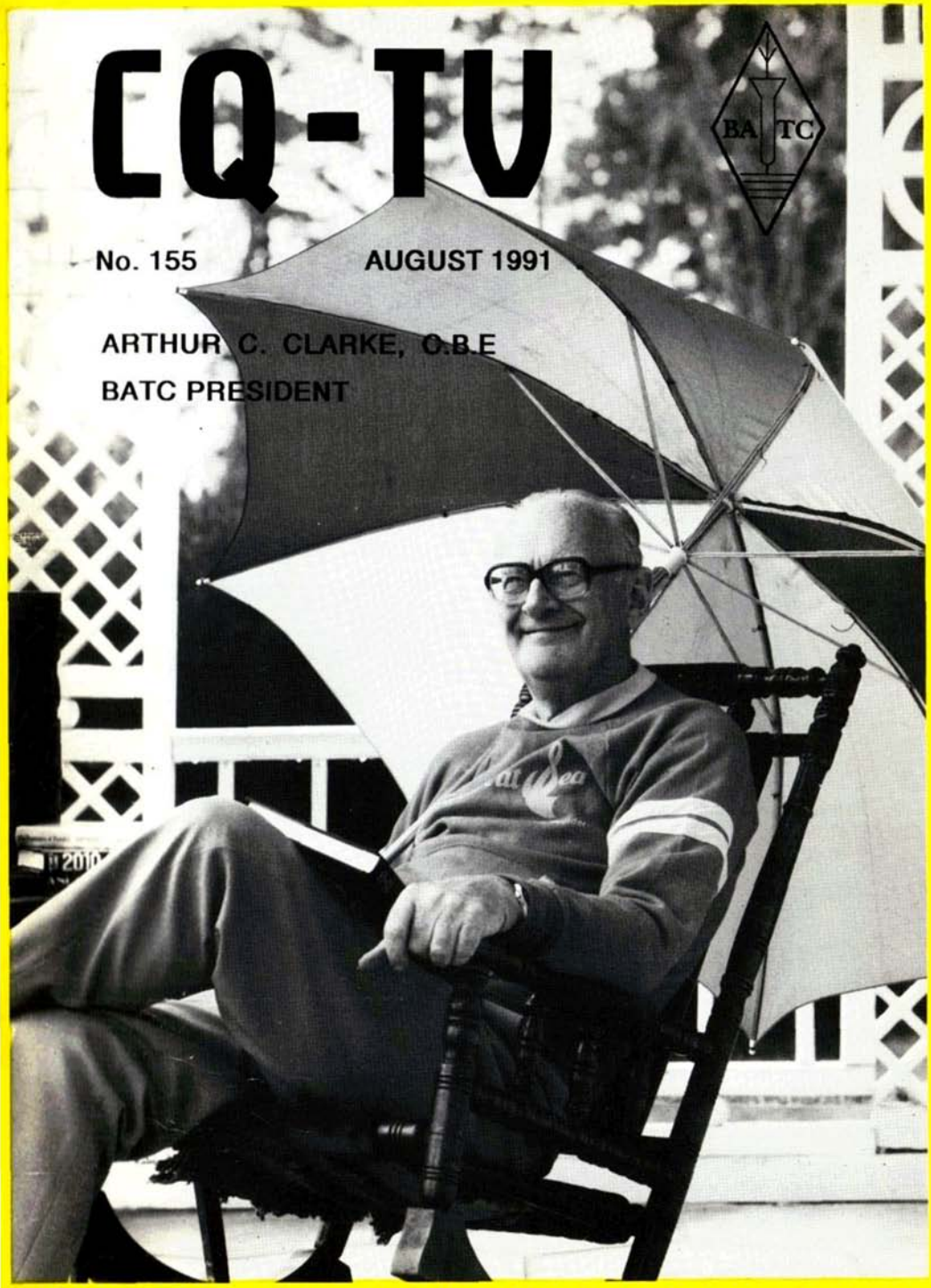
CQ-TV

No. 155 AUGUST 1991

ARTHUR C. CLARKE, C.B.E
BATC PRESIDENT



BRITISH AMATEUR TELEVISION CLUB

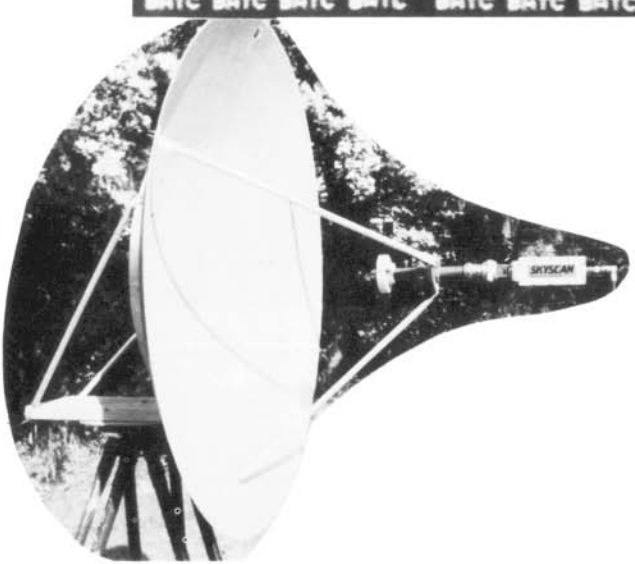
MICROWAVE PLUMBING

CIRCULAR WAVEGUIDE FOR 3cm

BOB

PLATTS

G8OZP



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The magazine is printed and bound by APEX PRINTERS of Rugby.

WHO TO WRITE TO

Members of the BATC committee are available to help and advise club members on any ATV related subject. Remember that all such work is done in spare time, so please try to keep such queries to a minimum.

CQ-TV MAGAZINE - Anything destined for publication in CQ-TV magazine or forthcoming BATC publications. Articles; review items; advertisements; other material. EDITOR: MIKE WOODING G6IQM, 5 Ware Orchard, Barby, Nr. Rugby CV23 8UF Tel: (0788) 890365 (Answerphone). FAX: 0788 890365.

CLUB AFFAIRS - video tape library; technical queries, especially related to handbook projects: TREVOR BROWN G8CJS, 14 Stairfoot Close, Adel, Leeds LS16 8JR. Tel: (0532) 670115

MEMBERS SERVICES - PCB's; components; camera tubes; accessories etc. (other than publications); queries related to such supplies: PETER DELANEY G8KZG, 6 East View Close, Wargrave, Berkshire RG10 8BJ. Tel: (0734) 403121

MEMBERSHIP - Anything to do with membership including new applications; queries and information about new and existing membership, non-receipt of CQ-TV; subscriptions; membership records; data protection: DAVE LAWTON G0ANO, 'Grenehurst', Pinewood Road, High Wycombe, Bucks HP12 4DD: Tel: (0494) 28899

GENERAL CLUB CORESPONDENCE & LIBRARY - Any general club business. Queries relating to the borrowing or donation of written material. PAUL MARSHALL G8MJW, Fern House, Church Road, Harby, Nottinghamshire NG23 7ED: Tel: (0522) 703348

PUBLICATIONS - Anything related to the supply of BATC publications. IAN PAWSON G8IQU, 14 Lilac Avenue, Leicester LE5 1FN Tel: (0533) 769425

EXHIBITIONS AND RALLIES - also arrangements and information about lectures and talks to clubs; demonstrations etc: PAUL MARSHALL (address as above).

CLUB LIAISON - and anything of a 'political' nature; co-ordination of ATV repeater licences: GRAHAM SHIRVILLE G3VZV, The Hill Farm, Potsgrove, Milton Keynes, Bucks MK17 9HF. Tel: (0525) 290 343

PUBLIC RELATIONS AND PUBLICITY - IAN SHEPHERD, Grosvenor House, Watsons Lane, Harby, Melton Mowbray, LE14 4DD. Tel: (0949) 61267

TVI & RADIO INTERFERENCE - problems of this nature to: LES ROBOTHAM G8KLH, 38 Ennerdale Avenue, Stanmore, Middx. HA7 2LD. Tel:(01 907) 4219 (not committee).

CONTESTS - BOB PLATTS G8OZP, 8 Station Road, Rolleston-on-Dove, Burton-on-Trent. Tel: 0283 813181.

CQ-TV AWARDS - BOB WEBB G8VBA, 78 Station Road, Rolleston-on-Dove, Burton-on-Trent, Staffs, DE13 9AB. Tel: 0283 814582

Where possible it is better to telephone your query rather than write. Please do not call at unsocial hours. As a guide, try to call between 6.30 and 9.30pm evenings and not before 11am at weekends.

POSTBAG

REVOLUTIONARY COLOUR!

Dear Mike,

I read with great interest all the letters, comments and articles concerning bandwidth and whether to colour or not to colour on 70CM. Since I have no experience as yet of either transmitting or receiving I will not argue with those who are qualified to speak on the subject.

Can I ask one question please? What about the Peter Hardcastle VSB filter (CQ-TV 136 page 42). This would seem perhaps to be an answer to the colour question, though maybe some scheme of volunteers to align (& construct?) such filters might be necessary.

Whilst I'm a bit short on practical experience of ATV, my 23 years with the BBC have taught me something about television systems. I have a couple of ideas that could be useful to ATV.

Firstly, if there is not enough room for standard PAL, then what about a half-PAL system? In other words, if we have to roughly halve the luminance bandwidth then what about halving the chrominance bandwidth, and more importantly, halve the subcarrier frequency. 2.216809MHz and its sidebands (+/-600kHz) would fit in a 3MHz bandwidth. Using exactly half PAL subcarrier would mean that a standard crystal (with division) could be used, and a coder, such as John Goode's, would be a good subject for modification. Circuit values would need changing, as well as delays, but I'm sure it is possible. I haven't done any experiments to see what it would look like, but I think it's worth a try - what do you think.

My second idea concerns providing sound on 70cm, again within the 3MHz bandwidth recommended by the Club. I have been working for some time on a sound-in-sync system for amateurs, and hope eventually to have a project available for the magazine. However, due to time being of the essence at present I still haven't a working prototype. I am confident that I can make it work but no promises about when!

So, there you are Mike, a couple of revolutionary (?) ideas. I thought that as CQ-TV editor you should be aware of all the schemes, even those that are only on paper. I would be interested in anyone's comments.

Regards .... Peter Carliell

Many thanks for a most interesting letter Peter, which I have taken the liberty of editing a little. I too would be interested in any comments from our members, and even more interested in receiving the project!!!! ... Mike.

A SAD LOSS!

Dear BATC,

I felt that I should mention why my subs have not been renewed.

My interest in TV is Slow Scan, demonstrated by the designs contributed to CQ-TV. I still have this interest but my design work has moved into other aspects of amateur radio.

I know there are, today, members developing SSTV equipment, but for some reason wish to keep it to themselves, which is a great pity.

So little has been published in CQ-TV recently that I feel, that despite it being a first class magazine, there is insufficient to interest me.

I think SSTV has lost its way now that so many formats exist, a condition, I hope, is only temporary. Maybe things will sort themselves out in the future.

I wish the club well and will, of course, continue to answer the odd phone calls and letters I receive requesting technical assistance.

73 ... Peter G4ENA

Many thanks for your kind words and the wealth of articles and technical material you have given to us in the past Peter. We wish

you well and success in whichever aspect of our hobby you are involved with ... Ed.

TA MUCHLY!

Dear Mike

I know this is a bit late but I must write to say thank the club for this year's convention. It was only the second I have attended, but better than last year's.

The only improvement I could suggest would be more displays by members, but I'm not carping and I know that the effort needed is down to the membership. I shall be doing something myself one day, but I can't say when.

Would you please pass on my thanks to all the hard workers on the committee, and also to the wives and girlfriends who either actively helped, didn't object, or coped with the children on their own all day.

Lastly, may I ask that the convention remains at Harlaxton Manor? It is some 130 miles for me, but that's an easy trip on the A1, and I can pop into my mum's in Peterborough for a cup of tea on the way home.

Regards ... Peter Carliell.

Thank you Peter ... Mike

VIDEO MIXING DESK & EFFECTS GENERATOR

Dear Mike,

You may remember I contacted you recently concerning the above recent project in CQ-TV. I have now completed the unit but I have a few problems with it. I am therefore writing to you to ask if you would be so kind as to put in the next edition a request, asking if there are any members who can offer help.

The main problem I am experiencing is that when inputting two or more video sources I have problems with the sync. All the effects work as they should and indeed 90% of the unit works fine, but it is this fault that is causing me problems.

I there is anyone out there who can help or who has built the unit I would love to hear from them. If they phone me I will phone them back so that the cost of the call is mine.

Many thanks ... Bill Allen G4RUQ

Bill Allen, 'Lydgate', 39 Deerpark Crescent, Wingerworth, Chesterfield, S42 6XE. 0246 236756

THE LOWESTOFT & GREAT YARMOUTH REPEATER MANAGEMENT GROUP

Dear Mike,

Reproduced on the address label of CQ-TV 153 was a very useful map of ATV repeaters in the UK. On this was marked a new 24cm ATV repeater GB3LO and I thought that BATC members would appreciate the following update.

The repeater is managed by the above group (Chairman G4YFQ, Secretary G0FIY and Treasurer G4KDL). Our repeater builder is Ray G4RKP and at present the project is well on the way to completion. The logic is similar to the Norfolk ATV repeater GB3TN and the test card is a design from the ATV Handbook. The RF side of things will be Wood & Douglas units. The aerials will be a pair of Alford Slots.

The repeater will operate on channel RT2R, input 1249MHz, output 1318MHz from the same site as RB14 repeater GB3YL, also managed by the group. The all important licence is still being processed, but the group hope to have GB3LO on air by mid-summer.

Several locals, including myself, have been building fro the project in recent months, including G0MIV, G1XUV, G5PFG and G4RRX. There must be other interested amateurs who would be in range of the box, so start constructing and see you on GB3LO.

73 ... Paul Godfrey G8JBD.

NEWS ROUNDUP

10GHZ THE EASY WAY

A short note just to let you know that part-4 of Jim Toon's series has not been published in this issue, but will appear in CQ-TV 156. This is due to a recent illness suffered by Jim, which precluded him from completed the article in time.

APOLOGY FROM MEMBERSHIP DEPT.

Can I apologise to the Australian ATV Club Secretary who wrote to me in February/ March requesting membership details and a variety of other information.

Unfortunately I lost his letter so we have not been able to reply. If anyone out there who knows who it was could pass on the message I would be greatly indebted. I will try and do better with their next letter.

Dave Lawton, Membership Secretary

£100 VIDEO CAMERA ?

Miniature video cameras for around £100 could be available in the near future if the new technology from VLSI Vision fulfils its promise. Instead of using the normal approach of CCD (Charge Coupled Device) coupled to an external processing system, the new technique uses ASIC CMOS to implement an array of photo-diodes and a signal processing system all on a single chip the size of a 5p (25mm2). Automated exposure control allows cheap plastic lenses to be cemented directly onto the chip - the large amount of processing power available also allows the output signal to be in a standard format, for example composite 1V peak-to-peak.

The team from Edinburgh University who developed the idea is also considering a number of other image processing devices. Soon to be announced is a fingerprint verification device that uses 100,000 transistors to perform the two billion integer operations per second needed to differentiate one print from another. As with the single chip camera, the aim is to put as much processing power on the chip alongside the image processing circuitry. The only external device would be a database of fingerprints, providing a complete security system on a chip, perhaps even for use in 'smart cards'.

Originally developed at Edinburgh University the idea of 'personal imaging' has been taken up by Technology Transfer Centre who, in turn, formed VLSI Vision. In practice this is an ASIC design house selling proprietary technology for commercial development in the consumer market.

Future chips and designs being looked at by the company include developing the single chip camera to work in colour, producing a standard PAL or NTSC output and video telephone that uses the H216 standard to compress images into a format that can be squirted down a standard telephone line with all processing circuitry built onto a single chip of about half an inch on its side.

For more information contact VVL on 031 668 1550.

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VIDEO MIXER KIT - CQ-TVs 151-154

The Video Mixer and Effects Generator construction project serialised in the previous four issues of the magazine is available as a kit from C-I ELECTRONICS at the address given below. Included in the

kit are all three PCBs, all the components listed in the parts lists, the slide potentiometers, the case and the front panel.

The price for the kit is HFL 799.50 (approx. £250) plus p&p at HFL 75.00 (approx. £25) for Europe and HFL 100.00 (approx. £30) for customers outside Europe.

Apart from the complete kit C-I Electronics are willing to supply individual components for this project, which includes some perhaps generally difficult to obtain components.

This company also produces kits and supplies components for other Elektor projects, some of which have been reproduced in past editions of CQ-TV and are planned for future editions. All orders are despatched by airmail and payment can be by any major credit card, Eurocheque, etc.

C-I Electronics, P.O. Box 22089, 6360 AB Nuth, Holland. Fax: 010 31 45 241877

SPLATTER !

No I havn't gone completely round the bend - yet! Splatter is the name of the monthly journal of the York Region Amateur Radio Club in Newmarket Ontario, Canada.

I wish to welcome the Splatter mob as recently joined members of the club.

I would also like to let them know via this short item that they can certainly reproduce articles from CQ-TV as long as they mention the source and author (and send me a bottle of moonshine!) ... Ed

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MEMBERSHIP

FULL YEAR: Subscription to the club is £9.00 per year. All subscriptions fall due on the first of January. Membership application forms are available by sending a stamped addressed envelope to Dave Lawton, whose address may be found on page-2 of this issue.

OVERSEAS MEMBERS are asked to send cheques bearing the name of the banker's London agent. Postage stamps are not acceptable as payment. Overseas airmail is extra - please enquire from Dave Lawton or see the rates list with your last subscription reminder form.

The British Amateur Television Club is affiliated to the Radio Society of Great Britain and has representatives on the committee of the European Amateur Television Working Group.

The BATC is registered under the DATA PROTECTION ACT - all queries to Dave Lawton, and VAT registered - number 468 3863 01.

CQ-TV is produced by the British Amateur Television Club as its official journal and is sent free to all members. It is not for general sale.

The BATC is a non-profitmaking club run by a committee elected from the mebership for the benefit of the membership.

Please note that any opinions expressed in this magazine are those of the writers, and do not necessarily reflect the opinions or official policy of the Committee or the Editor.

BATC PRESIDENT

I have foregone the editorial column in this issue (are those cheers that I hear? - Philistines!) in order to bring you the important news below from our Chairman, Trevor Brown ... Mike

A NEW BATC PRESIDENT

It is with great pleasure that I welcome **Arthur C. Clarke, C.B.E., B.Sc., F.R.S.A., F.R.A.S., F.B.I.S.**, author of 2001 and inventor of the communication satellite, to his latest role as president of the BATC. The post of club president had been vacant since Roger Appleton retired last year.

Arthur C. Clarke was born in Somerset in 1917. He is a graduate of King's College, London (where he obtained First Class Honours in Physics and Mathematics), a past Chairman of the British Interplanetary Society, and a member of the Academy of Astronautics, the Royal Astronomical Society, and many other scientific organizations. He served in the RAF during the Second World War and was in charge of the first radar talk-down equipment during its experimental trials.

Arthur has written over fifty books, among which are the science fiction classics Childhood's End, The City and the Stars, The Sands of Mars and Rendezvous with Rama: for this last mentioned novel he won three of science fiction's most prestigious trophies, the Hugo , Nebula and John W. Campbell Memorial Awards.

In 1968 he shared an Oscar nomination with Stanley Kubrick for 2001: A Space Odyssey. In 1982 its sequel, 2010: Odyssey Two, was released.

His enormously successful television series, Arthur C. Clarke's Mysterious World, has been screened in many countries.

Arthur C. Clarke lives in Sri Lanka where he has made his home for many years. His seventieth birthday in 1987 was marked by the unveiling of a plaque at his birthplace in Minehead. He was awarded the CBE in 1989.

I have taken the liberty of reproducing below Arthur's letter of acceptance to Trevor ... Ed:

London: 91 May/June

"Dear Trevor Brown,

Thanks for your letter - herewith interim acknowledgement - please see over....

April was not a month I'd care to relive, as it involved two medical emergencies and a race to finish my longest book, 'How the World was One: Towards the Tele-family of Man'. Then there was just time to pack and fly to London on May 5 with my personal physician, Dr. Theva Buell, and my partner Hector Ekanayake.

On May 8 I entered University College Hospital, and was operated upon the same day. I would like to pay a tribute to my surgeon, Mr. Peter Worth, who spent 2? hours in a tricky rearrangement of my plumbing, involving the removal of a diverticulum (bladder extrusion) and prostrate, both of which were heading for the Guiness Book of Records.

I would also like to express my gratitude to the nursing staff for their care and good humour. After only a few days of (mostly) mild discomfort, I was able to move around again, and was discharged in just under a fortnight. The 12-inch long incision is rapidly vanishing, and with it, alas, my hopes of a really convincing 'Great White Shark' scenario...

May 21 onwards I spent happily convalescing in Holland Park at the home of my dear friends Sally and Navam Tambayah, fussed over by their two delightful daughters (and two affectionate - not to say soppy -German Shepherds). I am steadily gaining strength while catching up with music and reading (mostly computer magazines) and phoning my friends. Soon I hope to venture out of doors, weather permitting, and plan to return to Sri Lanka 9 June. Already I feel a new man mentally - and I hope that the involvement extends to my general physical condition, much impaired during the last few years by Post-polio Syndrome.

Despite serious problems in the North and East, Sri Lanka seems to be returning to normal. The west coast hotels are full, and tourists are returning in record numbers. We have bought a beautiful house on the beach at Coral Gardens, Hikkaduwa, for Underwater safari's divers and our guests.

The Ekanayake family is fine; Tamara (7) has made her first TV commercial and features (full-size!) in a beautiful colour almanac, both for Lakspray Milk. Cherene (11) has won several swimming contests and Melinda (2) is an absolute doll.

My beloved Ridgeback has to be expelled from my bed several times per night, and Tammy's Chihuahua Pepsi lives permanently inside my shirt: she is quite the most endearing little creature I've ever known. I can't wait to see them all (humans and animals), and even hope to start a little SCUBA-diving again. So there's certainly no danger of boredom, and I expect to be happily occupied until at least 2001, which I can't really believe is only ten years away...

All good wishes .... Arthur C. Clarke'

I would like to extend the Club's wishes for a full and speedy recovery Arthur. I await with bated breath your next tome ... Mike

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VIDEO LINE SELECTOR

This article first appeared in the April 1990 edition of Elektor Electronics and we wish to thank the Editor for permission to reproduce it in CQ-TV.

C.J.A.Kuppens

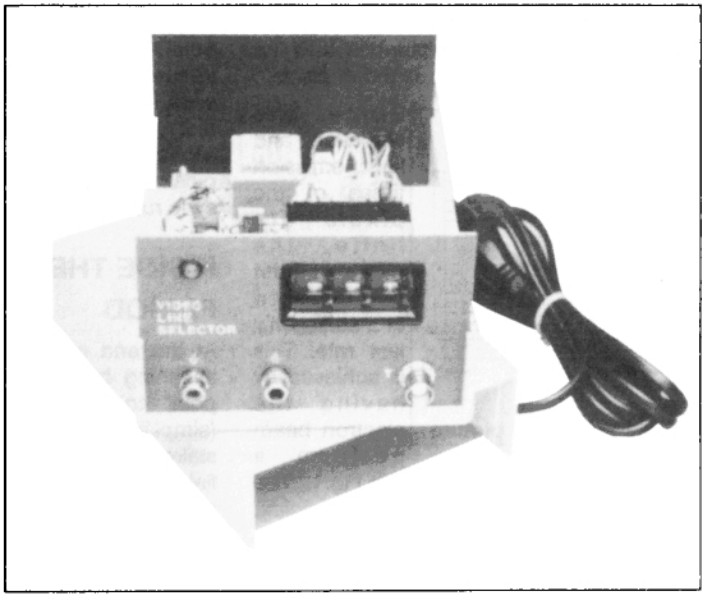
This low-cost line selector is a must for any one working on television and video circuits. The reason is plain: an oscilloscope, even when set to TV field or line triggering, will not usually allow you to study the video content of one specific line in the picture. This is simply because it is re-triggered by every next sync pulse instead of a single user-defined one.

The instrument described here ends the hassle by keeping your oscilloscope triggered on a video signal. Applications are manifold and interesting as you will soon discover. In particular, the "invisible" test lines transmitted as an extra service by most TV stations are indispensable for aligning video circuits as well as for bandwidth and picture quality assessment.

Although many oscilloscopes offer two timebase settings and associated sync separators for TV signals, these functions are often difficult to master for the beginner. For simple TV signals like a monochrome staircase, the TV field and line trigger modes are usually sufficient to ensure a reasonably stable oscilloscope display. For moving pictures, however, triggering is a constant nuisance. Furthermore, the oscilloscope user often has no idea which picture line he is monitoring.

The function of a video line selector is not unlike that of a word comparator for, say, a logic analyser. Both circuits allow the user to define a certain trigger condition for the displaying instrument (usually an oscilloscope). This condition is necessary to extract only the wanted information from a composite signal, and to prevent all other information arriving at the display, where it causes confusion and display irregularity. In the case of the logic analyser, the trigger condition is defined as a combination of logic levels.

In the case of the video line selector, it is



defined as the number of a specific line in the TV picture. The present circuit has a block of thumbwheel or other switches with BCD (Binary Coded Decimal) outputs to set up a trigger condition for any one of 625 lines (PAL - Phase Alternation Line) in an interlaced picture. As a result, the selected line is the first one displayed on the oscilloscope (depending on the timebase setting, more lines may follow).

THE TV PICTURE

Although it is assumed here that the reader is familiar with the basic structure of a TV signal. a few essential points will be covered briefly in the interest of the circuit description. The discussion applies mostly to the PAL I/B/G TV standards.

A moving TV picture is not a series of still images projected on the screen in rapid succession. Rather, it is produced by the light emission of individual pixels (picture elements) at the inside of the picture tube. These pixels are actuated by a fast scanning electron beam. The intensity of this beam is accurately controlled to actuate certain pixels, while "skipping" adjacent ones. In this way the picture is built up from many hundreds of thousand of pixels.

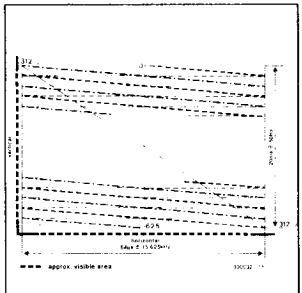


Fig.1 One TV picture

Since the actuation and light emission times of the pixels are finite, the picture must be refreshed at a sufficiently fast rate. This is achieved by having the electron beam perform a scanning movement as shown in Fig.1. The picture is, in fact, composed of two fields, which together form a raster or picture. To allow sufficient time for the blanked beam to travel from the bottom of a raster to the top of the next one, and to prevent display flicker, the scanning is interlaced, i.e. two fields are written in succession. After the blanking period (vertical flyback) the beam starts to write, in a zig-zag manner, the first (or "odd") field, starting at the top centre of the picture. The number of complete pictures (rasters) is 25 per second, which is obtained by displaying 50 interlaced fields per second.

Since a PAL picture consists of 625 lines, each field must have 312.5 lines to maintain the correct relationship with the other field due to interlacing. The sequence is, therefore, 1-314-2-315-3-316, etc. (Fig.1).

A number of lines at the top and bottom of the picture shown in Fig.1 fall inside the field blanking and are therefore not normally visible on the TV. On many older TV sets they can be made visible however, by reducing the picture height. In practice about 10% of the available number of picture lines (625 for PAL) fall within the vertical flyback (blanking) period, which contains the vertical synchronisation pulse and a number of other signals.

TV lines in a PAL picture have a duration of 64us, which corresponds to a line frequency of 15,625Hz. About 52us of each line contains picture information - the rest (invisible to the left and right) is allocated to the line blanking interval. One picture is built up in 20ms, i.e. the vertical sync runs at 50Hz.

INSIDE THE FIELD BLANKING PERIOD

At the end of each field (312.5 lines) the scanning beam has to be repositioned to point to the top of the screen. The (simplified) drawings in Fig.2 show a staircase video signal in two successive fields. the raster synchronisation pulse starts at instant FDW (Field Datum Word), the datum word, and lasts 2.5H (H = one line period). A problem may occur with the line synchronisation which must continue

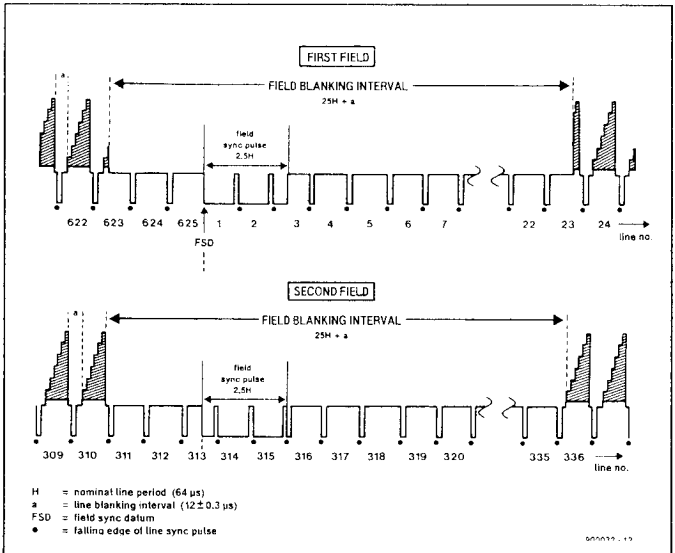


Fig.2 TV Field transistion without Equalising Pulses

during the filed synchronisation. Normally, in a composite video signal, the line synchronisation is detected as a pulse that goes lower than the reference black (or blanking) level. Since the field sync pulse already reaches the lowest possible level, the TV would miss out on a least 2 line sync pulses if they were not inserted "upside down" in the field sync interval. This can be done with impunity since most line sync processors in TV sets and monitors use the negative edge of the pulse (in Fig.2 these are marked with a small dot).

Since each raster consists of an odd number of lines, a field consists of an even number of lines plus one half line. This means that instant FDW coincides with the start of a full line (number 1) in the first field, and with the centre of a line (number 313) in the second field.

As a result, the inverted line sync pulses occur at different instants in the odd and even fields. Without special measures, this may lead to incomplete interlacing and, as a result, a light display flicker.

The cause of this (possible) problem lies with the synchronisation separator circuits in the TV. In general, the line and field sync signals are obtained in two ways with the aid of different circuits. The line sync is obtained by differentiating the sync pulse train, whereas the field sync is obtained by integrating the sync pulse train. Without going into details of these operations, it will be clear that the instant the field sync pulse for the first field arrives, it will be one line period (H) after the last line sync pulse. For the second field, however, it follows at only 32us (0.5H) after the last line sync pulse.

This situation would lead to timing problems with the regeneration of the field sync pulses (obtained from integration, which is a time-based operation) for the two fields, and, as a result, small, but visible, interlace imperfections.

The solution to this problem has been found in the use of equalising pulses, which precede and follow the field sync pulse as shown in Fig.3. These pulses, which are 2.53us long, are inserted into 2.5H long slots before and after the field sync pulse. The frequency of the equalising is 2 times that of the line frequency, while their width is half that of a line sync pulse.

The beneficial effect of the equalising pulses is that the integrator output voltages provided by the picture sync separator are made equal for both fields. The result is near-perfect interlaced scanning.

Although the first 20 lines after the field sync fall within the field blanking period,

they are not normally empty (i.e. black with no video content). Indeed, the lines in the blanking period are often the most interesting to the video technician. Depending on the TV station and operating authorities, lines 15–21 and 328–334 usually contain special test signals. These video insertion (VIT – Video Insertion Test) signals may be fed to an oscilloscope to assess the reception quality or the response of certain sub-circuits in the receiver. In a number of cases, these lines are also used for remote monitoring of transmitter linearity and for information exchange between a central microwave distribution tower and TV relay stations. The use of these lines appears to be little-known, which makes them even more interesting (also for certain satellite transmissions).

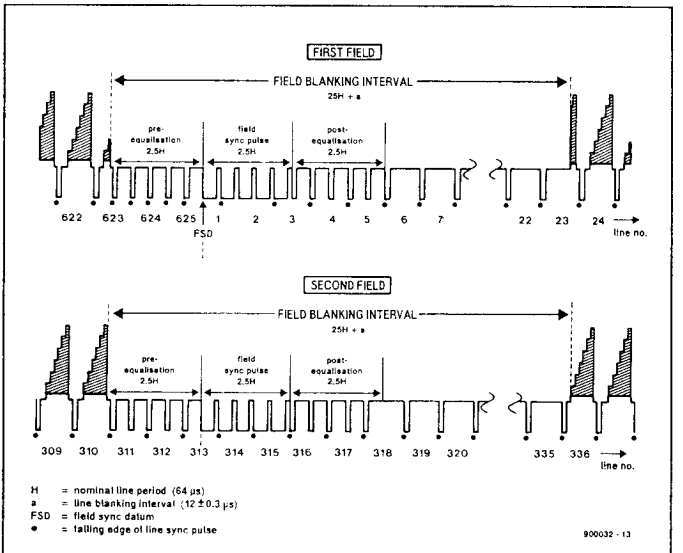


Fig.3 TV Field transistion with Equalising Pulses

In Europe, teletext is normally carried in lines 15, 16, 20, 21, 328, 329, 333 and 334.

THE LINE SELECTOR CIRCUIT

The practical circuit on the video line selector is fairly simple –see Fig.4. The circuit may be divided into two parts: a sync separator (IC1 and IC2) and a counter plus word comparator (IC3–IC8).

The circuit has two inputs and one output. One of the inputs is for the composite video signal (CVBS – Chroma Video Blanking Synchronisation – at connector K1), and the other for the BCD switchblock (or discrete switches) used for setting the video line number.

The output supplies a CMOS-compatible digital signal with a swing of 5V for connecting to the trigger input of an oscilloscope.

The key component in the sync separator is IC1, a type LM1881 from National Semiconductors. This chip contains everything that is necessary to extract the synchronisation pulses from a composite video signal applied to its input, at pin-2. In addition, this chip is capable of identifying, on the basis of their different sync pulse structures, the odd and even fields that make up a raster. Only the BURST and ODD/EVEN outputs are used in the present application.

The BURST output goes low for about 4us to mark the approximate location of the chrominance colour burst (4.43 MHz for PAL; 3.58MHz for NTSC) on the back porch of the line blanking period. The burst pulse is used here for line counting, since the LM1881 lacks a line sync output. Provided the timing is corrected this can be done with impunity since every line blanking period has a rear porch (whether a burst is actually present in the CVBS signal is irrelevant here).

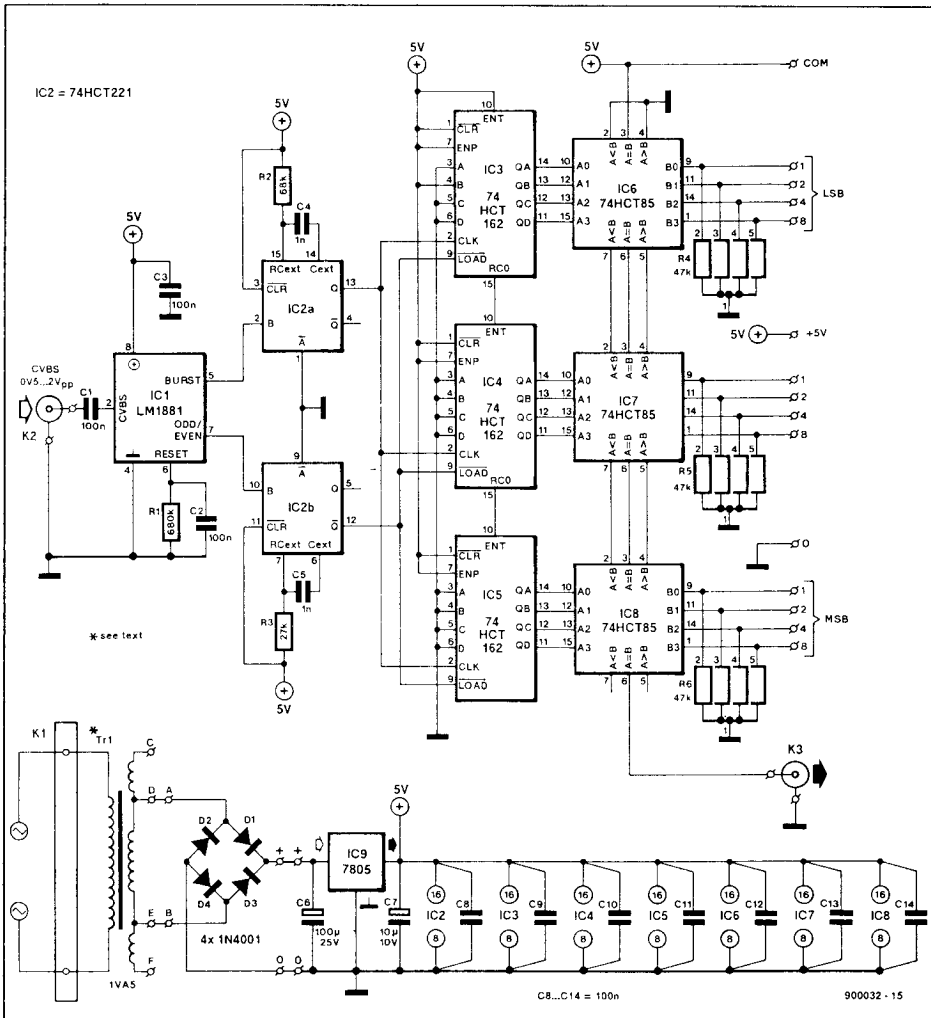
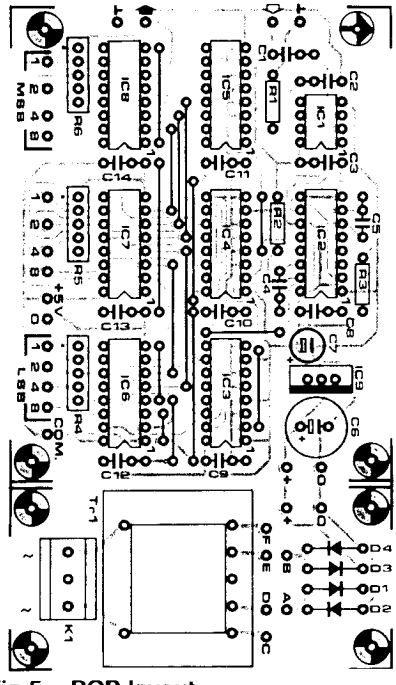


Fig.4 Circuit Diagram of the Video Line Selector

Both the ODD/EVEN and the BURST signals are lengthened by a non-retriggerable monostable contained in IC1.

The ODD/EVEN output toggles on the rising edge of the first equalising pulse in the field sync pulse for the first field. The counters in the word comparator, however, are preset on the falling edge of this pulse. Since that instance occurs half-way through the first line, a preset value of 2 (0010) is loaded into IC3 by tying its B-input to the +5V line.

The result, however, would be that triggering occurs half a line too early for the first 5 lines, which requires a correction at



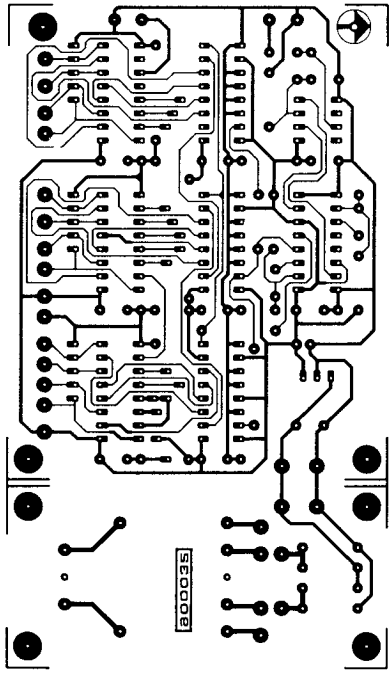


Fig.5 PCB layout

the end of the last equalising pulse. Timer IC2B is triggered on the rising edge of the ODD/EVEN signal. The bar-Q output of this timer is connected to the LOAD inputs of counters IC3, IC4 and IC5. These are actuated on the rising edge of the clock signal, when the preset values are loaded.

The BURST/BACK PORCH signal supplied by the LM1881 is not used direct for controlling the load operations in the counters. Instead, a non-retriggerable monostable, IC2A, is used to prevent the counters being advanced five lines too many by the equalising pulses. The monotime of IC2A is set to about 48us by R2-C4. If the monostable triggers on an equalising pulse, this monotime ensures that the next one is "skipped".

In principle, the monotime could be made a little shorter, but also a little longer, e.g. 62us or so, to eliminate the risk of IC2A being triggered by noise in the blanking period.

The three-digit binary line number supplied by the three counters is compared to the three-digit number set on the BCD switches. The line number word and switch word are applied in groups of 4-bits to the AN and BN inputs of three cascaded 4-bit comparators, type 74HCT85. The A=B output of the last comparator, IC8, goes high if the counted line number matches the number set on the BCD switches.

This instant marks the triggering of the oscilloscope timebase, so that the content of the relevant line is displayed. The actual trigger instant coincides with then end of the colour burst at about 4us after the positive edge of the line sync pulse.

The 5V regulated power supply of the circuit is standard and requires no further discussion. Provision is made to fit three different mains transformers, as will be discussed below.

BACKGROUND TO VIDEO INSERTION TEST LINES (VIT)

VIT lines enable the quality of TV reception as well as the quality of TV and video equipment to be checked and optimised. A number of test signals are available, and their function is discussed briefly. The contents of the VIT lines are in accordance with the relevant recommendations for PAL G/B/I transmissions (CCIR Spec 624-2).

Note: the use and function of VIT lines are recommendations, not standards. Differences may therefore occur depending on the type of transmitter (terrestrial/ satellite; high/low power; TV-band; etc.), as well as on services and broadcasting authorities.

VIT lines 17 and 18 (Fig.1)

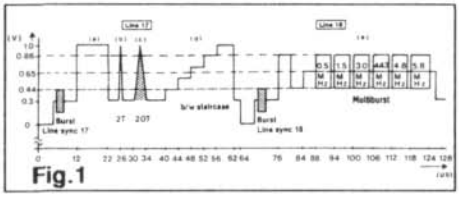


Fig.1

(a) *Reference bar* to establish maximum black and white levels. Test: LF-response of receive system.

(b) *2T-pulse* for picture resolution assessment. T is the shortest possible rise-time in a system in which the highest frequency of a sinusoidal signal is fc. Hence T = 1/2fc. In a PAL TV system fc = 5MHz so T = 0.1us. The 2T pulse has sinusoidal slopes and a width of 0.2us. Test: amplitude reduction of the 2T pulse with respect to the reference bar means loss of high frequencies in the system. For normal TV reception a loss of 20% is acceptable.

(c) *20T-pulse* for testing chrominance and luminance response and possible interactions between these components. The 20T pulse is actually a 20T long chrominance burst. Since 20T = 0.5MHz and the chrominance frequency is 4.43MHz, these components are affected differently by bandwidth limiting factors in the transmission system. Test: the 20T pulse serves to identify amplitude and phase distortion.

In Fig.2 the first response indicates chrominance amplitude reduced, the second different phase delays for chrominance and luminance, and the third response indicates a combination of both problems.

(d) *Monochrome Staircase* for linearity assessment. Steps are 140mV level increments. test: irregular step size means non-linearity.

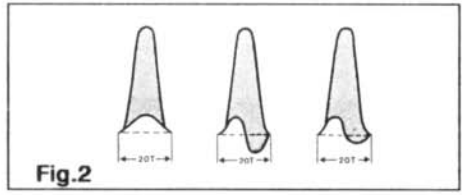


Fig.2

(e) *Multiburst* for frequency response measurement. The bursts have a nominal amplitude of 420mV p-p and are preceded by an 8us long 125kHz reference signal. Test: high-frequency loss is marked by reduced amplitude which is first noted with the last three bursts.

VIT lines 330 and 331 (Fig.3)

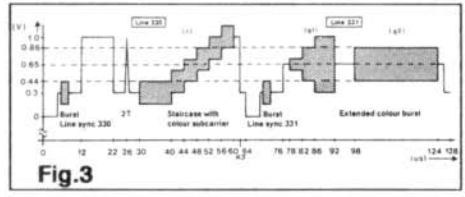
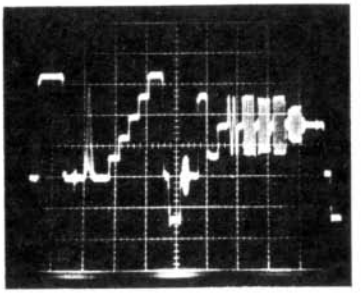


Fig.3

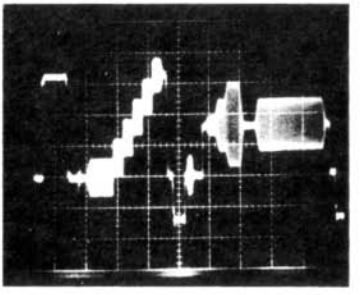
(f) *Staircase with Colour Subcarrier* for differential gain or phase error detection. The subcarrier level is 280mV p-p. Ideally, the colour separator in the receiver removes the luminance component and supplies a 30us long 4.43MHz burst of 280mV p-p. Test: phase or amplitude irregularities on the step instants (40-44-48-52-56us). Use an oscilloscope for amplitude test and a vectorscope for phase test.

(g) *Colour Subcarrier Signals and Extended Colour Burst* for measurement of intermodulation between chrominance and luminance components. After filtering out the chrominance subcarrier (4.43MHz), the luminance level should be constant at 0.65V. Test: amplitude irregularities occurring between 78-92us indicate intermodulation caused by chrominance changes (g1) or luminance changes (g2; subcarrier level of 420mV p-p).

Fig.4 shows the theory in practice. The upper oscillogram is of lines 17 and 18, and the lower oscillogram of lines 330 and 331. The oscilloscope used was an Iwatsu 100MHz model.



Lines 17 and 18



Lines 330 and 331

CONSTRUCTION

The single-sided printed circuit board for this project is shown in Fig.5 (for details on obtaining the PCB see the end of this article). Depending on the enclosure you intend to use, it may have to be divided into two to separate the power supply section from the rest of the circuit.

Start the construction of the main board by fitting all 14 wire links, followed by the passive parts. The components in positions R4, R5 and R6 are preferably 4-resistor, 5-pin single-in-line (SIL) arrays. Discrete resistors may also be used if such arrays are difficult to obtain. In that case, fit four 47k resistors upright on the board and cut their free terminals short. Join the free terminals with a horizontally running wire that goes to the PCB hole marked with a dot.

Voltage regulator IC9 can make do without a heat-sink as it dissipates little heat.

IC sockets are not strictly required, but you may prefer to use them to make replacement of an IC easier if a fault is suspected.

Three different types of transformer may be fitted on the power supply board. The choice between these depends on availability and the mains voltage (U.K. 240V; other European countries 220V). For operation from 240V mains fit a 2 x 4.5V (1.2VA) transformer from RS Components. For 220V mains, use either a Block 1 x 9V (1.5VA) or a 2 x 6V (1.5VA) type. Install insulated wire links if necessary:

- RS 2 x 4.5V: B - F and A - C
- Block 1 x 9V: B - E and A - D
- Block 2 x 4.5V: A - C, B - F and D - E

The mains is connected to terminal block K1.

The choice of BCD switches is all yours. Thumbwheel switches with BCD outputs are available from several sources. Their only disadvantages are that they are usually

relatively large and not as quick to operate as rotary types. Before connecting the BCD switches to the circuit, be sure that you know the pin assignment (A-B-C-D and +/common). A mistake here makes the selection of a particular video line a matter of chance. If in doubt, check out the pin functions of the switches you intend to use with a multimeter.

The inputs marked "1" on the PCB must be connected to the least-significant bit, i.e. the switch terminal whose output level changes every time the switch is operated. Similarly, the terminals that change every second, fourth and eighth switch turn are connected to the PCB pins marked 2, 4 and 8 respectively.

The PCB(s) and the BCD switches are fitted into a suitably sized ABS enclosure. The type shown in the photographs has outside dimensions of 165 x 115 x 75mm (L x W x H). A mains socket with integral fuse-holder is fitted on the rear panel.

Two video input sockets are fitted on the front panel to enable the line selector to be connected in parallel with an existing video link. Alternatively, a single BNC input socket may be fitted. In that case, a T-junction is used to make to make the parallel connection. The trigger output of the circuit is a BNC socket to allow ready use of the available test cables.

PRACTICAL USE

Since the LM1881 has a maximum input voltage rating of 3V peak-to-peak, it is recommended to provide the input of the circuit with a 10klinear potentiometer as a level control. Remember that the input impedance of the LM1881 is about 10k, and the CVBS signal must be negative-going, i.e. the sync pulses point down and represent the lowest instantaneous voltage.

Connect the trigger output of the circuit to the external trigger input of the oscilloscope. The composite video signal is applied simultaneously to the line selector, the oscilloscope input and a video monitor, to assist in tuning to a TV station. Set the oscilloscope to external triggering, and select the TV H+ mode if available. Set the oscilloscope timebase to 20us. The oscilloscope should display three successive lines, starting with the number set on the line selector (line 17 is suitable for a start).

Finally, in view of the relatively fast signals that occur in TV pictures, particularly in the VIT lines, it is recommended that an oscilloscope is used which has a bandwidth of a least 20MHz. You will notice that a relatively high trace intensity setting is required for a close examination of the test line contents.

A printed circuit board for this project is available from Elektor Electronics (Publishing), Down House, Broomhill Road, London, SW18 4JQ. The reference number is: 900032 and the price including VAT and p&p is £8.48.

COMPONENTS LIST

Resistors:

1	680k	R_1
1	68k	R_2
1	27k	R_3
3	47k 4-way SIL array	R_4;R_5;R_6

Capacitors:

9	100n	C_1;C_2;C_8–C_{14}
1	100n ceramic	C_3
2	1n0	C_4;C_5
1	100µ 25V radial	C_6
1	10µ 10V radial	C_7

Semiconductors:

4	1N4001	D_1;D_2;D_3;D_4
1	LM1881	IC_1
1	74HCT221	IC_2
3	74HCT162	IC_3;IC_4;IC_5
3	74HCT85	IC_6;IC_7;IC_8
1	7805	IC_9

Miscellaneous:

1	mains transformer. Options: VR1109 (Block) or 207-863 (RS components (see text).	
1	PCB terminal block	K_1
1	BNC or phono socket	K_2
1	BNC socket	K_3
1	PCB	900032

COMPONENT TELEVISION

Trevor Brown G8CJS

The phrase *'component television'* is fast becoming a buzz word for something new in television, although television has been around in component form for years, so let's have a look and find out what's changed.

Television signals always originated from the camera as separate RGB signals (before the advent of single tube domestic cameras). The signals were then coded into PAL NTSC OR SECAM so they could be transmitted or recorded. The transmission of pictures still requires that the pictures be coded, especially since the imminent demise of Marco polo (The British DBS Satellite). The record process however has undergone radical change to the point where component recording of pictures is possible.

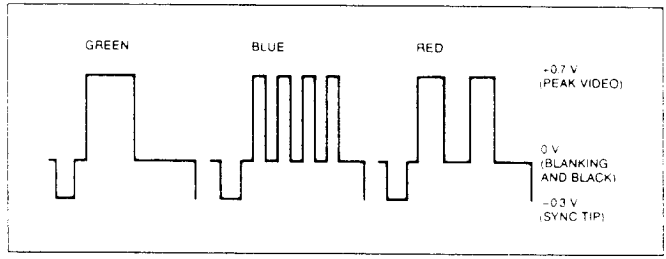
The first component VTR machines were the Betacam machines from Sony, which recorded separate chroma and luminance signals onto a half inch tape for electronic news gathering. The system proved to be quite signal friendly and multi generation VTR dubbing seemed to take a step forward. Because the signals were recorded in component form, and no encode system was recorded, all 625 formats should be interchangeable ie PAL and SECAM, something that could be useful in a news environment although I don't know anyone who has tried that.

The format for Beta was two twin FM tracks helically scanned by two rotating heads separated by the different azimuth positions of the two heads. On one track is modulated the luminance signal in the normal way, and on the other the two component signals R-Y and B-Y. The two signals were accommodated onto a single track by time domain multiplexing. The 64uS line (625 line) being compressed to 32uS to enable the R-Y and B-Y to be recorded sequentially, the buzz word for this is CTDM. Time compression does increase the bandwidth of the signals, in this case it doubled the bandwidth. The bandwidth of the system had already being set to 3.5MHz as being reasonable for news pictures. The R-Y and B-Y signals are relatively low bandwidth signals and the doubling of their bandwidth only brings them up to that of the luminance.

The video recorder was docked directly onto a camera in camcorder fashion and so the component signals could be generated by matrixing the RGB into Y,R-Y and B-Y without the signal ever undergoing coding. Decoding of the PAL signal to provide component signals is where the system of component working falls down.

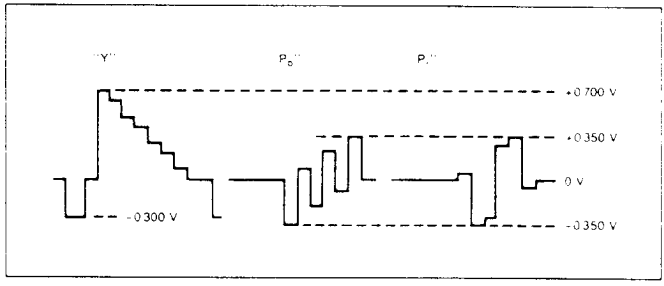
Betacam deals with recording PAL signals in a way that does not involve decoding the signal, in that the PAL signal is split into two bands one the low frequency video and the other band being the high frequency video which are subsequently recorded onto the two helical tracks. On replay the two signals are combined to form composite video. This dual format working is transparent to the operator, the machine switches mode and idents the recording as this alternate format. This can cause problems in the edit suit and I suspect the tape would not travel too well to say a SECAM country.

The first thing we learnt from this excursion into component work was that multigeneration VTR dubbing survives much better if the pictures are stored and transferred in component form. The best results are from pictures that have never been encoded, the process of decoding encoded signals is unsatisfactory. Things like chroma key also become possible from recorded pictures. The early Betacam

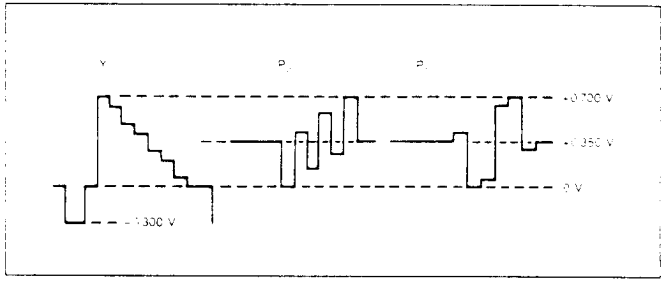


SMPTE "GBR" standard, 100% amplitude color bar signal.

Fig.1



SMPTE/EBU component standard, 100% amplitude color bar signal.



SMPTE/EBU component standard, 100% amplitude color bar signal. P_B and P_R offset by +350 mV to match luminance range.

Fig.2

recorders were soon joined by Betacam SP, M2 and D1, these were full bandwidth component formats.

When the recorder is docked to a single camera in camcorder fashion then component signals to feed the machine are readily available. The problem comes with multi camera studio setups, the practice here is to encode the pictures directly after the camera. The vision switchers, digital effects and caption keyers are all designed to accept encoded signals as are all the distribution and monitoring.

The ideal system is to replace them with component counterparts. One stop gap measure was to introduce a better PAL decoder so that the existing PAL could be converted to component.

The new decoders are called comb decoders and cope especially well with the part of the spectrum where chroma and luminance sidebands are interleaved, but there is no substitute for the full component studio.

The component studio gave way to some new buzz words, RGB became *GBR* to denote that the G signal carries the syncs, although under EBU standards all three signals carry sync (see Fig 1). These signals are not distributed because they are not as rugged as Y,B-Y and R-Y.

So this became the standard. The Y signal is composite ie. it carries the sync information as well, see Fig 2. There were some initial arguments about the level of B-Y and R-Y, the original amplitudes used by Sony in their Betacam system soon gave way to a EBU standard as per Fig 2. Along with the component signals came new waveform monitors that displayed the Y, B-Y and R-Y sequentially and the buzz word for this was *parade.* Another waveform display consisted of dots in boxes rather like a vector scope display and coined the buzz word *lightning.*

On the domestic market S-VHS made an appearance, by using the new high energy tapes the FM standard could be expanded into a new improved format. The colour information is still colour under, but by using the new S-VHS connector, separate chroma and luminance dubs can be made and some mix and effects generators are available to handle this format and indeed TV sets with S-VHS separate luminance and chroma inputs are also available. The colour under chroma is still PAL, as opposed to the broadcast system of time multiplexing and it is not on a separate track to the luminance. The separate chroma and luminance paths are on different frequency carriers as was the case with standard VHS. If the S-VHS VCR is fed with PAL then a comb filter is used to part the luminance from the chroma.

MODS FOR THE CROPREDY TEST CARD GENERATOR & THE WORTHING COLOURISER UNIT

John Stockley G8MNY

The original black and white caption circuit of the Cropredy test card generator unit works fairly well, except that many people have problems with so many fine connections. Also, there are some design problems which may affect your unit. Consequently, I have compiled the following list of modifications to the unit and also for the Worthing Group Colouriser kit which turns the Cropredy generator into a colour source.

THE CROPREDY TEST CARD GENERATOR

Fig.1 ... Only rubbish on the screen, caused by the failure of the crystal to oscillate correctly, usually at 100s of kHz instead of 8MHz. The culprit is C2 a 10n capacitor used in the feedback circuit. replace it with a 100pF if you have this problem.

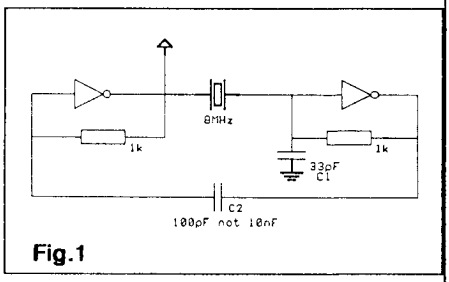


Fig.1

Fig.2 ... Rounded off back edge of line sync pulses or sync pulses too wide. The problem is that the sync transistor is too slow to turn off. The TTL '0' level is too high for the transistor off state, add a 680 ohm resistor from the base of Q2 to ground.

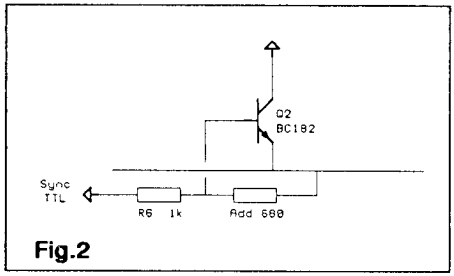


Fig.2

Fig.3 ... The unit gives a DC biased output and consequently when this is blocked by a 1000uF capacitor the sync pulses become clipped when the unit is terminated. Raise the output bias point by adding a 15k between the base of Q1 and +5V, and add another 1n1418 diode in series with D2.

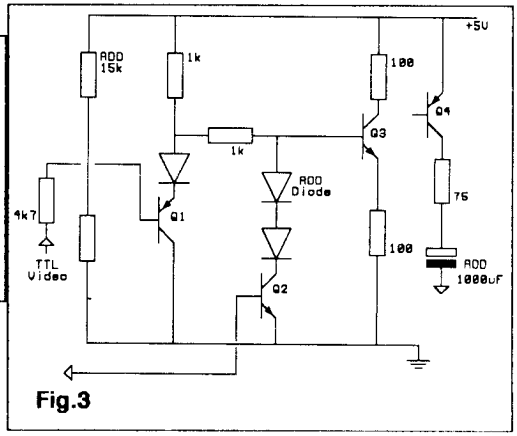


Fig.3

Fig.4 ... Improve the HF response and see the last grating clearly, check for overshoots with a good oscilloscope. Add a 270pF capacitor across R26 (75 ohm).

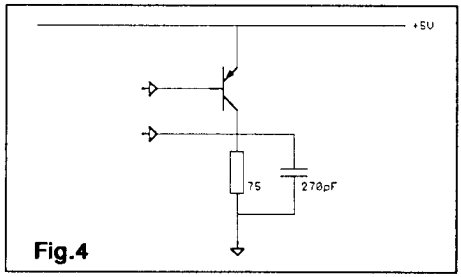


Fig.4

Fig.5 ... This circuit radiates RFI up to VHF so house it in a metal box and use PSU decoupling components, e.g: ferrite beads and 0.1uF on the 12V supply. This will improve things.

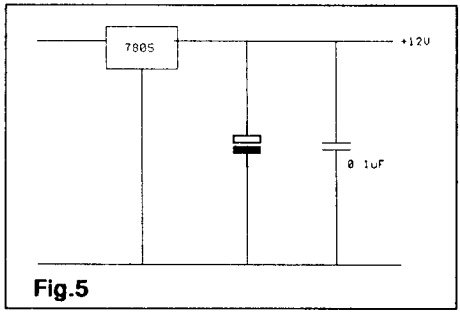


Fig.5

THE WORTHING COLOURISER

I found only minor problems with this circuit.

Fig.6 ... The colour output is higher than the black and white output. A simple attenuator of 27 ohm in series and an 820 ohm to earth as shown overcomes this problem and means that switching between colour and black and white gives identical results.

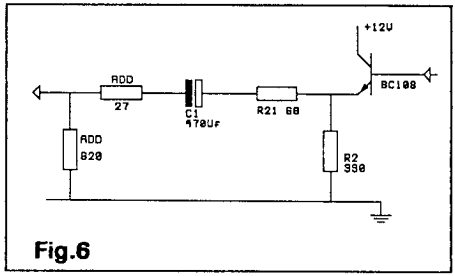


Fig.6

Fig.7 ... The colour burst is not precisely timed. With a good oscilloscope compare with a broadcast source. Trim the burst gate time constant to set the burst in the correct position by adjusting R6 (33k). I had to add a 180k resistor across R6.

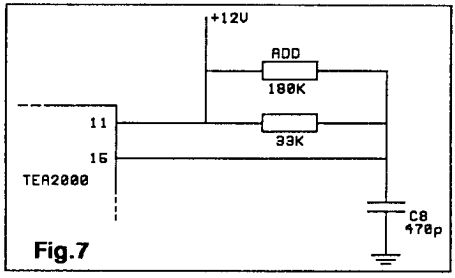


Fig.7

Fig.8 ... The colour subcarrier frequency trimmer has a very course adjustment and it is difficult to meet the +/- 10Hz required. This can be improved by band spreading. Replace C10 (2-33pF) with a 2-10pF trimmer and add a 5.6pF capacitor in parallel with it.

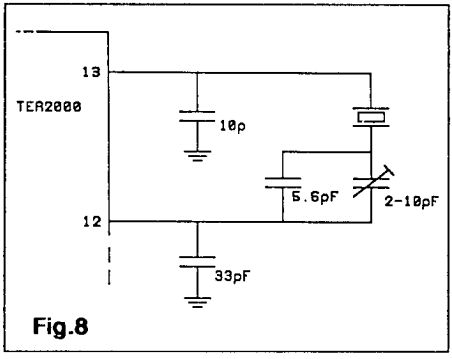


Fig.8

Fig.9 ... Colour frequency drift. This may depend on the crystal and shack temperature range, but two reversed biased 1n1418 diodes between the TEA2000 crystal pins–12 and 13 and the ground pin–9 do reduce drift.

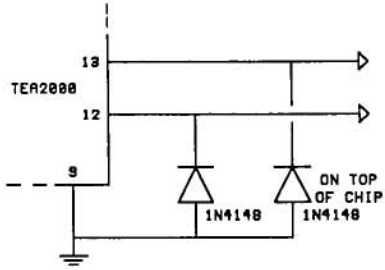


Fig.9

To set up a 4.4336MHz frequency accurately do not scope or count the crystal circuitry as touching any components in the oscillator area will cause drift. Instead, make the caption generator stop at a colour burst point – switching the Cropredy unit off/on,,or selecting no EPROM if expansion fitted – until just the colour carrier appears on the video output colour output. Then mix this with a broadcast video signal (dual–beam oscilloscope or couple with two 100 ohm resistors) and set the oscilloscope up to display the broadcast colour burst. Then adjust the trimmer for best zero beat. Once set up try checking for thermal drift by putting your finger on the TEA2000 for ten seconds and see the frequency change. You can get the colouriser to better than 10Hz once warmed up!

Sorry Boss, I still can't find a parking space!

Z-MATCH II

SMITH CHART RF DESIGN SOFTWARE PACKAGE

REVIEW

Mike Wooding G6IQM

Having reviewed the EASY-PC package from Number One Systems Limited in the last issue of CQ-TV, I decided that another of their software packages ought to be reviewed for the magazine, namely **Z-MATCH II.**

Z-MATCH II is a Smith chart RF design software package. Quoting from Number One Systems: 'In spite of the availability of modern design aids, such as the hand-held programmable calculator, sophisticated circuit simulation and Computer Aided Design (CAD) software, the Smith chart is still widely used as a radio frequency circuit design tool. The Z-MATCH II program enables the Smith chart design process to be performed easily and accurately on a PC computer.

For those of you who have never seen a Smith chart the following is going to seem like white mans magic! However, I shall attempt a short explanation of what a Smith chart is, and how one is used.

This is not going to be the easiest thing for me to do, as it is a very long time since I learnt how to use and used them. Therefore, with the kind permission of Number One Systems Limited, I am going to reproduce, in part, the introductory explanations of Smith charts and their uses from the Z-MATCH II instruction manual, along with some diagrams also reproduced from the Z-MATCH II manual.

SMITH CHART CIRCLES

The Smith chart is made up of two sets of circles; one set represents the resistive (R) part of a complex impedance, the other set represents the reactive (X) part.

• Normalised Resistance and reactance ... In order to avoid the need for a different chart for each characteristic impedance (Zo), the paper Smith chart uses normalised values of resistance and reactance circles. The normalised impedance Zn is given by:

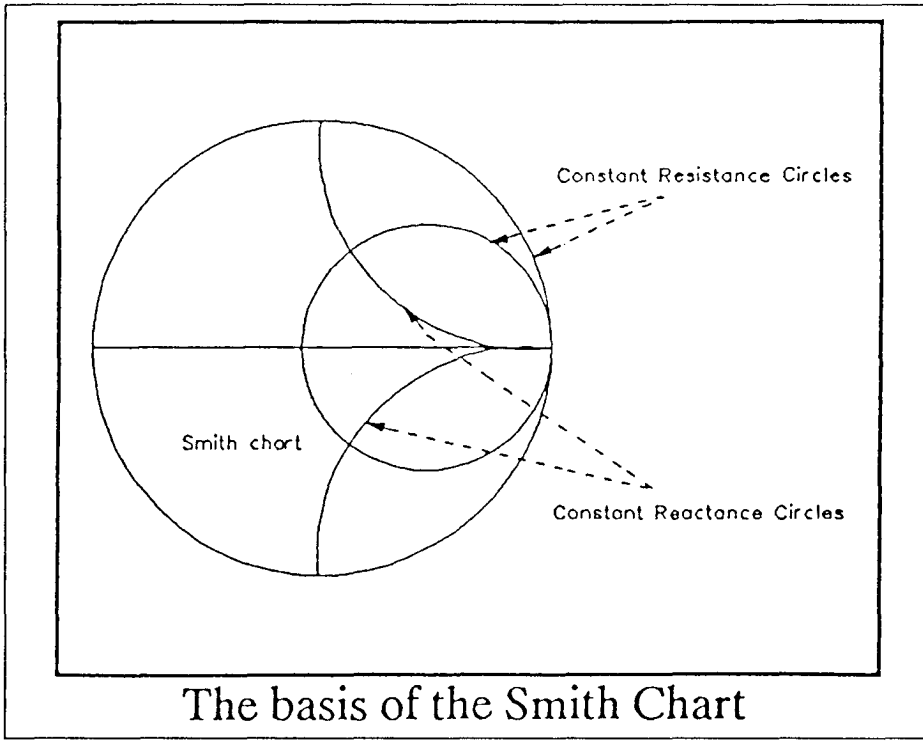
$$Zn = Z/Zo = (R/Z0) + j(X/Zo)$$

Where Z, R and X are the actual values of impedance, resistance and reactance respectively.

• Series Impedance Values ... The impedance of any point on a transmission line can be represented by a point on a Smith chart.

The series impedance value of a point on the chart is found by reading the values of the intersecting resistance and reactance circles. The Z-MATCH II program displays the series impedance value corresponding to the cursor position on the chart.

• Parallel Admittance Values ... An admittance value (Y) Smith chart can also be drawn. The circles on this chart represent values of constant conductance (1/R) and constant susceptance (1/X). By using a Y chart overlay on an impedance chart, it is possible to convert from series



The basis of the Smith Chart

impedance to equivalent parallel admittance.

• Standing wave Ratio (SWR) ... A circle that is concentric with the centre of a Smith chart has a fixed value SWR. The SWR of such a circle is equal to the value of R/Zo at the point where the circle crosses the horizontal axis on the right-hand side of the chart.

Intersections of the SWR circle with the horizontal axis on the left of the circle represents points of voltage minimum, intersections on the right represent voltage maxima.

Moving round a constant SWR circle is equivalent to travelling along a lossless transmission line; successive values of impedance indicated on the chart correspond to the impedances seen along a lossless line with the same SWR.

• Wavelengths Towards Generator and Load ... The distance moved on a transmission line is directly proportional to the angle of rotation around a constant SWR circle; one revolution is equal to a half wavelength movement.

Moving around an SWR circle in a clockwise direction is equivalent to travelling towards the generator, whereas moving anti-clockwise is the same as travelling towards the load. The wavelengths towards the generator and load (backwards and forwards respectively) are shown on the periphery of the standard paper Smith chart. These peripheral scales on the paper chart are used by drawing a straight line from the centre of the chart through the point of interest. The Z-MATCH II chart indicates directly the wavelength (or length in metres) corresponding to the cursor position.

By convention, the starting point for the wavelength scales is the left-hand minimum position; this is because in practice it is easier to accurately locate a voltage minimum than a voltage maximum on a line. The angle of the reflection coefficient is zero at the opposite, voltage maximum, point. Since the Smith chart repeats itself every half wavelength round a constant SWR circle, lines longer than half a wavelength are dealt with by subtracting multiples of a half wavelength from the actual line length.

Lumped L and C Circuits ... The Smith chart can also be used for the design and analysis of discrete L and C circuits. When a single component L, C or R is added to a network then either the resistance (R), reactance (X), conductance (G) or susceptance (B) parameter of that network will not change. The point representing the network impedance, or admittance, on the Smith chart will therefore move on a particular chart circle when a single component is added.

By switching between the Y and Z charts and moving the cursor on constant reactance or constant susceptance circles, it is possible to move from any one point on a chart to any other. Moving on a Y chart susceptance circle is equivalent to adding parallel inductance or capacitance to a network; moving on a Z chart reactance circle is equivalent to adding series inductance or capacitance. Using the Z and Y charts in this way, it is possible to build up networks to impedance match from any source impedance to any given impedance load.

The reference mode facility provided by the Z-MATCH II (see below) program is particularly useful in this type of process; the reference mode enables the value of inductance or capacitance required to move between any two points on a circle to be read directly.

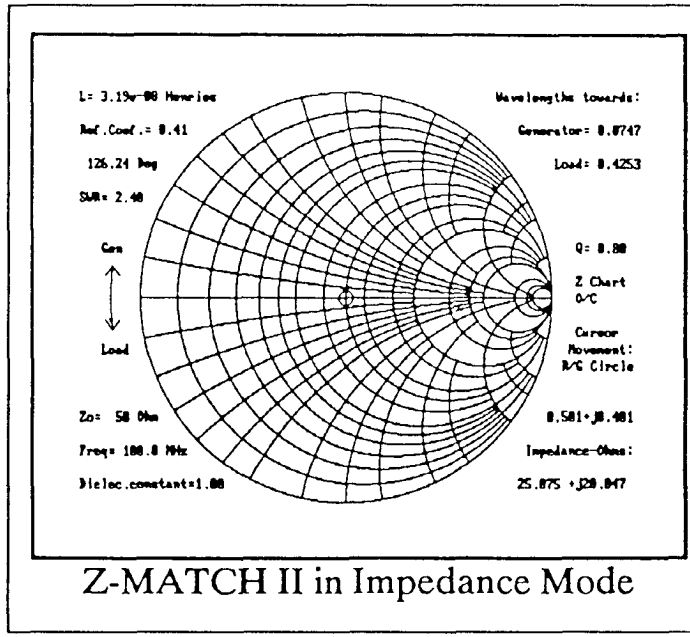
With the conventional paper Smith chart the rules for the correct direction of movement on the constant parameter circle need to be known. Z-MATCH II simplifies the procedures involved considerably, by displaying directly the equivalent value of R, L and C at the operating frequency chosen. The change in L, C or R can therefore be seen as the cursor moves round any of the constant parameter circles.

Z-MATCH II

Z-MATCH II is a CAD package for designing and calculating Smith charts. The basic requirements to run the package are an IBM PC/XT/XT289/AT/386 or PS2 computer, or compatible clone, running under MS-DOS 2.0 or later. A colour graphics adaptor (CGA, EGA or VGA) and a colour monitor, and a minimum of 256k of free RAM memory. For hard copy of the output an IBM Graphics printer, or compatible, and adaptor card are required. Z-MATCH II does not require a maths co-processor to be installed, but it will enhance the speed of operations substantially. A mouse may be used with the software, but, as will be seen later, due to the necessity of precision locating of the cursor, this method is not wholly satisfactory.

As with the EASY-PC, the presentation of the package is very good. The user manual comes in an A4 ring binder, allowing for easy updates to be added. The software is supplied on one 5.25" 360k disc or one 3.5" 760K disc, both being supplied with the package.

The user manual begins with the usual software and copyright licence conditions and agreement, followed by the introduction, installation, running and basic operating instructions. The manual then continues with a brief description of what a Smith chart is and what it can be used for. This is, as is explained in the manual, by no means meant to be able to teach you the whats, whys and wherefores of Smith chart use, but is a general guide for those already conversant with the subject. For



Z-MATCH II in Impedance Mode

those less used to working with Smith charts, a tutorial section of worked examples is included later in the manual.

Following the initial section of the user manual is a comprehensive detailing of all the features of the package and explanations of all the features, menus and command key functions.

There are four methods of manipulating the cursor around the chart:

- in straight lines using the numeric keypad keys (2, 4, 6 & 8). The speed of movement can be changed by holding down the 'SHIFT' key simultaneously.
- if your keyboard is an enhanced version with separate cursor control keys, then these can also be used. In this case the shift key will not change the speed of movement with these keys, but the speed will always be opposite to that with the numeric cursor control keys.
- the 1 and 3 keys on the numeric keypad ('End' and 'Pg Dn') move the cursor around selected circles (see below). On the enhanced keyboard the separate 'End' and 'Pg Dn' keys also do this, but at the slower speed.
- using the mouse, by pressing the left-hand button, moving the pointer to the desired position and then releasing the mouse button.

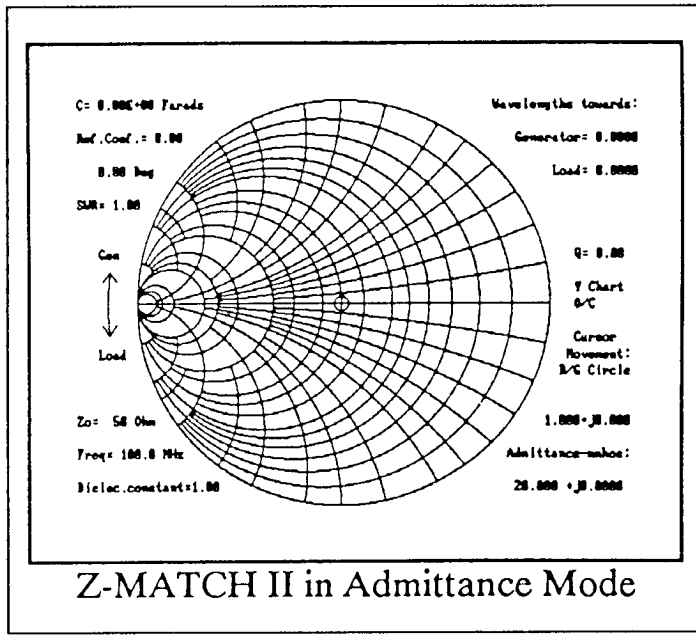
However, as previously noted, using the mouse to position the cursor is less accurate than using the cursor keys - which is the recommended method.

FEATURES

Although, due to the complexity of the software, I am unable to give a complete description of all the features available, I hope to briefly describe some of the major functions.

CIRCLES ... this function allows the user to draw various circle on the chart: a circle centred on the current cursor position

- a constant conductance circle that passes through the current cursor position when in the impedance mode



Z-MATCH II in Admittance Mode

• a constant resistance circle that passes through the current cursor position when in the admittance mode

• a constant Standing Wave Ratio (SWR) circle that passes through the current cursor position (this circle passes through all the impedance, or admittance, points that would be present on a half-wavelength of transmission line with the same SWR and Zo value)

• a unity conductance circle to be drawn on the chart when in the impedance mode

DISPLAYS ... this allows the method in which the parameters are displayed on the chart to be changed to suit the user's requirements in the following ways:

• a rectangular or polar coordinate display shown at the bottom of the screen. This process serves the same function as using a Carter chart overlay with a paper Smith chart.

• toggling between a wavelength scale from source and load to a distance in metres scale from source and load, depending on which constants or parameters are already known

• redraw the entire chart, maintaining the values of frequency, Zo, etc., already entered, but clearing the display of any circles drawn, whilst maintaining the current cursor position

• the ability to enter the various known parameters, i.e: characteristic impedance (Zo), frequency and dielectric constant or velocity factor.

LOCATE ... this set of functions allows the user to easily manipulate the graphics cursor around the chart:

• the ability to compensate for transmission line loss, by simply entering the loss in dB, which updates the cursor to a new position, taking the loss into account and giving the corresponding SWR, impedance, etc.

• the ability to move the cursor to a specific point on the chart relative to the

prompted input of values for series impedance, parallel admittance, polar impedance or scattering parameter.

- the facility to permanently mark a cursor position on the chart for future reference

- selection of cursor movement around constant resistance or conductance circles, SWR circles, or the constant reactance or susceptance circles

Other facilities are available which allow the user to switch the program to reference mode, which enables further calculations to be made with reference to the current cursor position. Also, the display can be switched between series impedance and parallel admittance displays, using a single function key stroke. The background and drawing colours used in the display can also be user selected.

MAIN FEATURES OF Z-MATCH II

Z-MATCH II displays a Smith chart which shows:

- Actual Impedance and Admittance
- Normalised Impedance and Admittance
- Polar Impedance
- Distance towards Generator and Load
- Reflection Coefficient
- Standing Wave Ratio
- Equivalent Inductance or Capacitance
- Zo, Frequency and Dielectric Constant
- Network

Z-MATCH II provides these features:

- Conversion between Impedance and Admittance Circle drawing

- Determination of the effect of line loss Line Transformer calculations

- Location of any given Z, Y, S or Polar parameter Movement of the screen cursor on chart circles

- Amplifier design using S-parameters Display of ANALYSER II program output files

Note: ANALYSER II is an advanced AC Linear Analysis program that calculates and displays the steady-state AC frequency response of a circuit in terms of Gain, Phase, Group Delay and Input/Output Impedances. It is also available from Number One Systems Limited at a cost of £229.71 inclusive of VAT and p&p. This package may also be reviewed at a later date.

CONCLUSIONS

I found the package easy to use and the results obtained were as accurate as those that could be obtained by manual charting, but much quicker and easier to obtain! The ability to quickly change parameters and observe the changes on the chart are an absolute boon to a designer.

I agree with the comment in the user manual that a mouse can be used but is not recommended. It is not really possible to place the cursor accurately enough using the mouse. However, moving around the chart with the mouse and then making final precise adjustments with the cursor keys worked fine.

Obviously aimed at the professional RF circuit designer, this package represents excellent value for money, especially when taking into account the time that could be saved using such a utility, instead of the 'Bob Crachett' method using quill and ink. Highly recommended.

I wish to thank Mr.Espin of Number One Systems Limited for his help and advice, and for the review software.

Z-MATCH is priced at £195.00 + £4.75 p&p + VAT and is available from: Number One Systems Limited, Harding Way, St.Ives, Huntingdon, Cambridgeshire, PE17 4WR. Tel: 0480 61778. International: + 44 480 61778. FAX: 0480 494042.

SECOND-HAND SONY CAMERAS

Eric Edwards GW8LJJ

Wandering around some rallies (I don't get the opportunity to get to many of these) I have noticed some good black and white video cameras for sale, including Sony models AVC3420 and AVC3450.

These Sony cameras were designed to be used with reel-to-reel portable video recorders (VTRs) as will be evident by their 10-pin connectors. These cameras will not work without an external source of sync pulses.

To make use of these cameras we must feed in the 12 volt shack supply as shown in Fig.1 to pins 9 and 10 (+ve to pin-10), and the line and field drives from the station Sync Pulse Generator to the single transistor stages shown. These simple convertor amplifiers condition the standard drives from the SPG to the levels required by the camera. The line drive circuit produces the required inverted pulse suitable for the camera simply by removing a resistor from the base of the transistor in the equivalent field drive circuit.

I have used three of these cameras in my shack and they all give good results, considering that I paid only £25 for one pair and £15 for the other one.

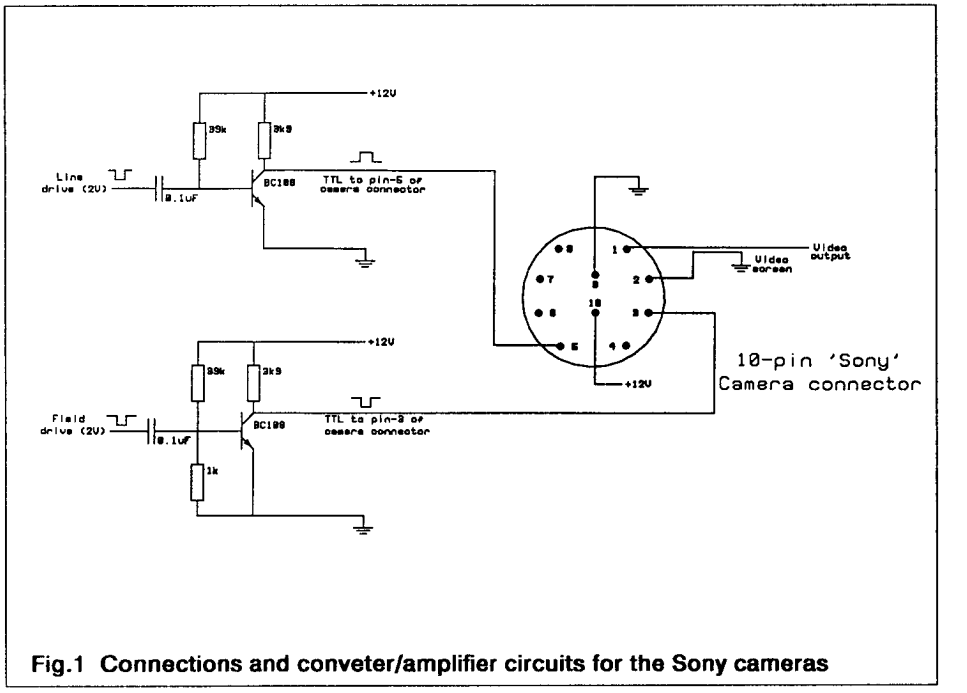


Fig.1 Connections and conveter/amplifier circuits for the Sony cameras

MICROWAVE PLUMBING !
CIRCULAR WAVEGUIDE FOR 3CM

Bob Platts G8OZP

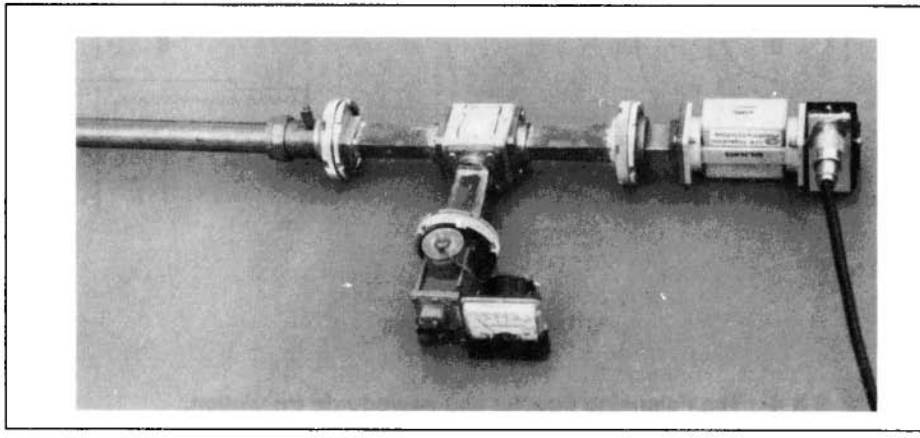
The 3CM repeater GB3XT requires separate waveguide feeds with the antennas mounted 11 meters AGL. Due to cost WG16 waveguide was not practical, so an alternative was sought. Tests were made with 22mm copper water pipe and fittings to see if they would make a suitable alternative and the results obtained have been very promising. This article sets out the system developed so far, to enable others to engineer systems to suit other requirements. Construction of several parts requires access to a lathe and basic engineering skills.

Fig.1 shows the transmit half of the system developed for GB3XT. The output from the TX is in semi rigid coax. This feeds a bandpass filter constructed from WG16. The output port of the filter is converted to 22mm pipe by a transition made from a WG16 flange and a fitting normally used to plumb 22mm copper pipe into a hot water tank. The 2 or 3 meter lengths of 22mm copper water pipe are coupled together with polarising couplers made from in-line compression fittings.

The TX antenna is a prototype 8-element colinear with a horizontal beamwidth of 100 degrees also machined from 22mm pipe.

The receive system is similar with a 20-element colinear in WG16. A transition converts to 22mm pipe, again coupled with polarising couplers. At the receiver a transition converts back to WG16, and then a WG16 to WG17 tapered transition converts down to fit the converted satellite LNB. (CQ-TV 151).

Fig's.2, 3 and 4 show the construction of the transition and the polarising couplers. The parts required for the transition are a circular WG16 flange (thick type) about half an inch of WG16 waveguide and a 22mm tank adaptor.



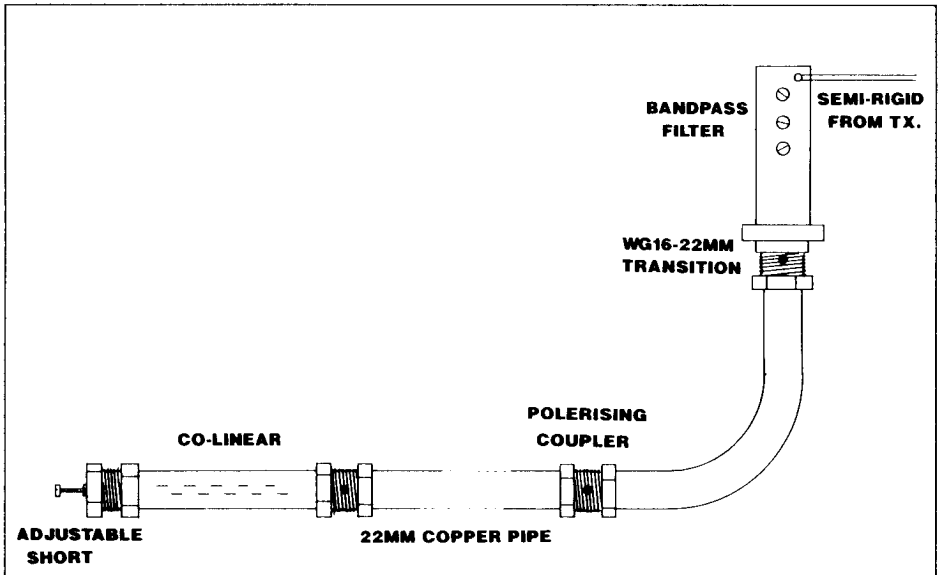
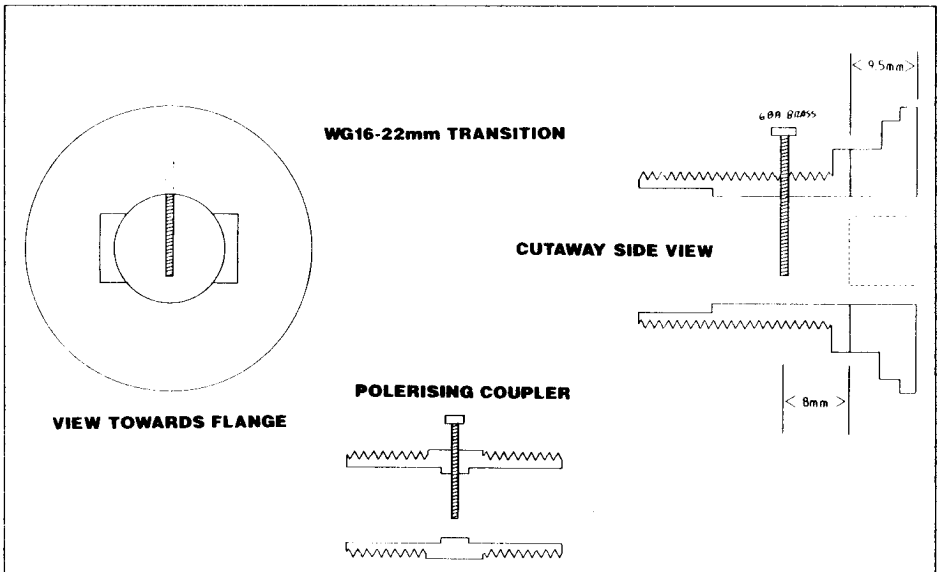


Fig.1 The Transmit half of the system used for GB3XT



Fig's.2, 3 & 4 The Polarising coupler and waveguide transistion.

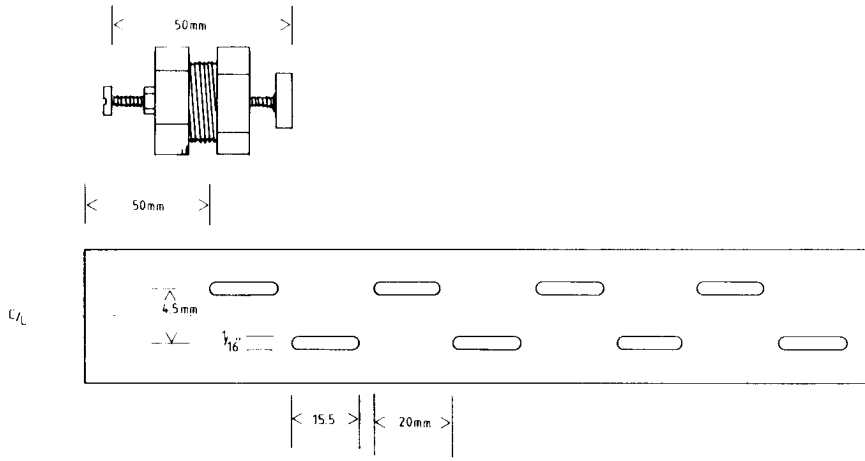


Fig.5 The Reflected Power Meter.

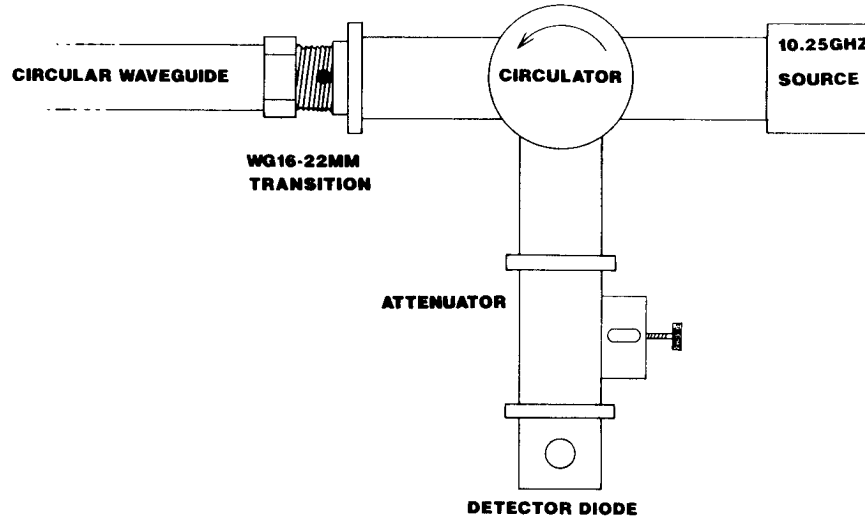
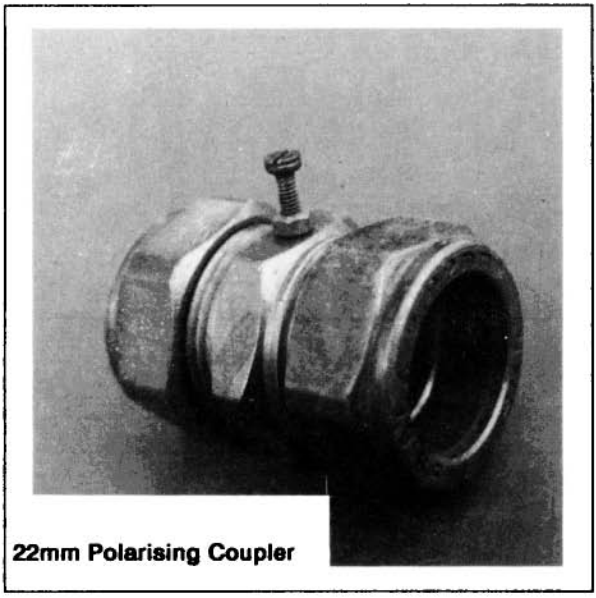


Fig.6 An 8-element Colinear Aerial constructed from 22mm Copper pipe.



22mm Polarising Coupler

Solder the waveguide into the flange and face off as normal. From the waveguide end (as opposed to the coupling end) machine the flange down to a length of 9.5mm. Face off the tank adaptor and then turn the flange down to the same diameter as the boss on the WG16 flange. Solder the two parts together and then with care bore the WG16 flange out to the same bore as the tank adaptor. Drill and tap out for the brass screw.

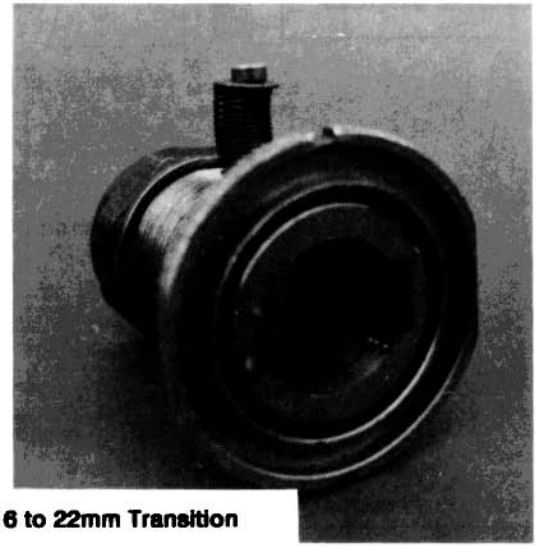
The polarising couplers are 22mm compression fitting couplers with a centrally fitted 8BA or equivalent screw.

The system required several bends to get the pipe out, around, over and up things. It was found that bends in 22mm pipe need to be as shallow as possible. Too tight a radius causes the polarisation to change, and sometimes the mode to. About a 6 inch radius bend appears the minimum for 90 degrees bends. A spring type pipe bender was used as it was noted that machine benders tend to leave the pipe with an oval section, which could cause problems.

The 22mm pipe colinear is at this stage a prototype, which gives promise for future development. By the nature of things it is a little more complex to make. The length of pipe used is not critical, the marking out and machining of the slots however is. Errors should be no greater than 0.5mmm.

After marking out to the dimensions of Fig.5, the slots should be machined with a 1/16 inch (0.0625) plain shank slotting drill (obtainable from engineering merchants).

If only a lathe is available, fit the drill in the chuck, fit a close fitting hardwood dowel inside the pipe to stop it deforming, and



16 to 22mm Transition

then clamp in V-blocks on the cross slide of the lathe.

The adjustable short for the top of the colinear should be a good snug sliding fit in the pipe. The disk should be made from brass or copper about 6 to 10mm thick. Accurately drill and tap the centre for the screw. The 4BA (3mm) adjusting screw should be secured with a spot of solder on the outside face. The mounting for the short is a 22mm compression fitting blanking plug. The hole for the adjuster must be accurately drilled and tapped to prevent the short binding. A locknut will also be required after final adjustment.

The feed system is frequency conscious and should therefore be set up in stages, adjusting each component for minimum reflected power before fitting the next stage. Equipment required for setting up is a circular dummy load, some way of measuring reflected power and a low power signal.

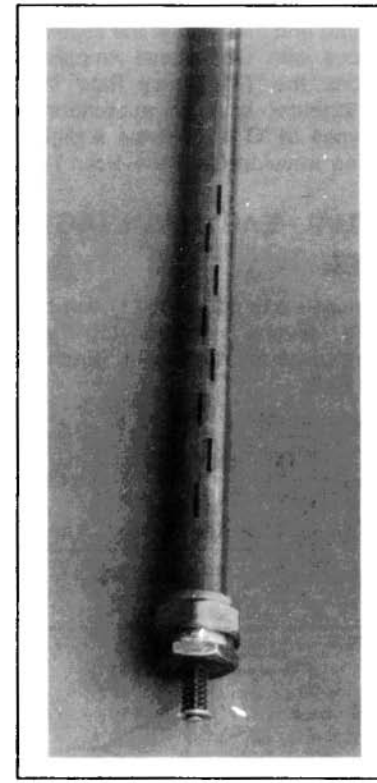
The dummy load can be made from about 5 inches of hardwood dowel machined down to fit inside the pipe. The first 3 inches should be turned down to a taper. A length of cord attached to the other end comes in very handy, should it be accidentally dropped down the waveguide. (Believe me!).

There are several ways of measuring the reflected power of the system. If an SWR bridge is not available then a circulator set up as in Fig.6 could be used. Alternatively a 3dB cross coupler may be used instead.

Set up the WG16 to 22mm transition first. Attach a signal source to the reflected power meter and the transition to the output. Fit a length of 22mm pipe to the transition and the dummy load in the end of that. Adjust the screw on the transition for minimum reflection and tighten the locknut. Fit a polarising coupler with the screw at 0 or 180 degrees to the one on the transition and another length of pipe, fit the load and again adjust for minimum.

Repeat the procedure until all components have been fitted.

The colinear must be fitted with the centre line of the slots at either 0 or 180 degrees to the screws in the transitions and couplers. The adjustable short should also be set for minimum reflection. Once assembled it is worthwhile re-checking the adjustment again as there can be some interaction.



That's it then! So in a short while I shall expect to see domestic copper pipe waveguide systems in use all over the place, coupled with water cisterns loaded up for 24CM and copper cylinders used as 2C39A cavity PA's!! Seriously though, this is a novel idea from our Bob and one worth experimenting with ... Ed.

LOGIC CIRCUITS

Part–10

John Wood G3YQC

OP. AMPS AND BRMS.

This tenth and final part in the series on ICs continues with Operational Amplifiers and describes the TTL Binary Rate Multiplier 7497 together with an application using both types of IC to generate a digital field scanning waveform for Slow-Scan TV use.

VIRTUAL–EARTH VOLTAGE ADDER

The virtual–earth adder (Fig.1) can be used to add several voltages together with differing gains for each input. Each gain is simply Rf/Ri.

$$Vo = -\frac{Vi\ Rf}{Ri1} + \frac{V2\ Rf}{Ri2} + \ldots + \frac{Vn\ Rf}{Rin}$$

or:

$$Vo = \frac{-Rf\ (V1 + V2 + .. + Vn)}{(Ri1\ Ri2\ Rin)}$$

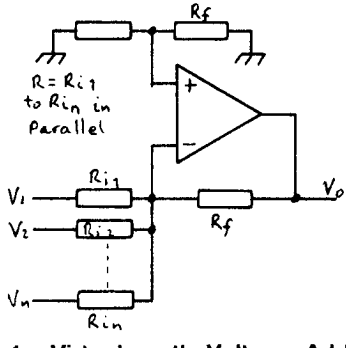


Fig.1 Virtual–earth Voltage Adder

The inputs may of course be either positive or negative and this is the basis of a vision or sound mixer.

The input voltages can be fed to the non–inverting terminal as well to effect subtraction without the need for an invertor but things begin to get a bit tricky when this sort of thing is done since the gain is now:–

$$G = \frac{1 + Rf}{Ri1\ Ri2\ Rin}$$

i.e. it increases with every additional input resistance on the inverting input, as shown below. Whilst the individual input gains remain constant, the total gain depends on the number of inputs, etc., so for more than a few the calculations become rather lengthy.

$$G = 1 + \frac{Rf}{Ri_1 \parallel Ri_2 \parallel \ldots \parallel Ri_n}$$

Gain Increases with inputs

VARIABLE GAIN CONTROL

It has already been shown that the gain of an invertor is proportional to Rf/Ri (i.e. the Op. Amp has nothing to do with it). By making Rf and Ri a potentiometer the gain can be controlled from unity to A (the open–loop gain).

Unfortunately, the change of gain with potentiometer angle is not linear, but if Rf (or Ri) is made a linear variable resistance then the change will be linear from zero to Rf/Ri. (or Rf/Ri to A). See Fig.2.

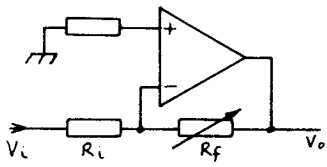


Fig.2 **Variable Gain Control**

NON-LINEAR AMPLIFICATION

The basic Op Amp circuit has the two resistors Rf and Ri but there is no reason why either of these should not be replaced by some other device – active or passive.

For instance, if a voltage dependant resistor (VDR) is used to replace Rf the amplifier has a high gain for low-level signals but a low gain for high-level ones. This is because the resistance of the VDR decreases as the voltage across it is increased – to the extent of about the fifth power of the voltage.

This arrangement can be effective as a null-detector or a volume compressor (Fig.3). By putting the VDR in place of Ri instead, the opposite effect is obtained; that of a volume expander.

Another non-linear device is a diode. This has a square-law relationship between current and voltage over a small voltage range but is difficult to employ with guaranteed results in a non-linear amplifier.

A much better non-linear device is an ordinary transistor connected as a diode (Fig.4). This can maintain its logarithmic characteristic over as much as a nine-decade range of current. The effect occurs only for one polarity of voltage as might be expected. When reverse-biassed the resistance is very high and the gain of the Op Amp is also high. To overcome this a second transistor of complementary type can be used in parallel.

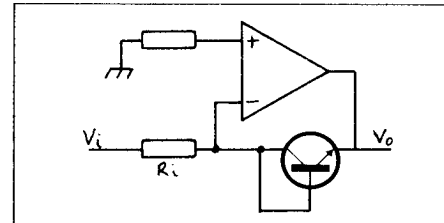
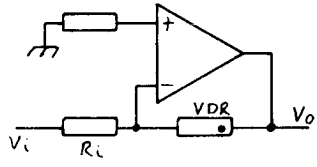


Fig.4

There still remains a 'dead-spot' of some 0.6 Volts per transistor before each transistor turns on. However, this is contained within the feedback loop and the Op Amp effectively reduces it to 0.6/A or a negligible amount. With planar transistors the reverse-bias across them should be limited to some 5 Volts. This can be done by attenuating the Op Amp output as shown in Fig.5.

Placing the transistor(s) in place of Ri gives an anti-log characteristic (Fig.5). It is now



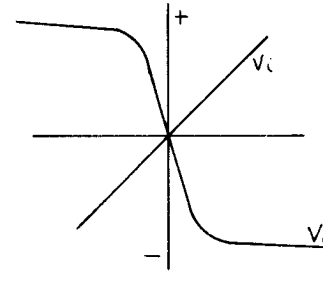


Fig.3 **Employing a VDR**

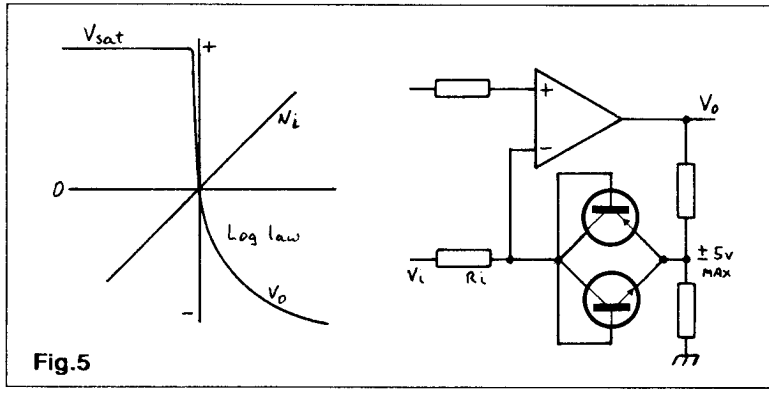


Fig.5

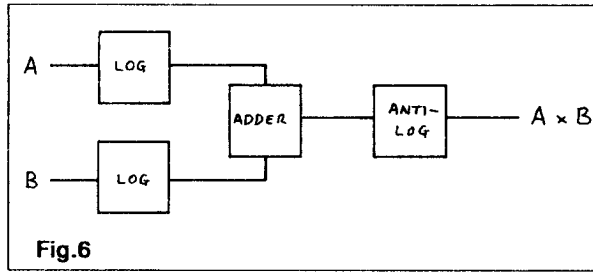


Fig.6

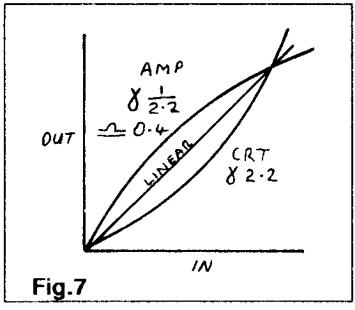


Fig.7

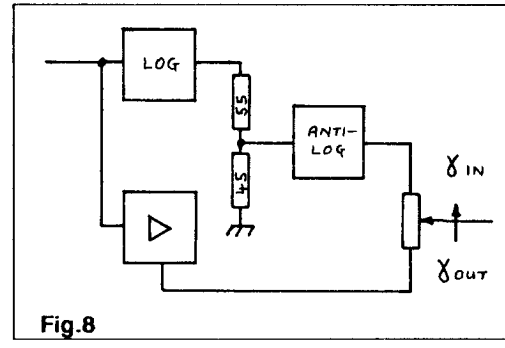


Fig.8

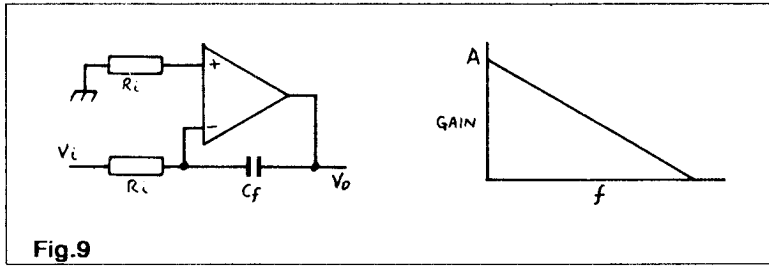


Fig.9

possible to perform mathematical calculations in analogue form by using these two circuits and a voltage adder. See Fig.6.

This system can be put to use as a gamma correcting amplifier. Gamma is the term used to denote the law relating to light and voltage in cathode-ray tubes and camera pick-up tubes. For a CRT it is of the order of 2.2 and the effect is to crush the whites in the picture. For a vidicon it is about unity and for a photo-cell it is unity (i.e. it is linear). The Image-Orthicon has a variable Gamma of about the right amount - 0.5. To give correctly contrasted pictures of unity Gamma the pick-up tube and camera has to have a Gamma of 1/2.2 or about 0.4 - it stretches the blacks. See Fig.7.

Gamma can be obtained quite simply with a log/antilog combination by using the mathematical approach (Fig.8). So by taking 40% of the log output and then taking the antilog the signal is raised to the power 0.4. To use this system with simple control a secondary path is provided for the signal without any non-linear effect such that the peak white-to-black voltage is the same. A mix from one source to another allows a smooth introduction of the Gamma effect.

This form of Gamma control can also be used with negative film, etc., if the log signal is amplified instead of being attenuated. In both cases good quality Op Amps are essential. (Note, the amplifiers require only one diode as the correction is unidirectional in a video signal). One problem with Gamma correcting amplifiers is that the gain is theoretically infinite at black level - giving high amounts of noise in the blacks and some form of level system is required to prevent signals below a certain level from being affected at all.

REACTIVE FEEDBACK

If the feedback resistor, Rf, of the basic Op Amp is replaced by a capacitor then the amplifier gain depends on the ratio of the capacitive-reactance to Ri. For high frequencies the gain will be low - in fact the gain is inversely-proportional to frequency. See Fig.9.

This is therefore an integrator, but it differs from a simple CR network integrator in that there is considerable gain at low frequencies and dc. If a DC voltage is applied to the input it causes a change at the output of the Op Amp which tries to oppose the input because of the negative feedback. At low frequencies, though, the NFB is negligible so the output changes slowly towards A.vi and soon saturates the Op Amp output. This means that the amplifier saturates for any voltage greater than a very small amount. This steady voltage change is in fact at a linear rate proportional to CR and is known as the characteristic time.

For example, a 1uF and a 1k gives 10 to the minus-three secs/volt or 1volt in 1 mS. A typical Op Amp would saturate at 10 Volts in some 10 mS. The linear change of voltage with time is very useful if the amplifier is not allowed to saturate by ensuring that the input currents are balanced properly.

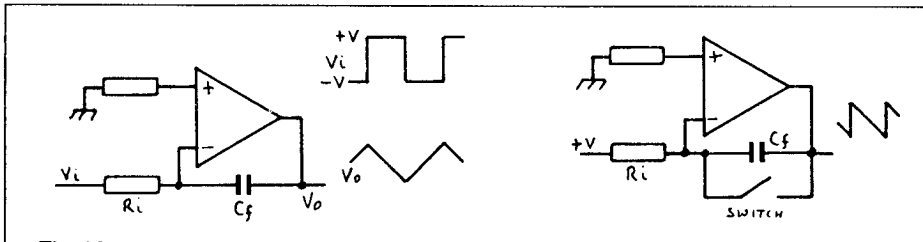


Fig.10

If the input to the integrator is made a squarewave voltage then the output voltage will be triangular and of a voltage proportional to the input frequency. A sawtooth can be obtained if the input voltage is made a pulse shape, but the best way to obtain a sawtooth is to discharge the capacitor at regular intervals with some sort of a switch. See Fig.10.

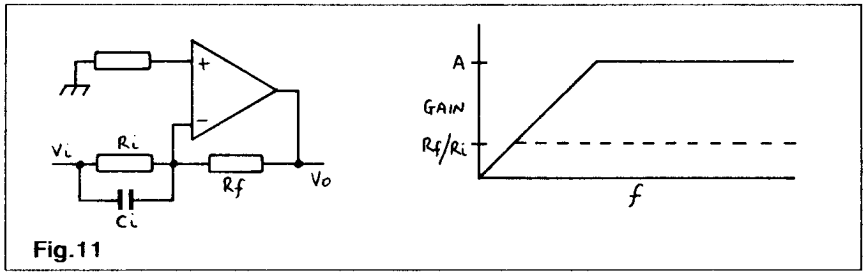


Fig.11

If the capacitor replaces Ri instead of Rf the circuit becomes a differentiator which has a rising frequency response. The problem now is that the gain is a maximum to pulse edges and the amplifier saturates immediately with a slow return to zero voltage. The return is linear but the system tends to be unstable and it is usual to have another resistor across the capacitor to limit the HF gain to Rf/Ri. See Fig.11.

Inductors can be used in place of the capacitors but the integrator then becomes a differentiator and vice-versa. Inductances are 'difficult' components anyway and are best avoided in IC circuits.

The differentiator and integrator can be combined in a circuit which gives a differentiator with HF roll-off (See Fig.12). The differentiator time-constant is Ci.Rf and the integrator one is Ri.Cf. If a frequency is chosen such that Ci.Ri = Rf.Cf then the gain will be a maximum (of Rf/Ri). This arrangement provides a differentiator with HF loss which attenuates noise. It is a kind of tuned filter. As an integrator the circuit is stable and free from DC drift.

THE BINARY-RATE MULTIPLIER 7497 (BRM)

This IC device is basically a six-bit serial binary counter (divide-by-64) with additional circuitry to extract the input clock pulses according to both the state of the count and the states of six inputs.

The output of the 7497 can be any number of pulses from 1 to 63 from the input 64. That is, it reduces the pulse rate to some fraction between 1/64 and 63/64. See Fig.13.

The reduction of pulse rate is achieved by the omission of certain pulses from the sequence. If input F is made low then one

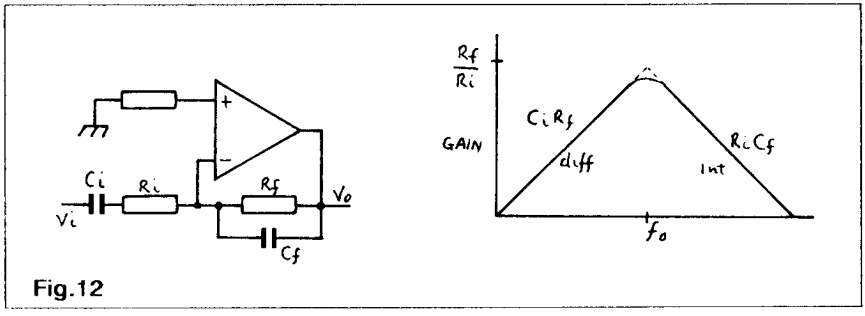


Fig.12

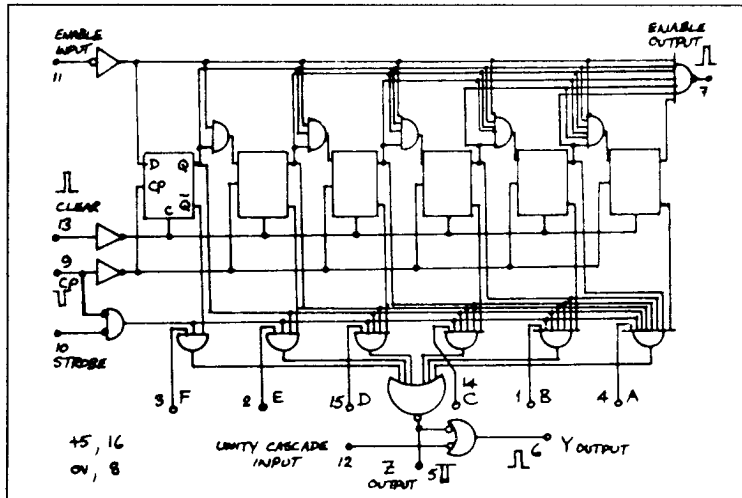


Fig.13 The Binary-Rate-Multiplier, 7497

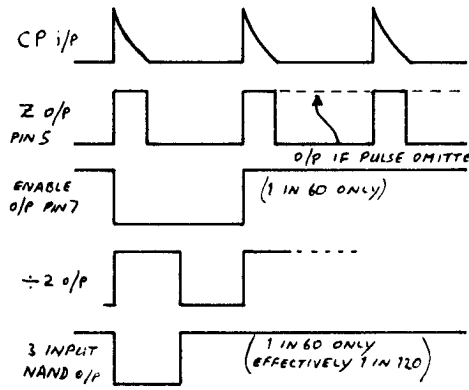


Fig.14

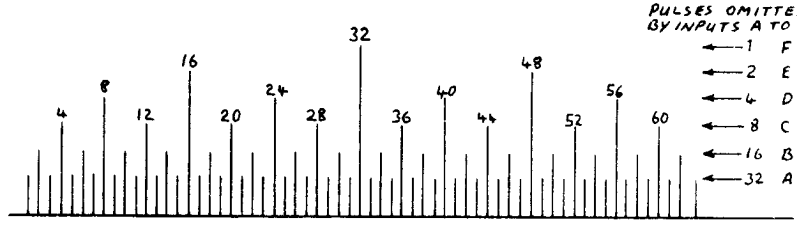


Fig.15

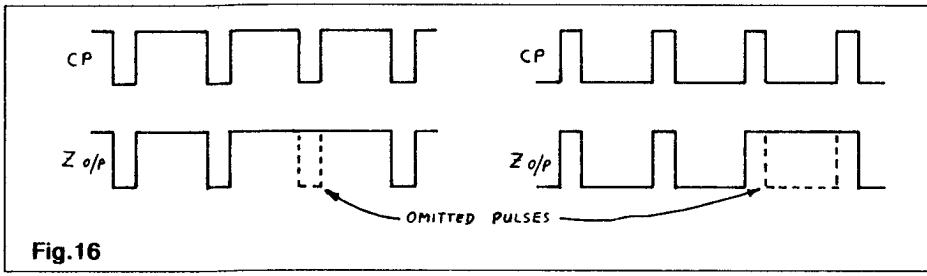


Fig.16

pulse is omitted (position 32). Input E causes two pulses to be omitted (positions 16 and 48), etc. as in Fig.14. The output sequence is therefore irregular and not suitable for FREQUENCY division.

The title of Multiplier is seen to be rather misleading as the device is actually a divider. For normal use the input-enable and strobe inputs are made low as is the clear input. The Z-output then consists of negative-going clock pulses with some missing. The Y-output is the inverse of Z (if the unity-cascade input is made low). If the input clock pulses are positive then the Z-output is STILL negative.

The devices may be cascaded to cover 12 bits or more by connecting the Enable-output to the Enable and Strobe inputs of the following device. The Z-output is also connected to the unity-cascade.

An output of 64/64 may be obtained from Y when the BRM is inhibited by the strobe, by connecting the Unity-cascade to the Clock input. There is a decimal rate multiplier version of the 7497 with the number 74167.

The BRM can be used to make a simple Digital-to-Analogue converter (D-A). Each output pulse from the BRM is made almost a whole clock-pulse period by making the input clock pulses narrow and positive through a differentiator. The frequency source is of no concern as long as it is of a high frequency.

The output pulses are integrated by a simple CR network so that the average dc of the output varies between some 4 volts and 0 volts according to how many pulses are omitted or passed. In practice the voltage does not decend to zero because of the finite width of the input clock pulses.

The D-A directly converts a digital state to an analogue voltage so if a counter is attached to the six inputs the output voltage will be a 64-step staircase if the counter is fed with a steady source of clock pulses.

The only snag to this very simple system is that the maximum rate at which the output can be varied is the oscillator frequency/64. It would be tricky to achieve TV line rates with a satisfactory waveshape.

Using a down-counter gives a reversed staircase but the same result can be more easily obtained by means of an output invertor.

SLOW-SCAN TV DIGITAL VERTICAL SCAN

This is an extension of the use of a six-bit Binary Rate Multiplier to handle seven bits for 120 levels in a Digital-to-Analogue converter. See Fig.17.

The BRM is fed with high-frequency clock pulses of very short duration via a differentiator so that the output consists of narrow positive pulses at the Z output. These may, or may not, be joined by low voltage levels in the normal manner. The output can be considered as wide negative pulses with narrow gaps and varying numbers of these negative numbers are missing. The average DC of the output depends upon the number actually missing

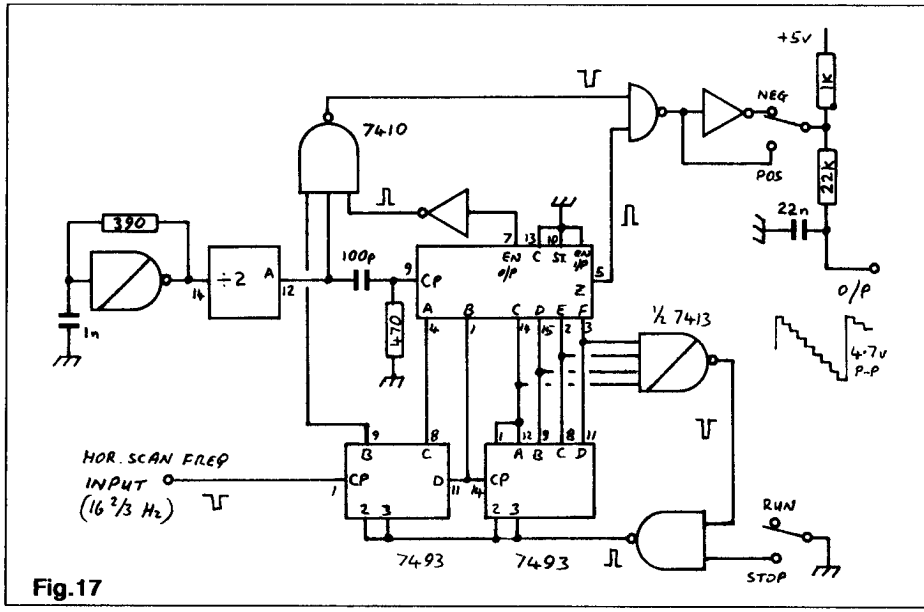


Fig.17

and the clock frequency has no part in the dc voltage. The six gating-inputs are fed with the six Most Significant Bits of the counter so that the output dc voltage would have 64 discrete voltage levels. However, the count is reduced to a total of 120 for Slow-Scan use and so the dc voltage has only 60 levels. The output for a continuous count is a rising staircase.

The Least Significant Bit is handled separately as follows: The BRM Enable-output, pin 7, has a negative pulse present which occurs once only for the 60-pulse sequence and this is inverted and gated with the output from the counter LSB and a square-wave from the input to the BRM.

The resulting output is a negative pulse once per 60-bit sequence of one half the normal duration - if the LSB is positive. That is, for every other input pulse to the counter the output is a pulse of a 120th of the 60-pulse sequence. This is the equivalent of a step in voltage of one 120th the total output every OTHER pulse and since the 60 levels each take two pulses to change, the result is a 120 level staircase corresponding to 7 bits. Various refinements are added to enable the scan to be stopped or inverted and a pull-up resistor of 1k makes the output voltage almost 5-volts peak-to-peak. The pull-up resistor does not have this effect directly on the BRM output pin and this treatment is not recommended except on ordinary gates. A 741 Op Amp is included to convert the 0 to 5 volts staircase to a +/- 10 volt one with which to drive a set of scan coils (See Fig.18).

There is no reason why this system should not be used for Slow-Scan line scan too, except perhaps that 120 steps may not be enough in the horizontal direction. The raster would in fact be a dot matrix of 120 x 120 dots rather than 120 lines.

The amount of integration shown is not critical except that it should not greatly affect the scan flyback time. To keep this small the clock frequency must be of the order of several MHz and a two-stage integrator may be of use here. In fact, the 741 can have a capacitor put across Rf to do the same job.

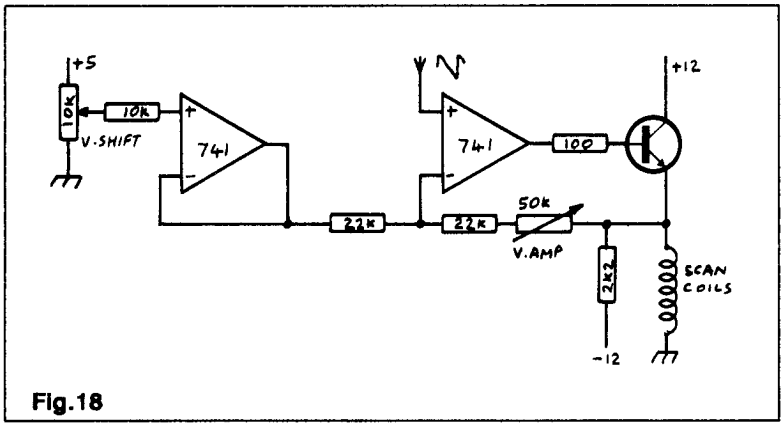


Fig.18

This concludes this series on Logic Circuits and elements. I hope that it has proved of interest and perhaps even of use to some of you.

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PUBLICATIONS should NOT be ordered on this form. A separate form is provided for that purpose elsewhere in this supplement. We reserve the right to change prices without notice.
All Club crystals are HC18/U (wire ended).

1" vidicon tubes are available in different heater ratings (95 and 300mA) - 6" long; (EMI types 9677, 9728 and EEV types P849). 2/3" tubes have 95mA heaters (EEV type P8037). These tubes are all of separate mesh construction, with magnetic focus. Electrostatic vidicon and Leddicon tubes are available, to special order. Members requesting information on prices or other types of tube or equivalents are asked to send a stamped, addressed envelope for their reply.

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3	.....	One inch Vidicon base	£1.00	0.25	.....
4	.....	2/3 inch Vidicon base	0.65	0.25	.....
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I²C Part-4 - THE RELAY BOARD

I²C RELAY BOARD.

Discussions at **THE SHOW** revealed the need for our I²C system to be able to control parts of the external world. To this end we have designed a simple, but effective, relay board.

All of the contacts of the eight relays are brought to the edge connector for use as required. Each relay is a double pole change-over type and provision has been made for pull up or pull down resistors (or links) on the normally open, and normally closed contacts.

The circuit consists of a PCF8574A eight bit port integrated circuit (IC2), which can be set to one of 8 possible addresses by the setting of the three switches on the A0-A2 inputs.

The eight individually addressable 'bits' are each connected to a section of IC1 ULN2803. This is an octal relay driver IC which has built in protection diodes to 'snub' the back EMF from the relays when they are de-energised.

WARNING: The relays are only rated at 1Amp at 115 Volts, so MUST NOT be used to switch mains voltages direct.

COMPONENTS

The relays are standard 12 Volt, PCB mounting Double pole double throw manufactured by OMRON and are available from Farnell (part No.179-351), RS Components, and several other suppliers.

There are 32 pull-up/pull-down resistors shown on the circuit diagram. They are only shown for guidance and it is only necessary to fit them if they are required by the input circuitry of the device that is being controlled by that particular relay.

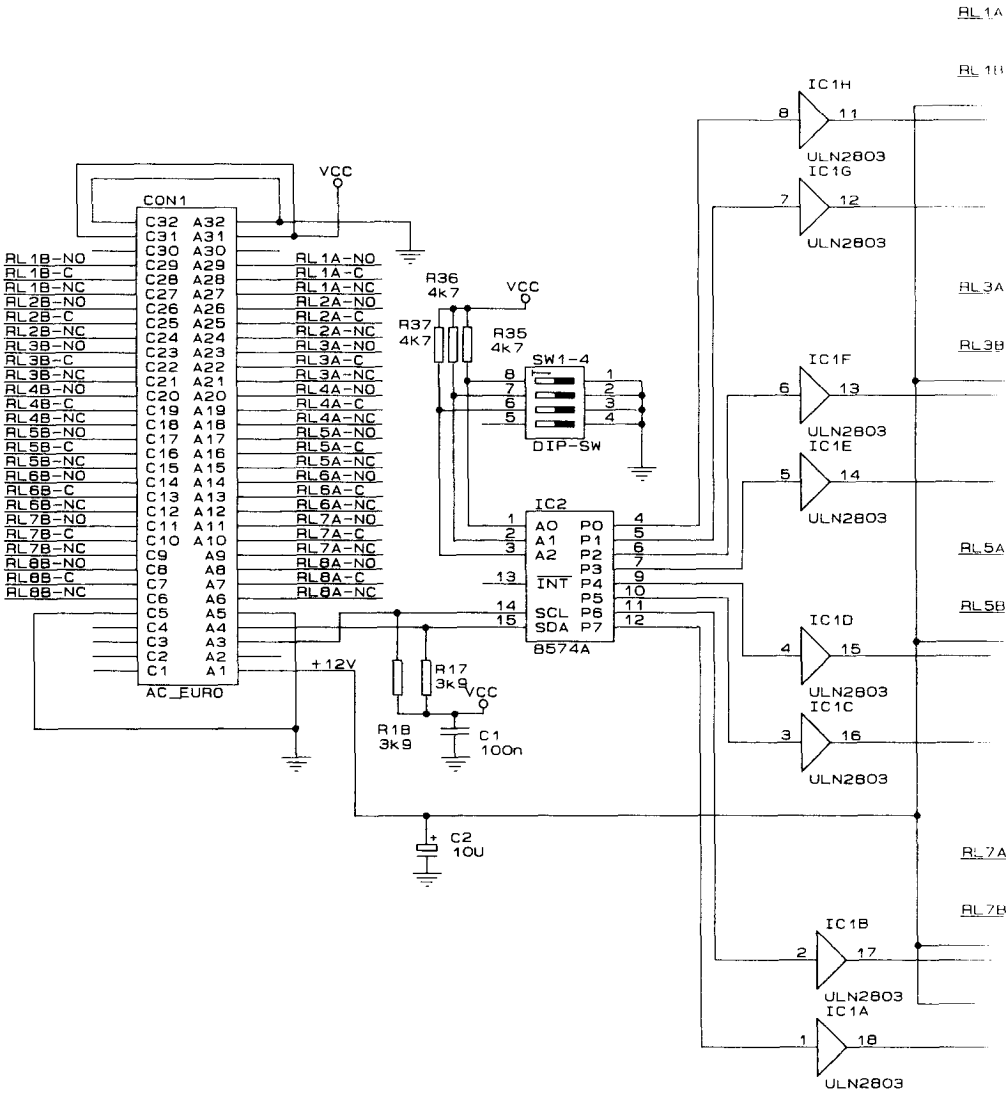
SOFTWARE

The next version of firmware is now available, everyone who has received the EPROM containing version 2.26 should return this with return postage enclosed and version 2.27 will be sent to you.

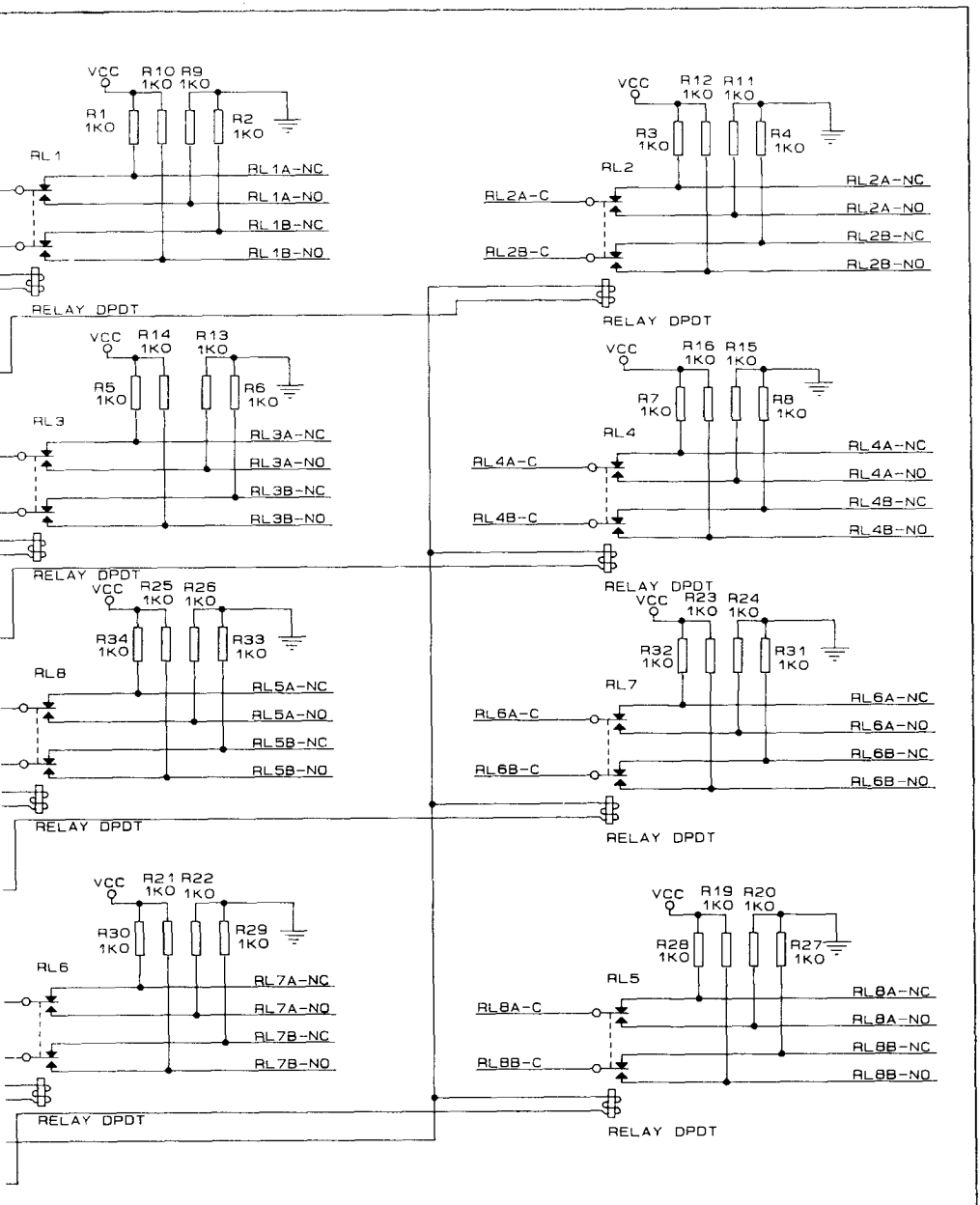
Version 2.27 includes full support for the relay card described in this article, as well as some enhancements to the existing functions.

Any feedback regarding the software would be most useful and should be sent to:

Chris Smith G1FEF, 107 Hithcin Street, Biggleswade, Bedfordshire, SG18 8BL



I²C Relay Board Circuit Diagram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R10 1KO
R9 1KO
R1 1KO
R2 1KO
RL1
RL1A-NC
RL1A-NO
RL1B-NC
RL1B-NO
RELAY DPDT
VCC
R12 1KO
R11 1KO
R3 1KO
R4 1KO
RL2
RL2A-C
RL2B-C
RL2A-NC
RL2A-NO
RL2B-NC
RL2B-NO
RELAY DPDT
VCC
R14 1KO
R13 1KO
R5 1KO
R6 1KO
RL3
RL3A-NC
RL3A-NO
RL3B-NC
RL3B-NO
RELAY DPDT
VCC
R16 1KO
R15 1KO
R7 1KO
R8 1KO
RL4
RL4A-C
RL4B-C
RL4A-NC
RL4A-NO
RL4B-NC
RL4B-NO
RELAY DPDT
VCC
R25 1KO
R26 1KO
R34 1KO
R33 1KO
RL8
RL5A-NC
RL5A-NO
RL5B-NC
RL5B-NO
RELAY DPDT
VCC
R23 1KO
R24 1KO
R32 1KO
R31 1KO
RL7
RL6A-C
RL6B-C
RL6A-NC
RL6A-NO
RL6B-NC
RL6B-NO
RELAY DPDT
VCC
R21 1KO
R22 1KO
R30 1KO
R29 1KO
RL6
RL7A-NC
RL7A-NO
RL7B-NC
RL7B-NO
RELAY DPDT
VCC
R19 1KO
R20 1KO
R28 1KO
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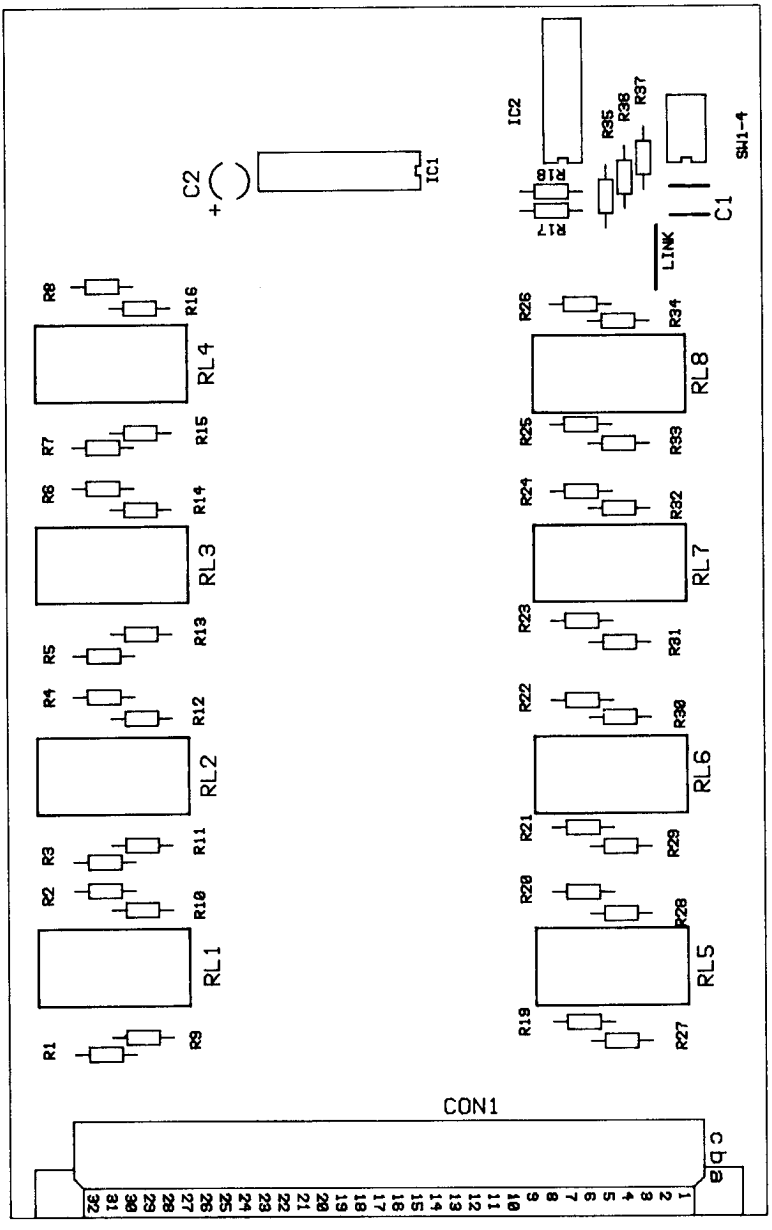
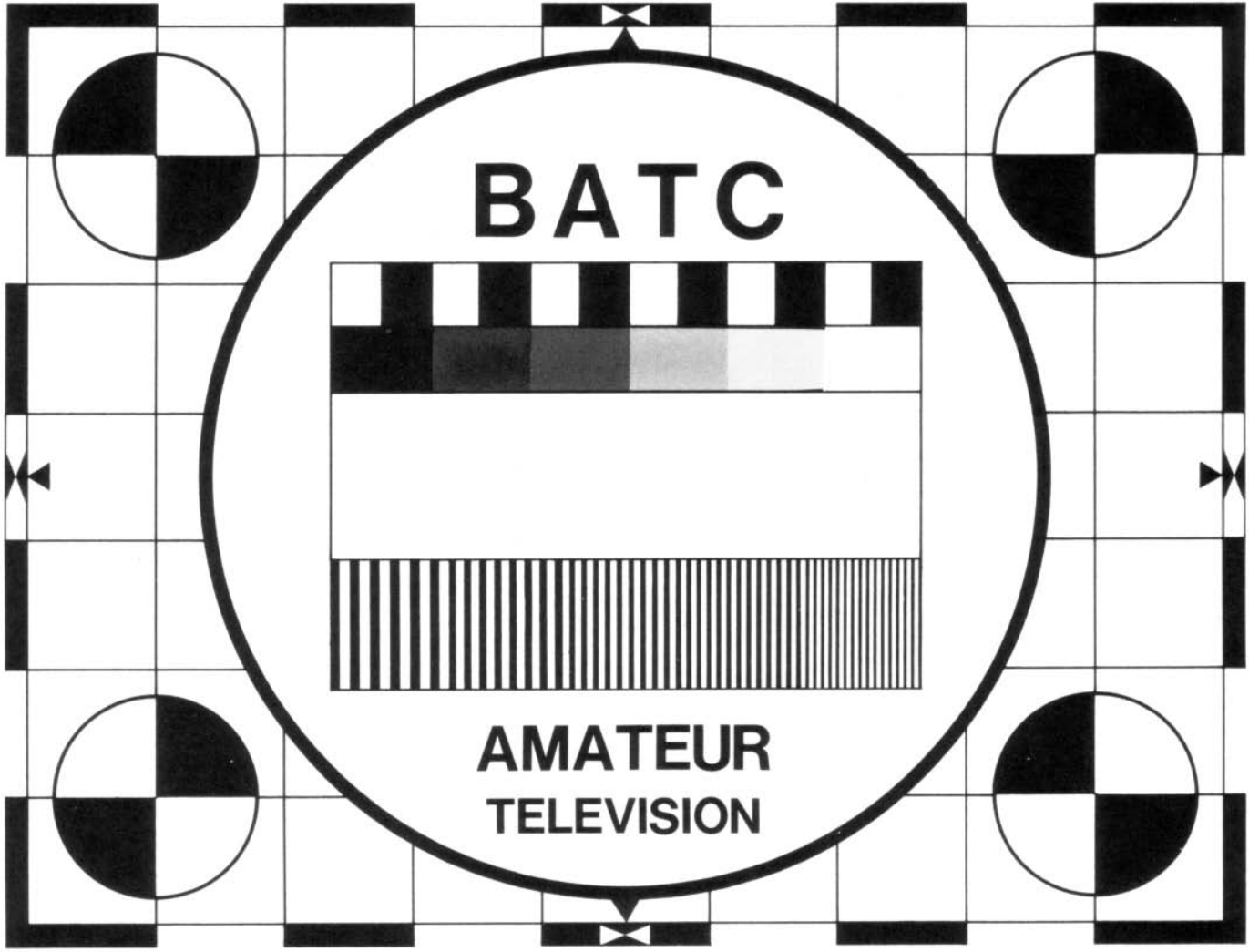
RELAY DPDT



I²C Relay Board Component Overlay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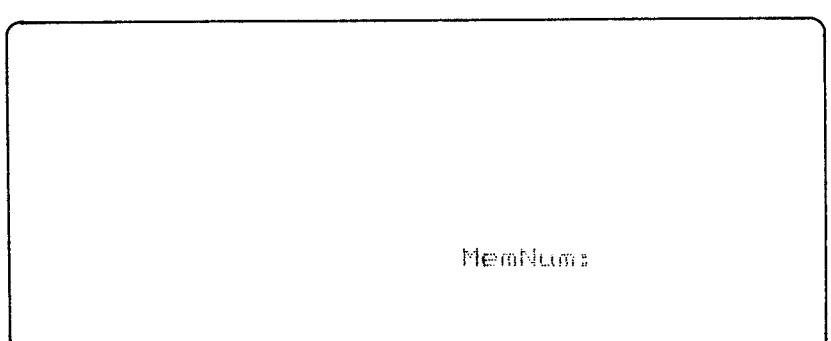


FIELD BULLETIN 3

REVISED

FIELD BULLETIN 3 – REVISED

In last months I²C supplement we produced in error field bulletin 3 which seems to introduce more errors than it corrected. I can only apologise for this, and reproduce below the definitive version (please delete the earlier bulletin 3 from your folder).

This bulletin will optimise component values and correct the few PCB and circuit diagram errors that have crept into the system. In all cases the component values should be taken from the circuit diagrams that have appeared in the CQ-TV supplement, rather than the component lists. The following text indicates where the circuit diagrams are incorrect, the PCB needs modifying, or a component value other than the value indicated on the circuit diagram should be fitted.

CPU BOARD

- Link IC5, pin 1 to IC5, pin 10
- Link IC4, pin-19 to IC2 pin-19
- R15 on the diagram (connected between Vcc and the line marked RAMDIS) should read R16. The PCB silk-screen identifies it correctly. It's value is correct, at 3K3.
- C14 on the diagram (connected across R3) should read C15. The PCB silk-screen is also incorrect. There are two C14's shown on the PCB. The one between R3 and R4 is actually C15, its value is 47pF. The 'other' C14 is shown correctly on the diagram and PCB, its value is 470pF.
- The track shown on the diagram going from R8 to CON1, pin B31, actually goes to CON1, pin A3 on the PCB. This is the chip select line for the 8255, when used in conjunction with the VDU board.
- If the CPU doesn't reset correctly, every time you power up, try the following mods:

Connect a 1N4148 diode across R10, cathode to Vcc, anode to junction of R10/C13.

Ensure that C13 is a tantalum bead capacitor. (C13 could also be increased in value to 47uF)

VDU BOARD

- Cut track between C18/Y2 and C26
- Replace R22 and R23 with wire links.
- C25 should be 100nF ceramic.
- C21 should be 10nF ceramic. Resistors not shown on the diagram, but present on the PCB : R26, R27 and R28. They should all be 4K7. They are pull-up resistors for the RED, GREEN and BLUE outputs.

- Capacitors not shown, or shown incorrectly, on the diagram, but present on the PCB: C1, C2, C4 and C14. They should all be 10nF ceramic.

- Capacitor between IC9, pins 16 and 13 on the diagram, should read C26 and its value is 22nF ceramic. It is identified correctly on the PCB silk-screen.

- Capacitor C11 should be 10uF electrolytic.

- Capacitor between IC8, pin 26 and GND should read C2 and its value is 10nF ceramic. It is identified correctly on the PCB silk-screen.

- The outline on the PCB for TR2 (2N3906) is reversed. Place TR2 in the PCB rotated by 180 degrees.

- Omit D3. Hard-wire top two connections of CON3. We shall not be using this link. To select between 'GENLOCK' and 'FREE-RUN' use CON2 only.

- The SYNC output (CON1, pin 5) has no pull-up resistor on the PCB. It will require one, as the output chip is an open collector device. Therefore, connect a 4K7 resistor on the PCB between CON1, pin 5 and CON1, pin 1.

VISION SWITCHER BOARD

- Replace the following resistors with wire links: R7, R9, R34, R36, R63, R65, R87, R89, R23, R24, R49, R50, R73, R74, R102, R103

- Alter the following resistors from 47R to 1K: R3, R5, R30, R32, R58, R60, R83, R84

- The following transistors should be type BF244 or 2N3819, not BFR30 as shown on the diagram: TR4, TR6, TR12, TR14, TR20, TR22, TR28, TR29

- The following capacitors should be 10uF electrolytic, not 6u8 as shown on the diagram: C10, C8, C14, C16, C22, C24, C30, C32

- The track from R113 to a plated-through hole on the underside of the PCB should be cut. A link should then be wired between R113 and +12V, EG: CON1, pin A1. On the diagram alter the -12 to +12 on the top side of R113.

- Link IC5, pin1 to IC5, pin 10.

- The edge connector (CON1) as shown on the diagram is incorrect. It is actually wired as follows:

1A = +12V Power in
3A = SCL I²C Bus clock
5A = VIDREF Video reference input
7A = Video out 2 Channel 2 output
9A = Video in 8 Video inputs, high impedance
11A = Ground
13A = Ground
15A = Video in 6
17A = Ground
19A = Ground
21A = Video in 4
23A = Ground
25A = Ground
27A = Video in 2
29A = Ground
31A = +5V Power in (on-board regulator)

2A = -12V Power in
4A = SDA I²C Bus data
6A = Video out 1 Channel 1 output
8A = No Connection
10A = Ground
12A = Video in 7
14A = Ground
16A = Ground
18A = Video in 5
20A = Ground
22A = Ground
24A = Video in 3
26A = Ground
28A = Ground
30A = Video in 1
32A = Ground

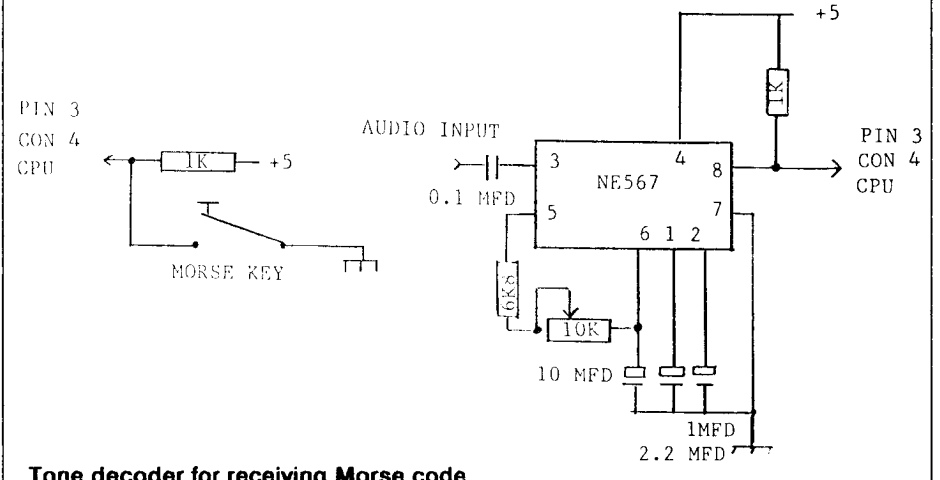
ODDS & ENDS

Morse Code

This is an option on the menu to decode CW and display the message on the screen. The software is resident in the custom EPROM and only requires to be selected. The input is via pin 3 of connector 4 on the CPU card. Connector-4 is located directly below IC8 (8255) and can be extended to the main edge connector using one of the spare pins if you so desire. The input is designed to respond to 0v and 5v, so a pull up resistor of 1K is needed along with a Morse key.

If you want to expand the system FOR decoding Morse received over the air then you will need a tone decoder circuit. This can be achieved using an NE567, which will convert the tone to a logic level suitable for connection to pin 3 on connector 4.

The circuit reproduced below is taken from the data book, RV1 is set to the frequency of the tone which in the case of CW is set by the BFO in the receiver, so adjust both for the best result.



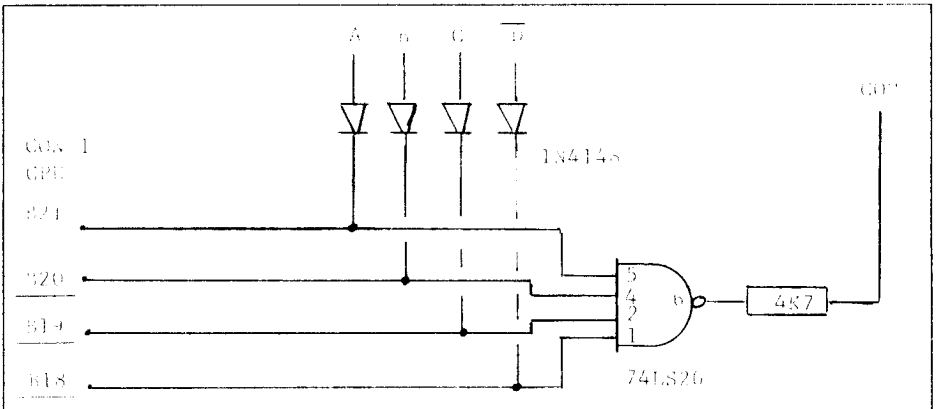
Tone decoder for receiving Morse code

Electronic Test-card

This menu option refers to the electronic Test-card designed by G4BAU which first appeared in the ATV HANDBOOK (blue cover) and later in Micro and TV projects. The test card had a decade switch which allowed any single test pattern in the test card to be expanded to fill the whole screen. If you have one of these very test-cards in the shack then you can interface the waveform selection to the I2C micro by the following circuit.

The gate is a 74LS02 nand gate and the A B C D refer to the decade switch which is located on the original test-card.

Connector 1 is the card edge connector of the CPU board and the diodes are 1N4148's. The switch should be left in position 8 and the test waveform selection can then be carried out from the keyboard.



Electronic Test-Card Interface

STOP PRESS TR1 CPU BOARD

This device is shown on the circuit as a 2N3702 and should be a 2N3906 which has a different lead configuration and is the one that matches the PCB layout.

Sorry for all the errors but because of the complexity of this circuit and level of support we have endeavoured to provide, the project has been run by a team that are well distributed around the country. All the members having day jobs that often get in the way of pushing back the frontiers of ATV.

Can I also add that if you are thinking of building this project please order your PCB's now so that future PCB runs can be set.

i.e: I will order the correct number of future PCB's to match the number of CPU and VDU boards sold.

GB3ET REPEATER GROUP

KEYBOARD PROBLEMS ???

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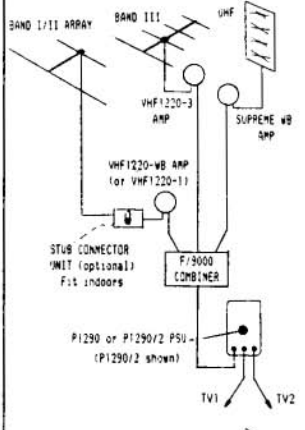

Fig.1: A suggested DX-TV aerial system incorporating 'Fringe Electronics' amplifiers and a single power source. The P1290/2 power unit can be used to pass signals to two receivers.

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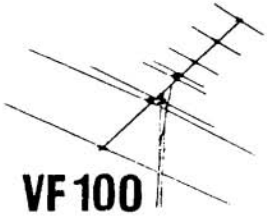

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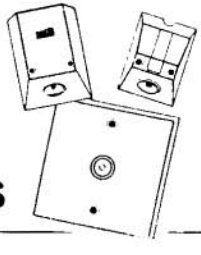

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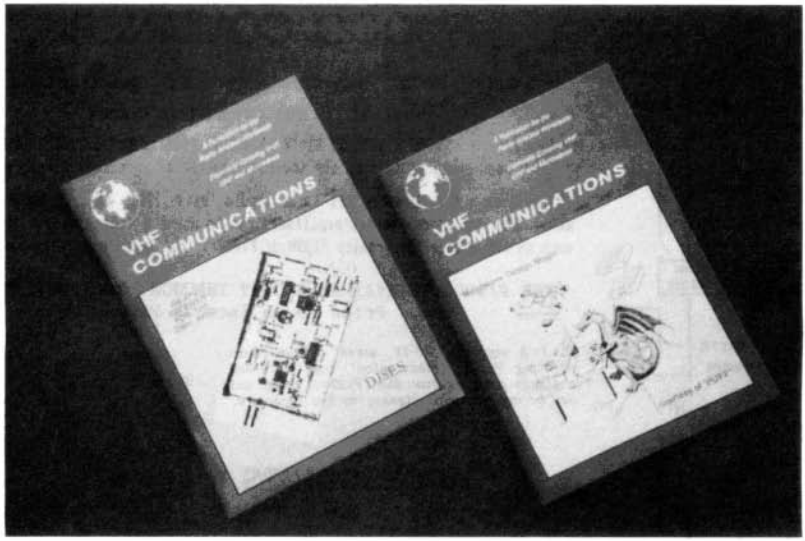

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USING OSCILLOSCOPES

Part-8

Mike Wooding G6IQM

In this part of this series I shall continue the examination of Measurement Techniques I began in the last part, beginning with a further look at X-Y measurements. I shall again be giving exercises that you can try on your oscilloscope, using the probe calibration signal as the measured waveform.

X-Y MEASUREMENTS

As I explained in the last part of this series; displaying two waveforms and measuring when one starts with respect to another is possible with any dual trace oscilloscope, but that is not the only way to make a phase measurement. Look at the front panel of your oscilloscope and you will probably see that the vertical channel BNC connectors are labelled X and Y. The last position on the SEC/DIV switch is XY, and when you use it the oscilloscope's time base is bypassed.

The Channel 1 input signal is still the horizontal axis of the oscilloscope's display, but now the signal on Channel 2 becomes the vertical axis. In the X-Y mode, you can input one sinusoidal on each Channel and your screen will display a Lissajous pattern. (They are named after Jules Antoine Lissajous, a French physicist; say "LEE-zashu"). The shape of the pattern will indicate the phase difference between the two signal. Some examples of Lissajous patterns are shown in Fig.1.

Frequency measurements with Lissajous patterns require a known sine wave on one channel. If there is no phase shift, the ratio between the known and unknown signals will correspond to the ratio of horizontal and vertical lobes of the pattern. When the frequencies are the same, only the shifts in phase will affect the pattern. In the drawings in Fig.1 below, both phase and frequency differences are shown.

Note that general purpose oscilloscope Lissajous pattern phase measurements are usually limited by the frequency response of the horizontal amplifier (typically designed with far less bandwidth than vertical Channels). Specialized X-Y oscilloscopes or monitors will have almost identical vertical and horizontal systems.

Finding the phase shift of two sinusoidal signals with a Lissajous pattern is one example of an X-Y measurement. The X-Y capability can be used for other measurements as well. The Lissajous patterns can also be used to determine the frequency of an unknown signal, when you have a known signal on the other channel. This is a very accurate frequency measurement as long as your known signal is accurate and both signals are sine

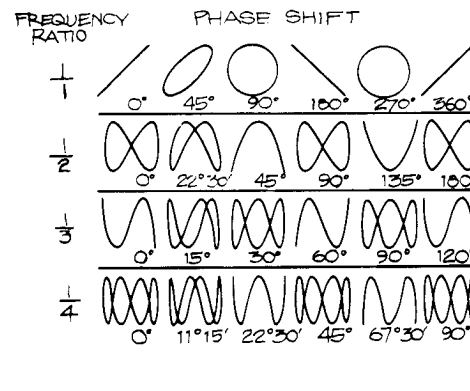


Fig.1 Frequency Measurements with Lissajous Patterns

waves. The patterns you can see are shown in Fig.1, where the effects of both frequency and phase differences are shown.

Component checking in service or production situations is another X-Y application; it requires only a simple transistor checker like that shown in Fig.2. X-Y component checking requires the transistor checker shown. With it connected to an oscilloscope in the X-Y mode, patterns like those illustrated in Fig.2 indicate the component's condition. The waveforms shown are found when the components are not in a circuit; in-circuit component patterns will differ because of resistors and capacitors associated with the component.

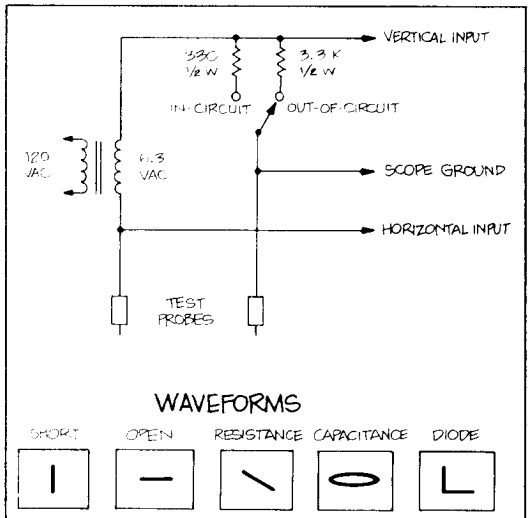


Fig.2 Component Checking

There are many other applications for X-Y measurements in television servicing, in engine analysis, and in 2-way radio servicing, for examples. In fact, any time you have physical phenomena that are interdependent and not time-dependent, X-Y measurements are the answer. Aerodynamic lift and drag, motor speed and torque, or pressure and volumes of liquids and gasses are more examples. With the proper transducer, you can use your oscilloscope to make any of these measurements.

DIFFERENTIAL MEASUREMENTS

The ADD vertical mode and the Channel 2 INVERT button on your oscilloscope (only if it is a dual channel one of course) will allow differential measurements to be made.

Often differential measurements allow you to eliminate undesirable components from a signal that you are trying to measure. If you have a signal that is very similar to the unnecessary noise, the set up is simple. Put the signal with the spurious information on Channel 1. Connect the signal that is like unwanted components to Channel 2. Set both input coupling switches to DC (use AC if the DC components of the signals are too large), and select the alternate vertical mode by moving the VERTICAL MODE switches to BOTH and ALT.

Now set your volts/division switches so that the two signals are about equal in amplitude. Then you can move the right-hand VERTICAL MODE switch to ADD and press the INVERT button, so that the common mode signals have opposite polarities.

If you use Channel 2 VOLTS/DIV switch and VAR control for maximum cancellation of the common signal, the signal that remains on-screen will only contain the desired part of the Channel 1 input signal. The two common-mode signals have cancelled out leaving only the difference between the two.

The photographs in Fig.3 show an example of the before and after of making a differential measurement. The upper photograph shows a 1 kHz square wave

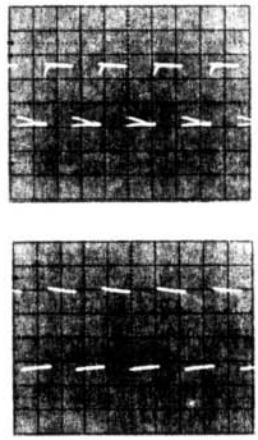


Fig.3 Differential Measurements

contaminated with a 60 Hz sine wave. Once the common-mode component (the sine wave) is input to Channel 2 and that channel is inverted, the signals can be added with the ADD vertical mode. The result is shown in the lower photograph.

USING THE Z AXIS

Referring back to part-1 of this series we discussed that the oscilloscope has three axes of information: X is the horizontal component of the graph, Y is the vertical component, and Z is the brightness or darkness of the electron beam. Many instruments have a Z-axis input connector, often on the rear of the instrument. This input allows you to change the brightness (modulate the intensity) of the signal on the screen with an external signal.

The Z-axis input will commonly accept a signal of up to 30 V through a usable frequency range of DC to 5 MHz, although individual instruments' performance must be checked in the manufacturers specifications. Positive voltages decrease the brightness and negative voltages increase it; 5 Volts will cause a noticeable change.

The Z-axis input is an advantage to users that have their instruments set up for a long series of tests. One example is the testing of high fidelity equipment illustrated in Fig.4. A function generator sweeps through the frequencies of interest during the product testing, 20 to 20000 Hz in this case. Then an adjustable notch filter is used to generate a marker, at 15 kHz, for instance, and this signal is applied to the Z-axis input to brighten the trace. This allows the tester to evaluate the product's performance with a glance.

USING TV TRIGGERING

Many oscilloscopes offer television triggering to simplify looking at composite video signals. Usually, however, the oscilloscope will only trigger of fields at some sweep speeds and lines at others. However, some makes of instrument, such as the Tektronix 2200 series, offer a TV FIELD mode. This mode allows the oscilloscope to trigger at the field rate of a composite video signal. However, a composite video signal consists of two

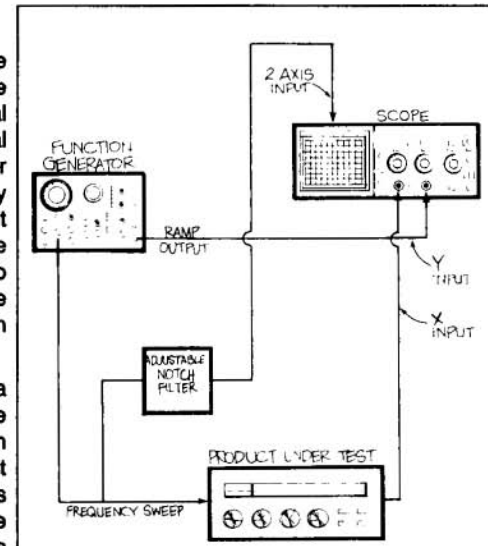


Fig.4 Using the Z-Axis

equal fields and the oscilloscope is unable to differentiate between them, and will consequently trigger alternately on the two fields, and the display will be confusing if you look at one line at a time. To prevent this, you add more holdoff time, and there are two ways to do that. You can use the variable holdoff control, or you can simply switch the vertical operating mode to display both channels. That makes the total holdoff time for one channel greater than one field period. Then just position the unused vertical channel off-screen to avoid confusion.

It is also important to select the trigger slope that corresponds to the edge of the waveform where the sync pulses are located. Picking a negative slope for the pulses at the bottom of the waveform allows you to see as many sync pulses as possible.

When you want to observe the TV line portion of the composite video signal, use the NORM trigger mode and trigger on the horizontal synchronisation pulses for a stable display. It is usually best to select the blanking level of the sync waveform so that the vertical field rate will not cause double triggering.

DELAYED SWEEP MEASUREMENTS

Delayed sweep is a technique that adds a precise amount of time between the trigger point and the beginning of an oscilloscope sweep. Often delayed sweep is used as a convenient way to make a measurement, as is illustrated in the rise time measurement in Exercise 1 on the next page.

To make a rise time measurement without delayed sweep, you must trigger on the edge occurring before the desired transition.

With delayed sweep, you may choose to trigger anywhere along the displayed waveform and use the delay time control to start the sweep exactly where you want.

Sometimes, however, delayed sweep is the only way to make a measurement. Suppose that part of the waveform you want to measure is so far from the available trigger point that it will not show on the screen. The problem can be solved with delayed sweep: trigger where you have to and delay out to where you want the sweep to start.

But the delayed sweep feature you will use the most often is the intensified sweep; it lets you use the delayed sweep as a positionable magnifier. You trigger normally and then use the oscilloscope's intensified horizontal mode. Now the signal on the screen will show a brighter zone after the delay time. Run the delay time (and the intensified zone) out to the part of the signal that interests you, then switch to the delayed mode and increase the sweep speed to magnify the selected waveform portion so that you can examine it in detail.

Single Time Base Oscilloscopes ... Very few single time base oscilloscopes offer delayed sweep measurements. Those that do may have measurement capabilities similar to those of the Tektronix 2213 which is used in this example and Exercise 1. The Tektronix 2213 has three possible operating modes; NO DLY, INTENS and DLY'D. When you set the HORIZONTAL MODE switch to NO DLY (no delay) only the normal sweep functions.

When you choose INTENS (intensified sweep) your oscilloscope will display the normal sweep and the trace will also be intensified after a delay time. the amount of delay is determined by both the DELAY TIME switch (you can use 0.5 uS, 10 uS, or 0,2 mS) and the DELAY TIME MULTIPLIER control. The multiplier lets you pick from 1 to 20 times the switch setting.

The third position, DLY'D (delayed) makes the sweep start after the delay time you have chosen. After selecting this position you can move the SEC/DIV to a faster sweep speed and examine the waveform in greater detail.

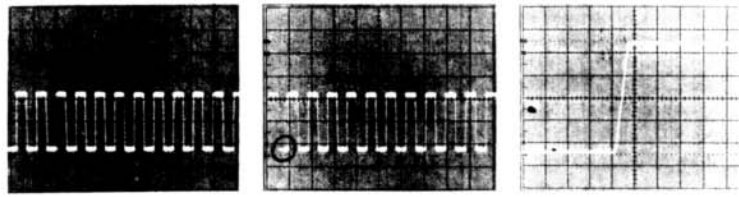


Fig.5 Delayed Sweep Measurements

This list of horizontal modes should begin to give ideas of how useful these delayed sweep features are. Start by making the rise time measurement outlined in Exercise 1. Note that when making rise time measurements it is essential that the rise time of the measuring instrument be taken into account in order to reduce the uncertainties of the measurement.

Exercise 1 Delayed Sweep Measurements using single time base scopes.

1 ... Connect your probe to the Channel 1 BNC connector and the probe adjustment jack, hook the ground strap onto the collar of Channel 2 BNC, or any convenient earthing point, and make sure that the probe is compensated.

2 ... Use these control settings: CH 1 VOLTS/DIV on 0.2 using a 10x probe VOLTS/DIV read-out; CH 1 input coupling on AC; VERTICAL MODE is CH 1; TRIGGER MODE is AUTO; TRIGGER SLOPE is negative (–); trigger SOURCE is INT (for internal) and INT trigger switch is either CH 1 or VERT MODE; HORIZONTAL MODE is NO DLY; SEC/DIV is o.5 mS. Check all the variable controls to make sure that they are in their calibrated positions.

3 ... Set the input coupling to GND and centre the trace. Switch back to AC and set the trigger LEVEL control for a stable display. The waveform should look like the first photograph in Fig.5 above.

4 ... Because a rise time measurement is best made at faster sweep speeds, turn the SEC/DIV control to 2 uS. Use the trigger LEVEL control to try to get all of the positive transition on the screen. You cannot; you lose your trigger when you get off the slope, of the signal.

5 .. Turn back to 0.5 mS/div and switch to intensified display with the HORIZONTAL MODE switch. Switch the DELAY TIME to 0,2 mS and use the DELAY TIME MULTIPLIER to move the intensified zone on the waveform to a point before the first complete positive-going transition of the square wave. The intensified zone now shows you where the delayed sweep will start, as shown in the second photograph in Fig.5..

6 ... Switch the horizontal mode to DLY'D and the SEC/DIV switch to 5 uS. Now you can use the horizontal POSITION and DELAY TIME MULTIPLIER controls to get a single transition on the screen.

7 ... Change to 0.1 V/div and line up the signal with the 0 and 100% dotted lines of the graticule. If you have a signal that does not fit between the 0 and 100% lines of the graticule, you have to count major and minor divisions and estimate the rise time while ignoring the first and last 10% of the transition.

8 ... Use the horizontal POSITION control to move the waveform until it crosses a vertical graticule line at the 10% marking. Adjust the FOCUS control for a sharp waveform and make your rise time measurement from that vertical line to where the step crosses the 90% line. Now you can make a rise time measurement on a waveform like that in the third photograph in Fig.5.

For example, for 1 major division and 4 minor divisions: 1.8 times the SEC/DIV setting of 5 uS gives us a rise time of 9 uS.

Dual Time Base Oscilloscopes ... Delayed sweep is usually found on dual time base oscilloscopes. The example used here and in Exercise 2 is the Tektronix 2215, which has two totally separate horizontal sweep generators. In dual time base instruments, one sweep is triggered in the normal fashion and the start of the second sweep is delayed.

To keep these two sweep distinct when describing them, the delaying sweep is called the A sweep; the delayed sweep is called the B sweep. The length of time between the start of the A sweep and the start of the B sweep is called the delay time.

Dual time base oscilloscopes offer all the measurement capabilities of single time base instruments plus the following:

- convenient comparisons of signals at two different sweep speeds
- jitter-free triggering of delayed sweeps
- and timing measurement accuracy of 1.5%

Most of this increase in measurement performance is available because you can separately control the two sweep speeds and use them in three horizontal operating modes. These modes (in a Tektronix 2215) are A sweep only, B sweep only, or A intensified by B as well as B delayed. (These facilities would most likely be available on all oscilloscopes featuring dual delayed timebases). The HORIZONTAL MODE switch controls the operating mode and the two SEC/DIV switches - concentrically mounted on the Tektronix 2215 - control the sweep speeds.

When the ALT (for alternate horizontal mode) position of the HORIZONTAL MODE switch is selected the oscilloscope will display the A sweep intensified by the B sweep and the B sweep delayed. As you set faster sweeps with the B SEC/DIV switch you will see the intensified zone on the A trace get smaller and the B sweep expanded by the new speed setting. As you move the B DELAY TIME POSITION dial and change where the B sweep starts, you will see the intensified zone move across the A trace and see the B waveform change.

This sounds more complicated in words than it is in practice. As you use the oscilloscope in Exercise. 2 below you will find that the procedure is very easy. You will always see exactly where the B sweep starts, and you can use the size of the intensified zone to judge which B sweep speed you need to make the measurement you want.

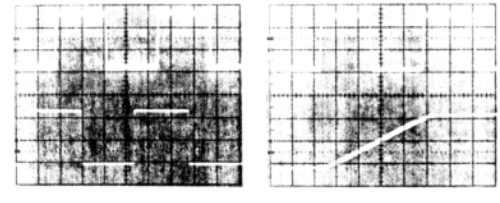


Fig.6 Rise Time Measurement

Exercise 2 Delayed Sweep Measurements using dual time base scopes.

1 ... Connect your probe to the Channel 1 BNC connector and the probe adjustment jack, hook the ground strap onto the collar of Channel 2 BNC, or any convenient earthing point, and make sure that the probe is compensated.

2 ... Use these control settings: CH 1 VOLTS/DIV on 0.2 (remember to use the 10x probe read-out); CH 1 input coupling on AC; vertical MODE is CH 1; A TRIGGER MODE is NORM; TRIGGER SLOPE is negative (-); A SOURCE is INT and the A&B INT trigger switch is either CH 1 or VERT MODE; HORIZONTAL MODE is ; A and B SEC/DIV is 0.2 mS. Check the

variable controls to make sure that they are in their calibrated detent positions.

3 ... Set the A TRIGGER LEVEL control for a stable display and position the waveform in the top half of the screen. Switch to the ALT (for alternate A and B sweeps) display with the HORIZONTAL MODE switch. Use the Channel 1 POSITION and ALT SWP SEP (alternate sweep separation) controls to position the two sweeps so that they do not overlap.

4 ... Use the B DELAY TIME POSITION dial to move the beginning of the intensified zone to a point before the first complete positive transition. Your screen should look like the first photograph in Fig.6.

5 ... Pull out on the SEC/DIV knob and rotate it clockwise to change the B sweep speed to 2 uS/division. This will make the intensified zone smaller; move it to the first rising edge of the waveform as shown in the second photograph in Fig.6.

6 ... Switch the horizontal mode to B, the Channel 1 vertical sensitivity to 0.1 Volts/division, and the sweep speed to 1 uS/division. Use the horizontal and vertical POSITION controls and the B DELAY TIME POSITION control to line up the waveform with the 0 and 100% dotted lines of the graticule.

If you have a signal that does not fit between the 0 and 100% lines of the graticule, you have to count major and minor divisions and estimate the rise time while ignoring the first and last 10% of the transition.

7 ... Position the waveform so that it crosses a vertical graticule line at the 10% marking. Adjust the FOCUS control for a sharp waveform and count major and minor divisions across the screen where the step crosses the 90% line.

If there are 4 major and 8 minor divisions, 4 and 8/10 times the SEC/DIV setting of 1 uS gives a rise time of 4.8 uS. The third photograph in Fig.6 shows how the screen should look now.

Note: any jitter present in the B sweep is from the probe adjustment circuit (or signal source being measured) and not the oscilloscope's timebases.

This concludes this part of the series. In the next and final part I shall finalise this complex section dealing with delayed sweep measurements and then end with an overview of oscilloscope performance.

VIDEO SWEEP GENERATOR

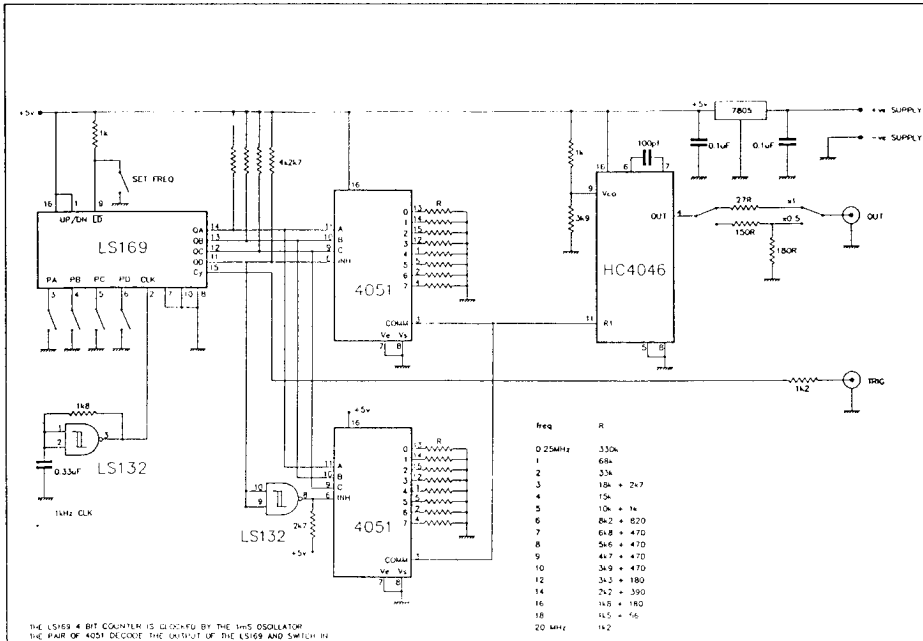
Graham Lewis

This simple circuit of a video sweep generator as developed to provide a test signal source whilst I was experimenting with circuits for cameras a oscilloscope 'Y' amplifiers.

The HC4046 is the high speed equivalent of the old faithful CMOS 4046, and is guaranteed to oscillate to 15MHz. I squeezed 20MHz out, and being a member of the HC family the device exhibits near perfect square wave characteristics in that the rise and fall times are very low.

I chose to step then value of the timing resistor since this gave me bursts of known frequencies that could be set up using a frequency counter when the circuit is operated in the single frequency mode. The VCO input produced rather a compressed V/F law and the range was restricted.

To be honest there is some frequency jitter on the 0.25MHz, but that is included as an LF reference against which to judge the other frequencies. The added bonus of using square waves as a source is the ability to optimise the pulse response of the gear under test.



Simple Video Sweep Generator

IN RETROSPECT

VIDEO FILTER, CQ-TV 153 page 20

Having built the video filter featured in the above issue Peter Hardcastle G1COI has offered two or three suggested modifications - to make it work!! As I rather like Peter's style of presentation I have reproduced his letter in its entirety - I know that the purists amongst you don't always approve of my sense of humour pervading the magazine - but I am not alone see!!

Dear Mike,

Bad news, Mike, you'd better sit down for this.

Shock, horror, gasp - the much regurgitated video filter (CQ-TV 153 page 20) does not work. Try it on a spectrum analyser and see for yourself! HF mush out (i.e: >2MHZ) is at a higher level than HF mush in, well it is using my Commodore 64 electronic abacus.

Why?

'Cos the post filter amplifier (Tr2/Tr3) is about as linear as a tart's filling, that's why. (What's he on about?).

The circuit assumes that the negative feedback provided by R8/R5 will correct for the inherently non-linear amplifier configuration - valid only if there id heaps of open-loop gain - but there ain't. Gain falls off with frequency, unless you use super spiff transistors with very low collector-base capacitance. the re-cycled red-spot germanium attenuators that most of us use (except me!!!!) have a couple of Farads at least between all terminals.

Keeping up with this are we? Good.

Herewith the fix:

a) Reduce circuit impedances to reduce the effect of the c-b capacitances.

b) Improve open-loop linearity so the NFB does not have to work so hard.

c) While we are in it, might as well properly output-match the Toko filter (prevents droop at high end of pass-band). Hmmm?

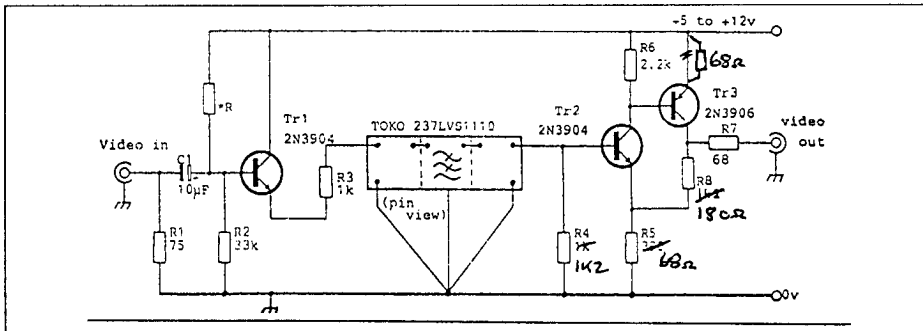
Wot?

Change: R4 to 1k2, R5 to 68 ohms. Add a 68 ohm resistor between Tr3 emitter and the 12V supply rail.

Then the filter works fine!

Yorz, Peter Hardcastle G1COI.

One of our better designs Eh Peter! ... Mike.



Value of *R ... 22k for 5V supply, 33k for 9V supply and 47k for 12V supply.

SSTV REVISITED

R.W.J.Humphries B.Sc., G4UKL

Since the last review of hardware and software for colour slow-scan television "SSTV-Almost the State of the Art" appeared in CQ-TV 150, May 1990, developments, upgrades and new products have proliferated, high resolution slow scan is an expanding field, becoming ever more difficult to keep abreast of the progress being made world-wide.

There are mixed feeling amongst devotees over the plethora of new modes of transmission, which arrive with some regularity. A quick check of my own equipment gives a total of over 90 different ways in which a picture can be transmitted or received, none compatible with another, and more are on the way.

Do we need such a collection of modes which polarise amateurs according to the equipment they have? Some styles are decidedly better than others, and whilst it is not the purpose of this article to write down modes, it would not be amiss to indicate reliability based on practical experience over many years.

Whether the origin of the transmission is from convertor or computer the best overall performer is undoubtedly the mode developed by G3OQD, colloquially known as either New-Mode, Martin's mode, or simply M1. This mode is superior, yielding the highest quality picture with reception which continues in the presence of QRM and QSB. It has an edge over all others and deservedly is universally the most widely used.

Other modes, some of which carry emotive names suggestive of superior attributes, do not yield the same consistent quality, resorting to gimmickry and exorbitant prices to attract devotees, with transmissions taking almost as long as Fax, watch-out for your PA!

The following is supplementary to the original article which appeared in CQ-TV 150 and lists the known changes and additions to date.

Convertors

The Volker Wraase SC1 is now superseded by the **SC2,** which claims a high memory resolution of 512 picture elements per line. There are now 16 colour and B&W modes.

Some of the many innovations are the provision of expansion slots, the ability to load a picture from camera during reception or transmission, 265, 144 colour values and switchable digital contrast enhancer.

A new system of input-signal processing using advanced analogue technology, Improved and extended FAX TX/RX and an SSTV 'free-run mode' which switches external sync to an internal quartz clock. This claims to remove completely sync interference and line-fray due to phase distortion.

The unit, priced at DM 2950 + freight (*approximately £1000 + freight*) does not include a power supply, monitor, or necessary keyboard, and there are other options which most SSTV-ers would like to have (e.g: the digital record/playback interface to connect a VCR for loss-free SSTV/FAX image recording DM395 + freight).

Transmissions on 14.23 made by DK3UG using a prototype SC2 have been of the quality one would expect from a 512-line system, but to evaluate fully the pictures would need to be received on a complementary SC2 convertor.

A peculiarity of this convertor is that it does not send a VIS pulse and does not appear to be able to TX in the G3OQD mode.

ROBOT 1200C

This continues in production in its original form. The manufacturers state that they have no plans for any further amateur SSTV convertors. Improvements and modifications are left in the hands of amateurs, but it is noted that later models have a modified louvred case and provisions for increased memory originally introduced by G3OQD.

LM9000C

Amateurs building these convertors must note that some ICs are not readily available in the U.K. and need persistent tracking down. Before parting with money for the boards it would be useful to contact someone who has trodden the path before you. It may not be as cheap or easy as it would seem, although the finished product works equally with the 1200C.

NS88

This is a Japanese clone of the 1200C, selling cheaply and in quantity in Japan. To date it has not appeared in the U.K. market, but a few seem to have reached the USA.

EPROM UPDATES

G3OQD

The Robot 1200c EPROM supplied by G3OQD has been replaced by Version 4. This new EPROM supports the AVT modes of SSTV popularised by Amiga computer users in the U.S.A. Transmission and receive in 24, 90, 94, 188 second colour and 125 second B&W are supported together with QRM and Narrow modes. The EPROM also contains a character generator, test cards and improved FAX receive. A computer is not necessary to use these facilities, entry is made directly from the 1200C touch-pads. An addition not greeted with universal approval is the automatic and none removable insertion of the station call-sign at the top of every picture sent.

SCOTTIE

The V.3.6 EPROM costing $220 is supplied to foreign hams only. It supports neither AVT nor G3OQD modes. Registered U.K. Scottie users who purchased earlier versions with promised updates 'shall be' left high and dry with obsolete EPROMS.

SOFTWARE

SSTV.COM (KC5VC)

This has been upgraded to V.39.7 and now includes the AVT modes complementary to the G3OQD V.4.0 EPROM. The Auto transmit section has been re-written to exclude the lesser little used modes and a new set of editing facilities added. The cost to new users is £12.00 with updates for existing users costing £5.00 plus a formatted disk to suit their system. The net proceeds going to Kathy Williams, KC5VCs widow. This programme does not have mouse support. (Language: Turbo Pascal).

SCAN (W5ZR)

Rewritten and presented in a new format, this mouse driven software is a very smooth and comprehensive package, including some graphic routines supplied by N9AMR and some interesting routines for converting pictures to dual coloured posters. The N9AMR graphics entails a great deal of math computation. The addition of a 12Mhz+ co-processor, whilst not essential, gives the programme just enough extra speed to avoid waiting around for a function to complete. Not a programme for Amstrad 1512 and 1640 computers, but it will run quite happily up to 25Mhz.

IMAGE. (WD9GIG)

This is a programme written by a computer expert par excellence, who knows the art of programming inside out, but it is not at all

easy to use. The programme is interactive, functioning via a series of windows which can be dragged anywhere on the screen and saved for recall on next boot-up. It works from series of icons created by the user which are used to load and save pictures (very slow).

Limited text fonts and graphics are located on the picture by entering x,y parameters, but the text has a unique system of colour and pattern variations giving a virtually unlimited range.

This is a complicated programme and although there is a printable 48 page manual on the disk. However, it would take a great deal of time..weeks...to come to terms with the intricate structure to use the programme usefully on air.

Unlike other software this programme will load pictures created with PC.Paint .PCX format. The drawback seems to be that .PCX format is too large to fit the Robot 1200c display so only the top-left quadrant is loaded up to the Robot.

The simulation of the Robot front panel is the best that has been seen and being accessed by the mouse gives a very smooth control over most of the usual Robot functions. (Language: C++).

HI-RES (N9AMR)

This newcomer to the scene by N9AMR is going to become the fore-runner. I can say this without equivocation having used both versions 1.2 and the current version 1.4. The author Tom Jenkins told me that his intention was to write a programme which had all the best points of GEST and KC5VC, plus his own brand of graphic manipulation and facilities previously undreamt of in the world of SSTV. He has done just that.

The programme is menu/mouse driven, supports all 1200C functions, has a superb graphics system and is able import and load picture files made by all the other current formats (e.g: .PIX,.IMG,.PIC, etc.). The ability to load the near photographic quality .GIF format adds a picture quality previously attainable by three amateur experimental projects.

The graphics manipulation is extraordinary, being a major extension of the facility incorporated into the W5ZR Scan, pictures can be wrapped round cylinders, boxes, globes, turned into wine-glasses, scrolls, twisted and multiplied up to the limits of the imagination and ingenuity of the user.

Not essential, but a great asset, is a Maths co-processor in your computer.

The programme supports all known modes and EPROMS, and takes up the minimum of memory space.

Lastly, the text editing is simple to use. Any of the GEST fonts can added to the menu so there is a style to suit all tastes. (Language Turbo Pascal 5).

BBC

Software for the BBC computer has had some updates but no details have been provided. Production of the Acorn BBC Master 128 computer has now ceased.

ATARI ST (WB2OSZ)

Software for running a colour RX/TX system has been developed by John Langner WB2OSZ. John very helpfully sent reprints from the American Amateur Radio Magazine entitled 'Colour SSTV for the Atari ST'. These articles contain a mass of technical information, circuits, parts lists, useful contacts, and would be helpful for the amateur with little prior knowledge of SSTV.

John wrote in Jan 1991 that he was perfecting a new version with a graphical user interface, full-screen images without flicker and other new features. I will send copies of the articles to any interested hams (cost about 1.50).

MFJ-1278 for Atari

Multimode data controller, includes basic SSTV GEST. Moving pictures on Slow-scan TV.? Yes quite possible and easy in B&W with Gest. I have a few copies of the Gest manual left. There is a later version of Gest to be had if you don't mind the $150 rip-off.

COMMODORE

SSTV programmes for both C64 and C128 are available. Both require a special interface board model CIM64 available from Robot Research.

IN THE PIPELINE

☞ A rumoured colour SSTV convertor on an expansion board for PC AT computers. No external convertors or monitors will be required. Sounds too good to be true.

☞ A PC programme to print SSTV pictures to colour printers other that the out-dated Transtar specified for the 1200c. Intended for Paintjet colour printers, but possibly useable with colour ribbon printers, it will send SSTV pictures saved to disc to the computer screen where, with the use of a supplementary commercial programme, you can edit, crop, enhance and colour correct, etc., before printing.

☞ A new stand alone SSTV convertor from the USA to rival the 1200C.

MORE CONTACT ADDRESSES:

IMAGE: Dick Isely, 736 Fellows Street, St.Charles, IL 60174, USA

HI-RES: Tom Jenkins, 5968 S.Keystone Ave., Indianapolis, IN 56227, USA

ATARI: John Langner, 115 Stedman Street, Chelmsford, MA 01824, USA

SC2: Volker Wraase Electronic, Kronsberg 10, D-2300 Altenholz, Germany

COMMODORE: Tom Hibben, Box188 DeSoto, WI 54624, USA

GEST: Brian Summers, 1462 Epping Road, Burlington, Ont. L7M 1P4, Canada

MFJ: UK Agents may stock, try KW Communications Ltd, Chatham Road, Sandling, Nr.Maidstone, Kent, ME14 3AY.

ROBOT: Robot Research, 5636 Ruffin Road, San Diego, CA 61927, USA

BIG BROTHER .... A LOOK AT VIDEO STUDIO PROFESSIONAL

This short article has been reproduced from 'Storyboard', the Journal of the Institute of Videography, by kind permission of the editor.

Ken Potter, F.Inst.V.

If you feel a bit daunted by your first sight of it then you're not alone. This software package is the logical development from ZVP's own VideoStudio, which has become the favourite amongst a great many of those involved in low budget video production. From amateur enthusiasts through semi-pro users, educational establishments, government departments, also corporate and independent video production concerns.

Little brother VideoStudio didn't go far enough, but all the same illustrated how fundamental features (such as learning, use, and of course, productivity) were missing from competing software.

So the time has come to expand on that theme, and introduce a much more comprehensive solution to your problems than VideoStudio could ever expect to be, hampered by its price, (constraining it to a mere two disks) and the early Amigas with small amounts of RAM (especially CHIP) which restricted the screen modes possible.

So VideoStudio PROFESSIONAL is indeed very different in nature, but prior knowledge of VideoStudio is extremely helpful, many of the fundamental principles being shared between the two products.

VideoStudio PRO is aimed more at the serious user, one who is willing to take the trouble to learn about how the software works. This effort is then rewarded by a far wider range of features than ever seen before on ANY video production software. Couple this with an unrivalled potential for productivity and you don't have to be a computer expert to lean how to use this software. The principles that are to be grasped relate to the generation of VIDEO. After all, that is the job in hand. This balance distinguishes the computer software toys from the software you will want to use again and again in your regular videomaking.

Don't expect to grasp all these concepts at once though. ZVP has spent two (happy?) years dreaming many of these functions up... and you're very unlikely to be able to digest it all at once. Previous experience of VideoStudio would be very helpful, as many of the fundamental operations are based on a similar concept. Previous experience of the Amiga (without VideoStudio) can be a advantage, too, but to a lesser extent perhaps.

VideoStudio PROFESSIONAL is NOT a replacement for its kid brother VideoStudio. If you have this too ... don't sell it, bin it, feed it to the dog ... yet. It will be rather useful... You can use the old VideoStudio fonts with the basic VideoStudio Professional. That way you don't have to buy a extension fonts disk at first.

FOOTNOTE:

The present Amiga 500 is not capable of running this program without modification. The modification is an illegal one and will almost certainly render your guarantee invalid. Your present programs will probably not run with the modification. Bearing this in mind, anyone thinking of buying an Amiga 500 for the purpose of video production would be well advised to go for the Amiga 1500 which costs about £600.00.

Colour brochure and technical advice from Z Video Products, on 0268-411719.

DEAR BILL !

John Goode

(With Apologies to Private Eye)

Upon reading Bill Mercer's article in CQ-TV 154, I was troubled by the fact that a number of the questions he raised arose from articles I had written. I therefore feel that the least I can do is answer in the form of yet another article, in case the questions Bill has raised have occurred to other members, who may not have bothered to write. Anyway, they say that confession is good for the soul.

One of these problems has arisen as I am a bit of an experimenter - I tend to crib other people's basic ideas, but then change details so that they fit in more exactly with the particular problem I want to solve. This is so in the case of pin-5 of the TDA3950 circuit. If you remember, this was originally published in "Circuit Notebook" by GW8PBX, and in that pin-5 was shown as being driven from "line drive". There was certainly no mention of sandcastle pulses, and as I had no data sheet on the TDA3950, I fed it from SPG line-drive. As this pulse does not extend into the back-porch period, the circuit didn't synchronise properly as there was no burst extraction. I then tried burst-gate, but later, like you Bill, I discovered that the leading edge of the pulse is used to trigger the PAL squarewave function. I can only assume that there was some confusion, and that I used one of my earlier drawings for inclusion in CQ-TV 150 - sorry about that.

So let's get it clear - the pulse required on pin-5 of the TDA3950(A) is LINE BLANKING, 9-12vpp. It must be continuous throughout the field period, as its leading edge triggers PS, and it must cover the back-porch line period, as it is used to gate the burst. If you do that, the circuit is pretty reliable, so long as it is fed with a reasonably constant level of chroma - unfortunately the TDA3950 does not include an ACC circuit. See Fig.1.

Pulse-widening can certainly be a problem when even fast switching types of transistors are driven into saturation, and fitting a pull-down resistor (NPN) will usually cure it. An alternative is to shunt the

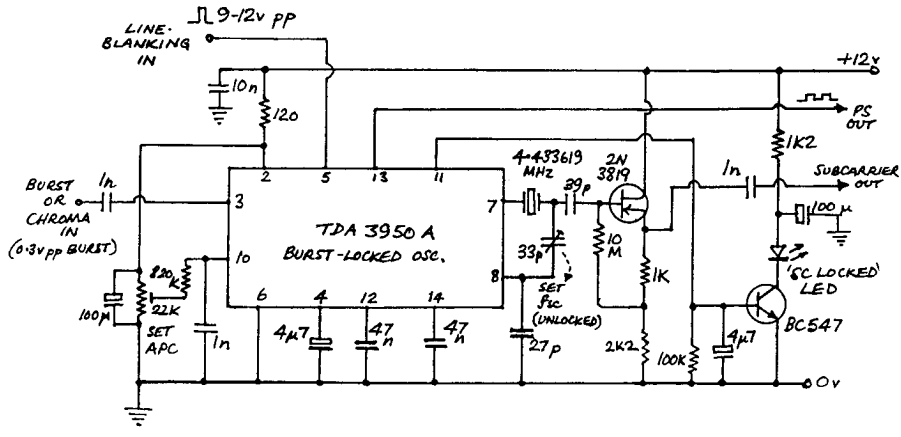


Fig.1 Improved TDA3950 Circuit

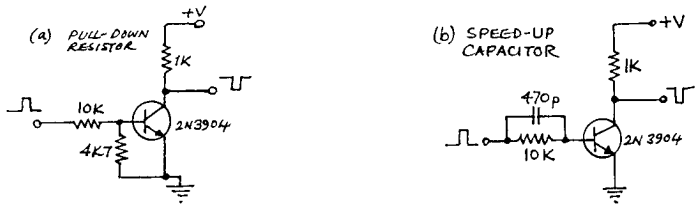


Fig.2 Preventing Pulse-lengthening

base resistor with a speed-up capacitor. See Fig.2. Of course, pulse widening doesn't matter if we are only interested in the timing of the pulse leading-edge; nevertheless, it is a problem that should be addressed. Where I've been guilty of failing to address the problem is usually because the pulse amp in question has been "designed empirically", rather than theoretically, and I happened to "get away with it"!

The business of separating chroma from luma using the emitter-follower circuit shown in Fig.3. I have not found the tuned circuit values to be too critical. Originally I used an RS 1A VHF choke as the inductor (5uH) as this was cheap and readily available. The required capacitance is therefore about 250pF, halfway between the preferred values of 220 and 270pF. I tried both, and couldn't detect much difference - I suppose 220pF must have worked best. Now that reasonably priced small inductors are available from Toko, I now use 4.7uH and 270pF - this is virtually spot on. Incidentally, if too high a Q circuit is used, the chroma sidebands will be unduly attenuated.

PAL Coders: The luminance delay should normally be 200nS if the U and V filters are to spec., but this depends upon the relative complexity of the chroma and luma circuitry - it is not only a function of bandwidth and risetimes. I suspect that Nigel Walker's use of a 500nS delay was partly based on what was available (from TV receivers) at the time (1976, not 1956!), and also on the fact that his design uses much more LC filtering than the later designs do. There is no 'magic amount' of delay - you choose the amount that gives the best YC registration at the output. The same is true of receiver decoders -with a correctly aligned signal at the input, the amount of luma delay is chosen to give correct YC line-up on screen. Chroma decoding circuitry is more complex than encoding (1H delay, etc), and so needs a longer delay in the luma chain to give correct alignment at the matrix where RGB is recovered. However, with mass-produced receivers, this may not be as accurate as you and I would wish.

As far as PAL Coders for Systems B & G are concerned, no manufacturer, as far as I know, makes any distinction between PAL coders that are used on systems B,G or I. The signal is simply encoded into PAL

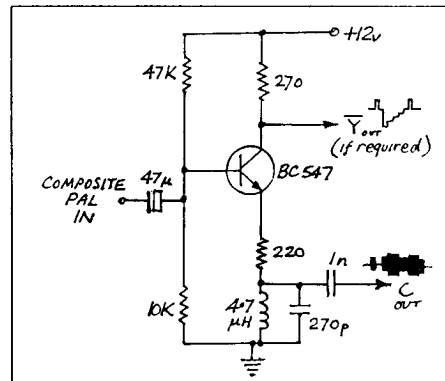


Fig.3 Chroma-Luma separation

(usually at source) with symmetrical 1.3MHz chroma sidebands, and at the transmitter passed through a 5MHz filter before transmission. This theoretically makes the chroma sidebands assymetric, but the PAL signal is robust enough to stand this. (It's probably quite rare for the chroma bandwidth to exceed 600kHz on "natural" pictures anyway). Any further information on this would be welcome if anyone knows better.

Footnote to the above: PAL on systems M and N uses a 3.58MHz subcarrier; on M as it is the 525/60 "PALM" system used in Brazil; on N as the video bandwidth is restricted to 4.2MHz even though it is a 625/50 system. (Used in Argentina).

As far as the Handbook video fader is concerned, I am hoping to deal with my own "cribs" of this useful circuit in the next "In The Studio" column. The only time that I experienced bad chroma suppression was when I tried to build a version taking a single-ended output from the 1495 IC. When I ditched this idea and used a differential input amp (NE592), suppression of chroma was OK. All my versions have been built on Veroboard, so a double-sided PCB, however desirable, is not necessary!

THE BRITISH AMATEUR TELEVISION CLUB

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31 DECEMBER 1990

	1990	1989
INCOME		
Subscriptions	12907	12669
Members services	783	897
Publications	(306)	2314
Advertising	494	809
Building Society interest	623	649
Bank interest	1516	976
Tape sales	195	-
Exhibitions	1871	1839
Donations	31	58
Postages	358	296
Donated equipment sales	1042	-
	19514	20507
less:		
EXPENDITURE		
CQ.TV printing	7547	9794
CQ.TV postage	4464	4184
CQ.TV production	1123	2431
General office expenses	1151	309
General postages	691	364
RSGB affiliation fee	12	12
Committee members' expenses	141	116
Exhibitions	1470	724
Advertising	311	295
Insurance and legal	323	55
Miscellaneous expenses	311	232
Accountancy	210	190
Rally attendance	92	349
Account charges	-	6
	17846	19061
EXCESS OF INCOME OVER EXPENDITURE	£1668	£1446

RNStore&Co
Chartered Accountants

THE BRITISH AMATEUR TELEVISION CLUB

BALANCE SHEET AT 31 DECEMBER 1990

	1990		1989	
FIXED ASSETS				
Office machinery				
Additions	1023		1445	
Less: Depreciation	1023	-	1445	-
CURRENT ASSETS				
Stocks- members services	2735		3415	
publications	4926		5992	
Payments in advance	156		430	
Midshires Building Society- deposit account	12180		9557	
Lloyds Bank Plc- current account	6311		3779	
investment account	17500		13000	
GiroBank account	80		30	
		43888		36203
Less:				
CURRENT LIABILITIES				
Creditors and accruals	952		932	
Subscriptions received in advance	17290		11293	
		18242		12225
		£25646		£23978
Represented by:				
ACCUMULATED FUND				
Balance brought forward		23978		22532
Add:				
Surplus of income over expenditure		1668		1446
		£25646		£23978

In accordance with instructions given to us, we have prepared these accounts from the accounting records of The British Amateur Television Club, and from information and explanations supplied to us.

Chartered Accountants
19 March 1991

RNStore&Co
Chartered Accountants

SHOW REPORT - CONVENTION 91

Mike Wooding G6IQM

Well it's all over for 1991 bar the committee discussions on the success or other of the venture. My personal thoughts, and those of several of you who have written to me since, are that it was a good rally. OK we didn't quite get the weather right this year - but it was dry!

Many of you who I spoke with during the day, those of you that found me HII, also agreed with these sentiments. The overall impression I got was that yes let's keep the convention at Harlaxton.

Those of us that arrived on saturday, staying either in our caravans or in 'The Cottage' had a really good get together on saturday night in the bar in the Hall, which was kindly made available to us by the Manor staff. There was a great deal of natter about ATV, repeaters, etc. Chairman Trevor was demonstrating (showing off!) the latest logic card assembly for GB3ET. Yours truly and my lady and our children, 'Des' G3NNG and his lady and John G8ZJY and his lady and entourage did our best, not without little success I might add, to lower the tone of the whole affair to that of a good laugh. All-in-all the best pre-convention 'do' I have ever been to in my 9 years of association with the club. I look forward to next year's.

Sunday morning seemed to arrive somewhat too quickly for most of us!!. Being a trader at this years rally I was not able to assist as much as usual with the preparations. However, your stalwart committee and helpers had been up and about it seemed for hours when I emerged at 0630! The traders started arriving in force from around 0800 onwards and from then on if got hectic to say the least, but eventually 1000 arrived and all seemed ready. The doors were opened!

Mind you, with the good selection of traders in The 'flea market' outside the hall I reckon that many bargains were grabbed

and deals made well before then with the likes of the RATS (Rugby Amateur Transmitting Society don't you know) and many others who braved the cool weather to sell their wares.

Once again our Honourable Tresurer Brian Summers had convinced his OB van that moving from its place of rest was not such a bad idea, and there it was in full operational splendour outside the front door again, providing a live televised display on monitors all around the exhibition, and also a PA service outside the Manor itself. Once again congratulations to Brian and his team for a worthy effort. *(Did you catch Brian riding his bike, complete with basket and no brakes!!).*

There was a good selection of traders again this year with a plethora of goodies on offer in the various halls. From monitors to computers, cameras to transmitters, components in all shapes and sizes, specialist publications (got to get that one in!), miscellaneous whatnots and YOU.

Yes, you were there in force, apparently spending a fair amount of cash as well. The craft section that was to be found in the Conservatory with yours truly also did a littler business and promoted quite a lot of interest from the ladies. However, until I get a report from the craft traders themselves I cannot say whether they will return next year. From what I saw of the business they were doing I rather doubt it. Still, we tried.

The lecture program was well attended and also the meeting of ATV repeater groups, which was held during the day, a full report of which I hope to include in the next issue. *(Hint, hint, Mike).*

The club stand in the entrance hall did a brisk trade and the committee members manning it provided lots of answers for heaps of questions, some of them even correct! The I²C demonstration, to the best of my belief although I did not see much of it myself, was helpful to those of you building the project and demonstrated a few of the features available using this system.

I must not forget to thank the team of Dave G8NND, Steve G8JMJ and Paul G8KFW for providing the test and measurement workshop, which proved to be of service to many of you. Thanks lads.

I just had to include this one!

There was of course lots more to the rally than I have mentioned, but if you were there then you saw it too, if you weren't there, then in my opinion you missed a good one. Make sure you come next year! We hope to Harlaxton but will not be able to confirm that until the next issue.

Finally, our thanks must go to club secretary Paul Marshall, who once again shouldered the responsibility of organising this year's event. Again, with the aid of a few loyal helpers and the rest of the committee he provided us with an excellent rally.

Thanks Paul, and well done.

Thanks also to the staff of Harlaxton Manor, in particular Frances Watkins, who did their utmost in making our day a memorable one, and for providing us with all the facilities we asked for and more. Thanks also to Bass Leisure for the loan of their exhibition stands.

TV REPEATER POWER LEVELS

A REPORT FROM THE BATC TECHNICAL LIAISON COMMITTEE

A CASE FOR MORE POWER FOR 24cm ATV REPEATERS

Since the advent of 24cm ATV repeaters they have been limited in output power to the same 25W ERP as phone repeaters. This was partly the result of using the same repeater application paperwork as used for the phone repeaters, and partly a desire to not 'rock the boat' by asking for a higher ERP and so jeopardise the application.

24cm ATV repeaters have been operating alongside the primary users of the band (The Civil Aviation Authority) for a number of years with only a couple of minor instances of interference to the radiolocation service. These were easily corrected by small frequency changes to the repeater outputs.

An effective monitoring system exists which is able to deal with any case of interference to prime users from amateur repeaters, so it is perhaps now time that the ERP limit for FM ATV repeaters can be safely reviewed.

To use a power limit for ATV repeaters derived from phone repeaters completely ignores the impact of the vast differences in the transmission standards. For comparison, the typical phone transmission requires a receiver bandwidth of 123 to 15kHz, whereas for FM ATV the bandwidth needs to be in the order of 12MHz. For the same transmitter power this causes a double-edged degradation of the signal-to-noise ratio of the FM ATV receiver, due to much more noise getting into the wide receiver, and the transmitter energy being dispersed over a much wider spectrum. Consequently, the primary coverage areas of FM ATV repeaters are minuscule when compared with their phone cousins.

In addition to improving the coverage area, increasing the power limit would allow better use of the restricted number of channels available, encourage higher occupancy of the microwave bands, improve the availability of beacon signals for those experimenting with microwaves, help promote the television aspect of amateur radio and allow the use of more discreet aerials to receive the repeaters.

To make a worthwhile improvement in the signal-to-noise ratio at the receiver the signal needs to be doubled, implying a fourfold increase in ERP to 100 Watts. This should be considered as a minimum, and consideration should be given to pressing for 200 Watts, a figure which is easily achieved from base stations with aerial gains of 10dB and transmitter outputs of 20 Watts from Mitsubishi 'bricks' or whatever.

It may not be so easy for repeaters to achieve 200 Watts ERP due to the low efficiency of omni-directional, horizontally polarised aerials such as the Alford slot and clover leaf designs

This paper was presented to a recent BATC committee meeting with a view to forwarding it to the RSGB Repeater Management Group and to the DTI for their consideration.

If you have any comments to offer the Technical Liaison Committee, or the full BATC committee, on this subject or any other, please send them to the Editor, quoting your name and membership number. They will then be presented at the nect full committee meeting for consideration ... Ed.

BROADCAST BAND DX-TV RECEPTION

Garry Smith and Keith Hamer

F2 conditions provided excellent signals throughout March and to a lesser extent in April. Several of the openings were extremely intense with signals frequently attaining a very high field strength. This was particularly evident on March 6th when an Iranian signal was monitored quite easily on a short length of wire attached to the aerial socket of the receiver!

Progressing into May, several minor Sporadic-E openings have already occurred with reception from the south and south-east. By the time this is in print we will all know whether the season has been a good or bad one!

The following logs are edited highlights of those which appear in TeleRadio news (issues 52 and 53). Many thanks to the following enthusiasts who have forwarded reception reports: Simon Hamer, Chris Howes, Garry Smith, Peter Chalkley, Kevin Bolger, Bob Brooks and David Glenday.

MARCH LOG

01/03/91: F2 reception from USSR, Iran, Dubai and Zimbabwe. Several unidentified Arabic signals were also present until 1000 UTC.

02/03/91: African pictures on channel E2 at 0843 UTC. The vision frequency offset was -5kHz. USSR signals via F2 noted later.

03/03/91: An excellent morning with two Australian channel 0 transmitters identified. These were DDQ-0, the commercial station in Queensland, and ABMN-0. Three New Zealand channel 1 transmitters were noted too at 0830 UTC. Other signals included Iran, Dubai, Zimbabwe, China and Thailand.

04/03/91: Unidentified F2 reception on channels E2 and R1 at 0915 UTC.

05/03/91: F2 reception on channels E2 and R1 at 0915 UTC.

06/03/91: Extremely strong Iranian reception which was identified by the FuBK test card. Thailand was also noted around mid-morning. Auroral activity noted on 80M.

07/03/91: Unidentified programmes with Arabic script noted on E2. The signals were P4 quality.

08/03/91: Dubai Teletext pages resolved on channel E2 at 0930 UTC.

10/03/91: Very strong signals from Dubai at 0930 UTC.

11/03/91: Unidentified colour bars resolved from the south-east at 0750 UTC (possibly Dubai). Dubai Teletext pages noted at 0915 on channel E2.

25/03/91: Tropospheric reception from several Danish UHF transmitters between 2000 and 2100 UTC.

26/03/91: Various Dutch UHF stations resolved via tropospheric DX.

27/03/91: Swedish Band-III and UHF signals received, plus Norway on E5, E8 and E11.

APRIL LOG

02/04/91: Dubai Teletext pages resolved at 0950 UTC on channel E2. Sporadic-E opening produced Band-I signals from Corsica (Canal Plus on channel L3) and Italy (RAI UNO on channel IA).

12/04/91: Good F2 conditions with Australia identified on channel 0 (DDQ-0), Malaysia, Dubai and Iran were later identified on channel E2.

14/04/91: Tropospheric reception from Denmark, Norway, Sweden, Germany, France, Netherlands, Belgium, Eire and Poland.

15/04/91: Similar reception to the 14th.

MAY LOG

04/05/91: Sporadic-E signals received from Corsica on channels L2 and L3 at 1700 UTC. 6M activity noted from Malta.

07/05/91: Yugoslavian programmes resolved on channel E3 during a mid-afternoon Sporadic-E opening.

08/05/91: Spanish and Italian transmitters received via Sporadic-E at 1400 UTC.

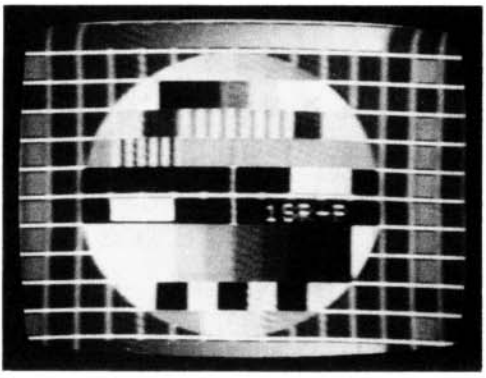
09/05/91: A mid-morning Sporadic-E opening produced Italian signals on channels E2 (a private station), IA (TVA) and IB (RAI UNO).

12/05/91: Sporadic-E reception was noted from Rumania on channel R2 between 1406 and 1600. two signals were present - TVR1 and TVR2. Pictures were resolved in PAL colour at times, thus confirming the country of origin (Rumania uses system-D PAL). No other countries were resolved during this period, although weak channel E3 signals from Yugoslavia appeared briefly at 1602.

21/05/91: Sporadic-E opening to Finland and USSR.

RESOLVING VISION

There is still plenty of time to receive pictures via Sporadic-E propagation. There are a variety of options open when it comes to monitoring the pictures. Multi-band TV sets are available which cover Band-I channels (some UK TV sets and video recorders already have multi-band tuners fitted as standard). Then there is a device known as an upconverter which converts the VHF frequencies to an equivalent bandwidth at UHF. This means that a normal UK TV can be used as a monitor, but you will not be able to hear the sound channel because the UK receiver sound IF



Czechoslovakian TV via Sporadic-E on ch. R1

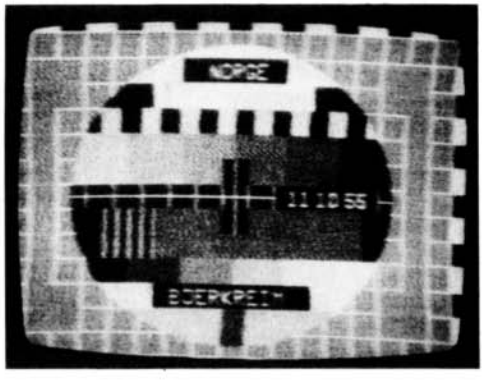
spacing is set to 6MHz (Europe uses 5.5MHz and 6.5MHz spacings). Some scanner receivers can be fitted with a video take-off board as an optional extra.

NARROWER IF BANDWIDTH

Unfortunately, the results obtained from any of the above types of equipment usually leave a lot to be desired on all but the strongest signals. With an upconverter or multi-band TV set the use of a wide IF bandwidth is inevitable unless you get your tweaking tool out and realign the vision IF strip! Using a specialised double-superhet converter system such as the D-100, offers reduced bandwidth facilities and the bonus of multi-system sound, which are essential for resolving the weaker signals. A normal UHF TV can be used as a vision monitor, while an FM radio provides the sound channel. Some satellite systems are now offering reduced bandwidth IF facilities for enhancing low-level signals.

AERIALS

The choice of aerial system is mainly governed by the amount of space and spare cash available! At a push, a Band-I aerial can be installed in the loft, although it is unlikely to be rotatable because of the roof supporting structures and the size of the reflector, at just over 3M in total length. A two or three element array is more than adequate for reception. For tropospheric reception at Band-III and at UHF frequencies it is recommended that aerials are installed out of doors and clear of local obstructions. Chimney height is acceptable. Wideband UHF grids tend to be popular with DX-TV enthusiasts because of their compact size and relatively low cost.



Norwegian test pattern received via tropo from the Bjerkreim transmitter on ch. E6

EURO NEWS

DENMARK: TV2 has changed the test card identification. The word 'Telecom' has been added to the transmitter name, e.e: 'Aabenraa Telecom'.

Due to the poor reception of the TV2 programme along the coast of the oresund in the northern part of Sjaelland there are plans to install a relay station at Karlskrona in Sweden.

ICELAND: Teletext (Textavarp) tests will commence in September this year and NICAM stereo from January 1992.

GERMANY: The regional programme of WEST-3 DORTMUND is split into two sub regional versions during part of 'Aktuelle Stunde', which is screened between 1900 and 2000 local time. The sub regions are Dortmund RUHRGEBEIT (via Dortmund channel E53 and Wesl-II channel E59) and Dortmund SUDWESTFALEN via Schwerte E43, Hochsauerland E40 and Ludenscheid E60.

FRANCE: 'Canal-J', the new children's channel aims at 2-14 year olds, was officially opened on 30/03/91. Transmissions, some encrypted, are via the TDF-1 satellite and many terrestrial UHF channels. The encryption method is the same as that used by Canal Plus. Daily programmes take place between 0700 and 2000 (local time) with a

A Golden Oldie! An early Australian test card as used by the ABC network until the introduction of colour during the eraly seventies. Channel 3 has a vision carrier frequency of 86.26MHz and a sound carrier of 91.55MHz.

2130 closedown on Mondays, Saturdays and during school holidays.

Latest information indicates that the programmes will be aired unencoded (en clair) between 0700 and 1630 and 1930 and 2000 (maybe until 2130 on extended days) local time.

EIRE: Campaignie Luxembourgoise de Telediffusion (CLT) is understood to be the major foreign investor in TV3, Eire's first commercial television company.

USA: As an alternative to high-definition TV, Super-NTSC is scheduled for nationwide tests. The new system uses image processing techniques and signals are originated in non-interlaced scanning at 1050 lines and then converted to a standard 525-line NTSC signal prior to transmission. A standard receiver will display a conventional picture, but a Super-NTSC set will process the signal and convert it back into a 1050-line image to provide the benefits of the new system.

RUMANIA: various satellite channels are being relayed over the TVR-1 network. Swiss @Teleclub Plus' programmes are sometimes shown. 'Super Channel' is relayed during the afternoon and 'TV-5 Europe' during the late evening.

FINLAND: The YLE TV3 transmitter at Lapua on channel 40 is showing the FuBK with the regional identification 'YLE LAPUA'. Regional identification is also aired from the Kupio channel E49 outlet of TV3. Both transmitters opened at the end of 1990.

MTV (Oy Mainos Televisio Ab) has introduced a Breakfast TF programme on the TV3 network. It is called 'Huomenta Suomi' (Good Morning Finland) and is shown Monday to Friday between 0428 and 0637 UTC, with the usual mixture of gossip, guests and cooking mishaps.

Finnish DXers are to get their own Teletext page (number 461) in the near future to announce current activities. The Finnish DX Association will update the page. Finnish

radio amateurs are already using page 460 for announcements about their own activities.

BULGARIA: Jamming signals are being transmitted on certain channels to prevent viewers from watching programmes from neighbouring Yugoslavia.

QA new 4th programme is now available in Bulgaria (Kopitoto on channel R41) which relays 'TV5 Europe' in PAL colour.

AZORES: A new channel E4 relay with an ERP of 1kW approximately has opened at Lages on the Isle of terceira. It will carry RTP programmes.

YUGOSLAVIA: Robert Maxwell has bought HTV-3 and also 40% of all newspapers and magazines from 'Vjesnik' Zagreb and 40% of 'Omladinski (Youth) Radio 101' in Zagreb. There are rumours that HTV will become totally private and there will be no more Pay-TV. It seems that another local RTV station will commence - 'TV Cibona' and 'Radio Cibona' in Zagreb. Programmes will be mainly music and sports and the signal will cover Zagreb, Karlovac and Sisak to the south.

Since 15/01/91 'OTV' Zagreb is now on air 24 hours daily. There are rumours that when HTV-3 eventually covers 100% of Croatia, 'OTV' will become a 4th network and increase its coverage.

From 11/02/91 'TV Skopje' has been renamed 'Makedonska Teleizija'. Its abbreviation is 'MTV' and 'MTB' in Cyrillic. 'Radio Skopje' has been renamed 'Makedonski Radio'.

A new E3 station appears to be operating in the north-west of Yugoslavia (Istra). This is possibly a private station near Rijeka or Pula. Exact identification has not been possible due to co-channel interference from the Kum (TV Slovenia) transmitter.

KENYA: The identification 'VOK-TV' is no longer used. The new identification is 'KBC'. The twin overlapping radiation lines symbol is still in use and it is also displayed in the background during the news programme.

GHANA: GBC-TV is preparing for a daily CNN satellite feed. It is also to become one of the twelve members of URTNA, Africa's regional broadcasting union, to form the nucleus of the much postponed URTNA news exchange. Since the reintroduction of the licence fee last year viewers have been more critical of GBC-TV's offerings.

RWANDA: The Rwanda Television Network is to change from SECAM to PAL with the help of the French Government. The change is planned because most sources of incoming material have also adopted it.

SAUDI ARABIA: Former employees of Kuwait Television who escaped from the country following the invasion by Iraq have been granted airtime on the third network. It will be used to transmit a news programme for Kuwaitis who escaped to Saudi Arabia. The transmissions will extend to the former Kuwait/Saudi Arabia border areas.

BELORUSSIA: Leningrad TV will be available;e to large areas of the republic. The first relays opened on 01/01/91 at Brest, Grodna and Vicebsk. Minsk will follow on 01/07/91. Full channel details are not yet known, except that Brest and Grodna transmissions are at UHF.

LATVIA: The main transmitter at Rezenke now has an additional UHF outlet for Latvian TV on channel R39. The Dungada relay in the north-west is using channels R8 (CT-2), R25 (Latvian TV) and R30 (CT-1). In Riga, test transmissions have started on R31, daily from around 1745 local time.

Now closed are the two VHF channels of the Liepaja transmitter on R5 (Latvian TV) and R12 (CT-1). These have been replaced by UHF transmitters which have been in use for some time. The channel R1 (Latvian TV) relay has also been closed.

LITHUANIA: After the occupation of the radio and TV studios in Vilnius and the Vilnius transmitter in January the situation is as follows:

Lietuvos Televizija (LTV) is now broadcast from the Kaunas studio and is radiated by all the regular transmitters except the Vilnius outlet.

Pro-Soviet staff in the occupied Vilnius TV studios have started their own programmes from 1800 to 2100 local time via Vilnius on channel R4 (vertical).

Other transmissions from the Vilnius tower include CT-1 on R2 (vertical), CT-2 on R31 and R38. The latter channel used to relay the Polish TP-1 network. Now it occassionallyv relays the satellite programme MTV. On certain evenings German SAT-1 broadcasts were relayed by a second network of LTV before the occupation of the studios in Vilnius.

ESTONIA: The powerful Nadezhda radio station, owned by the Intermovement of Estonia, began broadcasts from a military base at the end of August 1990. Soon a 2 to 3 hour TV programme will be produced there – at other times CT-1 will be relayed. The studio will be built on the outskirts of Tallinn and relay stations will be installed in eight military garrisons and the network will cover the whole of Estonia.

Euro News information kindly supplied by: Gosta van der Linden and the BXDC, Netherlands; Roger Bunney, UK; Dalibor Frkovic, Yugoslavia; BBC Engineering Information, London; Anthony Mann, Australia; Pertti Salonen, Finland.

Photo taken by the late Mike Barlow circa late 1956/early 1957, showing Mike Cox, Jack Terry and Brian Partridge (back to camera). *BATC archives.*

TV ON THE AIR

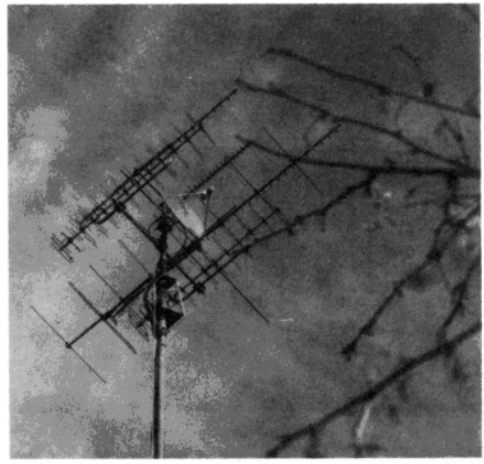
MICROWAVE BANDS

On the "top" coast of North Wales (on the map) John Lawrence GW3JGA and John Cronk GW3MEO are busy on 24cm, sending P5 FM ATV pictures to one another. At present this is over a cluttered one mile path in Prestatyn, but they are working on extending their coverage along the coast.

If you follow the coastline around Britain you come eventually to the north Kent coast and there you will find Ron G6GHP and Chris G4AYT playing microwaves at X Band. By trying reception at various portable locations of a signal from Chris's Whitstable location they have discovered that 10GHz TV signals travel an amazing distance. Using just a barefoot Solfan head (without a dish) they have exchanged P5 pictures between Whitstable and a high spot on the Isle of Grain, making a path length of some 21 miles. This is not quite line of sight, either – remarkable. 10GHz is definitely a band with potential, too bad so many people don't try it. Of all the ATV bands, it has got to be the cheapest to get going on, and perhaps someone will knock up an "Airfix kit" type set of parts for the diffident.

Our picture this time was taken at Ron's QTH in Margate and shows the antenna system used. One of his favourite tests is to send a signal on 10.3GHz over a 25km obstructed path to G4AYT at Whitstable, then it's sent back by Chris on 23cm. The picture is P5, with colour still visible ... just like closed circuit, Ron says! Microwaves appeal to Ron, in fact. He started fooling with them in 1987 and is still using the same Solfan equipment as then, the only difference is that he has improved the modulator circuitry. Of course, the price of Solfan heads has tumbled in those four years and you can now pick them up for a fiver or less. Dirt cheap! Ron is pleased to acknowledge the help and encouragement he has had from his QSO-partner Chris, too.

The winner of BATC diamond award no.6 and having done 10GHz to death, Ron is now looking for new challenges. He is experimenting with something new (to him), 2.3GHz, and is building a station for the band. He has nothing on the air yet but might be spurred on if there were someone else fairly local in Kent or Essex who was also interested. He is QTHR and would also like to find someone in Essex or the Netherlands who would be interested in conducting trans-oceanic TV tests on 10GHz.



Ron G6GHPs aerial array

BUGGERS OR MORONS?

Perhaps I should have written buggists, to make sure you know what I mean!

I think it is no secret that the various law enforcement agencies "borrow" the amateur bands for surveillance television form time to time. They used to use 70cm but now prefer the very bottom and top ends of 24/23cm.

This of course is a great boon for the manufacturers of ATV equipment, who are now finding a ready and expanding market for their wares.

On looking at one UK manufacturer's catalogue, Tom O'Hara W6ORG exclaimed: "The catalogue and data sheets makes one think everyone is spying on everyone else in England! The bugging biz is obviously a much bigger and more lucrative market than cheap old hams." Hmm ... sorry if that rattled anyone's cage. Even if it didn't, perhaps this will - it really makes my blood boil!

Normally you'd say any video signals on 23cm must be a good thing. But a not-so-welcome TV transmission on the 24cm band is a private (non-amateur) station on the Isle of Sheppey, which provides local amateurs with a rather boring, unchanging view of a caravan site. The signal can be picked up in Margate, so it is not exactly flea power. What is more annoying is that it is bang on 1310MHz, a repeater output channel.

The use of "amateur" television for this kind of surveillance is totally illegal and what is even more tragic is that the transmitters are reportedly being sold by a local G3 "amateur", who really ought to know better. One of his illegal efforts installed at Kent University was even picked up in the Netherlands! Amazing if it was not pathetic.

Perhaps the local hams could conduct some legitimate high power tests on 1310MHz: this might induce the caravan site owner to close his QRM machine down!

OXFORD ON THE AIR

A communication from Jeff G8PX (who says two-letter calls are just as "real" as three-letter ones!) advises that G6NB and G3UMF have reported improvements in signal strength since the GB3TV repeater at Dunstable has been overhauled. G8PX can now see GB3TV drawing out the Union Jack, and when he gets his masthead pre-amp finished he hopes to get a viewable picture. Jeff has also added a PLL to his Solent transmitter.

THE DRIER SIDE

Over on the East Coast, Clive G8EQZ has been busy contesting. He reports that the one held 9/10 march was rather quiet, with flat conditions and not many "big name" stations on the air. Despite the poor conditions he managed a two-way over a 295km path - just! He says it was a bit of a struggle, taking three quarters of an hour to verify since his receiver was equipped with a sync processor and the Nascom computer used by John G8MNY at the other end in Surrey put out decidedly non-standard syncs. Still, they got there in the end, and that's what counts.

In case you're wondering how one makes a 295km contact on 70cm under flat conditions, this is how you do it ... First select a hill 525 feet ASL (Market Weighton will do), then erect four 21-element antennas at a height of 60 feet and finally borrow a prototype Heatherlite amplifier using a 3CX800A7 tube in grounded grid mode. This will give you 25 watts p.e.p. into the antenna and an effective radiated power of 25kW! It also helps if the station the other end is running 40kW ERP. And that's how simple it really is - nothing to it!

Clive says they were making one-ways even to stations with nothing more than a TV antenna and a VCR which tuned 70cm. In all they achieved nine contacts on 24cm and 17 on 70cm from their portable location. The new amplifier is nice and

broadband, he adds. On another tack, he advises they seem to have found a new, improved site for the Hull TV repeater just above the cliffs on the coast east of Hull. This location should give coverage of Hull, Bridlington and Grimsby (and the Netherlands?!?) and tests will be conducted with a beacon and an Alford slot antenna as soon as sufficient bits and pieces have been procured. If you'd like to assist or take part in the experiments get in touch with Richard G4YTV, QTHR.

REPEATER NEWS

In addition, Jeff remarks that he understands the Aylesbury Vale Repeater Group are considering a 24cm ATV repeater if there is sufficient support. If you are interested in having a TV repeater covering the Oxford-Aylesbury area please let Jeff know (QTHR), as he is making up a list of supporters to send to the repeater group.

Hey, things are happening at Crawley! I understand that the Crawley Radio Club are taking over the running and housekeeping of the repeater and that permission has been given for a better located (higher) site. This should increase the transmission range, which is reportedly rather localised at present.

Down in Bournemouth Tony G6AMU/T says the television bug has bitten again and it's just like the old days of G6AMU/T! He is building some GW3JGA projects from the "yellow" handbook (they're straightforward and work!). Some of the lads locally are building a 24cm TV repeater and Tony is getting some gear together for that band.

Thanks also for the latest issue of P5, the Severnside Repeater Group's newsletter, which is sent to me. It is too full and so good I cannot hope to precis it or even pull out the plums here. The June 1991 issue has a superb discussion of the various types of coaxial cable we use for ATV and points out that not all "thick co-ax" is alike. I hope it is re-published in CQ-TV, but in the meantime it would be worth joining the group for this publication even if you don't live in the district. No other ATV club publication comes close to it for informative content.

News now of updates at Britain's loftiest ATV repeater up on the IBA tower at Emley Moor (Yorks.).

Main man Trevor G8CJS writes: "We have fitted new logic to GB3ET which adds a date and time display at the end of all QSOs so should you record some rare DX from the repeater you will have a record of the event on the tape. The new logic has two video inputs so we can add a second RX at a later date, probably 10GHz. The input used is idented on the screen at the end of all QSOs so you know if the station that just dropped out was on 24cm or 10GHz. The new logic also has a news page that is updated via a data link on the repeater audio input and is password-protected. Barry G6LIC has the keyboard, so if anyone has anything they would like put on the news page please contact him QTHR.

"The new logic is built out of three Eurocards: the CPU and VDU are BATC printed circuit boards that support a project called I²C. The VDU is teletext format and the CPU runs PROM-based Z80 code. The third board is the bits and pieces vision detector, vision switcher and data link: this is Eurocard size Veroboard. The hardware was built by yours truly and the software was written by Chris Smith G1FEF; all the new features were ideas submitted by the members of the group. The 10GHz receiver is a reality, but will need the purchase of a suitable LNB to tweak down to 10GHz. The new logic along with a replacement feeder that became waterlogged earlier in the year, the site rental and power and the new RSGB charges have together left the fund a little depleted. If the repeater is to continue to operate and develop then donations are required and should be sent to Barry G6LIC QTHR.

"The polar diagram of the repeater is passing our wildest hopes with some reports coming in from the strangest of places, the best being Summercoates, also Hornsea where G4YTV has become a regular user. G8CHN persists in accessing although he is behind the aerial and screened by the tower."

CELTIC CONNECTION

Derek GW3FDZ writes from Dyffryn Ardudwy: "I am pleased to report that I still have regular QSOs with Craig EI3FW, normally on a Thursday and Sunday evening at 2100 hours. A novel one that you should know about is that he let the New Year in for me at midnight this last New Year's Eve and then vice versa! Joyful celebrations were going out on 70cm in both directions!

SSTV NEWS

S. Bunin UB5UN, J. Jakonon UA3ALA, J. Czubaczensko UW6LC, E. Suchowierchow UA3AJT and A. Blasienko UP3BD were the first constructors of SSTV reception equipment in the Soviet Union. They took their equipment to a radio exhibition in 1973 but the organisers were not interested in SSTV and had UB5UN's apparatus removed. The SSTVers' fortunes changed thirteen years later in 1986, when the club station U3WRW received temporary permission to use the SSTV mode at the radio-amateur exhibition. They made about 20 contacts with European stations including DF2YT, DJ8LE, ON5NM, SP9AMN, SP9PAC, SP9GND, LZ1KNP, HB9ANT and Y21UO. Since 1 March 1990 amateur stations of the first category in the USSR have been allowed to use SSTV on the frequencies

7.035 - 7.045 MHz
14.225 - 14.235 MHz
21.335 - 21.345 MHz
28.675 - 28.685 MHz

and all UHF bands.

The U3QC station uses the photo-mechanical type of transmission. Thanks to BATC member Stan Pazur in Warsaw for this info: it was the only SSTV news received, apart from ...

Thomas GM4CAU in Aberdeen, who is having good results with the G3WCY/G4ENA system. At the moment Thomas is QRV only on 2 metres as far as SSTV is concerned, but he is hoping to have an aerial erected for 40 metres soon - he has seen some good pictures on 7.040MHz. On 20 metres he has received pictures from most of Europe and Canada, USA, Japan (just missed South Africa due to QRM), all on 8 seconds. He intends to send us some off-screen photographs (good!) to let others see what can be done with a home-brew SSTV system.

ULTIMATE COMMENT

Henry KB9FO remarks "I am installing 900MHz ATV in the van, with a second beam on the roof, an 18 element KLM, mounted above the 18 element horiz/vert. for 450MHz. Need to make a splitter for the 10-pin camera cable so I can feed two ATV transmitters at once! Maybe I should go all the way and add 1200MHz ATV stuff too! Add a quad array of loop yagis for 1200. Yep, no other mobile station like it!".

Having ridden in this vehicle, I can confirm there is no other one like it. At high speeds the antenna mast bolted onto the roof throbs in the wind and even at low speeds it makes a healthy clang in multi-storey car parks fitted with ceiling - mounted signs and lights! Yep, no vehicle like it ...

CONTEST NEWS

Bob Platts G8OZP

This year the BATC is organising the International ATV contest on behalf of the RSGB. The rules for this event are slightly different to the norm. However more of that later, first results.

SPRING VISION 1991 70cm

Callsign	Points	QSO's	Best DX	@Km
G8EQZ/P	2468	17	G8MNY/P	295
G8MNY/P	2267	12	G8EQZ/P	295
G0IMP/P	1608	13	GW7ATG/P	193

SPRING VISION 1991 24Cm

Callsign	Points	QSO's	Best DX	@Km
G8EQZ/8	748	9	G4RNA	78
G4WGZ/P	594	8	G3UMF	98

Clive and Richard, G4EQZ G4YTV, pulled all the stops out for this one and earned themselves top spot on both bands, mind you, 250W PSP into 4x21 ele on 70 does help to get one noticed, (a quick bit of mental arithmetic tells me that's about 100KW ERP). By comparison Their 20 W into a single loop Yagi on 24 seems positively tame, but obviously works well.

Andy and John, G8MNY G4WGZ, congratulated me on arranging the best mud bath in years at their site on the North Downs. A Land Rover had to be summoned to extricate them. Other than local PMR equipment, they found activity rather low, a bit like the number of logs I received.

Contest cock-up of the year must go to the Mayday Microwave contest. Due to popular demand the date for this was moved to the Sunday after bank holiday Monday. Whilst not mentioning any names, but somebody on receiving my copy noticed the new date as Sunday 12th, thinks, "this must be a mistake the Mayday microwave is always on a Monday". Hence the reason for the wrong day but right date. *(OK my fault - many apologies ... Ed).*

Activity for the day was quiet to say the least, with only one log received. John G8MNY considered going /P at first but changed his plans and operated from the home QTH, (perhaps memories of the Spring Vision). A final comment on his log "was this the right day". Yes it was and you are outright winner John.

MAYDAY MICROWAVE RESULTS

Callsign	Points	QSO's	Best DX	@Km
G8MNY	246	5	G4CRJ	59

1991 IARU REGION 1 ATV CONTEST

Date of contest: 14-15 September 1991

Duration of contest: 1800 GMT Saturday to 1200 GMT Sunday.

Contest Sections:

1 Transmitting: This section is entered by all those who use transmitting equipment to send pictures for the purpose of establishinG two-way vision communication, or those transmitting any other mode for the purpose of establishing one-way vision communication with a transmitting television station.

2 Receiving: This section is entered by all those who use receiveonly television equipment and do not attempt to communicate in any way with other participating television stations in order to influence their operations.

Eligible entrants:

Section 1: All licensed radio amateurs in region 1 may participate. Multiple operator entries will be accepted, providing only one callsign is used during the contest. Contestants must operate within the letter and spirit of the contest. No greater power than permitted in the ordinary licences of their country shall be used.

Contacts: For contest scoring purposes a participating station may be worked or viewed only once per band. Contacts made via active repeaters or transponders do not count for points. Types of emission. Contacts may be made using the mode(s) authorised for ATV on that band.

Contest exchanges: The following must be exchanged Code number. For each band used a transmitting station shall chose a four figure number that shall not change during the contest. The figures shall be neither the same or consecutive. The code number shall be transmitted in video only. Different numbers must be used on different bands. Callsign Vision and intercarrier sound (if used) report IARU Locator Contact serial number, starting with 001 on each band.

Scoring: 432MHz Band 2 points/Km 1296MHz Band 4 points/Km, Higher bands 10 points/Km.

For a one-way only contacts the score should be halved.

For cross band contacts the score is obtained by adding the scores which would have been obtained on each separate band and then divided the result by two

For receive only (section 2) the above scores should be halved.

Entries: **LOGS MUST BE SENT TO THE NATIONAL ATV. MANAGER POST-MARKED NOT LATER THAN THE SECOND MONDAY AFTER THE CONTEST DATE** and must show the following information:

Date.
Time in GMT/UT.
Callsign of the station worked.
Report and serial number sent.
Report and serial number received.
IARU locator received.
Number of points claimed.

A cover sheet must also be included with the following information:

Name and address of the main operator.
Station callsign.
Contest section.
Station IARU locator.
Bands used together with the code groups used on each.
Multi or single operator.
Callsigns of other operators (if any).
Claimed score.

Note: Cross-band contacts must be clearly marked for the band on which the transmission was made. A copy of the full rules is available from myself on receipt of a SAE.

BOB PLATTS G8OZP, 8 STATION ROAD, ROLLESTON-ON-DOVE, BURTON-ON-TRENT, STAFFS., DE13 9AA.

CONTEST CALENDAR

INTERNATIONAL ATV

Saturday Sept 14th - Sunday Sept 15th

1800GMT Saturday - 1200 GMT Sunday

Fast Scan TV all Bands

AUTUMN VISION

Sunday Nove,ber 10th

0001 - 2359 GMT

Slow Scan & Fast Scan ATV all Bands

WINTER CUMULATIVE 1992

Thursday Jan 2nd, Friday Jan 10th, Saturday Jan 18th, Sunday Jan 26th

1900 GMT to 2359 GMT each session

Slow Scan & Fast Scan ATV all bands

Three best logs out of the four to be entered

Ere! - wots all this then?

REPEATER GROUP AFFILIATIONS

Repeater	Channel	Contact	Telephone	Meetings
GB3ET	RMT2	B.Keedy G6LIC	0924 822605	Irregular
GB3ZZ	RMT2	S.O'Sullivan G8VPG	0225 873098	Quarterly
GB3VR	RMT2	D.Stewart G4HSY	0903 212373	Non
GB3RT	RMT2	S.Simmonds G6WLM		Irregular
GB3TV	RMT2	C.Asquith G4ENB	0582 27907	Every Friday

Following the announcement of the Repeater Affiliation scheme in the last edition of CQ-TV the above listed five groups have affiliated and contact has been made with most of the other UK repeater managers. Enquiries have been received from all groups just starting up and from as far away as VK..., all are welcome.

The BATC supports Television Repeaters

All of the repeater groups have said they welcome visitors and guests at their meetings and reception reports are also most welcome.

BATC contact B.Summers 081 998 4739

REPEATER PROFILE

GB3TV: The Dunstable Downs repeater, run by the Dunstable Downs Radio Club (DDRC), has had a number if improvements. The output power is increased by 5dB to 12W and the receiver sensitivity has been improved. An additional sound subcarrier has been added. The computer which runs the test card, repeater information and the DDRC programme now has battery back-up to avoid crashing during what seems to be frequent power interruptions on site.

As a result of these changes all stations operating via the repeater have seen improvements to their signal into the repeater and to the signal coming back from it. At the beginning of April there were fourteen stations regularly operating through GB3TV. The DDRC also has a number of members on receive with a view to transmitting later.

The 10GHz gateway GB3TG into GB3TV from just south of Milton Keynes should be operational shortly. very good results have been obtained into the gateway during trials from the north, with P5 pictures obtained from 25Km away.

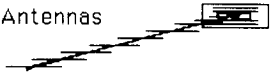
GB3TV's coverage is still obscured to the south by the very top of Dunstable Downs. The area affected is a 70 degree segment, approximately SE to SW. Coverage in all other directions is good. G6NB from Bicester is a good signal and out towards Cambridge, North towards Towcester and SW down the Aylesbury Vale towards Oxford. There are a few black-spots caused by the Chiltern Hills around Luton and St.Albans, but with a bit of effort a signal can still be received unless the station is close to the hillside.

Meetings are held every Friday at 'Chews House', High Street South, Dunstable. A lecture programme is operational and guests (potential members?) are most welcome.

DATA: TX 12W to omni Alford Slot 1318MHz. QRA IO91RU RX omni 6dB gain Alford Slot 1249.5MHz. Audio subcarrier 6MHz.

Severnside Television Group

STG 24cm Antennas

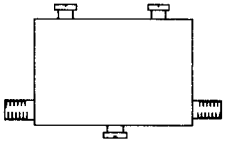


Our ever popular 24cm 18 element wideband Yagi is a must for all ATV stations. Specially designed to cover the whole band for repeater working. Look at some of the features....

* Frequency coverage 1240 - 1325 MHz
* Gain is 10db across the band
* SWR about 1:1.5 across the band
* Length only 900mm weight 300gm
* Neat and unobtrusive, looks like a small UHF ant.

Price still only £14.00 + £2.95 p&p
(UK delivery only)

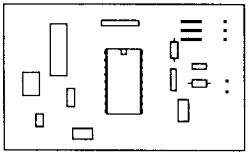
3 Pole & 5 Pole 24cm Filters



Precision made 3-pole and 5-pole interdigital filters for 23/24cm. Low insertion loss of 0.5db and 1db respectively. Wide passband of 60MHz, and -30db/-60db stopband at 70MHz offset. To order, state lower frequency of pass-band, and either BNC or N type connectors.

Price £49 (3pole) £79 (5pole)
plus £2.50 p&p

RGB to PAL Encoders



Our latest offering is ready built and aligned RGB encoder. It accepts 1Vpp ANALOGUE RGB and SYNC and gives 1Vpp composite PAL encoded video (75ohm) Suitable for converting a computer RGB output for transmission. Can be configured for TTL level RGB Based on the SONY CX1145 chip All circuits and connection details supplied.

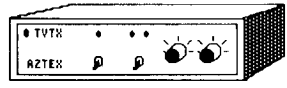
Introductory price £32.00 inc p&p

Severnside Television Group

15 Witney Close Saltford Bristol BS18 3DX (0225 873098) after 7pm & weekends Please allow 28 days for delivery.

Aztex Electronics

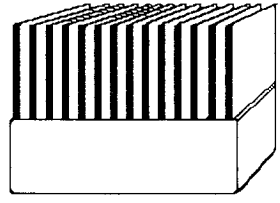
24 cm Transmitters



This state of the art FMTV transmitter gives a solid 2.5 W on either of the two switchable channels, 1249 & 1255 MHz. This ready assembled and tested unit accepts both line and mic inputs for intercarrier sound and front panel audio and video gain controls are provided. See CQTV 150 for review.

Price £245.00 + £5.00 p&p

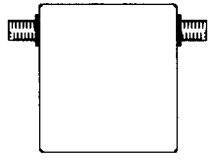
24cm Power Amplifiers



A 20 Watt PA using the SC1040 module is now available to accompany the AZTEX TX

Price £150.00 + £5.00 p&p

24 cm Pre-amplifiers



This GaAsFET pre-amp offers a gain of 17db with a noise figure of only 1db. Designed to go between the RX antenna and your receiver The gain is flat across the 23/24cm band but has an 8db roll-off at around 700MHz to help reduce broadcast TVI. A highly stable design based on the ATF10135 GaAsFET utilises SMT components and is boxed and aligned. NB the device does not contain RF switching.

Price £52.00 + £1.50 p&p

AZTEX Electronics

Ken Stevens G4BVK 20 Coberley Footshill Rd Hanham Bristol BS15 2ES (0272 677005) after 7pm and weekends. SAE for full details. Please allow 28 days for delivery.

THE WORTHING AND DISTRICT VIDEO REPEATER GROUP

GB3VR ATV REPEATER BRIGHTON

1W FM-TV 24cm TRANSMITTER THIS TRANSMITTER GENERATES ITS SIGNAL DIRECTLY AT THE WANTED FREQUENCY WHICH MAY BE SET ANYWHERE IN THE BAND. ON-BOARD INTERCARRIER SOUND AND FIXED PRE-EMPHASIS ARE STANDARD FEATURES. THE KIT INCLUDES THE DIECAST BOX AND COSTS £80.00

23/24cm ATV CONVERTER THIS UNIT BLOCK CONVERTS THE 1.3GHz TO THE DOMESTIC UHF TV BAND. USE THIS KIT WITH A STANDARD TV TUNER AND BATC IF PCB, FOR A COMPLETE FM RX SYSTEM. APPLICATION NOTES INCLUDED. £40.00 INC DI-CAST BOX.

TWO CHANNEL PLL THIS NEWLY DESIGNED TWO CHANNEL PHASE LOCKED LOOP WILL IMPROVE THE OVERALL STABILITY OF THE SOLENT 1WATT TRANSMITTER. TWO CRYSTAL LOCKED CHANNELS, AND A THIRD FREE RUNNING TUNING POSITION ARE AVAILABLE. KIT PRICE ONLY £30.00. CRYSTALS FOR THE PLL ON CHANNELS RMT1, 2, 3 OR SIMPLEX 1255MHz £7.00 EACH. OTHER FREQUENCIES TO ORDER.

VIDEO AGC KIT. THIS UNIT ACCEPTS A COMPOSITE VIDEO SIGNAL IN THE RANGE 0.15 TO 2V p-p AND OUTPUTS A CONSTANT 1V p-p ACROSS 75-OHMS. THIS UNIQUE AMATEUR DESIGN IS A MUST FOR TV STATIONS AND REPEATERS. £16.00 EACH.

EXPANSION BOARDS FOR THE CIRKIT CROPREADY TEST CARD GENERATOR BOTH 2 AND 8-WAY EXPANSION BOARDS ARE AVAILABLE ENABLING THE SELECTION, BY S/POLE SWITCH OR BCD, OF EXTRA EPROM PATTERNS. PRICE: 2-WAY £7 & 8-WAY £18.

EPROM SERVICE FOR THE CIRKIT TEST CARD GENERATOR. A FAST RELIABLE SERVICE WITH A RANGE OF DESIGNS INCLUDING BATC, IBA LOOK-ALIKE, EBU TYPES 1 & 2 TEST CARDS, CONTEST NUMBERS, TEXT, GREY SCALE PLUS MANY MORE. THESE EPROMS ARE TO THE FULL SYSTEM I STANDARD. SAE FOR FURTHER DETAILS OR TEL. GEOFF ON (0903) 32161 (7 TO 8pm). PRICE: £6.50 PER CHIP. PLEASE STATE B/W OR COLOUR WHEN ORDERING.

COLOURISER KIT FOR THE CIRKIT TEST CARD GENERATOR. BY THE ADDITION OF THIS KIT, THIS POPULAR ELECTRONIC TEST CARD CAN BE UPGRADED TO PRODUCE COLOUR IN ANY GREY SCALE AREA, ON EXISTING OR NEW EPROMS. AN IMPROVED DESIGN TO THE CIRCUIT DESCRIBED IN CQ-TV 139. PRICE £20.00.

THE 'NEW ATV' PROGRAM FOR THE 48K SPECTRUM. THIS VERSION HAS OVER 60 COMMANDS, WHICH INCLUDE 7 TESTCARDS, MEMOPAD, CLOCK WITH ALARM, MAPS, TONES, LOCATOR CALC (OLD & NEW), FLAG, X-HATCH, VARIOUS SIZE TEXT PRINTING PLUS A DISK TRANSFER COMMAND AND MUCH MUCH MORE. ALL THIS FOR ONLY £6.00. OPUS DISK VERSION £8.00. A MUST FOR ALL SPECTRUM OWNERS.

BBC AMATEUR TELEVISION PROGRAM FOR THE BBC MODEL 'B AND MASTER. PROGRAM INCLUDES 8 TESTCARDS, MAIDENHEAD LOCATOR SYSTEM, VARIOUS MESSAGE PADS, PLUS MANY MORE FEATURES. AVAILABLE ON 80 TRACK DISC OR 40 TRACK D/SIDED DISC, FOR ONLY £8.50. SEND NAME LOCATOR AND CALLSIGN WHEN ORDERING.

ORDERS TO THE TREASURER OF GB3VR,:-
R.STEPHENS G8XEU, 21 St. JAMES AVENUE, LANCING, WEST SUSSEX, BN15 0NN.

MARKET PLACE

ADVERTISING RATES:

Market place ads - Free*
Full page - cover - £50.00
Full page - inside - £40.00
Smaller displays - proportional

*Advertisements are placed in this column free of charge to paid up members only, please quote your membership number. Addresses will be included unless otherwise requested. All paid advertisements are subject to standard rate VAT.

Copy should be sent to the Editor at 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF before 20th September. Tel/Fax: 0788 890365.

FOR SALE

Hewlett Packard HP122A DUAL BEAM OSCILLOSCOPE, complete with mains lead and probe and handbook. Fully working, recently checked on Tektronix calibration rig ... £125 plus carriage at cost. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr. Rugby, CV23 8UF. Tel/Fax: 0788 890365 (Answerphone).

BLACK & WHITE composite video MONITORS ... £35 each plus carriage at cost. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr. Rugby, CV23 8UF. Tel/Fax: 0788 890365 (Answerphone).

FERGUSON 3CO2 COLOUR VIDEO CAMERA, auto and manual focus, telephoto, auto AGC (selectable), built in fader (fade to red, green, blue or white), polarity inverter. In other words 'all singin and dancin!' Also JVC VIDEO TITLER which fits onto the camera next to the eyepiece, which provides scrolling text, call sign etc., on the video signal. Also JVC power supply/video adaptor and flexible JVC camera extension lead ... £200 the lot. Chris G1EZJ. Tel: 0782 46570.

SONY PORTABLE LOW-BAND U-MATIC RECORDER. It's old but was professionally serviced over Christmas and had new heads fitted ... 400 ono. EDIT SUITE, consisting of a newsmaster edit controller with two Sony 2860 low-band U-matic recorder/player machines. One machine has a slight fault, needs attention. Includes a non-working spare edit controller and a non-working but complete 2860. Any reasonable offer considered. Tel: 021 472 1841 x249 (answerphone) or 021 440 7769 and ask for Nick.

STELLAMASTER SM8 s/n no: 853-930. Optimised for 7.5 & 15 ips. Highest mastering quality. Complete with set of NiCads, leather carrying case and ABR NAB spool attachment. Only 20 hours use from new ... £4750. New 'Ball & Biscuit' Mic - collectors item ... £80. Dual-band Graphic equaliser ... £180. 2 off 10-output rack-mounting Line Distribution amplifiers, balanced outputs. New ... £195 each. AHB ADT unit, New ... £195. D&R Hi/Lo pass Filter Unit, New ... £70. D&R Com Noise Reduction unit, New ... £90. Pair of Spendor stands, New ... £20. Phantom power supply unit, New ... £35. DI Box, New ... £20. Twin channel DI Box, New ... £30. Ribbon Cardioid Lavalier Mic (Antique!) ... £25. 2 off Lowther PM6C Loudspeaker drive units (pair) ... £25. Hy-Com Multimode 25W linear, 26-30MHz ... £20. Realistic radio mic system ... £85. PZM boundary mic ... £18. Bolex Standard-8 Cine camera with leather case (collectors item) ... 25. Eumig P8 projector, s/n: 866103 ... £15. Marconi CT402 Signal Generator, 1.5 to 220MHz ... £65. JVC U-matic professional portable VCR, CR4400E s/n: 13200146. JVC professional Colour Camera S100E s/n: 17611776, PAL with Canon motorised zoom lens (lens alone worth over £1000) ... £950. Racal RA1217 professional receiver in table cabinet ... £450. Computer package: Apple 11E enhanced, 2 Apple 5.25" disc drives & disc controller card, Apple Monochrome (white) monitor, extended 80-column card, buffered parallel printer card, Apple 11E Appleworks ... £295. Brother HR-20 printer, s/n: B73149765 ... £295. Mr.B.J.Whitty. Tel: 0704 840328.

3 working EMI2001 CAMERA CHANNELS (camera, lens, CCU and PSU). 1 off EMI2001 Channel complete but with wiring fault. Debris from three other EMI2001 Channels for spares. Other assorted EMI2001 spares etc. Large quantities of EMI2001 camera cable. 4 off EMI Coders in need of attention but work on a good day! Several sets of EMI2001 manuals. Other assorted manuals for the above equipment. 3 off Vinton EMI2001 Outside Broadcast Tripods and Dollies. 1 off Vinton Spring Pedestal. 2 off Vinton Mk.3 Pan and Tilt Heads. 1 off Vinton Mk.1 Pan and Tilt Head. All equipment must go ASAP ... £800 ono. Tel: 021 472 1841 x249 (answerphone) or 021 440 7769 and ask for Nick.

AMIGA users Redale 8802 Genlock to use with the Commodore Amiga computer. Brand new never used. Add titles and graphics to video productions ... £175 ono. SHARP PC1246 pocket computer/calculator. Brand new ... £25 ono. S2/BIP INTERFACE unit for Citizen 120D printer to use with Commodore computer ... £30 ono. John. Tel: 0253 594381.

EVR PLAYER complete ... £25. P863 VIDICON tube (short version 1") unused ... £5. Telequipment D53A scope, 2 x JD, plus 1 x G plug-ins, spare tube, manuals ... £50. Early(iest?) s/s transistor colour TV, RBM CT187cs (25"), good-looking walnut cabinet ... offers, buyer collects. Brian Pethers, 238 Northumberland Avenue, Welling, Kent, DA16 2QG. Tel: 081 303 7583.

PHILIPS VR2220 portable VCR, little used with service manual ... £25 + £4.15 p&p. NEC N1-521 2/3" Vidicon camera, int. Xtal or ext. drives, mains powered with tube, lens and service manual ... £30 + £3.15 p&p. RIGONDA VL100 6" TV, mains or 12V powered; slightly modified with service info. ... £15 + £4 p&p. MATSUSHITA S4089P 1" colour striped Vidicon ... offers. HITACHI H4165 1/2" colour striped Saticon ... offers. A few ZNA134 SPG ICs ... £5 each +27p p&p. Trevor Lumb, 2 Briarwood Avenue, Bury St. Edmunds, Suffolk, IP33 3QF. Tel: 0284 754318.

Brand new SONY AVC 3250CE B&W CAMERA, genlock, low-light switch, 16mm lens, 4" detachable viewfinder, 550-lines resolution, in fitted case with leads ... £80. New SONY 12-75mm C-mount ZOOM LENS for latter camera ... £50. New Panasonic RF ADAPTOR VWRFC1 ... £8. Seafarer MARINE TRANSCEIVER , 12 volt, microphone, 8-channel ... £45. Off-air TUNER, 19V rack-mount, balanced audio & 5 video outputs, built-in speaker ... £70. Pentax screw to C-mount Adaptor ... £5. Kinston solid aluminium TRIPOD, professional ... £75. Pye BC22 10-way w/t charger ... £8. Sony 1810 U-matic PLAYER with RF modulator ... £50. Motorola WALKIE-TALKIE & accessories in aluminium flight case ... £250. RS lead acid CHARGER 2/6/12 volt ... £10. All open to offers. Mr.P.Bedford. Tel: 081 747 0069.

WOOD & DOUGLAS 1250DC50 24cm downconverter, new ... £40, second-hand ... £30. WOOD & DOUGLAS VIDIF + 6MHz sound ... £35. CMQ VIDIF c/w 1053 tuner ... £25. All working and complete with circuits. B.Aylward. Tel: 081 651 0767.

IVC OPEN REEL VTR type 711P, with many tapes and manual ... £100. Dave Hazell. Tel: 0993 771373.

FOR DISPOSAL: SONY Beta video SLC7. New heads, needs timer and rewind attention. Service manual available plus several L750 tapes. Nominal offer or swop for Photographic items. Garrard 401 with Decca FFSS arm and stereo head, Leak Troughline tuner and Stereo 30 in Pargs cabinet with matching Wharfedale Lintons ... £100. Ferrograph industrial stereo recorder (valve) ... £40. Brian hayward G8VXQ, 35 Dorchester Road, Solihull, B91 1LW. Tel: 021 705 3583.

3CM LNB, 10-10.5GHz input via WG17 flange, 1-1.5GHz IF output. Gain 50db+, NF 2-2.2db. Requires +12vDC via feeder. BNC connector ... £46.00. Bob Platts G8OZP, 8 Station Road, Rolleston on Dove, Burton upon Trent, DE13 9AA. 0283 813181 7-9pm.

Olympia ES100 daisy-wheel Electric typewriter and serial printer, selection of daisy-wheels, handbook & circuits. This is the printer that CQ-TV used to be typed on and is a good, if somewhat old, solid printer. A photo of this printer appears on page 35 of CQ-TV 133. A BATC Sale proceeds to club funds ... £49.00

DONATED EQUIPMENT: A quantity of Ex broadcast equipment has been donated to the BATC. This comprises:- monitors, U-matic recorders, a vision mixer, a colour camera, and other items of studio equipment. Anyone who is interested in these items should telephone me on 081 998 4739 and the items MUST BE COLLECTED FROM GLASGOW!!!.

S-VHS equipment for sale: Panasonic MS1B Camcorder with extra batteries and all extra options; Panasonic NVS1 VCR with insert edit and NICAM sound; Panasonic TV with S-VHS input, stereo sound. Also other bits and pieces; e.g: 1kW floodlight and stand tripod for Camcorder. Chris Smith G1FEF. Tel: 0767 313292.

EXCHANGE & WANTED

WANTED: HANDBOOK OR CIRCUIT DIAGRAM only for EMI aperture corrector type 2113/1. I believe these were used with the 2001 camera channel. I can photostat and return any material quickly, all expenses paid. Gordon Sharpley G3LEE, 52 Ullswater Road, Flixton, Manchester, M31 2SU. Tel: 061 748 8031.

WANTED: ASTEC AT1020 TUNER module, preferably new and unused, but will consider others. Details and price to: Chris Ashby G4AYT, 3 Sheppy View, Whitstable, Kent, CT5 4PG. Tel: 0227 262555.

WANTED: CIRCUIT for colour bar generator type KG1 built by Labgear for Granada. (These units are being sold at rallies and are an excellent piece of test equipment). John Blackburn G4EAB. Tel: 090 237 2349.

WANTED: 23CM AMPLIFIER SC1040 or 2C39 or parts to make one. F.A.Jefferies G8PX, 1 Lovelace Road, Oxford, OX2 8LP. Tel: 0865 58785.

WANTED: In excellent condition FORTOP TVT435/R ATV transceiver. Details to Alf Frost G3OGD, 30 Bevan Avenue, Stoke-on-Trent, ST7 1QU. Tel: 0782 785865.

WANTED: John Logie Baird signed letters. I will pay a good price for letters or associated material. Mr.P.Bedford. Tel: 081 747 0069.

WANTED: A lattice tower, 60 foot with tilt if possible. Bob G7AVU. Tel: 0427 616762.

WANTED: CIRCUIT DIAGRAM for an H.P. 431C Power Meter. B.Aylward. Tel: 081 651 0767.

WANTED: SERVICE MANUALS for Grundig SVR4004 and Video 2x4 Super VCRs. Audio/sync head for Philips N1501 VCR, also test tapes, jigs and tools for N1500/N1700 series. N1512 VCR complete or just the AV in/out panel. Dave Hazell. Tel: 0993 771373.

WANTED: Telephone dial. Free standing auxiliary Post Office style Dial in black Bakelite circa 1960, for OB van. Marconi Mk8 Camera rain covers, Viewfinder hoods, Operational control panel, Modification records, Backpack for Mk8 portable, In cable extender Brick for Mk9P, any other Marconi Mk8 or Mk9 items of interest WHY? Quantity of round XLR fixed three pin sockets. Telephone B. Summers 081 998 4739 answerphone.

EXCHANGE: MMT 432/28S TRANSVERTER (mint condition) for 24CM transmitter (minimum 1 Watt) in good working order and receive down converter. P.Wilkinson, 34 Finsbury Street, Alford, Lincolnshire, LN13 9BH.

WANTED: SERVICE MANUAL or schematic drawings for CCTV camera and Remo unit model ELBEX – EX.901-C (the PCB: EX.900). This is a brand new camera and local suppliers say it is dated and cannot supply any data or circuits. It is a remote controlled unit, i.e: auto iris, remote zoom and pan, with power trafo' fitted inside of mounting bracket. Remote control accessed through 8-pin DIN socket, together with video and audio signal outputs. The PCB is double-sided, which presents a great difficulty circuit tracing to determine the DIN socket connections and also fault-finding. So, in Andy's words, 'A thousand blessings bestowed for any help! .... Mike EI5CL, 135 Downpatrick Road, Dublin 12, Eire.

More photos from Convention 91

THE CQ-TV AWARD

This award is available to both transmitting and receiving enthusiasts, in any part of the world, whether they are members of the BATC or not. The award is for contacts made using fast-scan high definition television systems only.

TRANSMITTING AWARD

For pictures transmitted which have been successfully identified by another station, claim 2-points per kilometer; if the contact becomes a successful two-way exchange of pictures, then 10 bonus points may be claimed by each station regardless of distance. For contacts on the 1.3GHz band or above, points are doubled.

RECEIVING AWARD

For any picture positively identified - claim for a one-way contact. Otherwise rules are as for transmitting.

POINTS

The award is divided into four grades: For the Bronze - 1,000 points, for the Silver - 5,000 points, for the Gold - 10,000 points and for the Diamond - 100,000 points. Points already gained for an existing award may be added in when applying for a higher grade.

CONTACTS

A station may be worked once only per day for the purpose of this award. It is quite possible for it to be gained by working the same station many times. Contacts through TV repeaters do not count.

THE AWARD

Upon qualification for the Bronze award, a certificate will be issued together with a Bronze seal; the certificate may be up-graded later with Silver and Gold seals. The Diamond award is in the form of a specially made trophy.

APPLICATIONS

Applications should include log details consisting of call sign, date of QSO, band, location of the station worked and points claimed. Contacts made from other than the home station should be clearly marked. QSL cards are not required, but the application should be checked and signed by either a licensed amateur or a BATC member.

CERTIFICATE APPLICATIONS SHOULD INCLUDE A LARGE (12" x 8.5") STAMPED ADDRESSED ENVELOPE

For upgrade seals an ordinary SAE should be enclosed.

Applications should be made to the Awards Manager: Bob Webb G8VBA, 78 Station Road, Rolleston-on-Dove, Burton-on-Trent Staffs. DE13 9AB. Tel: (0283) 814582

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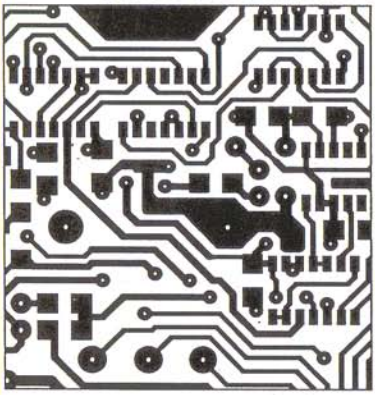

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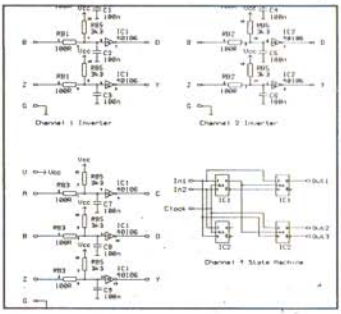

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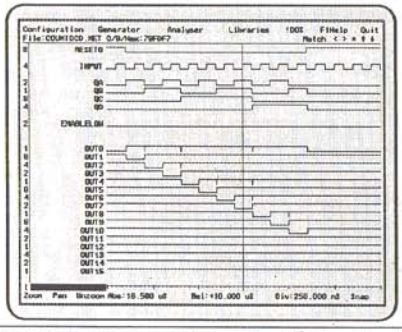

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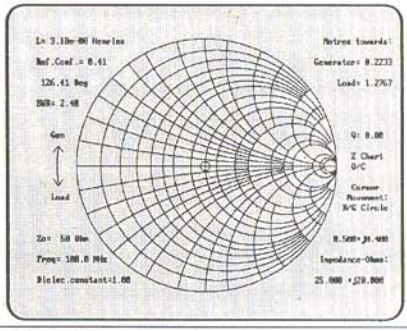

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