the power supply and for shorts on the secondary side I decided to disconnect the secondaries and place a dummy load across the 103V rectifier. As the set still didn't start up it seemed probable that the fault was in

the power supply. The 5V from the mains transformer T802 was o.k., and the optocoupler D811 was conducting as it should do if the set is not in standby. After much deliberation I removed the excess-current trip transistor Q801 and wound the mains input up via a variac. The set then started and the dummy load bulb glowed with pride. But this didn't give me any obvious leads.

Q801 checked out all right but a new one was fitted anyway and of course didn't improve matters. I then turned my attention to the current sampling resistor R811, which is in series with the chopper transistor in IC801 and is between Q801's base and chassis. Its value is shown as 56Ω. I found that it read o.k., but something started to nag at me. In other Panasonic chassis that have similar power supplies this resistor has a much smaller value, about 1Ω. The circuit definitely said 56Ω, but was this a misprint? For some reason it wasn't in the parts list, so I couldn't be sure. The original resistor from when the set "self-destructed" was then found. This didn't provide a clue because the markings had rubbed off. It was a shot in the dark, but another of these sets was found. R811 was removed and checked. It read 0.56Ω. When this value had been fitted the set worked correctly. A hasty correction was made to the circuit diagram. S.C.

TV and Video at the Trade Shows

George Cole

This spring saw the return of the Brown Goods Show, otherwise known as the Great Trek Around London as the companies involved stage their shows at venues scattered all round the capital. I managed to visit most of them, but there are a couple of notable absences from this report. Panasonic for example has placed a news embargo on its interesting new products until the autumn.

Better VHS

A number of companies demonstrated systems that improve the quality of standard VHS pictures. Although Super-VHS has been around for several years sales of S-VHS equipment have been disappointing – the format accounts for just seven per cent of the camcorder market and about two-three per cent of the mains recorder sector. S-VHS offers much better picture quality, with a horizontal resolution of 400 plus lines compared to 250 with standard VHS, but the hardware and blank tapes are expensive and S-VHS recordings aren't compatible with VHS machines. There's also a chronic shortage of S-VHS software.

The general feeling seems to be that VHS will be very difficult to dislodge as a mains recorder format. Picture quality is good enough for most people, the machines and tapes are inexpensive and there's an enormous catalogue of cheap VHS software.

Akai's VHS enhancement system is called Intelligent HQ (I-HQ), and some reviewers have gone as far as to say that it makes VHS almost as good as S-VHS. Akai claims that most VHS decks are set up to give optimum results with standard-grade tape and that the use of high-grade tape can thus result in poorer picture quality. I-HQ machines detect the tape type by analysing the off-tape Y f.m. signal level then adjust the playback circuits accordingly. There are five basic components of I-HQ: (1)

A switchable (normal/high grade) Y-signal record equalisation circuit that provides h.f. roll-off correction with high-grade tapes. (2) A variable emphasis facility that boosts detail enhancement during recording. (3) Two-mode (normal/high grade) switching to reduce Y signal loss. (4) Variable noise-cancellation level control for different grades of tape. (5) A line-noise canceller that can be switched off to improve picture detail. The system is controlled by a microcomputer chip that compares the Y f.m. signal with a preset level and then adjusts the five circuits.

So how does it look? Akai's demonstration at the Science Museum had a couple of large monitors coupled to I-HQ and standard HQ decks. Both VHS and S-VHS material was shown, and in both cases the detail leapt out at you when the I-HQ mode was switched on. Akai points out that I-HQ doesn't use any digital enhancement or fancy picture effects: it simply lets you see detail that most decks hide. I-HQ is very impressive, and it's easy to see why Akai is so bullish about the system. The company no longer markets S-VHS equipment and has put I-HQ on its VSF310EK, VSF410EK, VSF510EK, VSF600EK and VSA650EK VCRs and PVSC40 VHS-C camcorder.

Over in Piccadilly Nokia was showing its Active Sideband Optimum (ASO) system, which is included with VCR models VR3721, VR3731 and VR3761. ASO improves the picture quality with old, worn and copied tapes by preserving the h.f. signals normally lost during playback. The demonstrations showed the benefits of the system clearly, with the ASO pictures looking cleaner and clearer. Nokia plans to show an improved version, presently known as ASO Plus or Enhanced ASO, at the Berlin consumer electronics show this autumn. The ASO system will be offered to other VHS companies – Sanyo has already taken out a licence.

Mitsubishi's HS-MX1, HS-M34, HS-M45, HS-M54 and

HS-M55 VCRs feature Intelligent Picture Control (IPC), a system that analyses the off-tape signal and automatically adjusts the picture sharpness control. The HS-M55 also features "Quasi S-VHS", a system first seen with Panasonic's NV-W1 deck. It allows VHS decks to play S-VHS recordings but not to make them. The arrival of Quasi S-VHS has caused some confusion. Panasonic sees it as a way of increasing interest in the S-VHS format and making S-VHS more attractive to video software companies. Mitsubishi however sees it as a convenience feature that allows S-VHS camcorder owners to play their recordings via their VHS machines. This probably explains why the NV-W1's Quasi S-VHS facility offers a horizontal resolution of some 380 lines while the HS-M55's is just 250 lines. Incidentally Panasonic considered launching a budget Quasi S-VHS deck but found that expensive amorphous heads would be required. More details on these systems will appear in a future article.

TV Receivers

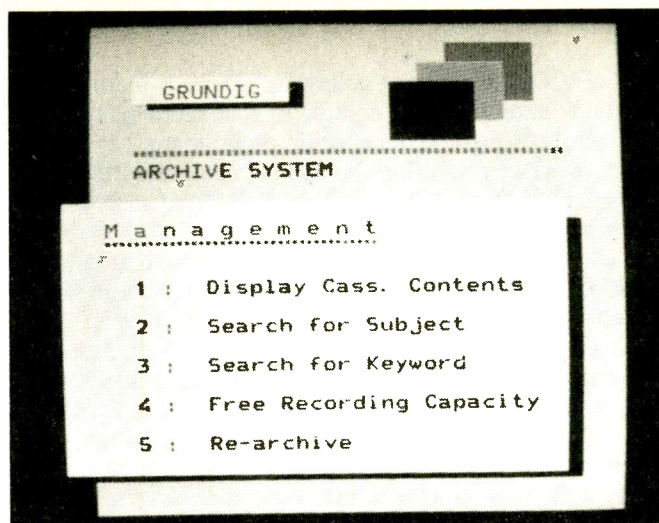
On the TV side the undoubted stars were the wide-screen, 16:9 sets shown by Ferguson and Philips. The Ferguson A86W is a 36in. set with a high-scan (1,250 lines) chassis. Other features include a satellite tuner, Nicam, Fastext and five scart sockets that cater for RGB and Y/C signals, satellite and terrestrial descramblers and a gold scart for HD-TV signals. The front of the set also has a Y/C socket and phono audio and video sockets. A 4:3 picture can be expanded to 16:9. This effect is achieved using analogue circuitry, both vertical and horizontal expansion being used to avoid distortion. The expanded picture looks remarkably clear, the main disadvantage being that parts of the top and bottom are lost – this could be a problem with subtitled programmes. Viewers can also move the 4:3 picture to the left-hand side of the screen and display three pictures from other channels on the right-hand side – Ferguson calls this effect POP (picture outside picture): there's also a PIP facility. The audio circuits provide 2 x 70W and there's surround sound capability. The A86W is due for release next September, at a price of around £3,500.

The Philips 8906 widescreen model includes a scroll facility so that the subtitles of expanded 4:3 pictures can be moved on to the screen. Other features include a field frequency of 100Hz to remove flicker, Nicam, PIP, Fastext and a surround sound system. There are two scart sockets and three Y/C sockets. The 8906 is due for release this autumn at a price to be announced.

A number of improved-definition TV (IDTV) sets were shown by Grundig. Basically these sets have a 100Hz field frequency to eliminate flicker and some noise-reduction circuitry. IDTV pictures are an improvement, especially with large-screen displays. Grundig's IDTV sets include the Cinema 117-100, a 46in. projection TV receiver at around £5,000; the M95-100, a 37in. model at around £3,000; the M82-100, a 32in. model at around £2,000; and the M70-100, a 27in. model at around £1,300. They are all multi-standard, Nicam-adaptable models.

Philips also intends to launch IDTV sets this autumn, starting with a 24in. model priced at around £800.

Nokia is to introduce three new TV chassis this autumn, the Euromono, Eurostereo and Eurodigi. The module concept used enables future developments to be incorporated: for example the stereo chassis is retrofittable for satellite stereo TV. The new sets will be fitted with Nokia's Black Planigon tubes. A demonstration with a conventional tube and the Black Planigon types showed how



Grundig's Archive system menu.

effective the latter are at reducing glare when lights around the sets were turned up. Nokia's 24in. Model SFN6332 will use the Euromono chassis while the 24in. SFN6363 and 28in. SFN7163 will have the Eurostereo chassis. Four Salora models will be fitted with the Eurodigi chassis, the 33in. Nicam 33E9U, 28in. 28E9U and the 24in. 25E7U and 25N6U.

Sony's new second-generation E series Trinitron sets incorporate a new digital comb filter. Models include the 24in. KVE2522 at £800 and the 28in. KVE2922 at £1,000. Both have two scart sockets plus front mounted Y/C sockets and Fastext. A clever reversible handset is included: one side has very basic controls while the reverse side looks like something from the flight deck of a space shuttle! It also doubles as a learning remote for other TV sets and VCRs.

Quite a few companies have introduced user-friendly remote control units. Ferguson offers an optional basic remote handset for some of its VCRs.

Mitsubishi's 25in. CT25B2STX and 29in. CT29B2STX feature a Nicam decoder, Fastext, NTSC 3.58/4.43 playback, RGB and composite video scart sockets and Y/C sockets. There's a powered swivel base that can be turned $\pm 15^\circ$ via remote control or spun through 120° manually. The 33in. CT33C1STX has a PAL/SECAM tuner and NTSC playback.

Sharp had 5.6in. and 8.6in. LCD TV sets on show though there are no immediate plans to launch them in Europe. Toshiba's "Products of the Future" show included a 32in. MUSE HD-TV set with an HD-TV VCR that uses half-inch tape.

If someone pops a motorcycle helmet on your bench it's probably the new "Discoverer" TV set from Philips. These sets are aimed at male teenagers and are priced at around £250. They are shaped like a Sci-fi motorbike helmet with a flip-up visor and rear-mounted wheels for adjusting the viewing angle.

VCRs

Grundig caused a stir with its VS960 VCR at £700. It includes Nicam, hi-fi sound and Fastext, but the star feature is its Archive system. This works in conjunction with the teletext timer system. Details of each recording are stored, including programme title, start and stop times, date, tape number and programme category, e.g. drama, sport, documentary etc. All the user has to do is to put the

programme into one of fifteen categories and number the tape.

The VS960 offers the following Archive features: (1) Cassette content lists the content of each archived tape and can run fast forward to a specific programme. (2) Subject search works by entering the subject category after which the machine lists all the archived tapes that include such programmes. (3) Keyword search enables you to key in two consecutive letters via the remote control handset. The VS960 then lists all programmes that have the same order of letters in the title. For example, keying in WO might produce "Wogan", tape 3, "World This Week", tape 12, "The Great Woods", tape 20. (4) Free recording tells the user how much recording time is left on each archived tape. This works by taking the difference between cassette capacity and the end of the last recording. (5) Re-archive enables the user to store in the system details of recordings made on other VCRs. In all details of up to 700 titles can be stored. Grundig plans to offer a memory upgrade that will double this capacity.

I was given some technical details of how this system works. A 64K EPROM (erasable programmable read only memory) is used for Archive software while a 32K EPROM provides the system control software, which was developed by Grundig. The Archive memory consists of a 32K EEPROM (electrically erasable programmable ROM) which keeps its contents when the power is turned off. The upgrade will consist of a second EEPROM. Re-archiving can be done automatically by searching for VISS index marks and recording the programme start and stop times. Programme details, e.g. title, are added manually. Manual re-archiving involves a search through the tape for the programme start and stop times.

Several companies demonstrated decks that use teletext codes to offer accurate time-shift recording. This autumn Channel 4 will begin labelling individual programmes with a teletext code. Suitably equipped teletext VCRs will be able to detect these codes and will switch on to make a recording only when the appropriate code is detected, switching off when a second code is received. This means that viewers won't miss programmes with delayed starting times. The system can even be used to follow programmes across channels, for example when Wimbledon is moved from BBC-1 to BBC-2. Philips calls this new system Programme Delivery Control (PDC). It will be included with Model 31DV3 which has a suggested price of £339. Mitsubishi is including it in Model HS-M45, at around £429, but won't call it PDC since the company feels that consumers wouldn't understand what it means. Mitsubishi thinks that the words "text programming" should be featured in a title for the system. Maybe they'll approve of Ferguson's idea - with Model FV54LX, at around £420, the system is called "Fastext Programming Plus". Let's hope that this confusion over terminology will be sorted out by the time that the first machines arrive in the autumn.

Hitachi is to launch an S-VHS VCR, Model VT-S890, with Nicam, hi-fi sound and NTSC playback at around £800. Sony has produced a stereo Video Walkman, Model GV-300E, at £700. Philips announced the PVR200, a portable VHS VCR with a built-in 4in. LCD screen and a PAL/SECAM tuner. Price is to be announced.

Camcorders

Philips demonstrated an S-VHS-C camcorder, Model VKR9500, priced at £2,299. It includes a built-in VITC (vertical interval time code) generator and has an ESP

(electronic still photography) system that provides high-quality video still pictures. A VITC-compatible edit deck, Model IHP6803/6804, is to be launched at around £1,000, also a colour video printer, Model SPR6400, at around £1,400.

Sony demonstrated a new Hi-8 camcorder, Model CCD-V800 (£1,200), that uses another time-code system called RC (rewritable consumer). This works by recording the time-code information in the small gap between the video/f.m. audio track and the PCM digital audio track. This space is currently used for the 8mm tape index system. Date and time information can be added to the time code and index data. The reason for calling the system RC is that users can add time codes to recordings made on machines without the RC facility.

Sony's CCD-F375 at £600 features a new "one-touch connection" system that connects the AV signals and power supply through the contact part of the battery plate. The power adaptor includes r.f. and AV signal outputs.

Ferguson's second 8mm camcorder, Model F802, is priced at £679. Samsung has entered the 8mm field with Model VC-E805P, priced at £600.

Satellite TV

The trend with satellite TV is to integrate receivers and decoders and to put them into TV sets and VCRs. Philips showed the STU801, an integrated Astra receiver/decoder which has sixty presets, remote control, three scart sockets, four stereo or nine mono audio channels and a four-event VCR timer with video recording lock. Philips will also be launching a VCR with a built-in Astra receiver, Model VR716 (price to be announced).

Ferguson is offering a satellite receiver retrofit service for its current range of Soundline TV sets and 24 and 28in. Monitor Line models. The price will be around £200, excluding the dish. Nokia also plans to offer a retrofit system for all sets with 25in. and over c.r.t.s. Sony's KVE2925(s) is a package that includes a KVE2922 TV set with integrated SAT503 tuner and a 60cm dish at £1,400.

Digital Audio

A number of DAT (digital audio tape) products were shown by Sony. The DAT Walkman, Model TCD-D3, is priced at £500. There were also a four-head DAT recorder, Model DTC77ES (£1,000), for tape monitoring and a car DAT player, Model DTX10 (£995.95), which features a non-tracking (NT) system. Technical details of this are sketchy. It seems that the NT format doesn't use the conventional rotary-head system for reading the audio data. Instead, the data is stored in a RAM. The advantages of the NT system are that it's cheaper to produce and is less prone to tracking errors in a moving vehicle.

Aiwa showed an NTSC multimedia DAT system that stores sound, still video and graphics on DAT tape. Eight-bit coding is used for the still video pictures and a horizontal resolution of 450 lines is claimed. A two-hour DAT tape can be used to store 1,400 video stills with audio, 800 computer graphics with sound, 1,700 eight-bit computer graphics or 7,200 four-bit computer graphics. Eight-bit non-linear coding is used for the audio, the dynamic range being 86dB. The multimedia DAT system can store images from camcorders, still video cameras, VCRs and TV tuners and has a standard RS232 interface to allow the sound and images to be fed into a computer.

Aiwa also announced a system for storing moving digital video images on DAT tape. It uses Intel's DVI (digital

video interactive) system, which compresses each image by a factor of 60. The audio system uses four-bit ADPCM (adaptive delta pulse code modulation) coding. No details of a European launch were given.

Sony is to launch an interesting CD player, Model CDP-K1, at £200. It works in the same way as a normal CD player but can also be used for the current karaoke craze –

singing along with voiceless backing tracks of favourite songs. The CDP-K1 has two microphone sockets and can reduce the volume level of the vocal track on a normal compact disc to enable users to follow the lyrics. There's a digital echo effect to fill out the sound, and the speed of the music can be altered to suit the user's pitch. You can't say I didn't warn you!

TEST CASE

342

Each month we provide an interesting case of TV/video servicing to exercise your ingenuity. These are not trick questions but are based on actual practical faults.

We've had our share of bounces lately. One of them, in which the root cause of failure of a set fitted with the Panasonic U2 chassis wasn't found until its second visit to the workshop, was described in test case 340 (April). On other occasions equipment has some back to the workshop shortly after repair with a fault that's not related to the original one – always a tricky situation.

Such was the case with a Panasonic NV370, a machine nearing the end of its useful life. It came to us originally with a tape-chewing fault. The cause and cure were immediately obvious: the reel idler was badly worn and barely able to turn the tape spools. After replacing it we checked the take-up torque and back tension then cleaned the heads and the tape path. As far as we were concerned everything was now all right.

After some weeks the machine reappeared, with the depressing message "still chewing tapes, recent repair no. 80215" on the job card. It was indignantly grabbed by the man who had repaired it before. Muttering and cussing, he took it to his corner of the workshop. A succession of clunks and whirrs, accompanied by expletives, marked the progress of his tests on the machine's mechanical functions. He finally pronounced it perfectly o.k. and went off, job card in one hand and torquemeter in the other, to grumble with the service manager.

The offending VCR was left on soak test for several days, alternately in the play and rewind modes, during which time it behaved perfectly. Finally Workshop Sage suggested that it be given a good go in the search modes. He said this often turns something up, like the bottom edge of the tape! So this was done and sure enough on the umpteenth start of backwards search (review) the tape tangled up. A pile of it came writhing out between the backwards-spinning capstan and drum exit guide. The deck then shut down and drew the tattered tape back into the cassette. But it was all over too quickly to see what had happened!

Next time the fault perked up, two pairs of eyes were watching the deck. It was observed that when the review key was pressed the left-hand (supply) spool failed to turn backwards to take up the tape. We were now getting somewhere, even if the tape wasn't. Close attention was paid to the reel-drive arrangement. The service manual helpfully provides a review-torque figure – 200g-cm anticlockwise at the supply-reel table. The machine was in tolerance at about 190g-cm, but we made a slight increase to about 210g-cm by hooking the soft-brake spring one notch up. This move was not very conclusive and further tests showed that it had not solved the problem. Occasionally, depending on tape type, temperature or whatever, the tape would pour out on to the deck when review was selected. Maybe the reel drive was intermittent in some way? The reel-drive belt and the idler assembly were replaced, but the fault persisted.

Finally Sage took a hand again. The deck couldn't be made to misbehave to order, but with a plastic wand and the machine running in the review mode he probed here and there and achieved a correct diagnosis. What was it, and why did the machine have to be returned to the customer unrepaired? See next month for the answer and another puzzle in the series.

ANSWER TO TEST CASE 341

– page 518 last month –

Mr. Evans, the customer mentioned in last month's test case, never had occasion to return to the workshop with his chain-saw. The very next day the problems arising from the addition of a Sony satellite TV receiver to his installation were solved to everyone's satisfaction.

The unwelcome TV receiver switching to its AV mode whenever the Sony unit was switched on was prevented by snipping the lead to pin 8 of the scart socket in the TV set – it's the signal-routing control line. Some satellite receivers have, in hardware or software, a means of disabling it. This is a point worth checking. Anyway, the user could now select AV or off-air sources as required.

The picture interference was caused by cross-modulation – the already very strong terrestrial u.h.f. signals were being given an extra boost by the satellite TV receiver's through amplifier. This problem was solved by fitting a 6dB coaxial attenuator in the aerial downlead once we'd confirmed that the VCR had no local/DX attenuator switch which, had one been present, would probably have cured the trouble.

Finally the handset problem. Philbert sold Mr. Evans a One-For-All universal remote control unit which is capable of controlling all three units.

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9000 Series	R/W Idler TY07
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VT8000-VT11	Reel Tables RTT2

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NVG7-NVG21	F/F R/W Idler TY14
NV366	VXP0433 TY10
NV366	VXP0401 TY10
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VR805/905	F/F R/W Idler TY15
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SHARP	
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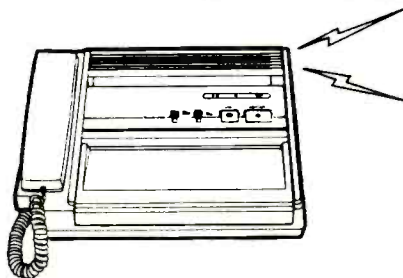
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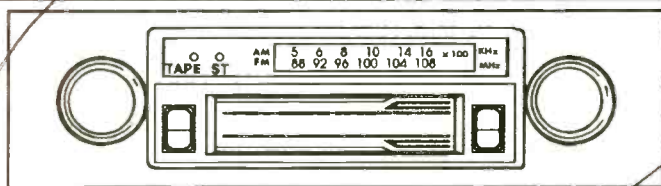
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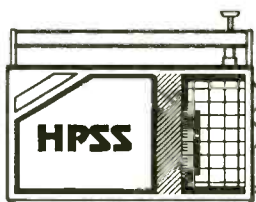
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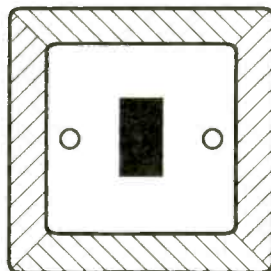
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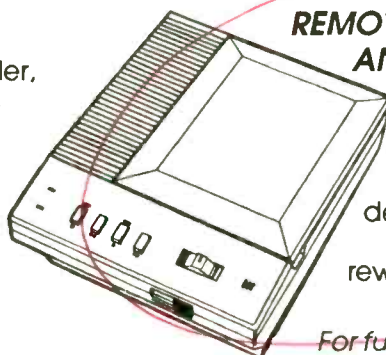
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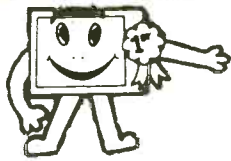
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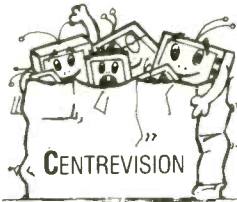
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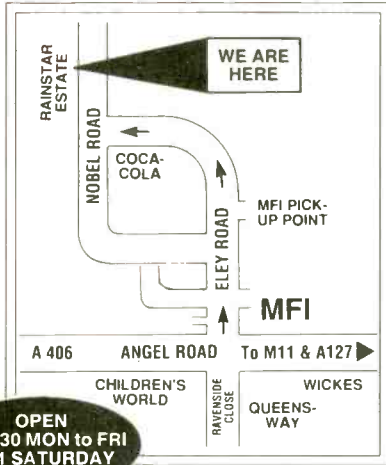
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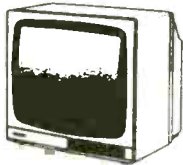
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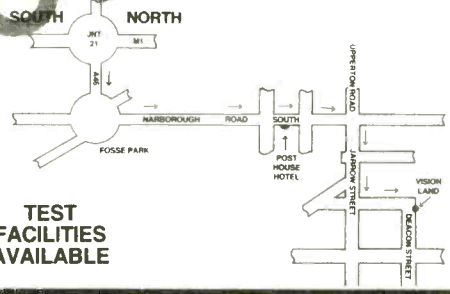
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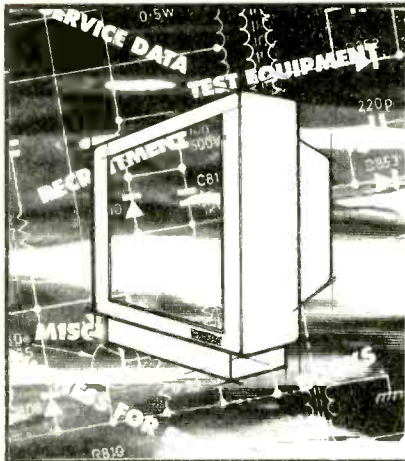
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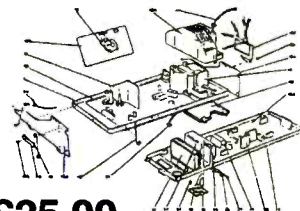
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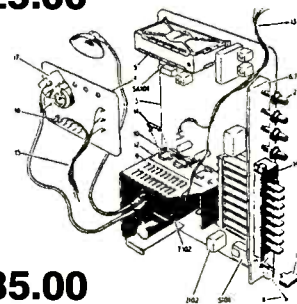
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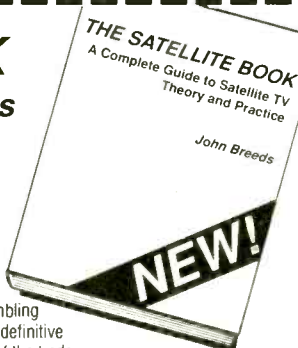
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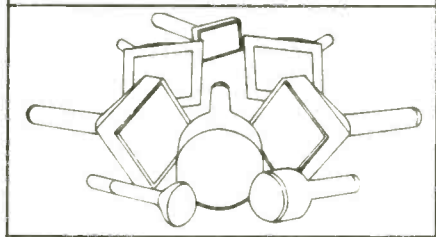
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