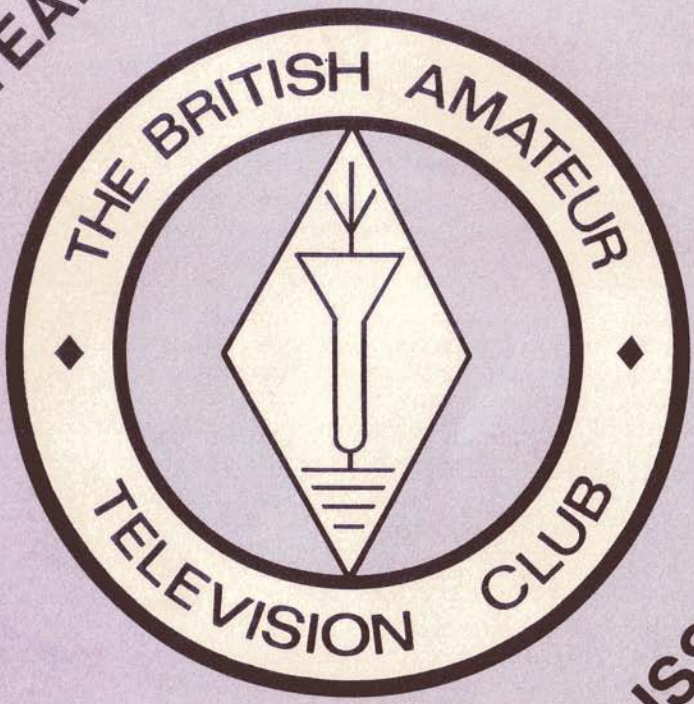
CQ-TV MAGAZINE No.150

BRITISH AMATEUR TELEVISION CLUB

MAY 1990

50 YEARS



150 ISSUES

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MEMBERSHIP

FULL YEAR: Subscription to the club is £6 per year for 1990, thereafter £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.

CONTENTS

CLOSE FOR PRESS FOR THE NEXT ISSUE ..... **20th SEPTEMBER** 1990

P.S: DON'T FORGET YOUR FREE INVITATION TO THE CONVENTION
ITS ON THE REVERSE OF THE LABEL CARRYING CARD
THE ONE THAT YOU JUST THREW INTO THE BIN !

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).

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

DIY ROBOT 1200C UPDATE

Dear Mike,

Since you published my article in CQ-TV 148 (DIY ROBOT-1200 page-45) I have had several letters from amateurs and SWL's who wrote to John Wilson VK3LM for details of the project.

Now that John has retired from the college it seems he is making only two kits available, at about £750 and £1000, dependant on whether a 'full' or 'part' kit is required. I suggest that anyone wishing to save money by building a 1200C clone requests a price for documentation, boards and/or switches only, since there is no point in ordering components from Australia when they can be obtained in this country. I hope this clarifies the situation,

Yours, Peter Lockwood G8SLB

SSTV

Dear Ed,

Re SSTV, there is an interesting point which I would like to make. On receiving pictures on a home-brewed monitor I found that vision modulation on 'white-scale' 2300Hz seemed to be weak. The monitor worked perfectly using the test pattern generator. I checked my receiver, but without test gear I could not determine whether the fault was there.

However, I recently purchased a graphic equaliser at a local boot sale, so I put that into the video path from the output of the receiver. I immediately had a great improvement in picture quality by enhancing the 2300Hz input. I have come to the conclusion that either modern SSB transmissions, or modern SSB receivers, suppress or filter the higher frequencies. Although my receiver is quite ancient having a 15-ohm output, whereas the graphic equaliser is about 4-ohm, chucking too much voltage at the monitor is not good either because in the front-end filter there are limiting diodes which only allow 1V p-p.

If this snippet gives food for thought I would welcome any comments. Also may I take this opportunity to thank everyone who transmits SSTV. I mainly listen on 20M (14.230MHz) for DX pictures. One day perhaps I'll try the dreaded Morse test and transmit some of my own!

Thank You, Sandy Pimlott G8IDE, 58 Queens Road, West Park, Hr.St.Budeaux, Plymouth, Devon, PL5 2NW.

IKEGAMI TRACKING SYSTEM

Dear Mike,

we have an idea over here that the Ikegami PTR1 Automatic Tracking system could be of use to members. The system would provide a wireless camera link with the automatic aerial pointing system through a beacon signal. So please Mike could you review this product, both technically and operationally, on how it works and its performance. We believe it would make a very interesting add-on project for anyone interested in going mobile with a camera rig on a radio-controlled model carrying ATV gear. Also, it would help those interested in satellite tracking methods.

Thank you from .. R.A.T.S., Kano, Nigeria.

Watch the next issue for a short review. All I can say is that you must all be rich over there! ... Ed.

SSTV STANDARDS

Dear Mike,

I read with interest John Langer's article on SSTV standards. As a shortwave viewer,

using a primitive monitor with a long persistence tube and photographing with an oscilloscope Polaroid camera (home developed), I have made an infinite arrangement of switching and R/C networks in order to vary my line scan and field times, but I think that it is time the SSTV'ers got their act together and decided some fixed standards, otherwise no-one will be 'speaking' the same language. Also to muck about with the 1200-2300Hz frequency scale is simply diabolical.

Living in the back-woods of SSTV the VHF bands are not of much use to me, so I concentrate on 20M. Most German and continental stations use the old standards, but 20M is prone to QRM, as opposed to slower standards which don't suffer from picture break-up.

But, there again, my top of picture is disappearing, but I can still take a good picture by leaving my camera shutter open for a longer frame period. Believe it or not, receiving SSTV pictures this way can provide a lot of enjoyment.

Since my last letter to you and reading John's article has made me realise that perhaps as I stated the white scale on some stations was weak if they were using a narrow band of 1700-2100Hz. If no suitable standards are set soon I think I will have to take up Golf ! ... at least I will only lose my balls HI !

73 ..... Sandy Pimlott G8IDE

G3WCY/G4ENA SSTV CONVERTER

Dear Ed,

I wonder if any member has any information on modifying the G3WCY/G4ENA SSTV converter for 48 second mode. I have had mine working successfully for about two years, but I feel I am missing out without this facility. Can anyone help ?

Yours ... Steve Hodgetts G4FAE, 14 Windsor Avenue, Littleover, Derby.

FANCY DRESS IN BRISTOL !

Dear Mike,

Severnside TV Group thought you might like to know that members of GB3ZZ are not always serious bods. On 14th January 1990 we celebrated the new year with our third annual fancy dress evening on the air. Our Chairperson Viv G1IXE became a 'Pussy cat' (?) and she really did purr - husband Ivor G1IXF was 'The Lion', who talked out of his eyes ! 'Dracula' made an appearance, normally Steve G8KUW our electronics wizard. Ken G4BVK made a tremendous 'Arab' ... with actions !

Under 'Mr.Pickwick' we almost recognised Phil G1HIA. Another member, Terry G4YTH acted out the part of the 'Phantom of the Opera'. 'The Lady' (with authenticity) we discovered was Paul G8YMM. My own role as 'The Treasurer' was aptly portrayed while throwing away thousands of pounds of Severnside TV Group's money !! This names but a few of the 14 members who responded with such abandon to make it an hilarious evening. The ATV calling frequency, we learned later, had many listeners all wishing they had joined our group.

A question ... does any other ATV group show such frivolity just once a year ????? Come on friends, show willing.

Yours, Jean Fletcher G0AWX, Hon. Treasurer, Severnside TV Group.

I have to report Jean that the GB3RT mob need a great deal of motivating even onto the air at times, as for the rest of you let me hear of your activities ... Ed

SEVERNSIDE YET AGAIN !

Dear Mr.Wooding,

The Chairman and Committee of the Bristol & West Video Camera Society have requested I write you with regard to an amateur television broadcast by the Severnside Amateur TV Group, which took place on Friday 9th February at the

Society's Bristol meeting rooms. The occasion was well and truly supported not only by the majority of members, but the general public, local newspapers and representatives from the Video camera press. To say the least the presentation was not only educational, but most interesting and very professional. Consensus of opinion by all present, a very worthwhile thoroughly enjoyable exercise.

We are indebted to the Severnside Group for their endeavours and look forward with much optimism to possible closer liaison in the near future. As I understand it, editorial coverage should be published in the March editions of both 'Camcorder User' and 'Video Camera'. I trust the foregoing will be useful and note to keep you informed of further developments etc.

Yours faithfully, Mr.M.Momber, Business Secretary.

NEWS ROUNDUP

GB3RT ON THE MOVE

Yes, I am getting rid of it (at least when the DTI gives me permission that is). GB3RT, the Rugby 24cm ATV repeater, is moving to a new site on the West side of Coventry, atop the Tile Hill College of FE to be exact.

The site will bring the repeater into the centre of its main operating area, and I hope that it will promote new activity on the band from the West Midlands area.

The new site will afford good paths in all directions. The aerials will be approximately 500ft ASL (around the same as here at Barby).

Please keep an ear out on GB2RS or over the grapevine for the move.

73 ... Mike G6IQM, manager GB3RT

RUGBY 10GHZ REPEATER

Yes, yours truly (or unruly) is proposing to build a 10GHz ATV repeater for the Rugby area. It will be under the guise of the Rugby ATV Repeater Group and will be located at my home address at Barby (7km SE Rugby), where GB3RT is situated at present. Any donations of 3cm gear would be much appreciated, I am particularly in need of (everything ?) a 10GHz circulator.

Bye again ... Mike G6IQM

DORSET VIDEO REPEATER GROUP

The inaugural meeting of the Dorset Video Repeater Group was held on Wednesday 29th November 1989. The group has been set-up with the intention of building and running a 24cm ATV repeater in the Weymouth area. A committee was elected and is composed of the following:

Chairman ..... John G4NTS

Secretary ..... Les G0FAJ

Treasurer .... Chris G1BJN

Technical ..... Nick G4WHO, Paul G7EYT & Malcolm G7DKS

If you are interested in joining the group please contact Les G0FAJ at the address given below:

Les Barnes, 29 Overlands Road, Wyke Regis, Weymouth, Dorset.

GB3(NORTHAMPTON)?

A little bird tells me that a new group has been formed in Northampton with a view to building and operating an FM ATV repeater. What's more, if II goes to plan they will have a terrific site! Watch this space!

AMIGA SSTV

The Amiga SSTV system referred to in Roland Humphries' article 'Colour Slow Scan TV' elsewhere in this issue, is now available from ICS Ltd at the address given at the end of that article. Cost ... £299.95.

AUTUMN VISION RESULTS

You may have noticed that a small virus crept into Bob 'Gunn Diode' Platts' computer whilst he was compiling the results for the '89 Autumn Vision contest. Not a bad trick though if you can get away with it ... it appears that Mike G8LES managed to win the 24CM section with 4406 points by working himself!

The truth of the matter is that it should have been Clive G8EQZ who won and that G8LES was his best DX. Bob offers his apologies for the error Clive and will be sending you his own apology written on a five pound note!

COMPONENT SUPPLIES

Some members have found difficulty in locating the TDA9503 used in the SSTV article by Zoltan Nemeth in CQ-TV 147. This device is currently listed by the following suppliers: Sendz Components, 63 Bishopsteignton, Shoeburyness, Essex, SS3 8AF.

Manor Supplies, 172 West End Lane, London, NW6 1SD.

CGL Components, PO Box 72, Unit 7, South John Street, Carlisle, Cumbria, CA2 5AL.

Grandata, KP House, Unit 15, Pop-in Commercial Centre, Southway, Wembley, Middlesex.

Economic Devices, PO Box 15, Wolverhampton, WV2 4AZ.

The first two firms specialise in surplus TV components and panels and are an invaluable source for the experimenter. The last two firms both keep a wide range of semiconducters with special TV uses.

MEMBERS' SERVICES

BATC Members' Services does not hold stocks of BATC publications and vice versa. Please note that only the items listed in the current 'Members' Services' supplement are available - a description of most of the various PCB's and components can be found in the 'What's What' supplement sent with CQ-TV 149. To avoid delay and inconvenience please be careful to include the correct amount of VAT with your order, ie 15% of total goods AND postage, unless an overseas member. Payment should be by cheque or crossed postal order made out in favour of the BATC - do NOT send cash or stamps please.

VIDICONS

Tubes available include electrostatic focus or deflection and low-light types not previously available to club members. Prices vary depending on the size, type and grade of tube. A tube guide appears in CQ-TV's 149 and 150. Please contact Members' Services for further information. The stripe-filter tubes used in domestic type colour cameras are NOT available through the club and normally must be ordered direct from equipment suppliers.

CAN YOU HELP !

A small Welsh community living in one of the many valleys receives its broadcast TV signals by use of a community funded (fully licensed) low-power repeater system. However, they have a problem in that the pictures received are still of poor quality. Amplifying the re-transmitted signals may not help, as they are on the same channels as the master signals and feedback may occur. What they require is a TRANSPOSER, from channels-54 to 65 to anywhere else in the broadcast band.

If you have such a system that is not being used, and would like to raise some funds for your latest project; or if you can offer any advice etc., please contact Peter Waugh on 069 172 597.

EDITORIAL

Mike Wooding G6IQM

It seems but a short time since I put pen to paper for the last editorial, and in truth it is, necessitated by the early closing date for this issue to enable me to get it published and delivered in time for the convention. Mind you, this was made easier by the great response from many of you for articles etc. With reference to this, please keep sending me articles, newsy bits, or whatever, for inclusion in the magazine. Also, let me know if there is a piece of equipment that you would like to see reviewed, or that you would like to see information about published in the magazine. CQ-TV is published for you, the membership, and without your feedback, critical comment, material, etc, it would not survive long.

Whilst on the subject of the magazine I can only offer my apologies for the lack of bits and pieces enclosed with it this time ! The last issue, with the multitude of supplements and whatever, caused the packing and postal department not a few headaches. But, as ever, the magazine was finally collected by the Post Office on a Friday night and dropped through many letter boxes the following Monday - not bad for second class ! I think a vote of thanks should be awarded to the packing department, namely Kim Wooding (yes Her indoors !), and also to the Post Office.

Anyway, there is one special enclosure extra to the very special enclosure - the magazine you fool ! - and that is the card that you just threw into the waste paper basket. You know, the one with the address label and your membership number on it ! On the other side of it is your invitation to the convention - no charge this year for you and your family if you bring this along - £1 if you forget it. Essentially, this invitation or £1 door charge, as appropriate, allows us to comply with the Sunday trading laws by ensuring that only members, or day members, are allowed into the event.

Finally, on the subject of the convention, I have had quite a few letters and phone calls from members both for and against the location of the new venue. Obviously, those of you to the North of Rugby consider it a good idea and not before time, some of you to the south consider it a retrograde step. My only comment at this juncture is to reserve my final thoughts and judgment until after the event, and to temper them with the success (or otherwise) of the move. I look forward to seeing you there and meeting lots of old friends and, hopefully, making new ones. This year I shall have more time to meet and talk with you (and drink your kind offerings !) as I shall not be totally immersed in the Bring-and-Buy stall.

THE B.G.M.

It's hard to convince my memory that it's two years since the last BGM, it seems like only a few months ago that we were organising who was up for re-election or whatever. But, nevertheless, it is two years and yours truly is one of your committee who must stand down for re-election - yes, note that I said re-election. Subject to you the membership's approval and votes I intend to remain as the officer in charge of editing your magazine.

However, that aside there are a few vacancies existing on the committee due to several members standing down, or wishing to do so. So, if you have some energy to spare in the direction of the club please offer yourselves for election at the meeting and join us in steering the club over the next few years.

CONTEST NEWS

Or should I say lack of it ! This is due essentially to the fact that I had to close for press early this issue in order that you receive it in time for the convention. Thus, Bob did not have all of the results in from the Winter Cumulative and therefore no news as such since the last issue. Never fear, the contest news will return next issue !

The contest calendar for the next few months is given elsewhere in this issue. One change that Bob has made is that he will gladly accept Slow Scan entries for the Summer Fun contest. He mumbled to me over the phone that this would give our SSTV'ers a chance to get out portable !! I have yet to see or hear of a portable SSTV station -come on prove me wrong, let's see a plethora of SSTV entries for this new section of the Summer Fun contest on Saturday and Sunday 9th and 10th of June.

24CM CAUSING QRM

Once the resting place of dedicated ATV'ers, self-banished from 70CM due to interference problems with local broadcast receiving sets or whatever, it is becoming apparent that this haven is no longer safe for some.

Those of us who are avid Astra viewers are probably aware of the frequencies of the satellite's transponders, but for those of you with better tastes (!) transponder-1 is on 11.21425GHz and number-16 on 11.43550GHz, number-4 is on 11.25850 GHz. Now, here's the crunch: the local oscillator in most head units is 10GHz, which means that the first IF on transponder-4 is 1258MHz (look familiar ?).

The local oscillators in the head unit are by necessity inherently stable, but I do not consider that a drift of 0.09% to be improbable, and in a positive direction that would bring the first IF from transponder-4 down to 1249MHz. Apart from that, the AFC lock-in range of most TVRO receivers is around 7.5MHz, thus any signal loud enough at 1251MHz would be pulled-in.

The end result of this is that ATV'ers transmitting on repeater channel RMT-2 input at 1249MHz, or on simplex at 1255MHz, may find their signals floating around on TV sets with their satellite receivers tuned to transponder-4 of Astra, which just happens to be EuroSport !

Unfortunately this is now beyond the realms of supposition. Several members have been in touch with me about this very problem. It seems to stem in the main from the use of poor quality down-leads from the head-unit to the satellite receiver, or badly terminated connections. In one case, however, it is apparent that the poor quality of the head-unit enclosure (a weather-proof plastic box !) is to blame, giving no screening to the LNB.

The final nail in this coffin is that at present the DTI and the RIS are not sure of their jurisdiction where interference to or from Astra receiving equipment is concerned, particularly as a recent local court case here in Rugby ruled that no broadcast TV receiving licence is required for the reception of Astra/Sky television only. Also, perhaps even more so than in the case of interference to terrestial TV, those in receipt of such interference seem even less susceptible to rational discussion.

If you are having such problems you have our sympathies. However, please write and let me know, in order that I can build up a dossier of cases. Forearmed is forewarned may be a suitable maxim.

THE END

OK that's about it then for this time. There are one or two other things I could go on about -like the £25 membership renewal subs for a well known society for one thing! But, alas, I am running short of space this time round. Anyway, I could always button-hole you at the convention couldn't I ? 73 & 88 ... see you at Harlaxton ... Mike.

NEW SSTV SOFTWARE FROM TECHNICAL SOFTWARE

REVIEW

This article first appeared in the March 1990 edition of Amateur Radio Magazine and I wish to thank the Editor for his permission to reproduce it here.

Mike Wooding G6IQM

In this review I shall be looking at two recently available new software packages for the BBC B and Master computers, available from Technical Software. Both packages are of particular interest to ATVers as they support all-mode SSTV.

RX-8 MULTIMODE RECEIVE PACKAGE

The RX-8 software package for the BBC B and Master computers form Technical Software is a multimode receive only system. As the name suggests, there are eight modes supported, these being:

AMTOR/SITOR (ARQ and FEC), ASCII, FAX,x MORSE, PACKET RADIO, RTTY, SSTV, UoSAT 1 AND 2

The package comes complete with an E-PROM, a User Manual, a Test cassette and an Interface with connecting leads. The package is well presented and the outward appearance gives a feeling of confidence in the claimed performance.

THE USER MANUAL

The User Manual is well produced, not one of these photo-copied efforts but professionally printed. The opening section 'Welcomes' the reader to RX-8 and gives a basic explanation of the 2-tone system used to send information in the various modes. However, as the author states, it is only a very basic introduction to the subject and further information may be required to fully understand the technicalities of the various modes.

The next section explains how to call-up the program and the various command keys that are common to all modes. Also given in some detail are explanations of the screen displays, keyboard use, the text store and the use of printers and disc/tape storage mediums.

At the very beginning of this section the reader is directed to the section at the end of the manual, for instructions on how to install the E-PROM in the computer, and also how to connect the interface between the radio and the computer. This I found a little strange, as I expected such instructions to be at the very beginning, however, they are quite comprehensive and I feel sure that even the least adept amongst us would be more than capable of installing the E-PROM and connecting the equipment up correctly.

A detailed page dealing with possible problems is provided for those unfortunate enough to experience difficulty in getting the system running correctly.

The remainder of the manual deals with the various modes and how to operate the software for each one. Advice is also given concerning the type of receiver and aerial required, what to do about computer noise and where on the bands to find the various types of transmission.

CONNECTING THE EQUIPMENT

As previously stated, the installation instructions are given at the end of the User Manual. Once the E-PROM has been fitted and the computer reassembled, the Interface must be connected to the User

Port on the BBC using the ribbon cable supplied. This **MUST** be carried out with the computer switched **OFF.**

The Interface is housed in a neat cream plastic enclosure measuring approximately 15.5 x 9 x 4cm. On the front panel of the interface is mounted a bank of three push-button switches (ON/OFF, FILTER ON & NARROW) and an LED Bargraph display. At the rear are the various interconnection sockets.

The unit is connected to the receiver using the 6-pin DIN to 3.5mm jack lead supplied with the package. If your receiver does not have a 3.5mm external speaker socket then an adaptor for the usual 0.25" headphone socket can be easily obtained. Alternatively, you could vandalise the lead and connect the appropriate plug. (A note from Technical Software has since advised me, that provided they are informed when ordering, the correct plugs will be fitted to the cables to suit your equipment).

THE SYSTEM IN USE

Once all is connected switch on the computer. The usual on-screen prompt line should appear with an extra one above it, announcing the presence of the RX-8 software. If you do not get this prompt message then further investigation inside the computer is required to ascertain the correct insertion of the E-PROM.

Having obtained the correct screen message type in *RX8 (or *RX-8, it does not matter which) and you should get the message:

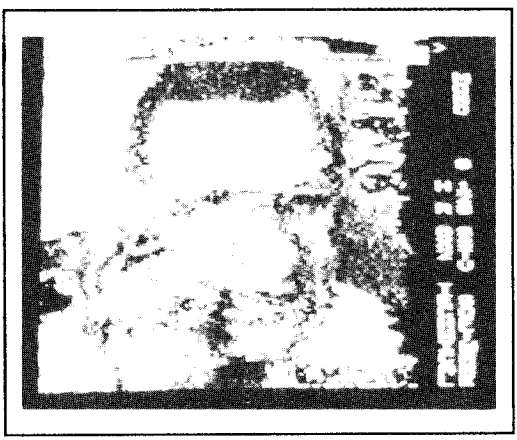
INTERFACE NOT OPERATIONAL ??

BASIC'

Now switch on the Interface and try again!

The software defaults to the RTTY receive program with a full screen display, featuring the program identification in a bar at the top and the program control bar at the bottom. The control bar indicates which mode the program is in and the various settings selected for receiving that mode. These two bars only occupy about 10% of the screen, leaving the rest for displaying the incoming information.

Switching between the eight receive modes is achieved by a simple 'SHIFT' and single letter keyboard operation. Within each mode the various facilities available are selected by single key strokes. I found that this simplicity in operation enabled me to quickly learn to use the software effectively. The only requirement was a simple crib sheet until I had become familiar with the operations.

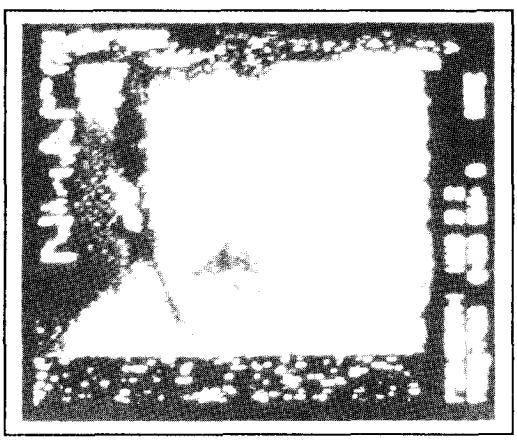


All the modes have some form of fine tuning indicator, either on screen, or by using the LED bargraph display on the Interface. I found this very helpful, as I am not particularly well versed with the nuances of the sounds of the various modes when being received.

Of particular interest to me was the SSTV receive mode. I found this system very much simpler to operate than other computer-based receive packages that I have used in the past. Reading the User Manual section dealing with SSTV it appears at first that this mode might be difficult to drive. However, once pictures are being received the simplicity of

operation becomes apparent, the results obtained on the screen soon indicate if any of the parameters have been wrongly selected, and these can be changed 'live' and the results of the changes seen immediately on the screen. Incoming pictures can be frozen on the screen at the end of the incoming frame, and then saved to disc/tape or sent to the printer for hard copy.

It would be inappropriate of me in this review to list all the various facilities available in the package. Suffice it to say that any signal that I found on the bands I appeared to be able to decode and read without much difficulty. The software seems well able to deal with just about any signal in any of the modes as satisfactorily as a dedicated unit for that mode.



CONCLUSIONS

All-in-all I found the RX-8 package easy to install and get running. In use, once I had mastered the relatively simple method of operation, the results obtained were quite impressive. For someone who is an avid short-wave listener, or for use by amateurs as the receive half of a transceive unit, I can highly recommend this system.

The RX-8 package is highly cost-effective when compared with other units for receiving perhaps only one of these modes. Particularly, as an all mode, Colour and Black and White, SSTV receive converter, its operation is without fault. A fuller description of the SSTV receive system is given in the GX-2 system review later in this article.

GX-2 DUAL-MODE TRANCEIVE PACKAGE

The GX-2 software package for the BBC B and Master computers from Technical Software is a dual-mode transmit and receive system. As the name suggests, there are two modes supported, these being:

SSTV and FAX

The package comes complete with an E-PROM, a User Manual and an Interface with connecting leads. The package is again well presented.

THE USER MANUAL

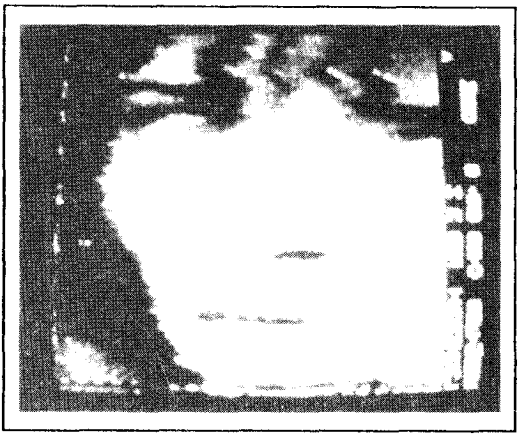
As with the Rx-8 package the User Manual is a well-produced booklet. The opening 'Welcome to GX-2' section is just that, and is followed by the Installation and Setting up instructions (just where I expect them to be, unlike the RX-8 manual). The E-PROM installation instructions are again quite comprehensive, as are the interface connection and set up details. The Problem pages are at the end of the manual, giving a list of possible symptoms and their probable cures.

The next three pages of the manual deal with the screen display, the keyboard, using a printer and saving to disc or tape. For saving and loading screens it is suggested that it is preferable to use a disc-based system, as individual screens take around 4-minutes to load or save using tape, which would make it impracticable during a QSO.

Another point raised in the manual, which I

can confirm, is that when printing out screens the effect on the printer ribbon is the same as when using a DTP package, that is that they may wear out rather quickly.

The next section in the manual deals with the comprehensive type-ahead facilities. It states in the manual that these are 'very sophisticated'. If I were comparing these facilities to those available in graphics packages I have used on the Atari ST, then I would not necessarily agree with that statement. However, bearing in mind that the system is operating on an 8-bit BBC computer, then these facilities offer a useful range of graphics designing tools.



The type ahead facility is available at any time apart from when receiving FAX pictures on the whole screen. Messages etc. can be typed ahead onto the whole screen or into buffers, which are only a quarter the height of the screen. This allows for up to five messages to be typed ahead, which can then be selected at random.

However, as stated in the manual, it must be remembered that when in SSTV mode these buffers actually occupy the whole screen when transmitted. Thus, the size of text selected must be chosen bearing in mind that it will be four times larger in the vertical plane when transmitted.

A choice of eight background colours (shades of grey in B&W SSTV and levels of brightness in FAX) are selectable, as are eight text colours. The four selectable text sizes correspond to x1, x2, x4 and x8 normal computer text height, with three widths also available corresponding to x3, x6 and x12 normal width.

The remainder of the manual deals with the specifics of the SSTV and FAX modes independently, with comprehensive instructions on the facilities available in each. A list of all the key strokes for each mode is given, and bearing in mind the relative complexity of the software's capabilities is definitely a must for quite a while learning to drive the system and after.

CONNECTING THE EQUIPMENT

As previously stated, the installation instructions are given at the beginning of the User Manual. Once the E-PROM has been fitted and the computer reassembled, the Interface must be connected to the User Port on the BBC using the ribbon cable attached. This **MUST** be carried out with the computer switched **OFF**.

The Interface is housed in a black plastic enclosure measuring approximately 11 x 6 x 3cm. All the interconnection cables are permanently connected inside the box, with their distant ends terminated in the ribbon plug for the User port on the computer and tinned wire ends for connection to the radio equipment with identifying labels for the transmit and receive leads.

Once all the connections have been made switch the equipment on. If all is well the usual screen prompt will appear on the monitor screen with the GX-2 prompt line above it announcing the presence of the E-PROM. Typing in *SSTV or *FAX for the required mode will result in the program being called.

If the interface is not connected correctly,

or not connected at all the prompt:

INTERFACE ??

BASIC

will apear on the screen. Check all connections and try again!

Once the selected program has been successfully called the screen will change to the receive screen for that mode.

SSTV

In the SSTV mode the screen display consists of the control bar down the right hand edge of the screen, the rest of the screen being the picture frame area. The system defaults to 8-second 128-line Mono receive and, if the receiver is switched on, will display any incoming signals on the screen as either noise or pictures, according to the type of incoming signal. Being in the receive mode is indicated by an R in the control bar. A fine tuning aid is shown in the top right hand corner of the screen, but is only usable once the signal is coarse tuned closely enough for the software to start decoding. This indicator is relatively useless if the signal is too noisy.

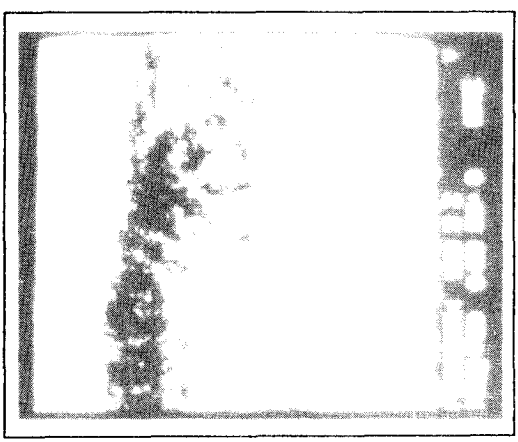
Changing between any of the receive modes is simply a matter of a double key operation, eg: CTRL M, CTRL Q etc. A full list of these key strokes is given in the User Manual. Similarly, changing scan speeds, or between mono and colour receive, is equally easily done.

During receive the program can be set to a hold mode, whereby the picture being received will be frozen on the screen at the end of the present frame scan. The frozen picture can then be saved to tape or disc as required.

Robot VIS mode is fully supported, in that the program will automatically switch to the correct receive settings once the VIS signal at the start of the frame is received. In line-sequential colour mode the software inserts the SC-1 sync pulse at the start of each red line. In receive, it detects this pulse to regain colour sync if lost. The GX-2 system is fully Robot and SC-1 compatible.

SSTV transmit is selected by keying CTRL T (to return to receive key CTRL R). Immediately the transmit mode is selected the system goes into standby mode transmitting a steady tone. This is a useful aid for the receiving station to tune up to. The control bar indicates transmit mode by displaying T instead of R.

Pictures for transmission may be loaded in from tape or disc, but as stated earlier the use of tape as a storage medium is not recommended for 'live' work due to the prolonged load/save time for screens.



Alternatively, transmit messages may be typed into the type-ahead buffers and selected for transmission. Each buffer has a colour/grey scale band at the bottom of its screen area, which is to remind you not to type into this area when in Robot mode, because it will not be sent. In other modes this band, or whatever is typed over it, is transmitted.

The appropriate screen is selected for transmission by pressing CTRL f1 to f5 for the five type-ahead buffers, or f0 for the main screen (where pictures loaded in from storage will be). As soon as the required screen is selected the screen

number is prompted in the control bar and the frame is transmitted, The transmission continues until another screen is selected, the system is put back on hold, or put back into receive.

During transmission it is possible to change the mode between 128 and 256 lines and also the transmit speed, but only whilst on hold. All other changes have to be initiated whilst in the receive mode.

FAX

In the FAX mode again the system defaults to receive at 120rpm at an IOC of 288, with the screen display consisting of the control bar across the top with the rest of the screen for displaying received/transmitted pictures. Again the various parameters available can be changed by simple dual key strokes.

There is no fine tuning indicator but once a few signals had been tuned across I found it not too difficult to find the correct spot. As suggested in the manual, tuning slowly from low to high seemed to be the easiest. Once a picture is being received the correct IOC must be selected if the picture aspect ratio is not correct. This is done by pressing CTRL (up arrow) or (down arrow) until the correct ratio is achieved. The facility for correctly centering the incoming picture on the screen is also provided. As in the SSTV mode the incoming picture can be frozen for saving to tape or disc.

When transmit is selected, by keying CTRL T (CTRL R to return to receive), the same settings are retained as were selected during receive. The sequence starts by sending 30 seconds of phasing signal to allow the receiving end to synchronise. The selected screen (or only the top quarter if selected) is transmitted.

Unlike SSTV the frame is sent only once followed by 5 seconds of stop tone, after which the program returns to the receive mode. At the amateur standard IOC of 288 a whole screen takes approximately 7 minutes to transmit. Not for the impatient this mode! To stop transmitting at any time simply press the ESCAPE key.

An optional extra is the Printer FAX facility. This allows received FAX pictures to be directly printed out. Automatic picture phasing is active in this mode, but only works at 120rpm, however, as this is the most common speed used this is not a problem.

CONCLUSIONS

I found the package relatively simple to drive, within an half an hour of starting I had the system up and running and the first slow scan pictures coming in. Probably because I went straight in at the deep end before fully reading the User Manual, I had some fun finding and using all the type-ahead buffers. The screen only shows four out of the five at any one time and, unless you have a good memory, which is number 1 etc is not always obvious. That aside the SSTV system gave good results with the minimum of fiddling.

In the FAX mode I had more trouble. However, this was entirely due to my not really knowing a thing about the mode (and still don't really!). Nevertheless, I did manage to receive enough pictures to show that the package performs as the manual states. Unfortunately, I was rarely able to find any commercial Fax transmissions, again it is more likely that I did not recognise them, or was looking in the wrong place. All that aside, the pictures that I did decode were of reasonable quality relative to the signal strengths received.

Unfortunately, I did not have a receiver available tunable to the weather Fax transmissions, but apparently the Printer FAX option gives better results than the on-screen pictures.

I can certainly recommend this package for any amateur station interested in either mode. On a cost-effective basis it compares favourably to any other converter

I have seen, but at a much lower cost, even if you have to consider getting a BBC! As far as FAX is concerned I do not know of many other systems yet available, but on performance alone I can recommend it.

The RX-8 system is available complete at a cost of £259 including VAT.

The GX-2 system is available complete at a cost of £99 including VAT, or £119 including the FAX direct printing operation.

Both systems are available only from: Technical Software, Fron, Upper Llandwrog, Caernarfon, Gwynedd, LL54 7RF. Tel: 0286 881886

LATE NEWS: Hot off the press, I have just been advised by Technical Software that they can now supply, free-of-charge to all past and present purchasers of the GX-2 package, a disc with the necessary software on it to convert graphics screens prepared on normal Mode 1 and 2 BBC screens to the equivalent GX-2 FAX or SSTV format.

BATC COMMITTEE CHAMBER OF HORRORS

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MEMBER: ANDY G8PTH

BATC CONVENTION 90

HARLAXTON MANOR

Here is the game plan for the Convention and Biennial General meeting on **SUNDAY MAY 6th** at **HARLAXTON MANOR, HARLAXTON, GRANTHAM.** I have included road maps and directions below, and as you can see the location is very easily accessible from the A1. The village of Harlaxton and the entrance to the Manor lie on the A607 Melton Mowbray to Grantham road. The entrance will be well signposted on the day.

The driveway to the Manor is long and **BE WARNED,** there are speed bumps. The car parking area (free) will be under the first archway on the grass either side of the road, **PLEASE** follow the instructions from the car park marshals, in order to alleviate confusion.

The Convention doors will open at 10am and close at 5pm on. Entrance will be by INVITATION, a free copy of which has been enclosed with this magazine. Entrance without this invitation will cost £1 (children under 14 free). Unfortunately, contrary to my report in the last magazine, we offer our apologies, but due to organisational problems we are unable to proceed with the free ticket number draw.

Full licenced catering will be provided and, we are assured, at reasonable prices too !

The Bring-and-Buy stall will be in operation as ever, run this year by the GB3ET group. Please support them and bring/buy your bargains. The usual conditions will apply - £1 entry fee and 5% commission. Also, a special area outside the building will be reserved for the Car Boot Sale, a charge of £5 per car will be made for this facility.

An important feature of this year's convention is the Biennial General Meeting to be held at **3pm.** The exact location in the building will be advertised on the day. The agenda for the meeting is as follows:

CHAIRMAN'S ADDRESS
TREASURER'S REPORT
THE NEW CONSTITUTION
ELECTION OF COMMITTEE MEMBERS
FURTHER BUSINESS & AWARDS
CQ-TV COMPETITION DRAW

BGM AGENDA

For those wishing to stay overnight at the Manor the charges will be £17.00 Bed & Breakfast per night per person for a double room, a small surcharge applies for single rooms. Please contact Mrs Frances Watkins, Co-ordinator Special Programmes, Harlaxton Manor on 0476 64541 for full details and bookings. There will be a limited supply of rooms, but the quantity available will not be known until after publication of this issue, so PLEASE contact Mrs Watkins as soon as possible for details.

Alternatively, Mrs Watkins can supply you with details of accommodation in the surrounding area.

The usual get-together will take place on Saturday night in the lounge area adjacent to the dining room at the Manor from around 7pm, anyone wishing to come along and meet us please do, ***I drink best bitter!***

Finally, the usual boring bit, don't forget that this is **YOUR** convention, we need your help and support. This event looks like being the biggest we have held yet and as such we need **VOLUNTEERS** to help with the car park, setting up tables and jobs like this. We do not ask that you devote all day, just an hour or two will help. Please contact Paul Marshall on 0522 703348 if you are willing and able to help, and **DO IT NOW !**

HOW TO GET TO HARLAXTON

TRAVELLING BY ROAD

Harlaxton Manor is situated off the A607 road, some 3 miles west of Grantham. The entrance drive is immediately opposite the 'Gregory Arms' public house (see large scale map below).

The main routes are as follows:

From the North or South ... A1 - turn off onto A607.

From the West ..... A52 - join A1 Southbound near Barrowby Village then turn off onto the A607.

From the East ..... A52 into Grantham then take the A607 towards Melton Mowbray.

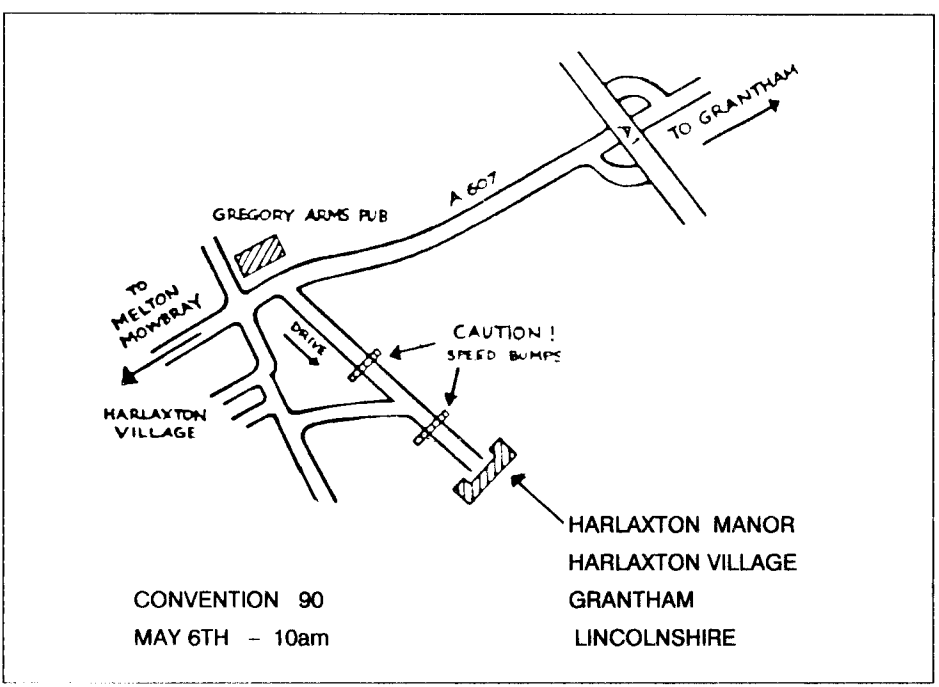
TRAVELLING BY COACH

Please follow the directions as above into harlaxton village and then into the Manor via the Tradesmans Drive (signposted HGV).

TRAVELLING BY RAIL

To Grantham - main London/Edinburgh line (Kings Cross to Grantham approximately 1 hour). Good rail connections east and west.

Taxi from Grantham station to Harlaxton (3 miles) in the region of £2.



10 x 1 VISION SWITCHER

R.L.CARDEN VK4XRL

INTRODUCTION.

The 10 x 1 vision switcher presented here is based on the Philips TDA8440 video/ audio switch for CTV receivers. These integrated circuits provide two three state switches for the audio channels and one three state switch for the video channel with a video amplifier with selectable gain of unity or two times. The units operate from a nominal +12V supply and can be system expandable up to seven devices (ie.14 inputs).

For good colour performance one requires that crosstalk be kept to a minimum. The data supplied gives the crosstalk specification as 6dB which is more then adequate for our requirements. Most routing switchers supplied to the television industry have crosstalk figures between 60 and 80dB. The bandwidth of this IC is quoted at the 1dB points as being 10MHz.

CIRCUIT DESCRIPTION

Referring now to the data information and the vision switcher circuit shown in Fig's.1 to 5. The incoming video signals are terminated in 75ohms and are fed via 1OOn capacitors to the video inputs on pins 3 and 1. In this design the audio feeds are not used. The video gain is set at unity, therefore the SCL pin, pin-18 is taken to ground. Video selection is performed via the SDA pin, pin-17 where video input No.1 is selected by taking SDA high while input No.2 is selected by taking SDA low.

An extra logic condition arises however because we need more than one device connected in parallel. All video outputs (pin-16) are then connected together and fed to the output amplifier. You will note that an OFF pin, pin-2, has been provided to switch off the desired device. All switches are in the OFF state if OFF is taken high (ie.+12V) and conversely all switches are in the selected state via the SDA pin if OFF is low.(ie. ground). The S2, S1 and S0 pins (pins-6,13,and 11) are taken high as the device is being used in the non I2C bus mode.

The video output amplifier is fairly straight forward, and has been used in many CQ-TV designs. Two outputs have been provided with adjustment of gain.

SWITCHING LOGIC.

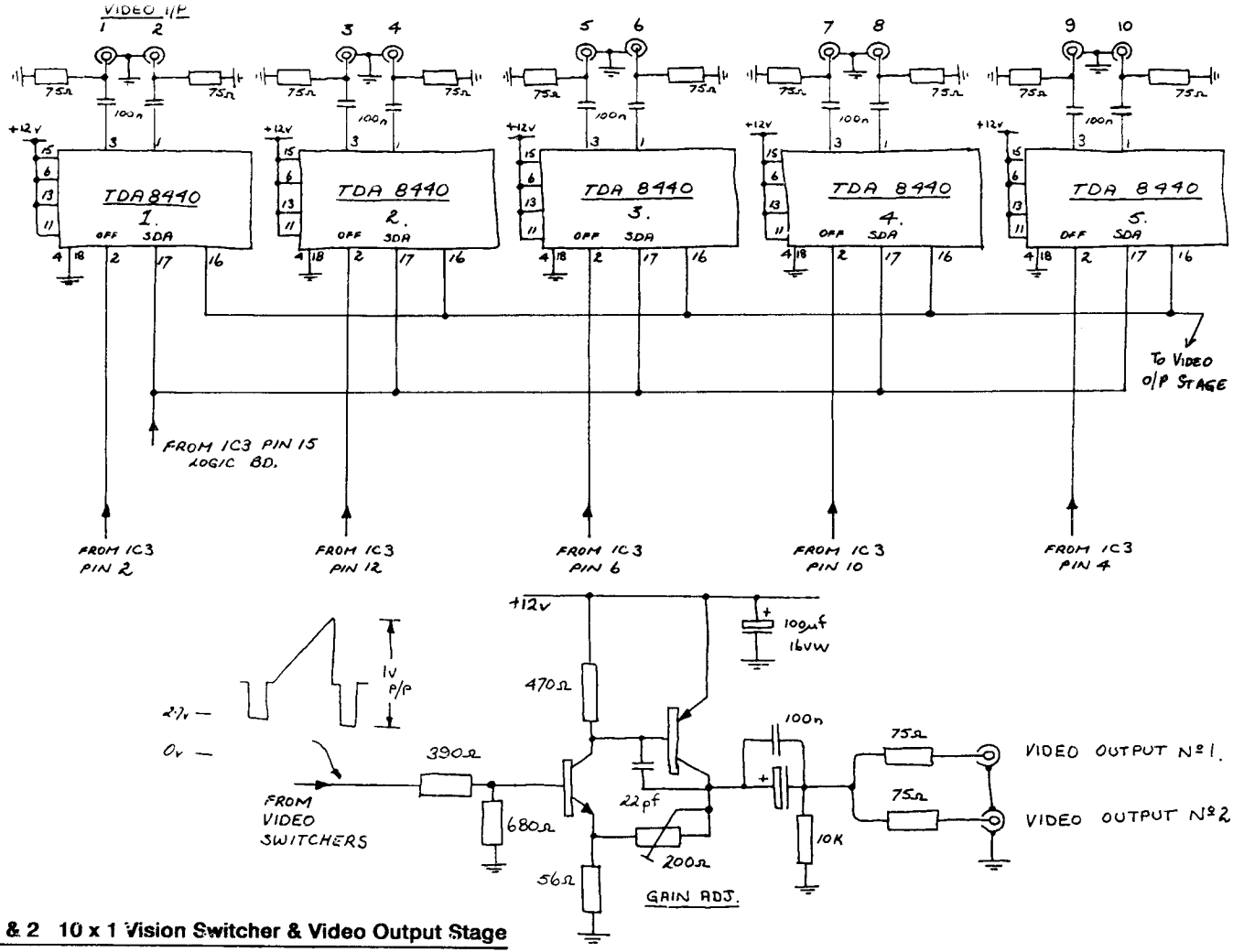
As stated above the logic switching requires two conditions;

(a) Only one IC to be activated at any one time. OFF pin, pin-2.

(b) Switching of either input. SDA pin, (pin-17).

Take for example that video switch No.1 requires input one to be switched to the output; The OFF pin, pin-2 for this video switch is held low while all other OFF pins are held high. The SDA pin for input one is also held high. It doesn't matter what condition the other SDA pins are as they are all switched off.

This switching arrangement is easily met with a couple of IC's and with some modification to the BCD mode. The input switching is taken care of by the 74C922 IC1 which is arranged in an x-y matrix and is capable of switching up to 16 inputs.



Fig's.1 & 2 10 x 1 Vision Switcher & Video Output Stage

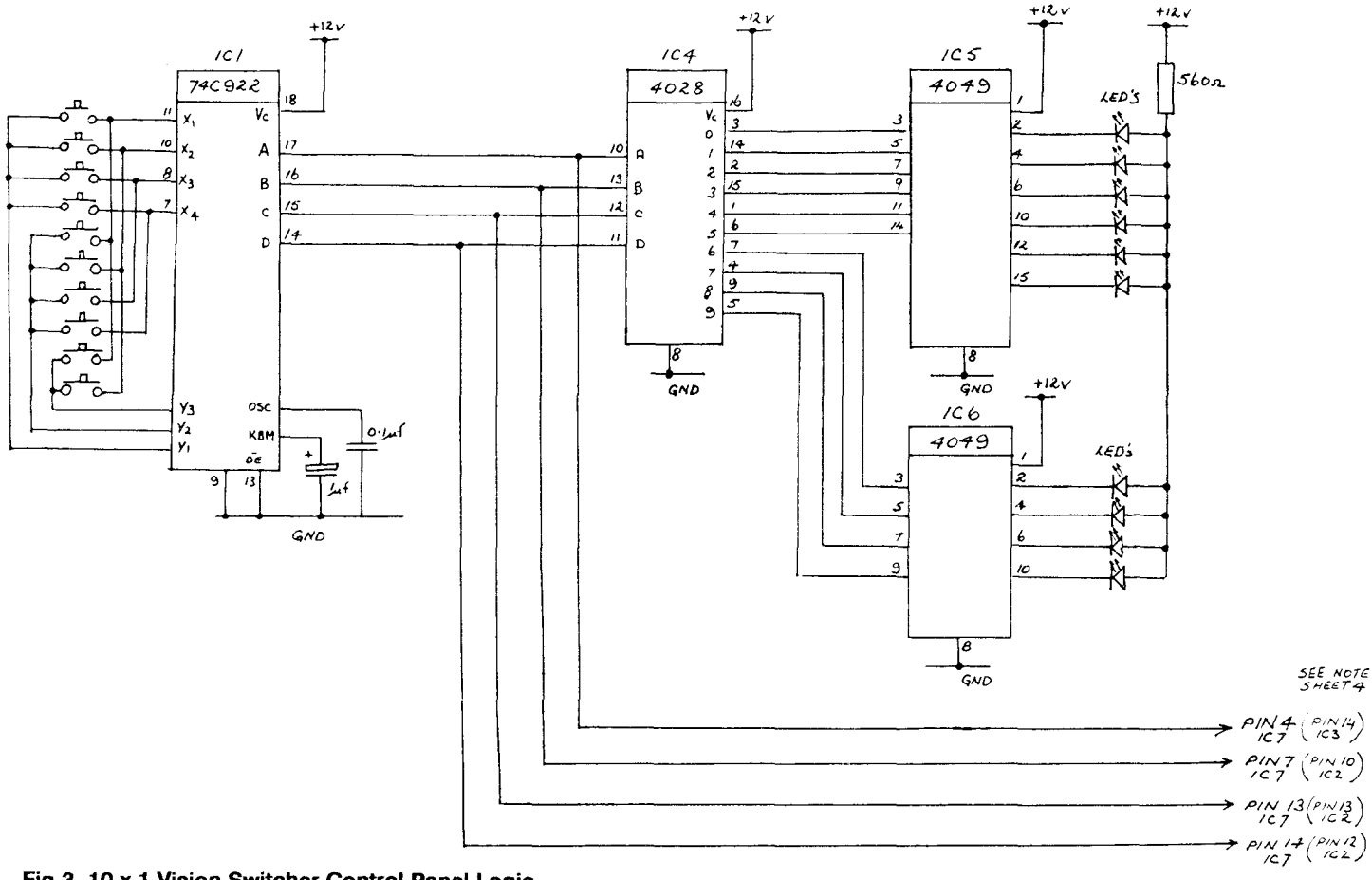


Fig.3 10 x 1 Vision Switcher Control Panel Logic

The BCD outputs are already latched and are fed via two paths. The first path is fed via the decoder IC4 and inverter IC5/6 to drive the indicator leds. The second path is to a second decoder IC2 (disregard IC7 and IC8 at this stage). However, the inputs are arranged so that the SDA inputs are tied together and either are high or low being fed from an inverter from the A output of the coder IC-IC. Therefore the truth table for the SDA input is as shown below in Table-1.

INPUT 1 ..... SDA H
INPUT 2 ..... SDA L
INPUT 3 ..... SDA H
INPUT 4 ..... SDA L
INPUT 5 ..... SDA H
INPUT 6 ..... SDA L
INPUT 7 ..... SDA H
INPUT 8 ..... SDA L
INPUT 9 ..... SDA H
INPUT 10 ..... SDA L

Table-1

The other outputs B,C and D are taken to the respective ABC inputs of IC2, note that input D is not required and is taken to ground.

If we now look at the bcd code shown in Table-2 you will notice that the BCD outputs which fed the decoder IC-IC2 are in pairs, i.e: if input 1 or 2 is selected then the output from pin-3 is low, inverted by IC3 and fed to the OFF pin. pin-2 on video switch No.I, this being high switches the IC into circuit.

If we would now like to provide vertical interval switching then IC7 and IC8 will now come into effect. If not required these maybe left out. IC8 is an LM 1881 and is a complete sync separator IC which has sync, clamp or burst gate, and vertical sync outputs. In this application only the vertical sync output is used. This output is inverted and fed to the store input of the latching IC7. This enables the inputs to this IC to be switched to the outputs during the vertical sync period.

A	B	C	D
L	L	L	L
H	L	L	L
L	H	L	L
H	H	L	L
L	L	H	L
H	L	H	L
L	H	H	L
H	H	H	L
L	L	L	H
H	L	L	H

Table-2

Another requirement (and can be omitted if not required) was to provide a remote indication of what button had been pressed. This required the use of a seven-segment indicator and driver plus an interface to convert the 0 to 9 input logic from the coder IC1 to display as 1 to 10. This was achieved by the use of the EPROM (2716).

Other methods could have been used, however it was felt that this was the simplest approach and could be upgraded to provide an alpha-numerical indication.

I would like to acknowledge the help given to me by Mr.Tom Curtis Jnr. for his help in devising the logic circuit used in this switcher.

As yet no PCB has been designed for this project; further suggestions or comments can be sent to the Project Officer, SEQATV Group, Box 3, Chermside, 4032, Australia.

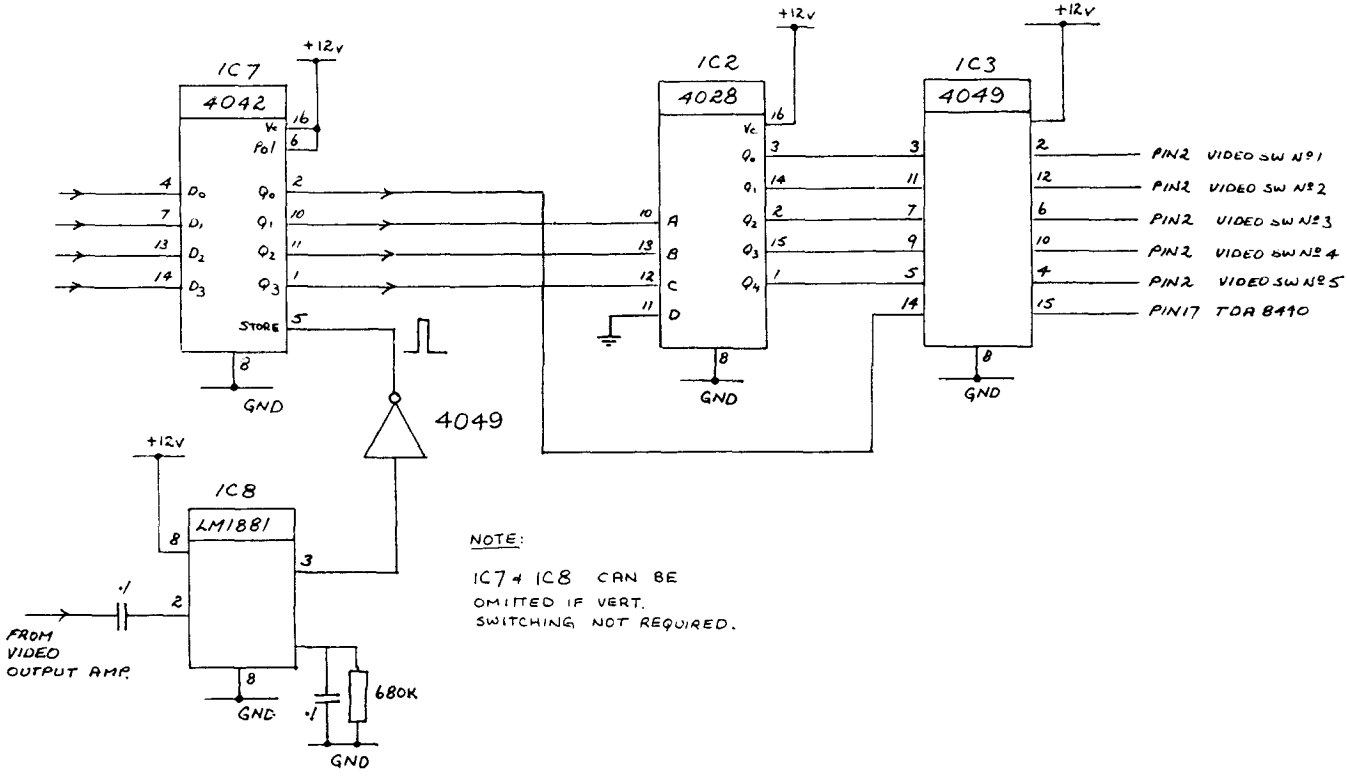
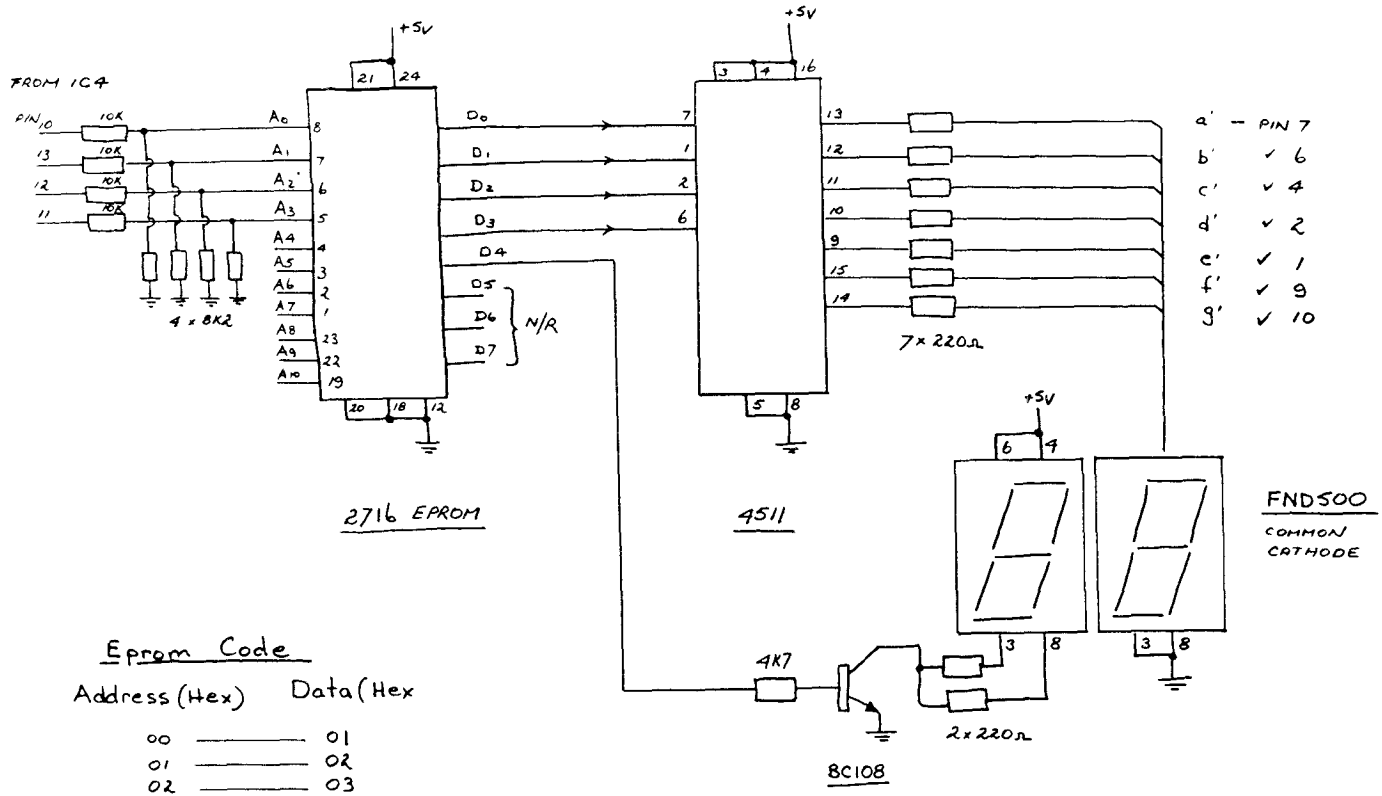


Fig.4 10 x 1 Vision Switcher Video Switch Logic



Eprom Code

Address (Hex)	Data (Hex
00	01
01	02
02	03
03	04
04	05
05	06
06	07
07	08
08	09
09	10

Fig.5 10 x 1 Vision Switcher Seven Segment Display Circuit

COLOUR CORRECTION

Part–2

John Goode

In the last part I showed how it is possible to vary the saturation of encoded PAL signals without separation of the luminance and chrominance components. In this part I shall extend this and show how correction of white-balance can be achieved without colour decoding or chrominance separation. I'm afraid this article will deal mainly with the theory of how this happens; in part-3 I will describe a prototype processing amplifier that uses these principles.

The easiest way to change the white-balance of a colour signal is to operate on it in its RGB form. Normally, the Green signal is held at nominal amplitude, whilst the Red and Blue signals are varied in amplitude with respect to the Green until white objects in the picture are rendered white. Under these conditions it is taken that, within the colorimetry limitations of the picture-generating device, that all other colours will be displayed correctly. Ideally, these conditions would always obtain whenever colour pictures are shot; in practice, due to changes in lighting colour temperature, incorrect (optical) filter selection, etc., pictures that could use

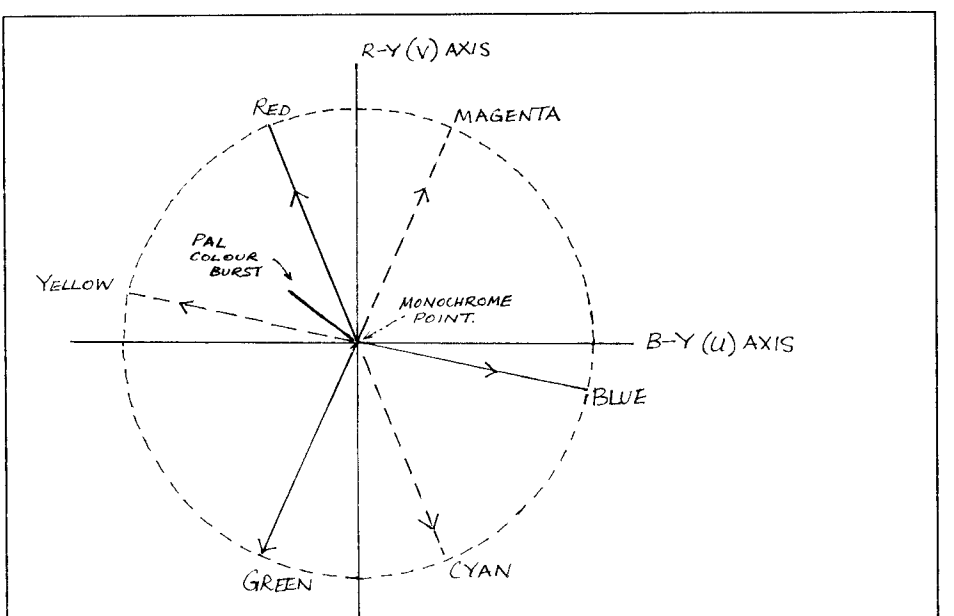


Fig.1 Primary and Complimentary Colour Phases

some colour correction do wind up on tape.

Correcting the colour of encoded pictures relies on the fact that in the PAL (and NTSC) systems hue is described by the relative phase of the chrominance subcarrier with respect to the colour burst phase. In Fig.1 I have shown the relative phases taken up by the primary colours and their complements for one line of the PAL signal. (On the next line the V-axis will reverse, but for simplicity I am ignoring this as it doesn't affect the explanation). One of the benefits of this method of modulation is that it is impossible to add two different encoded colour signals together, and the resulting encoded signal gives the correct resultant colour, exactly as if the signals were in the RGB form. For example, if we add an encoded red signal to an encoded green signal, the resultant vector will lie on the yellow axis, see Fig.2. (This is arrived at by the graphical method of vector addition, where the resultant is the diagonal of a parallelogram constructed from the component vectors). This is exactly the same result as we would get adding red and green in an RGB system.

It therefore follows that any colour vector can be changes as required by adding a suitable correction vector to it. In order to do this it is necessary to have a colour field generator to generate the correction signal. A suitable circuit for doing this is a modified version of the colour field generator as described in 'In The Studio' part-3 (CQ-TV 130 pp 35 & 36). The generator has 'U' and 'V' controls which allow resultant colour vectors of any phase to be generated and added to the original signal. See Fig.3, where vectors C and D cause the correction resultant vector B to be generated. When added to the original colour A, its vector is corrected to position E. However, these correction signals must

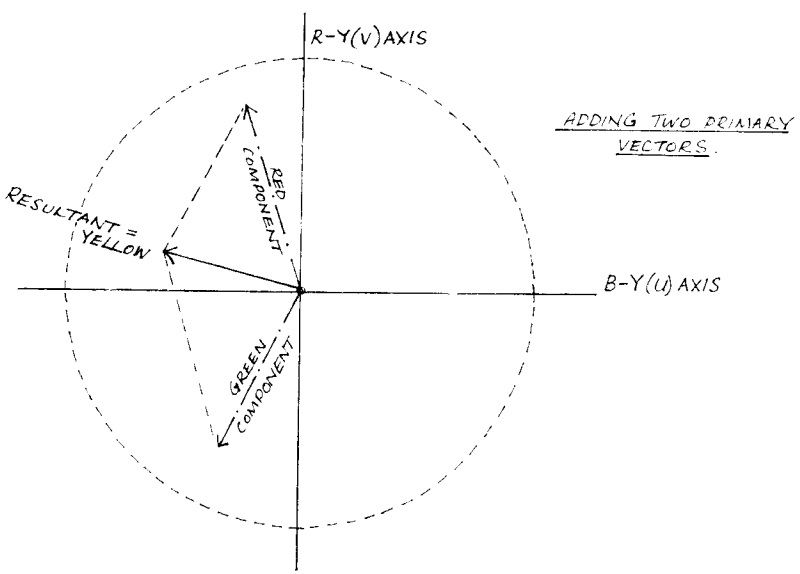


Fig.2 Adding Two Primary Vectors

obviously be synchronised to the original signal, so unless all signals are slaved to a master SPG, subcarrier must be regenerated from the original signal by means of a burst-locked oscillator (BLO). A suitable BLO is the one by GW8PBX from CQ-TV 129 (Circuit Notebook 41). I have built three of these (in a slightly modified form) and found them to be pretty reliable. See Fig.5.

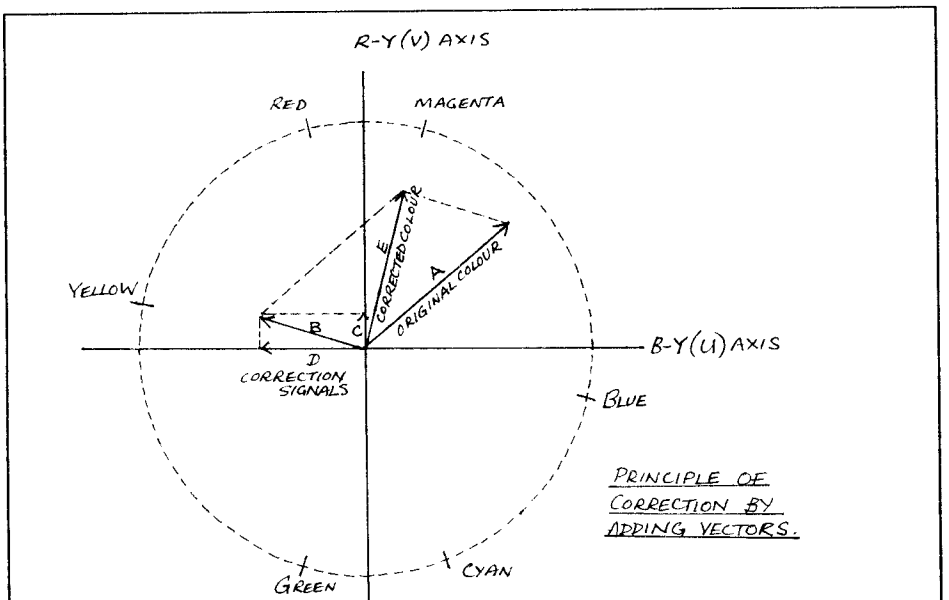


Fig.3 Principle of Correction by Adding Vectors

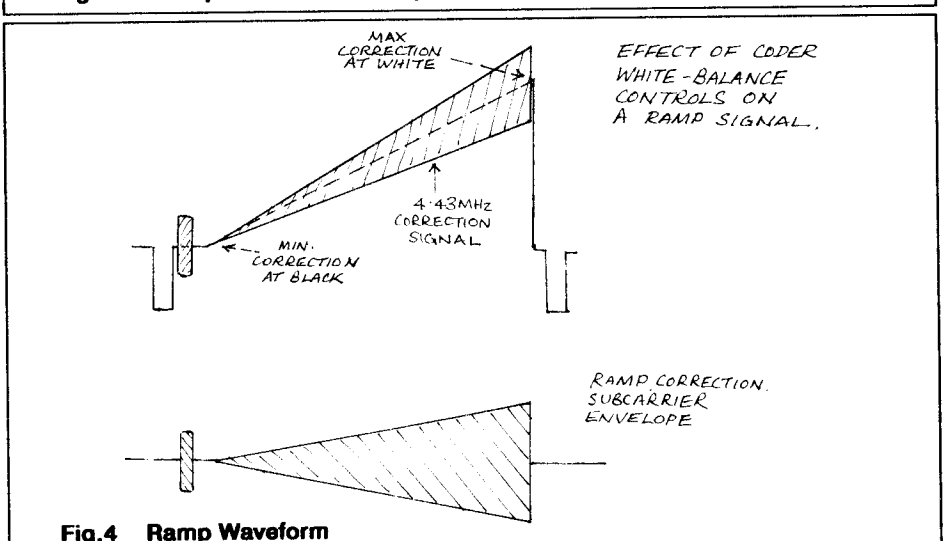


Fig.4 Ramp Waveform

Simply adding correction vectors to the encoded signals is not quite enough to give true white-balance correction however, as an overall cast of colour is added to the original signal regardless of signal amplitude; what we are interested in is WHITE-BALANCE correction. Consider Fig.4 which shows the effect of adjusting the white-balance controls on a PAL coder that has a monochrome ramp waveform fed to each of its RGB inputs. If the coder is correctly aligned, the output will be a monochrome ramp; adjusting the white-balance controls will cause a subcarrier envelope to be generated where the signal deviates from monochrome. Fig.4 shows that the correction varies linearly from zero at black to maximum at white. Examination of the subcarrier envelope shows that the same result could be obtained with our correction signal if it were modulated by the (non-composite) luminance signal; and this, in fact, is what we do. A balanced modulator (MC1496) is employed, and its effect is to vary the amount of colour correction applied in proportion to picture luminance. Also, by definition, it effectively blanks the correction signal as the luminance is at black level during synchronising periods.

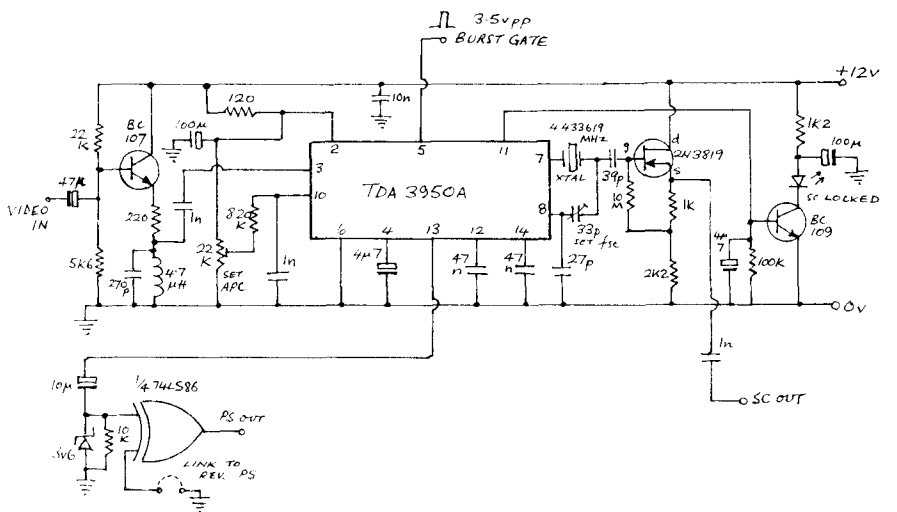


Fig.5 Burst-Locked Oscillator

Incidentally, although the practical side of this project has been worked out for the PAL system, theoretically the principle should be equally valid for the NTSC system, on which PAL is based. However, there may be simpler ways of introducing colour correction with NTSC, as the PAL line-by-line V-axis phase reversal is not there to complicate matters!

Finally, Fig.6 is a block diagram of the system as applied to a prototype processing amplifier I have recently completed. In part-3 I will describe it in more detail.

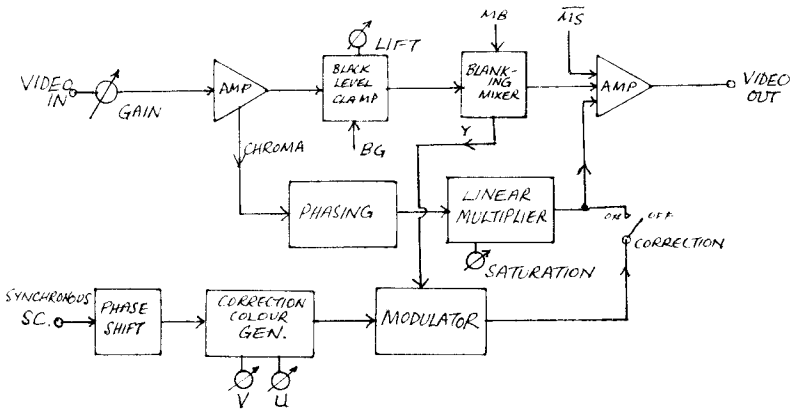


Fig.6 Block Diagram of the Processing Amplifier

CONTEST CALENDAR

MAYDAY MICROWAVE

0001 - 2359 local

All modes 24CM and above.

SUMMER FUN JOINT EUROPEAN

Saturday June 9th - Sunday June 10th.

1800 GMT Saturday - 1200 GMT Sunday.

Slow Scan & Fast scan TV all bands.

INTERNATIONAL ATV

Saturday Sept 8th - Sunday Sept 9th.

1800 GMT Saturday - 1200 GMT Sunday.

Fast Scan TV all Bands.

TWENTY YEARS OF ATV

Gordon A. Hunter B.A. GM3ULP (GM6ADR/T)

This article was really prompted by three events: an anniversary, an obituary and Andy Emmerson's 'Reflections of a Collector' in CQ-TV 145. Reading through the obituary column of a recent issue of Radio Communication, I was concerned to see the entry D.Thompson G3VQC, on October 1988. David Thompson was a 'local amateur' residing some twenty years ago in the town of Larkhall, several miles from Hamilton in Lanarkshire and only about 3 miles, line of sight across the River Clyde, from my own QTH in Motherwell.

I first met David at a meeting of the Motherwell and Wishaw Radio Club, which in later years, was destined to become the Mid Lanark Amateur Radio Society. At subsequent meetings and during QSOs on the air, the subject of Amateur Television was discussed and, as there appeared to be no local ATV activity, was to become our aim for the future. So this anniversary of twenty years licensed for ATV encourages me to turn back the pages of the GM6ADR/T GM3ULP ATV log book, and recollect somewhat on the events recorded therein.

GM6ADR/T The First ATV Transmissions

I became licensed as GM3ULP in August 1965, but it was to be some years later, in fact 1969, before I was able to consider applying for the Television License. Prior to this time, my only information on ATV, was a series of articles in 'Practical Television' from about 1964 on the building of an ATV station. These articles included a Flying Spot Scanner for transparencies, a 70cm 405 line TX and a suitable vision modulator. Later on I joined the BATC, along with David GM3VQC, who, as I said earlier, was also interested in the ATV mode. The content of 'CQ-TV' magazine I found very helpful for the beginner in TV transmission techniques; short items of television interest were also noted in the RSGB column 'Four Metres and Down'.

As Andy Emmerson comments in his recent article 'Reflections of a Collector', some 15 to 20 years ago video equipment was not always readily obtainable. However, encouraged with all this technical information beginning to appear, I decided to make a start on building some ATV equipment, just before applying for the Amateur Television Licence. The Flying Spot Scanner design in 'Practical Television' was based upon the CRT and scanning system as used in the old projection television sets; who remembers those sets with the 3' CRT?, 25KV eht and the set of mirrors inside the large wooden cabinet?

As a TV Technician, I well remember projection sets in all their glory; the customer's pride and joy and also a status symbol with some! By the time of my interest in ATV however, the projection set had almost completely disappeared from use.

A friend had started his own TV Service business some years before, and as appears to be usual practice in Radio and TV Servicing, he had collected a considerable amount of spares and old receivers. On telling him of my search for a projection set to be used as an FSS, he said he had this very item for disposal and it only required collection.

So, several nights later, complete with Ford Transit van and another friend, I turned up to collect this rare item. Unfortunately, I did not know that the set was stored in a small pre-fabricated building being used as a hen house, complete with free ranging hens! Perhaps I should explain that friend Jim was also a part - time farmer and some of the farm buildings were used as convenient stores for old Radio and TV sets.

Anyway, with somewhat youthful enthusiasm, the projection set was duly hauled out of its storage corner and loaded on to the Transit van. At home however, the enthusiasm rapidly diminished when, upon inspecting the 'innards' it was found to be in a corroded condition with the eht unit obviously unserviceable. The hens had also found it a convenient place to lay as the finding of several eggs in the cabinet bottom later revealed! Thus, my first attempt at home construction of ATV equipment was unsuccessful. No further supplies of projection equipment were available, at least locally, and a complete rethink was required.

Referring again to Andy's article, regarding vidicon cameras; this was also the route I decided to follow. At this time, the Television Company I worked for was becoming much involved in closed - circuit TV systems and, after attending a technical course on a newly introduced vidicon camera the Company were going to use, I discussed with the camera manufacturers, the possibility of my purchasing a basic camera for ATV use. This was an expensive item but one which I considered worthwhile. The company were agreeable to this transaction and in due course, I became the proud owner of a brand new solid - state 625 line vidicon camera.

This camera contained no less than 76 semiconductors, of which 30 were transistors and the rest diodes, a fact which did much to impress amateur television demonstration audiences for several years. The camera came without a lens so I purchased a lens from a company who had advertised in the 'Practical Television' magazine referred to earlier. A chance phone call to this company revealed they still had one lens available from the original advert of 1964, and this was duly purchased for the sum of £10.00. I had also constructed the vision modulator as described in, yes you guessed correctly, the 'Practical Television' 1964 magazine. I now had to obtain or construct both a 70cm receiver and transmitter.

Looking through the advert pages of the RSGB Bulletin, or was it now called the 'Radcom'?, I saw a 70cm tripler amplifier unit using QQV02-6 valves being offered ready built and tested. I wrote to the firm (a one man business if I remember correctly) and queried the use of this unit for television by screen modulating both tripler and amplifier valves. The reply, which I received said the unit had never been tried out on television but all should be well; so in due course the unit was purchased and the circuit altered to positive screen modulation.

The equipment used to receive ATV signals in the 70cm band in this era was usually 'padded down' UHF tuner units as used in domestic TV receivers. As I did not have any accurate frequency measuring equipment available, the method adopted was to tune the third harmonic signal from the 2 metre drive source. This method was described in 'Four Metres and Down' and was quite satisfactory. So the vision carrier frequency was derived from the third harmonic of 145.8MHz resulting in 437.4MHz. In those days, the band extended up to 450MHz with almost no activity, at least in my part of the country. So the choice of frequency was purely one of convenience, as 145.8MHz was the 'local' 2 metre frequency in use.

By this time, I had taken the decision to apply for the separate Amateur Television Licence. After answering the required questions mainly dealing with the nature of

the 'visual images' and my proposed method of frequency measurement (Lecher Bars), the callsign GM6ADR/T was issued.

So now I was all set up for ATV but, as yet, with a viewing audience of nil! Looking through the log book for GM6ADR/T I note my first entry on the 16/March/1969 stating 'test cards and captions - no contact'. These tests using a remote receiver continued until the entry in the log book for 28/June/ 1969 which states 'First vision QSO (one way) with GM6AEG/T'. David Thompson GM3VQC who I mentioned at the beginning of this article had also become licensed and had a receive set up using a converted UHF tuner.

These tests continued for some time with the log book recording comments such as:

'using the vision modulator to produce sound'.

This was essentially a convenience: sound talk-back was usually on 4-metres, but not always suitable, as the TV gear was at the other end of the shack.

'first QSO using 'tele - cine''.

This was a crude form of tele-cine using a standard 8mm projector and small white screen, with the video camera aimed at this screen; nevertheless, the results were acceptable.

'first 'outside broadcast''. This was the camera outside in the garden with the family dog Picky, racing around chasing a large striped rubber ball!

The log book records on the 16th November 1969 first 2-way vision QSO with GM6AEG/T.TXDavid was finally on the air with a home constructed TV T and a vidicon camera. This surely was the highpoint of all my ATV activities as, in reality, I was seeing my first ATV transmission. From this date, the log records numerous ATV transmissions. Changes in equipment such as the use of a 24 watt tripler amplifier using QQV03-20As and a new 48 element multibeam antenna. Simultaneous sound and vision was achieved by the use of a separate 70cm TX using a sound carrier frequency 3.5MHz below the vision carrier; more about this later.

And so the tests continued, with much interest being given from the local 'sound' amateurs. Several live demonstrations were given to the local radio clubs and other interested groups. The local newspaper also paid me a visit and today, on the wall of the shack is a copy of the published picture taken twenty years ago of the ATV station. Other newspapers sent along reporters and photographers and for a period ATV activity from Motherwell was being widely publicised. Matters came to a head however, when a report appeared in a Sunday Newspaper which I later denied to the Post Office, about two radio 'Hams' who had invented a videophone system; the heading on the article was ' Who's that on the Phone? ' !

However, keen as we were on the TV mode, lack of other amateur stations to actively participate, mainly I suppose because of their interest in more conventional modes of radio, gradually saw the reduction of our ATV activities. In fact, the log book for 1972 shows only 2 entries. Finally, the log records that ATV continued briefly between Larkhall and Motherwell until the last transmission using 'our system' on the 1st February 1974. After this date David GM3VQC / GM6AEG/T moved out of the district to the Worcester area and I commenced University studies, which effectively stopped all ATV activities.

Station Inspection

During the time which I am writing about, inspections of amateur radio stations by the Post Office engineers were quite regular. Operators were required to demonstrate their ability to measure both the transmitted frequency and power input/output. If all was well the station logbook was signed and the visit complete. Usually an

impending station inspection was preceded by a telephone call, to allow a mutually convenient time to be arranged. On this particular occasion, an arrangement by phone, was made for an inspection to take place later that week. So, in preparation for the visit, the station frequency meter, a BC221 - who remembers this with all the charts? -was dusted down, set up and tested against the station receiver, an Eddystone EA12 and the transmitter a Heathkit DX100U.

Came the night of the visit, the P.O. man duly arrived complete with his equipment van. The usual technical checks were made, all appeared to be well and the log book was signed. Before starting to consume the tea and tomato sandwiches, which were always provided on such an occasion, he suddenly noticed the ATV equipment at the other side of the shack, which was quite a long room, and queried me about its function. I replied saying 'Oh, that is the equipment for GM6ADR/T, amateur television on 70cms'. He replied, 'Well I should really check this out also, I did not realise you were active on this mode, but I will have to confirm with the office as to what tests have to be made'. So an arrangement was made for a return visit the following week, specially to check out the ATV gear.

On the night of the visit, I arranged with David to be monitoring the channel and also the 4 metres sound talkback frequency. In came the P.O.engineer armed with a power test meter complete with a single beam oscilloscope built into the case. The TX at this time was the unit using the two QQV02-6 valves running about 8W input power (measured from my own tests). The test meter was duly connected up and he requested me to 'switch on'! Immediately, the off - air monitor showed a picture, but nothing appeared on the test equipment except the smallest of vertical deflection on the 'scope trace. After much knob turning and the fitting of other external measuring inserts to his equipment he pronounced, 'your TX is not working'!

So, a quick call to David on 4 metres for confirmation of ' what could he see?' resulted in the reply, 'I can see the two of you leaning over a test meter turning controls. A t this point, it was decided that the test equipment was not functioning correctly at the low power involved and also the performance at these frequencies was a bit unknown. The DC power input of the final valve was measured and calculated and the test pronounced complete and satisfactory with a log book entry to confirm.

This incident happened almost 20 years ago just before the reduction in the amateur allocation on 70cm, so the tests were not as stringent as perhaps might be today.

Finally, in this article, can I say something about 'our system' as mentioned earlier. Twenty years ago, while all this ATV activity was taking place, dual standard 405 / 625 TV receivers were common. Many of the earlier receivers however were only fitted with a switchable line timebase, the IF strip being for the 405 line system.

The cameras both David and I used were 626 lines. Also, both vision modulators were for positive modulation. So, with the equipment available, 'our system' became 625 lines but with positive modulation. We always explained this anomaly to the more technically orientated viewer.

David had a professional photographer take some 'off screen' pictures of my ATV signals. One of these, showed me holding a microphone, facing the camera with the Eddystone receiver in the background. This picture I decided to submit for possible publication in the 'Four Metres and Down ' column in Radcom. Along with the photograph I sent the station equipment/system details. In due course, the photograph was indeed published with the blurb 'a remarkable photograph of

GM6ADR/T in action using best BBC2 standards'!

'BBC2' was the general term used at this time to describe domestic TV operation on 625 lines. As I predicted, someone wrote in to the column and rather huffily I thought stated, that 'the IBA also transmitted on 625 lines and, in any case, the sense of modulation should be negative not positive'.

This article is intended to relate only the more memorable events in fast scan ATV over the past 20 years. I have not talked about our experiences with Slow Scan television, although both of us were involved and had to obtain permission to use the mode on a two-year experimental basis.

At the beginning of this article, I said it had been prompted partly by an obituary. The early days of ATV as I knew them came to an end, when David, along with his parents, moved QTH to the Worcester area. Some contact usually via 80 metres was maintained for a short period but the ATV days using 'our system' were over. I noticed in CQ-TV issue no. 143 in 'TV on the Air' that G3VQC was a member of the 'Three Counties Slow Scan Net' and with my recent return to this mode perhaps we could have had another ATV QSO.

It was with regret that I learned David had become a silent key, but as I typed this article it was pleasant to recall our exploits of some twenty years ago in the field of Amateur Television.

OBITUARY

It is with deep regret that I have to inform you of the death of my brother John.W.Hogarth on Jan 17th.

He was well known as G3ACK and was a member of the BATC from its earliest days.

One of the first to put ATV on the air he was, you could say, one of the true pioneers of amateur television in the U.K. with his home-built equipment.

He helped many 'Hams' over the years to become interested and skilled in the field of ATV, and will be much missed by his many friends in this area.

Miss Sheila P.Hogarth, Tyne and Wear

CAMERA TUBES EXPLAINED

Part-5

Peter Delaney G8KZG

In part four of this series we listed the various types of vidicon tube. Low light vidicon, lead oxide and image orthicon tubes are listed below, to complete the tabulation. As before, tubes of similar type are grouped together, and footnotes identify the more important differences. In some cases, there may also be a suffix letter which indicates the colour channel it is intended for (red, green, blue, luminance).

1/2" NEWVICON / ULTRICON (1)

Electrostatic focus and magnetic deflection

Separate mesh, 95mA heater
XQ1602(3)

Separate mesh, 107mA, 2V8 heater
XQ1601

2/3" NEWVICON / ULTRICON (1)

Magnetic focus and deflection

Separate mesh, 95mA heater
S4075, TV9231, XQ1274, XQ1276(4), XQ1380(3), Z7927(1), 20PE15, 4833U, 4905

Electrostatic focus and magnetic deflection

Separate mesh, 95mA heater
E5071, S4092(2), S4102, XQ1275, XQ1277(2,4), XQ1278(2), XQ1381, 4875U, 4904

1" NEWVICON / ULTRICON (9)

Magnetic focus and deflection

Separate mesh, 95mA heater
E5041, E5058, LLSA-100(1), S1200, S1201, S1202, S4076, S4119(4), TV9901, XQ1440, XQ1442(5), XQ1443(4), XQ1444(3), Z7975(1), 4532U, 4906

Separate mesh, 95mA heater - short 5" version
XQ1445, 25PE14

1/2" LEDDICON / PLUMBICON / VISTACON

P8470

2/3" LEDDICON / PLUMBICON / VISTACON

Separate mesh, 95mA heater, rear loading
P8160, P8161, XQ1427, XQ1428

1" LEDDICON / PLUMBICON / VISTACON

Separate mesh, 90mA or 95mA heater, front loading
BC4892, BC4893(7), BC4894, P8021, P8022(9), P8023(7), P8024(9,7), P8025(8,6), P8026(8,6,7), P8190(11), P8191(7,11), XQ1070(8), XQ1071(8), XQ1072(8), XQ1073(8,7), XQ1074(8,7), XQ1075(8,7), XQ1076(8,7), XQ1090(8,6), XQ1091(8,6), XQ1093(8,6,7), XQ1094(8,6,7), XQ1095(8,6,7), XQ1096(8,6,7)

Separate mesh, 90mA or 95mA heater, rear loading
P8141, P8142(9), P8143(7), P8144(9,7), P8145(8,6), P8146(8,6,7), P8196(11), P8197(7,11), P8442(11), P8443(7,11), XQ1080(8,6), XQ1081(8,6), XQ1083(8,6,7), XQ1084(8,6,7), XQ1085(8,6,7), XQ1086(8,6,7),

Separate mesh, 190mA heater, rear loading
P8147(9,6), P8148(9,6,7), P8490(11), P8491(7,11), XQ1500(9,6), XQ1501(9,6), XQ1503(9,6,7), XQ1504(9,6,7), XQ1505(9,6,7), XQ1506(9,6,7)

30mm LEDDICON / PLUMBICON / VISTACON

Integral mesh, 95mA heater, rear loading
P8000, 4591, 4816, 55875, 55876

Separate mesh, 95mA heater, rear loading
P8001, P8003(7), P8005(8), P8007(8,7), P8131(8), P8133(8,7), P8135(8,6), P8137(8,7,6), 4592, 4816

Separate mesh, 190mA heater, rear loading
XQ1520(8,6), XQ1521(8,6), XQ1523(8,6,7), XQ1524(8,6,7), XQ1525(8,6,7), XQ1526(8,6,7)

Separate mesh, 300mA heater, rear loading
BC4392(8,10), BC4393(8,10,7), BC4394(8,10,7), BC4592, BC4593(7), BC4594(7), BC4992(8), BC4993(8,7), BC4994(8,7), E5040, E5055(7), P8008(4,6), P8130(8), P8132(8,7), P8136(8,6), P8138(8,7,6), P8400(8), P8401(8,7), XQ1020, XQ1021, XQ1022, XQ1023(7), XQ1024(7), XQ1025(7), XQ1026(7), XQ1410(8), XQ1411(8), XQ1413(8,7), XQ1414(8,7), XQ1415(8,7), XQ1416(8,7), 4593(7), 4817

3" IMAGE ORTHICON

Low capacity target
OS40, P851, P875, TH9700, VOS40K, 4415, 7293

High capacity target
C960, C962, LI218, M7050, M7091S, M7092, OS20, P807, P874, TH9701, VOS20K, 75PC11, 513QM8, 5820, 7294, 8093, 9549

4½" IMAGE ORTHICON

Low capacity target
P811, VOS50H, 7295, 9564

High capacity target
C980, LI221, LI222, LI223, P822, VOS25H, 515QM8, 5960-99-719-5436, 7389, 9565

Whilst care has been taken in the compilation of these tables, we cannot guarantee that a different tube type will necessarily be a satisfactory replacement.

FOOTNOTES

(1) Ultricon tube (U suffix to type number) targets should be set at 8 - 10 volts compared to tube cathode. Newvicon tubes are generally directly interchangeable with the equivalent vidicon with a standard target layer.
(2) Bipotential electrostatic focussing lens.
(3) Radiation resistant faceplate.
(4) Extended near infra-red response.
(5) Fibre optic faceplate.
(6) Tetrode electron gun (anti-comet tail tube).
(7) Extended red response.
(8) Tube with light bias in base, powered by a 5V0 250mA supply between pins 1 and 5, for 95mA heater tubes heater circuit within the tube for 300mA tubes.
(9) Tube with light bias from 5V 100mA bulb in tube socket.
(10) 400mA heater / light supply,.
(11) Diode gun.

IN RETROSPECT

24CM ATV CONVERTER, CQ-TV 144

Dave G4FRE advises us that some versions of the Neosid BV5046 inductor required for L6 do not correctly align on the PCB. Apparently some of these devices are packaged such that the mounting lugs on the can are on the wrong sides, thus when the can is inserted into the circuit the actual inductor is not connected.

The answer to this problem it to first confirm that the inductor is connected to the correct pins with the can oriented for insertion into the pre-drilled holes in the PCB. If this is not the case drill two new lug locating holes in the PCB. Alternatively, remove the can from the inductor, rotate it through 90 degrees and replace.

G3WCY SSTV SCAN CONVERTER

Thomas GM4CAU advises that the following changes should be made to the G3WCY scan converter. C117 should, he recommends, be reversed in polarity and RV201 benefits from having a 47k resistor wired in series with it.

DIGITAL FRAME STORE, THE ATV COMPENDIUM

A minor error exists on the BATC RAM card used in the digital television project. The pad between pins-1 and 2 of the 43256 furthest from the edge connector should be wired to the three small pads to the right (looking at the PCB so that the words can be read). This is readily accomplished using the decoupling capacitor lead and a fine soldering iron.

PRECISION MEASURING BOX AND LINING-UP CODERS, CQ-TV 147

Peter Carliell has sent in some further notes regarding the lining-up of a PAL coder without a vectorscope, as he outlined in the original article. The method described below depends upon being able to independently switch on and off the Y, U and V components. Anyone who has built the 'New PAL Coder' from CQ-TV 134 might be now wondering how to do this, as no switching was designed into the coder.

The luminance can easily be switched with the on/off arrangement shown in Fig.1. This system , however, cannot be used in the U and V chains, since making a break anywhere in these chains causes huge carrier balance errors. Fortunately a very neat and easy solution exists. Switching off the bias to pin-5 of a modulator IC will switch it off, and the U and V can thus be DC controlled. Once again Fig.1 shows wiring details.

There is a flaw in my modification to add syncs before the delay line, shown in CQ-TV 143. With the circuit as shown syncs will be absorbed by the low impedance at Q3's emitter. I had meant to draw the sync connection to the other end of R16. Even then I experienced trouble with spikes and ringing on sync edges.

There is a basic problem in driving video circuits from TTL IC's. The rise time of TTL is fast enough to create transients outside the video bandwidth, that is above 5MHz. If transients are too fast for the delay line they will promote overshoots and ringing. The outputs of TTL gates 5A, 5B and 4A are filtered by the following circuitry and don't cause problems. My new suggestion for routing syncs through this coder is to inject at the original point, but via a filter and delay network. Details are shown in Fig.2.

Another difficulty encountered when lining-up the 'New PAL Coder' is that the burst is made of separate U and V components with individual amplitude controls, which cannot be set accurately by simply measuring the 300mV resultant. If the coder is modified for U and V switching, then the best answer is a further simple modification to the Measuring Box.

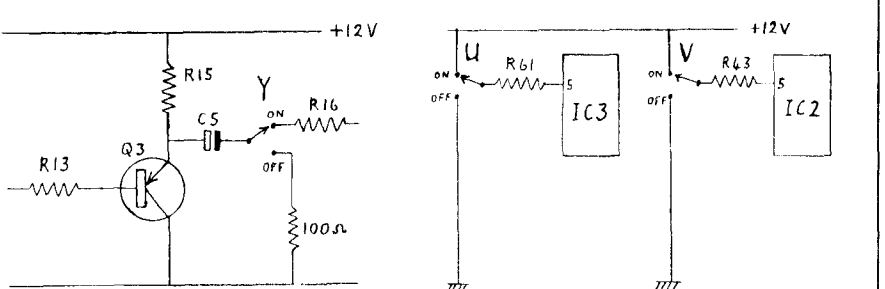


FIG.1 Y, U and V Switching

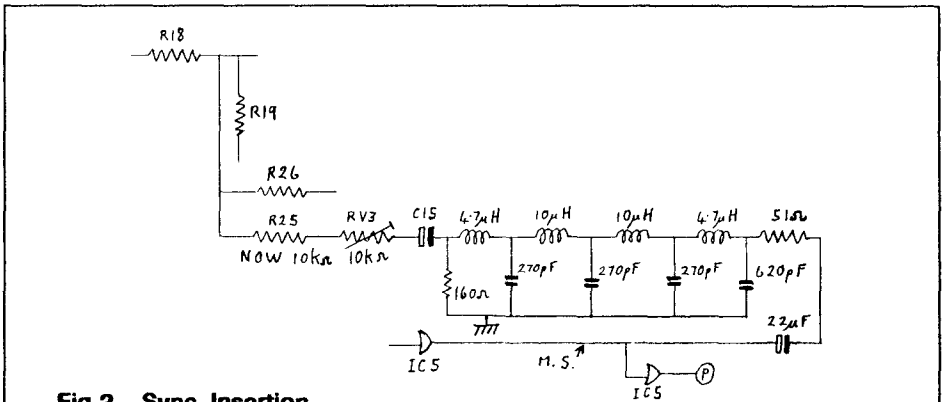


Fig.2 Sync Insertion

The burst components are each 212mV, and can therefore be set by adding a 212mV position to the range switch. R67 is replaced by R67a–d, and S3 must now have soven positions. Maplin sell a 1Pole/ 12Way switch with an adjustable end stop, which is ideal. The wiring is shown in Fig.3.

The line–up procedure is now as follows, and should be followed strictly in this order:

1) Connect DC, RGB colour bars, CSC and pulses (terminated) to the coder inputs. Feed one output through the Measuring Box to an equalised or terminated oscilloscope and terminate the other output.

2) Whilst the coder is warming–up monitor with a probe the signal at C40 and set RV11 for a symmetrical squarewave.

3) Switch Y off (U and V on) and, with the Measuring Box at OFF, set U and V carrier balances for minimum carrier on black level. Add Y and minimise subcarrier on the white bar with RV1. Now adjust the oscilloscope sweep speed sop that the line–to–line 'subcarrier twitter' is clear and minimise it with RV10 'set quadrature' (sets the 90 degree shift between axes).

4) With Y on (U and v off) and the Measuring Box on PICTURE make the white bar 0.7V with RV2, and syncs 0.3V with RV3 with the Measuring Box set to SYNCS.

5) Switch Y and V off (U on), put the Measuring Box to B–Y (U) and adjust 'chroma level' RV8. See photo–7 in the Measuring Box article (page–20, CQ–TV 147). Now turn the Measuring Box to MEASURE 212mV and set the U burst with RV9. Change to only V on with the Measuring Box set to R–Y (V) and trim 'R–Y gain' RV7. Set the V burst RV4 to 212mV.

It might be a good idea to now check through the line–up again.

The final results obtained using this method would not be better using a vectorscope.

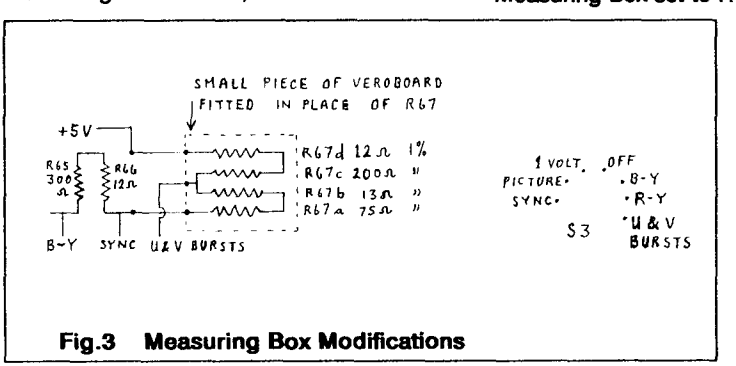


Fig.3 Measuring Box Modifications

TRANSISTOR SUBSTITUTION

Mike Wooding G6IQM

Let's say that you were thinking of building something from an American magazine – in fact an RF Speech Processor of a rather nice design. You have a look at the transistor types shown on the circuit diagram and find that you have never heard of most of them. What to do? are there any alternatives? or if not known what other types might do the job? What follows is hopefully a few words of wisdom about transistor substitution. Although intended for the beginner, possibly some of you older hands might also find it useful.

If you are a newcomer to the world of electronics and White Man's Magic and you pick up a semiconductor data book – the well known Towers International' for instance – you could be forgiven for wondering how anyone ever manages to design anything! There are literally thousands of different transistor types, and you might think that knowing which one of them to use in a particular circuit must call for great skill and knowledge, and a memory like a elephant.

It is true that more than 100,000 different type numbers for transistors have been issued over the years by manufacturers and standards associations. However, you will be relieved to know that the vast majority of the said devices were never widely used and probabl;y are not used now by professional designers.

The next thing to know is that there are basically three separate serial numbering systems used:

1) ... The American system, which uses the familiar '2N' series, the ubiquitous 2N3055 being one such example.

2) ... The European 'Pro-Electron' system, in which the devices get a code consisting of two letters and three numbers for so-called Consumer devices or three letters and two numbers for so-called industrial/professional devices. The BF981 used in many receiver front-ends is an example of the first and a BFY90 switching transistor an example of the second.

3) ... The third series is the Japanese system, in which all transistor numbers start with '2S' and continue with a letter, usually A, B, C or D, and several numbers. An example of this is the 2SC2094, used in the PA stage of some Icom transmitters. Incidentally, I have found on many occasions that some devices may only be marked with the last letter and figures, omitting the '2S', thus a C1618 may wel1 be a 2SC1618, especially if the unit originates in the far-east. Just another spanner thrown in to confuse the unwary!

It is a fair bet that an American design will use devices whose type numbers start with '2N', whilst European designs will use the Pro-Electron numbered types and Japanese designs the '2S' series. Having said that, several European manufacturers produce their own versions of '2N' devices which are particularly popular – the 2N2905 switching transistor is made by Mullard and Philips, as well as several USA manufacturers. In contrast, if you are trying to repair a japanese rig it will be full of '2S' series devices, for which no manufacturer outside the Japanese cartel can be found. However, all is not lost (yet!).

Finally, a few manufacturers insist on using their own numbering schemes for transistors. The most common ones you

are likely to come across are the MJ and MJE series form Motorola and the TIP series from Texas Instruments.

The most important point to remember is that for the vast majority of jobs – certainly those which do not involve high-power RF stages, high-voltage, very low noise, or anything similarly specialised – most designers will use the same device for related jobs in a wide range of different circuits. This means that you can do the same, whether you are designing from scratch, or fixing something. Also, for this type of non-critical use there are probably hundreds of different devices you could use in the circuit, all of which would work perfectly well.

Let's get back to that speech processor design you were considering building. One bit of the circuit uses a 2N1893. Now, I would be willing to lay odds that very few radio amateurs (or even us professionals come to that!) could tell you what a 2N1893 is, or what it is intended for.

Often as not, amateur designs are built from the shack junk box, made to work, and the design submitted or whatever, without any real attention paid to whether or not the devices used could be improved upon, or whether in fact they are being used as intended by the manufacturer.

I would also put money on the fact that it would be very difficult to obtain the 2N1893 device in Europe (OK, I bet that there is at least one smarty pants who writes in to me with an address!), even if it is a very common device in the States. So, the next question is what is it being used for? The answer in this case is that it is an NPN transistor being used to operate a small relay.

In electronic design terms, designing a transistor stage to switch a relay isn't difficult. Given that the circuit is running on a 13V supply and that the relay is an ordinary printed circuit type or whatever, then there must be a vast number of transistors which could do this job. We would immediately think of the BFY50 (OH yes we would!), basically because it has been used over the years to handle simple switching and almost without looking up its characteristics we would reckon it would work straight away when placed in this circuit. If it did not the 2N1893-driving-a-relay stage must be highly unusual!

The questions to ask yourself when looking at a design full of weird-sounding transistors should include the following when trying to find a substitute for a particular device:

1) ... is it NPN or PNP?

2) ... what frequency is it intended to operate at?

3) ... what current must it carry?

4) ... what sort of power must it dissipate?

5) ... are there any special requirements for mounting it? In other words, is the case style critical (plastic, metal, tab, etc), or can things be rearranged so that it does not matter?

6) ... is there anything unusual about the circuit it is in – i.e: is a high collector-emitter voltage rating necessary, does it need to operate at UHF, does it need phenomenally high gain?

7) ... is it Silicon or Germanium? (not always obvious but can be ascertained by the levels of bias voltages and the type of use).

So, what do you use for the non-critical jobs? Assuming that the equipment is not using voltage rails higher than 24 volts, which most small amateur-type projects don't, a table is given below of devices easily obtainable in Europe which between them will do most things.

Small signal switching, turning on an LED, low-power audio oscillator or amplifier:
NPN – BC107, BC108, BC548

PNP – BC177, BCY70

Operating small relays, sounders, lamps, anything requiring more current than above:
NPN - BFY50, BFX85

PNP - 2N2905, BSV17.

Small signal RF oscillator:
NPN - 2N2222, BF183;

PNP - BF234, BF450

Other RF applications tend to be more specialised and therefore no recommendations can be made.

Medium-power audio or PSU regulator:
NPN - MJE340, TIP series, BD131

PNP - MJE350, TIP series, BD132

Medium-power Darlington type: BSS62

High-power audio or PSU regulator:
NPN - 2N3055, 2N3771, 2N3772, 2N3773
PNP - BDX96

High-power, high-voltage: (nearly always NPN) BU204, BU208, BU407, BU500.

Higher-power, higher-voltage: (again NPN) BUS13, BUS14.

These are some of the devices readily available at rallies etc. Once again I wish to emphasise that for the vast majority of projects which do not involve either high-frequency operation, or tricky combinations like high-voltage and high-dissipation, a device from the above list ought to substitute OK.

The moral of the story is just that if you are considering making something from a published design do not be put off by the fact that the transistors in it do not sound familiar and are not listed in any of your data books. The odds are that you can find a device that will work perfectly well in the circuit, if you just have a think about what the transistor is doing. If the write-up of the article is any good it ought to be obvious in a few moments. In fact, whether the devices are mechanically interchangeable often matters as much as whether they are electrically compatible in the sort of applications discussed here, and any of the data books will give you reams of data about case styles and pin-outs.

In other words - that's one **LESS** excuse for not home-brewing!

TV ON THE AIR

Andy Emmerson G8PTH

SSTV ON VHF AND HF

First of all a nice long letter from Mike Drew GW0HWK on the subject of slow-scan. He is pleased to see that ATV news is now carried in the 'Back Scatter' section of 'Practical Wireless' and is thus reaching a wider audience. He writes:

"I have been working SSTV from my home location for several years and have had very good results with a Spectrum 48 using the G1FTU program, both on 2m FM and on HF. Although the Spectrum is very limited in grey scales, most people who have not used one are very surprised at the results gained from colour TX high definition modes when the Spectrum is used for RX. The colour TX from the Speccy is not too bad either.

"My home location is 5 miles NW of Wrexham at 1050 ft ASL on the Clwydian Mountains. Under normal conditions on 2M I can work stations from N. Lancs., Leeds, parts of S. Yorks., Birmingham and Hereford and Worcester. Obviously enhanced conditions allow all south and east coast and the near Continent. West/ south-west is difficult as I have the mountains behind me.

I also work from my works location near Ruthin (Clwyd Valley). If you are wondering, I work at the North Wales College of Agriculture as a lecturer and am also the head warden. So I am /P on a rota basis some evenings and weekends.

"I have noticed over the last few years all the new modes that have come for the Robot-type machines have tried to improve the quality of the pictures, by (1) going into slower speeds and (2) using new higher definition modes. Great, but what about the SWL's etc. that have only a passing interest in SSTV and cannot afford the dedicated equipment ? This is a problem several of us in the Rhyl and District ARC have discussed on many occasions. (I am the secretary of the club). There are six or seven members and several SWL's in the Rhyl area that enjoy watching the TX between us in the valley on 2M FM when I am /P at work.

"With this problem in mind, eg: many people not now being able to use their limited systems to receive the new modes, I have asked on 2M and HF to as many people as possible, if they or their SWL friends would be interested in a lot more B&W on the HF and/or VHF bands. The result was a resounding YES. Owing to that fact you may be interested in the following details about the 'new' Black and White Net that I have started up on 80 metres.

Day : SUNDAY Time : 1500 GMT Frequency: 3.734+/- QRM Main TX modes are 8 and 82 second B&W - 8 frames 8 sec., then a pause and 1 frame of that picture in 82 second mode.

"The other main participant and the person who will run the net if I am not about is Pam GW0LAL QTHR, Rhyl. Pam uses a Robot 1200C with all new modes fitted. Reception reports, comments on the type of picture or speeds that would like to be seen in B&W, can be sent to me at the following callbook address, enclosing an SAE if a reply is required.

Mr M.P.DREW GW0HWK, THE WARDEN'S FLAT, LLYSFASI COLLEGE OF AGRICULTURE, RUTHIN, CLWYD, N. WALES, LL15 2LB.

"Pam and I started the net in early

December 88 and have had several people call in. I have also had various reports from VHF contacts of the 80 metre net. Obviously we would like to get more people involved, especially the SWL's. After all they could well be the amateurs of the future.

"Now we come to VHF activity, which unfortunately in NW England and N Wales is rather lacking. This is mainly due to a few ill-mannered people (some licenced - some who use 144.500 as an open channel and as soon as anyone they can hear comes on, they cause deliberate QRM, even though they may have been speaking on the frequency for a most of the evening). This fact and the bad language that has sometimes gone with it has driven away the very few who used the frequency for SSTV calling and working in the past. In some areas of the country, as you said in your column, there is good activity with no problems from the other locals, because they know the SSTV nets exist. I have worked many people from the North York Moors to the south coast and listened to and watched many more. But I only joined in or put a call out if the frequency was not occupied when challenged or put up with the abuse etc. when it suddenly became busy.

I may well be on my soap box, but with the crowded 2M band, to have a frequency used in this way is rather annoying to say the least. It was nearly as annoying as to have the RSGB newscaster put out before Christmas, that people should stay clear of 145.300 as it is the RTTY frequency. Not much activity up here - I wish there was as I enjoy a chat on the keyboard as well.....

I am only too willing to start up a 2 metre SSTV net (to ignore the QRM as well, they will get the message) if there were a few more about who monitor the frequency and will stick with it, even though we might suffer to start with. All modes GIFTU can cope with.

"Maybe Andy a comment in your column as to a weekly regular evening for all interested in 2M FM SSTV will get it off the ground and beat our QRM problems once and for all. Who knows? I have tried, but it is difficult to work nobody, or someone who is 50+ miles away who you can work until the problem starts.

"My SSTV system is a Spectrum 48K (SAGA 1 Keyboard) with Opus Disk Drive as picture/program store. Pictures are digitised from a Romantic Robot Videoface using a Canon video camera and recorder. By the way, a useful snippet of information that I recently found out from Pam. If you are using the G1FTU program you can get fairly good results when listening to what is known 'Martin's New Mode' (72 second high definition) by going into 48 second Quasi. The pictures I have seen are quite acceptable considering the differences between the two modes."

70CM LIVES - CONTINUED

Another letter from North Wales, this time from John Cronk GW3MEO. John has been 'at it' for quite a while now, in fact since the days when RF receive amplification was virtually unknown on 70cm and most people used diode mixers.

Anyway, since moving to Prestatyn, he has re-activated his 70cm gear and has hooked up with a local station, GW4VHP. John loaned him a receiver and aerial and proved the gear was still functioning. Now it's down to generating a bit more activity and possibly tracking down GW3JGA on the air!

John is also experimenting with 23cm equipment 'but on my lonesome'. It's a pity, he says. that the repeaters are out of range.

Another who has set up afresh on 70cm is Andy G8SUY in Faversham. At the moment he has only 250mW at his disposal, but he intends to bring this up to the 20 watt level soon with the aid of a

linear 'blue brick' module. Already with the QRP setup he has managed to work Chris G4AYT at nearby Whitstable, achieving a P3 report.

Faversham is quite well placed to work Essex, East Anglia and parts of the Midlands, and Andy looks forward to repeating the contacts he used to make in the 'good old days'.

NEWS FROM YTV-LAND

Clive G8EQZ has been busy trying to improve the receive side of GB3ET, the Emley Moor repeater, and his experiments show it is possible to improve 24cm reception considerably.

His inspiration was an article in 'Der TV Amateur', the German ATV magazine, the idea being to use a gainy preamplifier ahead of a satellite TV receiver. Several people are using these receivers because they already tune the 24cm ATV band without modification, but they may not be getting the best results. Clive found that most receivers perform best when driven really hard, at the same level as they would if connected to a satellite LNB (up to 5mV of signal).

Accordingly he robbed the post-mixer amplifier from a Grundig LNB and fitted it inside one of the little circuit boxes you can buy with a BNC connector at each end. This device, which is arranged to be line powered, now gives 30dB gain and performs a treat in conjunction with a Bradford-made 'Pace' receiver. So old satellite systems do have their uses and it might be worth asking your local installers if they have any dead equipment! Apart from that, Clive is continuing work on GB3KT, the projected Kingston upon Hull TV repeater. Already constructed are a 200mW test transmitter and a caption generator with a sequencing message display.

Other local news ... G4YTV is now QRV on 70cm at low power and is using an Icom power module to build a 20 watt PA. In Bridlington G3PWN has built a 70CM upconverter and has already received pictures on it. He is now constructing a transmitter for the band.

In the same town G3ZTR is assisting Clive in the construction of a water-cooled twin 2C39 tube power amplifier for 24cm contest use, so watch their results once they start using this! In fact they're not doing too badly already, having found a secret mountain-top with excellent take-off.

Clive also notes that activity from his QTH is a little restricted at the moment after the January gales ripped the teeth out his rotator's gearing, even though his tower was fully down. He has also acquired an Amiga computer for video work.

SIGNOFF

Well, it's interesting to know that SSTV is still practised in some parts of the world. And once more that's all for this time. Please let me have all your reports in good time for the next article and send them to 71 Falcutt Way, Northampton, NN2 8PH. Thanks.

ATV CALLING: 144.750

SSTV CALLING: 144.500

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TV FOR AMATEURS (85gm) by John Wood G3YQC The definitive introduction to Amateur television, including construction articles.	£1.75	.....	.....
MICRO & TELEVISION PROJECTS (140gm) by Trevor Brown G8CJS. Constructing logic and Spectrum computer based aids for ATV'ers.	£1.00	.....	.....
THE BEST OF CQ-TV (150gm) *** NEW *** By Mike Wooding G6IQM *** ISSUE *** A compilation of the best construction articles from CQ-TV's 133 to 146.	£3.50	.....	.....
THE SLOW-SCAN COMPANION (165gm) By Grant Dixon, John Wood G3YQC & Mike Wooding G6IQM. The Slow Scanner's textbook, dealing with the whole aspect of SSTV, from basic principles to construction articles on full transceivers.	£3.50	.....	.....
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HB1 = ATV Handbook (blue); HB2 = ATV Handbook vol.2, or revised;
TVA = TV for Amateurs; MTP = Micro & Television Projects; COM = SSTV Companion; ATC = Amateur Television Compendium.

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). All tubes are of separate mesh construction, with magnetic focus and cost £25 each, including postage. Electrostatic vidicons, Leddicon and Ebitron tubes are available, to special order. Members requesting information on different types of tube or equivalents for other manufacturers are asked to send a stamped, addressed envelope for their reply.

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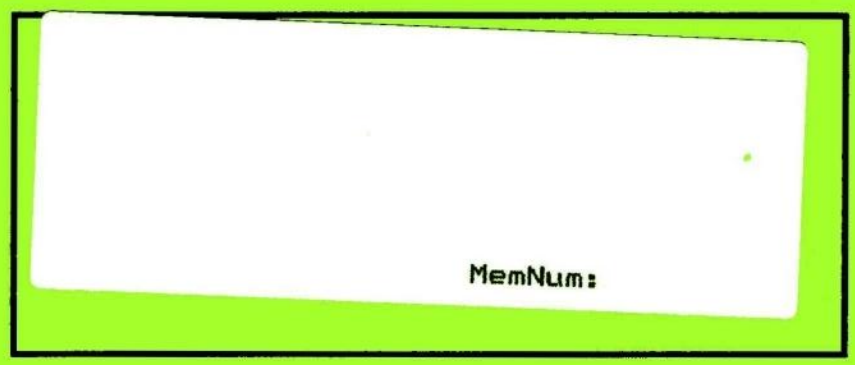

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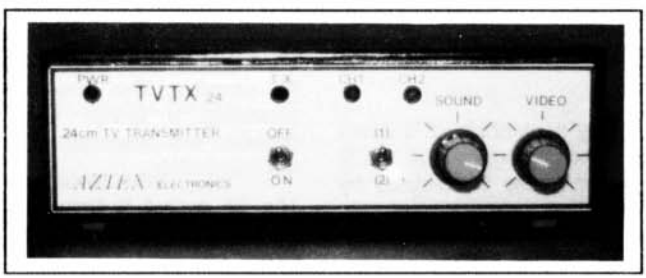
THE AZTEX 24CM ATV TRANSMITTER AND PRE-AMP

REVIEW

Mike Wooding G6IQM

The Aztex 24CM FM ATV transmitter was first seen at the Leicester Show last year and created a lot of interest. Since then I have been often asked for details of this unit, several times since it was first advertised in the last issue of CQ-TV. So, I duly contacted the Severnside TV Group, through whom it is marketed, and arranged for a unit to be despatched to me for review. At the same time I also requested a look at one of their G4BVK 24CM preamplifiers, and a review of that follows after this.



THE AZTEX TVTX 24 FM ATV TRANSMITTER

DEVELOPMENT INFORMATION

This section contains extracts taken from a letter to me from the designer Ken Stevens G4BVK:

"Looking further into the design of a transmitter the need for a stable output was one of the governing factors, so using the SP5060 Phase Lock Loop chip was an obvious choice. Using surface-mounted components was another way of maintaining stability.

The video pre-emphasis network, whilst based on the standard CCIR circuit was designed to give an HF component lift extra to that given by a standard CCIR network. This overcomes the HF losses within the modulator as well as providing the normal HF lift. Introducing some kind of DC restoration on the signal was also deemed necessary before injection into the modulator, and the circuit adopted to achieve this is very effective in stopping the video content from altering the black level position.

The two sound inputs are actively mixed using a TL072 op-amp before they are fed to the modulator. There is a separate PCB mounted pre-set for adjusting the line input

only, the front panel sound control adjusting the composite level of both inputs. There is also provided a subcarrier injection level pre-set on the PCB.

MANUFACTURER'S SPECIFICATIONS

Frequency Channel 1 ..... 1249 MHz

Channel 2 ..... 1255 MHz

RF Output Power ..... 2.5 Watts (typical)

Harmonics ..... < 50dBc

Modulation System .. FM (pre-emphasised)

Audio Subcarrier ..... Pre-set to 6MHz

..... >= 17dB below carrier

(variable with deviation setting)

Video Input ..... 1V p-p into 75-ohms

Audio inputs ..... Dynamic Microphone

Adjustable line input (VCR etc)

Power Consumption ..... 1.6A @ 13.8V

DESCRIPTION

The unit comes fully assembled in a black painted die-cast box measuring 188 x 120 x 57mm, with a removable lid secured by six cross-head screws. A professionally produced front panel features four LED's, one indicating the connection of the DC supply, one indicating transmit and two indicating which channel is selected. There is a main on/off switch and a channel select switch. Two potentiometers are provided, one for the sound and the other for the video deviation.

On the rear of the transmitter are the various connecting points. An N-type socket is provided for connection to the aerial, a BNC socket for the video input and two sockets for the audio inputs, a phono socket for the line input and 1/4" jack-socket for the microphone. The DC input is a 3-pin plug with a matching line socket and lead provided.

My only criticism of the outward appearance of the unit as supplied was the lack of identification of the connection points on the rear of the case. Whilst no-one is likely to confuse the aerial socket or the power socket with any other, confusion could arise between the two audio inputs and, perhaps, the video input. However, on bringing this to the attention of Ken Stevens I was informed that this is being attended to. Perhaps it is only fair at this point to state that the review unit was only the fourth or fifth produced.

Internally the transmitter is neatly laid out with the main printed circuit board bearing the audio amplifier, modulator and subcarrier generator circuitry and the video circuits. This circuit board is held in place with four nuts, bolts and spacers, thus removal for future servicing needs will be easily effected.

A small die-cast box occupies approximately one third of the main case on the right-hand side looking from the front of the unit. This box contains all the RF circuitry. This has the advantage of providing a further level of screening between the baseband and RF sections of the transmitter.

The RF output N-type socket is mounted through the case directly into the inner box and is soldered direct to the PCB, thus, no RF cables floating around inside. Interconnections between the RF box and the main PCB is effected by means of several feed-through terminals carrying the baseband signal, power supply and frequency switching control signals.

The RF assembly is bolted to the main case with the same bolts securing the internal PCB via spacers. The N-type aerial socket is bolted to the RF box and a clearance hole has been drilled through the main case.

Thus, although a little intricate, removal of the RF assembly and the RF circuit board for servicing can be achieved with care. The circuitry itself features state-of-the-art surface mount technology.

Three user adjustment points are provided

inside the transmitter and they are a pre-set potentiometer for audio subcarrier injection level, a trimmer capacitor for the audio subcarrier frequency and a pre-set potentiometer for the line audio level. Supply protection is effected by use of a miniature wire-ended fuse soldered between two posts on the PCB.

BENCH TESTS

The following test equipment was used to carry out the laboratory tests, and I wish to thank Roland Hall G0GSA for his assistance with the analyser tests and plots.

Marconi 2383 Spectrum Analyser & Tracking Generator

Racal Dana 9087 Signal Generator

Philips PM5646 Television Pattern Generator

Hewlett Packard 435A Power Meter

Hewlett Packard 8481A Power Sensor

Racal Dana 1998 Frequency Counter

Philips PM3226 Oscilloscope

Fluke 8050A Digital Multimeter

Racal Dana 9232 Bench Power Supply

FREQUENCY STABILITY

Two transmit frequencies are available on the transmitter, selectable by a front panel mounted toggle switch. Knowing that the unit has a crystal controlled PLL exciter I expected the frequency stability to be good, and, as the table in Fig.1 shows, it is. The review unit exhibited a drift down of 2200Hz over a 30 minute period.

POWER OUTPUT AND HARMONICS

The RF output power was monitored over a 30 minute period at 1249MHz and the results given in the table below in Fig.2. After an initial 20 minute period during which the power output dropped 0.37W (0.65dB) the output remained to all intents and purposes constant at 2.34W. A similar check was carried out at 1255MHz, the switch on power was slightly higher at

TIME	FREQUENCY
SWITCH ON	1249.02623
10 SECS	1249.02611
20 SECS	1249.02581
30 SECS	1249.02569
40 SECS	1249.02559
50 SECS	1249.02558
60 SECS	1249.02549
70 SECS	1249.02543
80 SECS	1249.02541
90 SECS	1249.02538
100 SECS	1249.02537
110 SECS	1249.02535
120 SECS	1249.02534
3 MINS	1249.02503
10 MINS	1249.02403
15 MINS	1249.02411
20 MINS	1249.02401
30 MINS	1249.02389

Fig.1 Frequency Stability

TIME	POWER
SWITCH ON	2.72W
5 MINS	2.54W
10 MINS	2.46W
15 MINS	2.37W
20 MINS	2.35W
25 MINS	2.34W
30 MINS	2.34W

Fig.2 Output Power

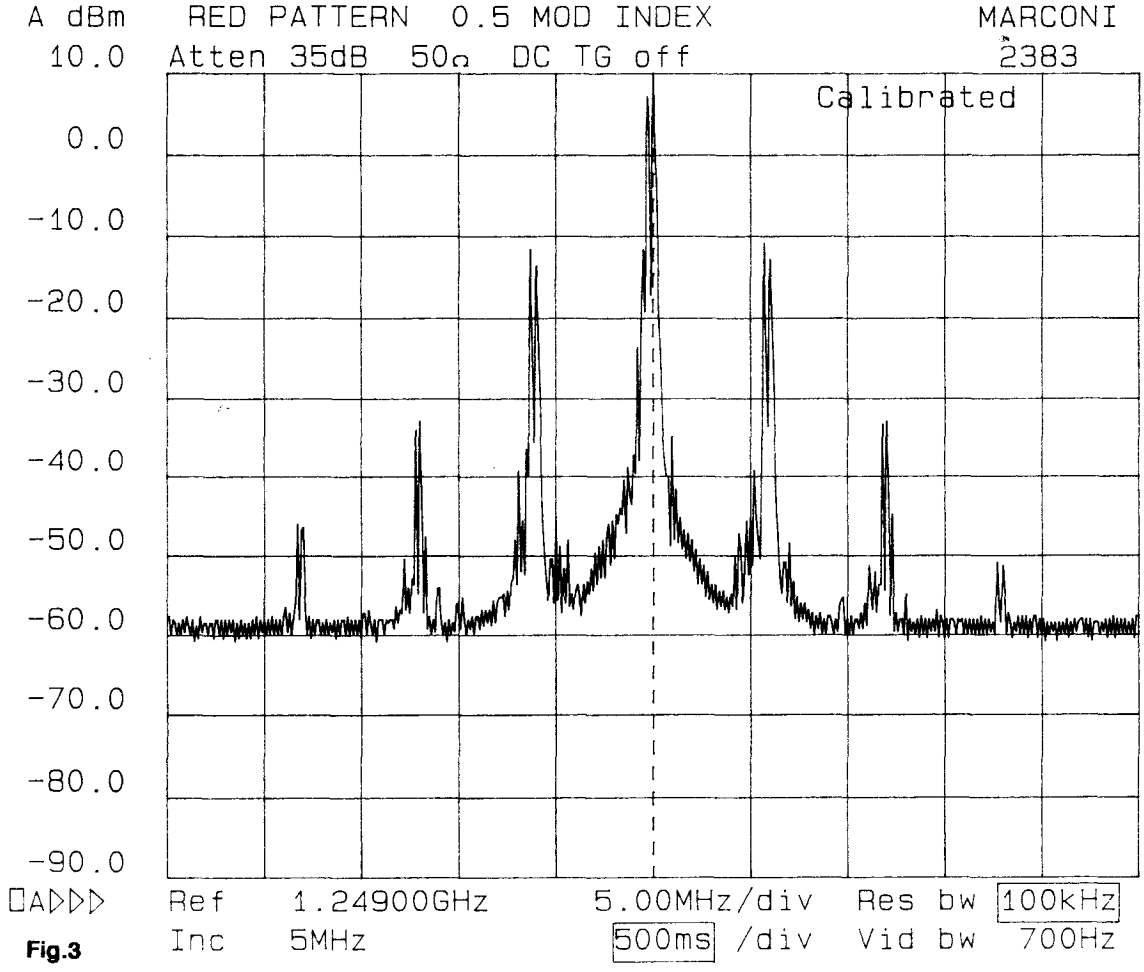

A dBm
RED PATTERN 0.5 MOD INDEX
MARCONI
10.0
Atten 35dB 50Ω DC TG off
2383
Calibrated
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
A
Ref 1.24900GHz
5.00MHz/div
Res bw 100kHz
Inc 5MHz
500ms /div
Vid bw 700Hz

Fig.3

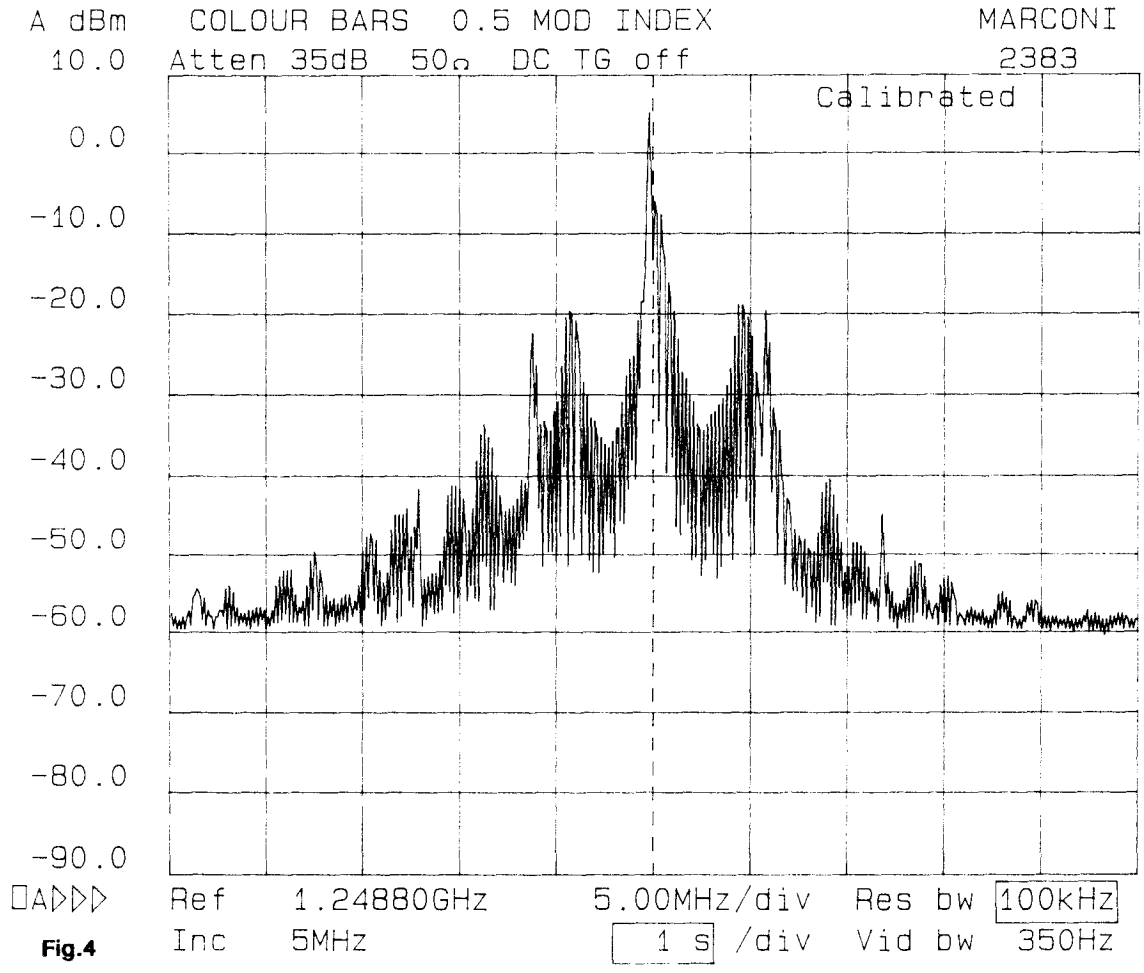

A dBm
COLOUR BARS 0.5 MOD INDEX
MARCONI
10.0
Atten 35dB 50Ω DC TG off
2383
Calibrated
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
□A▷▷▷
Ref 1.24880GHz
5.00MHz/div
Res bw 100kHz
Inc 5MHz
1 s /div
Vid bw 350Hz

Fig.4

2.84W with the final output power settling at 2.54W. The harmonic content of the unmodulated output was very low indeed, probably in the main due to the out-of-band rejection of the SC1043 PA output device. The second harmonic was measured at slightly less than 50dB down on the carrier. Third and subsequent harmonics were not detectable above the -75dB noise floor of the analyser.

VIDEO AND AUDIO CHARACTERISTICS

Using the previously CQ-TV developed system for ascertaining a modulation index of 0.5 as follows:

By applying a 5MHz sinewave to the video input and, viewing the output on a spectrum analyser, adjusting the video amplitude (deviation) from the signal generator so that the sidebands coincided with the recommended modulation index of 0.5. The output from the signal generator into the transmitter was then measured and this level used as the reference output level from the Philips TV pattern generator for the plots shown in Fig's.3, 4 and 5.

Fig.3 shows the spectrum obtained using a plain red pattern, Fig.4 the spectrum using 100% saturated colour bars and Fig.5 with a Philips PM5534 test card.

The audio subcarrier generator, unless otherwise specified, is set up to 5.9996MHz for U.K. use. However, the subcarrier oscillator trimmer capacitor is accessible with the unit's cover removed, and the subcarrier can be easily reset to 5.5MHz or whatever for continental working.

At maximum video deviation the subcarrier level was measured at 17dB below carrier, however, as the video deviation is reduced (using the front panel VIDEO control) the relative difference becomes greater, and at minimum video deviation the subcarrier was measured at 32dB below carrier (dBc).

With a standard video input level of 1V p-p the front panel VIDEO control was required to be set at approximately 50% in order to achieve a normally deviated picture, and at this setting the audio subcarrier was measured at around 24dBc, which proved to be quite adequate for good audio with P5 contacts. Nevertheless, I did adjust the subcarrier injection control on the main PCB and brought the relative level back to 17dBc at this VIDEO control setting. This provided very good audio fidelity commensurate with picture reception.

NOTE: I feel it only reasonable to point out here that if the input video level to the transmitter is adjusted such that the VIDEO control on the transmitter is set towards fully clockwise in operation, then the audio subcarrier level will be satisfactory without internal adjustment.

ON-AIR TESTS AND CONCLUSIONS

Overall I am very impressed with the workmanship and presentation of the transmitter. Upon receipt it was simply a matter of connecting 13.8 volts, plugging in the camera and microphone, connecting the aerial and switching on and adjusting the video and audio controls. This is ideal for those amongst us who are not of the home-brewing fraternity etc., the only unit currently available that satisfies this need.

Furthermore, the very useful output level of around 2.5W is enough to drive a 2C39A valve linear to quite a useful output (in my case to approximately 60W). The colour handling characteristics of the unit gave excellent results, as did the audio response, when tested over a P5 path between myself and Tony G0HOV.

My only criticisms are a follows: the first as I stated earlier, is the lack of rear panel identification of the various sockets. The other criticism is the use of the soldered in PCB mounted fuse. Whilst to some of us obtaining and changing this should failure occur would not be a problem, to some stations it could be a daunting task.

Finally, suffice it to say that I am so impressed with the transmitter that I am now running one myself.

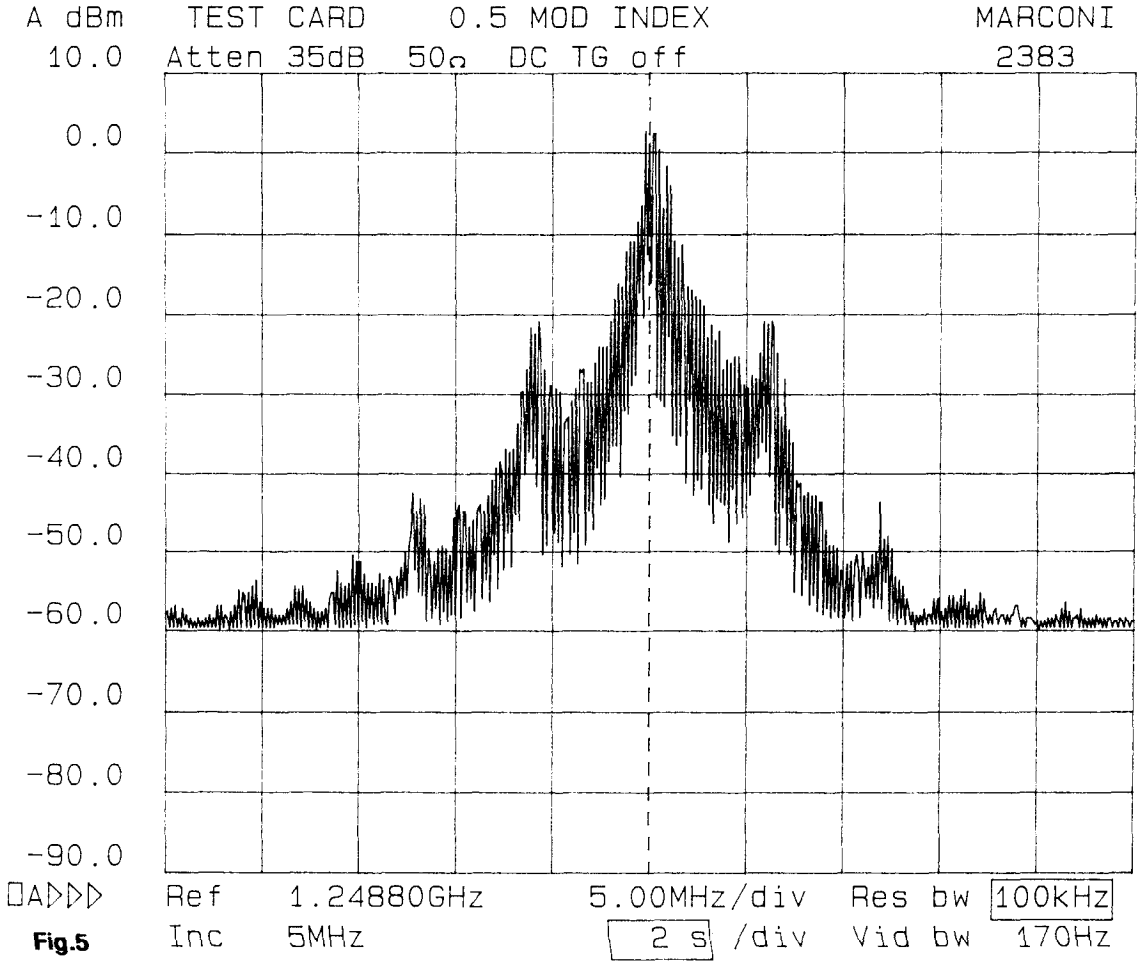
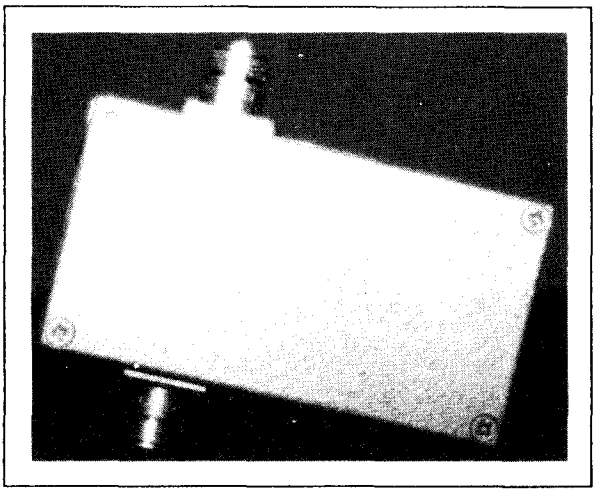

A dBm
TEST CARD
0.5 MOD INDEX
MARCONI
10.0
Atten 35dB 50Ω DC TG off
2383
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
□A▷▷▷
Ref 1.24880GHz
5.00MHz/div
Res bw 100kHz
Inc 5MHz
2 s /div
Vid bw 170Hz

Fig.5



The GaAsFET device itself, one of the latest devices from Avantek the ATF10135, is mounted on a vertical PCB screen soldered to the main circuit board.

A brass horizontal top screen is soldered to the vertical PCB screen and is also clamped to the side of the box under two of the output N-type socket retaining screws.

Input and output tuning trimmer capacitors are mounted at each socket respectively and a bias pre-set potentiometer is located on the main PCB.

THE AZTEX ULNA 23-24 GaAsFET PREAMPLIFIER

MANUFACTURERS SPECIFICATIONS

Typical Gain 17dB

Noise Figure 1dB

Bandwidth ..... 1250 to 1350MHz +/- 1dB

Rejection ..... 8dB @ 700Mhz

DCSupply ..... 7v to 18V

DESCRIPTION

The Ultra Low Noise Preamplifier comes in a blue hammer-finished die-cast box measuring 110 x 60 x 30mm, with N-type input and output sockets mounted one each side. The top cover of the box is secured by four cross-head screws.

NOTE: As stated by the manufacturer, this enclosure is not water-proof and needs to be mounted inside another weather-sealed enclosure for external/mast mounting.

The small printed circuit board is secured inside by solder tags, fixed to the PCB and secured on two of the N-type socket fixing bolts on each side. The DC supply is fed into the box by two insulated solder terminals and features a reverse polarity protection diode.

BENCH TESTS

The following test equipment was used to carry out the laboratory tests:

Marconi 2383 Spectrum Analyser & Tracking Generator

Fluke 8050A Digital Multimeter

Racal Dana 9232 Bench Power Supply

The two plots shown in Fig's 6 and 7 show gain versus frequency.

Fig.6 shows the gain over the frequency band from 249Mhz to 2240Mhz. The reference input level was -20dB and then centre frequency of the plot is 1249MHz.

It can be seen that the 0dB gain points are approximately 600MHz and 1700Mhz (we shall ignore frequencies above 2000MHz). The 3dB band is approximately 1150MHz to 1500MHz.

The plot shown in Fig.7 covers a frequency band from 1250MHz to 1350MHz, with a centre frequency of 1300MHz. It can be seen that over this frequency range, essentially the 23/24CM band, that the response is very flat, with a positive gain slope. The reference input level was again -20dB and the gain at 1300MHz was measured at 16.1dB. The gain at 1249MHz

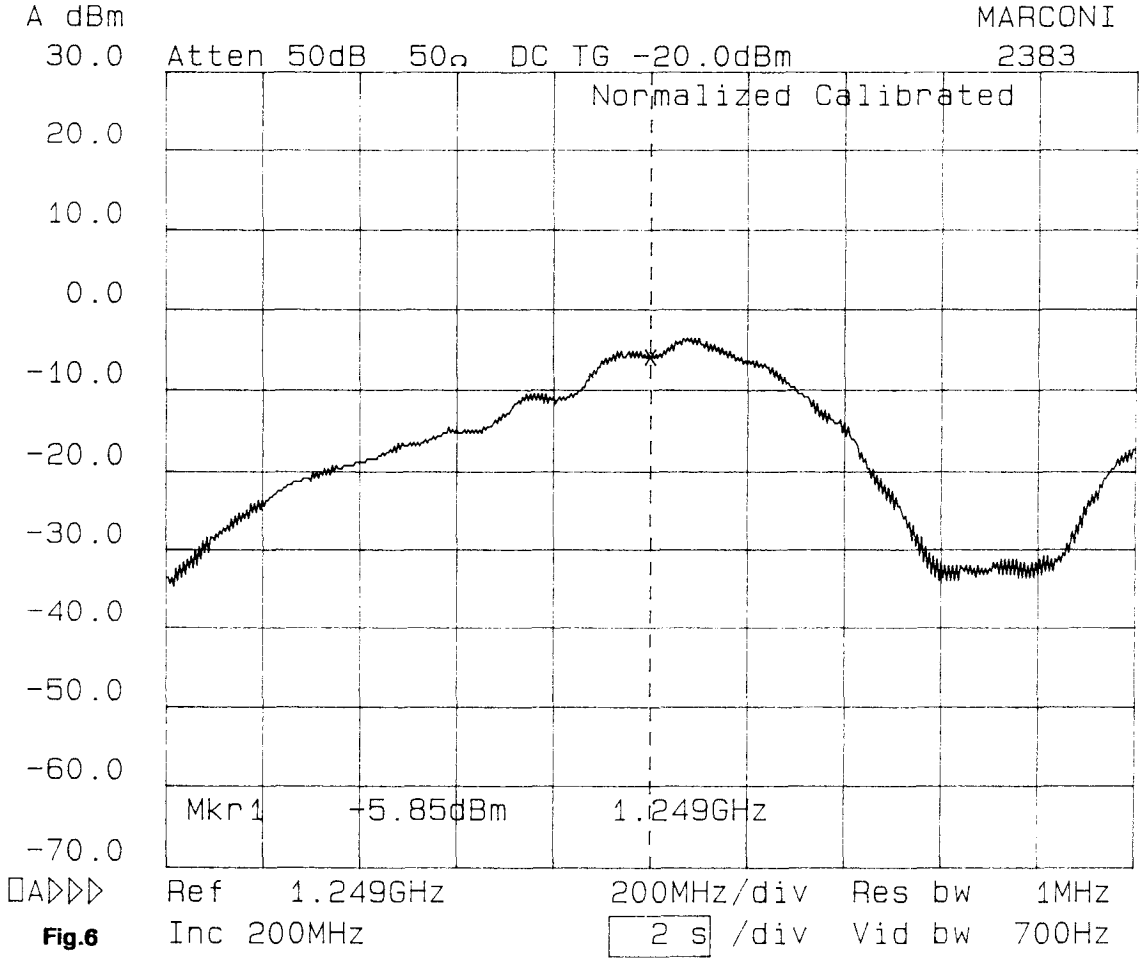

A dBm
MARCONI
30.0
Atten 50dB 50Ω DC TG -20.0dBm
2383
Normalized Calibrated
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Mkr1 +5.85dBm 1.249GHz
-70.0
Ref 1.249GHz
200MHz/div Res bw 1MHz
Inc 200MHz
2 s /div Vid bw 700Hz

Fig.6

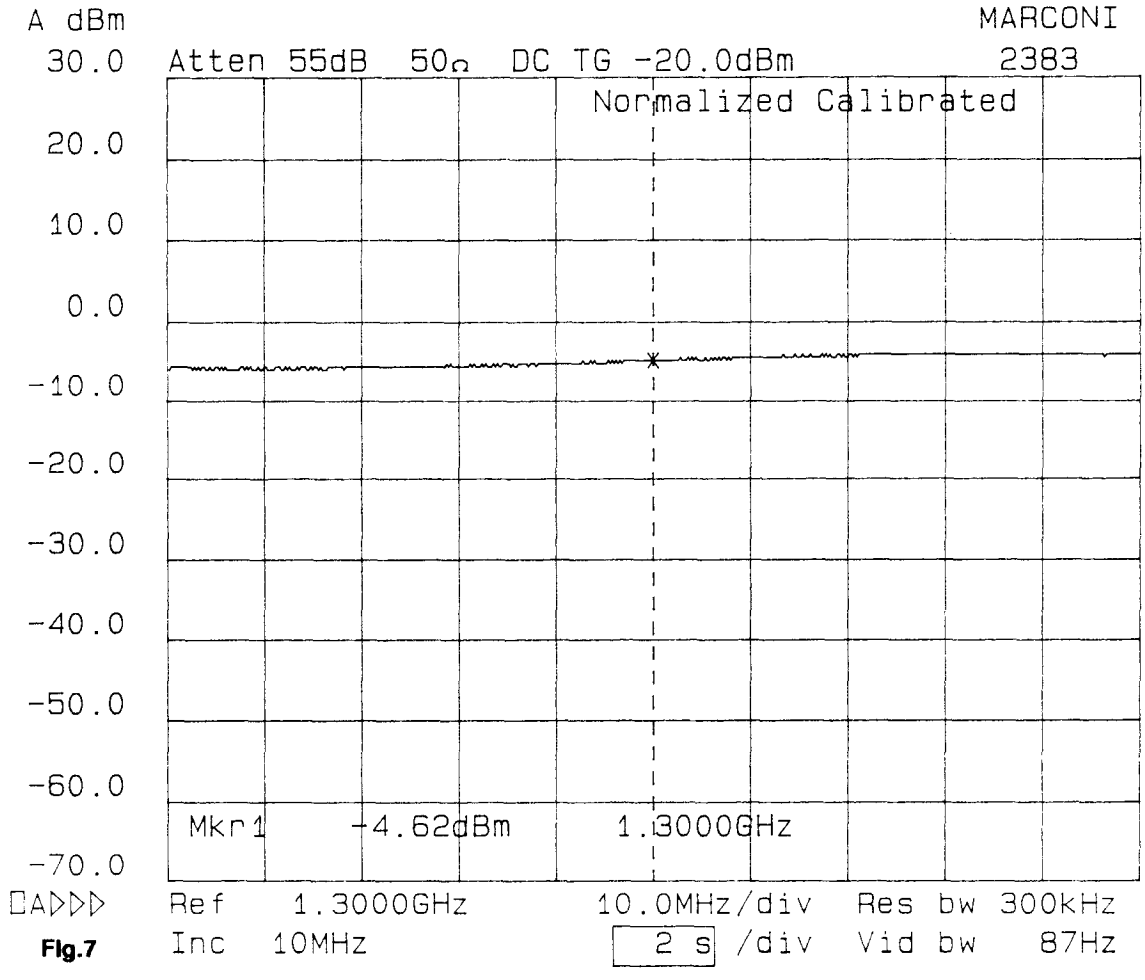

A dBm
MARCONI
30.0
Atten 55dB 50Ω DC TG -20.0dBm
2383
Normalized Calibrated
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Mkr1 -4.62dBm 1.3000GHz
-70.0
□A▷▷▷
Ref 1.3000GHz
10.0MHz/div
Res bw 300kHz
Inc 10MHz
2 s /div
Vid bw 87Hz

Fig.7

was measured at 15.5dB and at 1318MHz was 16.4dB.

ON AIR TESTS AND CONCLUSIONS

The flat, even response of the preamp over the entire 23/24CM band meant that I was able to tune to signals at both the RMT2 repeater input and output frequencies (1249 and 1318.5MHz) without any loss of preamplification.

This for me was a new experience as my own homebrew GaAsFET preamp is a half-band unit, which requires retuning when tuning from one end of the band to the other.

Also, the very low noise figure exhibited by the preamp means that the 15.5dB or so of gain appears to be a great deal more when compared against results obtained from other preamps with perhaps higher gain figures (not the least my own unit!).

Noise figures are a complex problem which I will not go into here, suffice it to say that this unit with its noise figure of around 1dB will take a lot of beating.

My overall impression of the preamplifier is of a sound, well made unit, exhibiting very good performance, and I wholly recommend that anyone requiring a preamp for 23/24CM (that just about encompasses everyone working 24CM ATV to my mind) should seriously consider this unit.

Both units are available only through the Severnside Television Group.

The Aztex TVTX 24 FM ATV transmitter is priced at £220 plus £2.50 p&p.

The Aztex ULNA 23-24 GaAsFET preamp is priced at £52 plus £1.50 p&p.

For further details contact the Severnside TV Group, 15 Witney Close, Saltford, Bristol, BS18 3DX. Tel: 0255 873098

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LOGIC CIRCUITS

Part–5

John Wood G3YQC

Just a reminder that although these articles bear my name, they are in fact a series, written by Arthur Critchley for CQ–TV in the early 1970's, when TTL logic devices had just become readily available. The articles are re–run by popular request as well as to provide a sound introduction to logic circuitry for the many members who have not seen the originals. I am taking the opportunity where necessary to incorporate any corrections to the original, and also to add to or modify both text and drawings to reflect more modern devices.

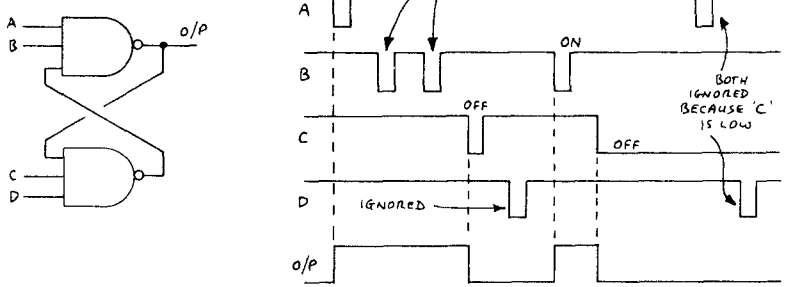


Fig.1 Multiplt–input R–S Bistable

MORE TTL ODDS AND ENDS

Loading Rules again

In calculating the loadings of gates, etc., it is frequently the case that several inputs of the same gate are paralleled. The loading factor for these inputs only is not the sum of the separate loading factors nor is it the loading of only one such gate. It is in fact some intermediate value and opinions seem to vary as to its size. as a general rule the new load is about half the sum of the loadings.

A two–input NOR–gate should, however, not have an unused input paralleled because the loading of the two inputs is in fact two loads since the NOR–gate input consists of two separate transistors. The unused input of a NOR–gate should be earthed when the gate is used as an invertor.

The Schmitt–input NAND–gate is another device where it may be better not to parallel the unused inputs. In this case, as for all NAND–gates, they should be returned to +5v via a resistor of about 1k.

Multiple–input R–S bistables

The usual R–S bistable consists of two cross–coupled two–input NAND–gates. If gates with more than two inputs are used then the extra inputs act as alternative

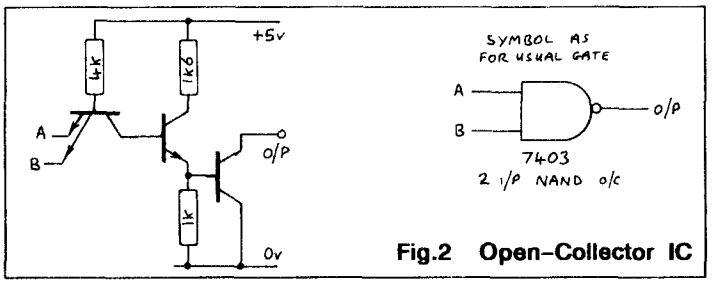


Fig.2 Open-Collector IC

inputs such that negative pulses to any of them will operate the bistable normally. As usual, any one of them kept low will paralyse the bistable (see Fig.1). The usual condition applies wherein the pulses must not coincide – any of them. This form of R-S bistable is useful in the formation of composite syncs where several different pulses may be used to drive the bistable at different times. The advantage is that some gates may be saved by so doing.

Open Collector IC's

These ICs are virtually described by their title. They do not have the usual totem-pole output stage, but finish up in a single transistor which has no load resistor. See Fig.2. The output load is therefore up to the user and can be a lamp, LED, TTL relay or any other low-current device. In other words, such IC's are useful as interface devices. However, it is not usual for the output transistors to have a voltage rating any higher than the IC, unless the IC is a special, e.g. the 7446 has a 30v rating for driving 7-segment indicators directly.

One use for open-collector ICs is to form a grey-scale generator. Fig.3 shows this in principle.

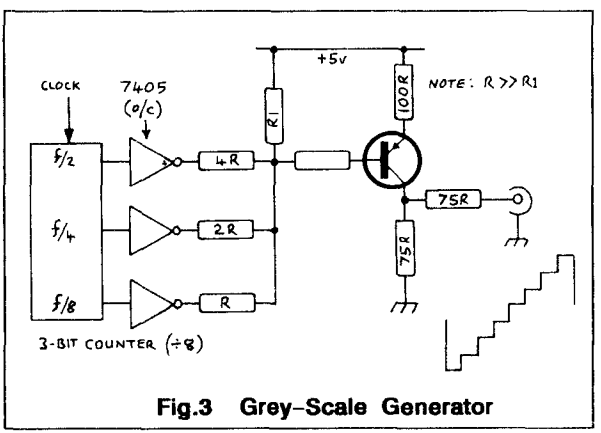


Fig.3 Grey-Scale Generator

Wired-OR

This describes the connection of several ICs to a common load resistor so that any of them may cause a voltage change – i.e. the OR-function. Fig.4 is self-explanatory.

This wired-OR connection must not beperformed on normal TTL gates because these have low impedance in both states and can thus present a virtuall short-circuit to the supply.

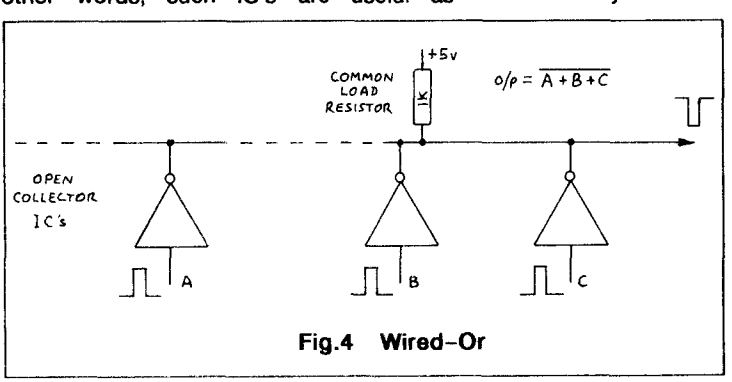


Fig.4 Wired-Or

Differentiation to obtain negative edges

This is normally avoided with TTL circuitry because of the risk of reverse biassing the IC input stage on the positive swing of the input. The circuit of Fig.5 shows how this may be avoided by the use of a diode to shunt away the pulse. The input is normally biassed to about +4v and is thus turned on, but not too hard.

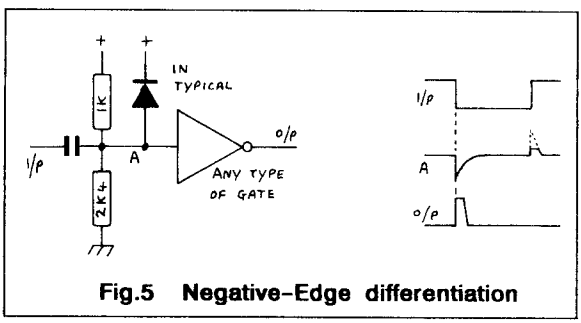


Fig.5 Negative-Edge differentiation

If C is made 1n the pulse width is 300nS, for 10n it is 2.5uS. Note: The input pulse must be longer than the output pulse desired by about three times.

Crystal Oscillator

This consists of two normal invertors, or NAND-gates biassed to their midpoints and connected in a ring via a capacitor and a crystal. This circuit is virtually a multivibrator. The crystal should be an AT-cut type with a series-resonance mode, and may be from 1 to 10MHz. A buffer is desirable. See Fig.6.

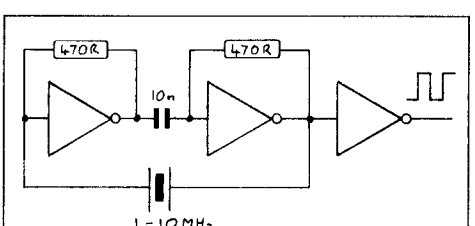


Fig.6 Crystal Oscillator

Frequency Doubler (1)

Normally a frequency doubler contains a resonant circuit to pick out the second harmonic, or employs a full-wave rectifier. This circuit, and the next two, use neither and do the job digitally.

The first circuit, in Fig.7, uses two monostables - the first of which has a period equal to a quarter of the input period. The second monostable has a period of one half of the input. The input square-wave and the output pulse of the second monostable are fed to an exclusive-OR gate and the resulting waveform is a square wave of twice the input frequency.

Frequency Doubler (2)

The first frequency doubler suffers from having two variables with which to set the output waveform so that cascading such circuits can result in very irregular waveforms.

The second version has only one variable and is therefore easier to set up. There is, however, a 12nS discrepancy in the output

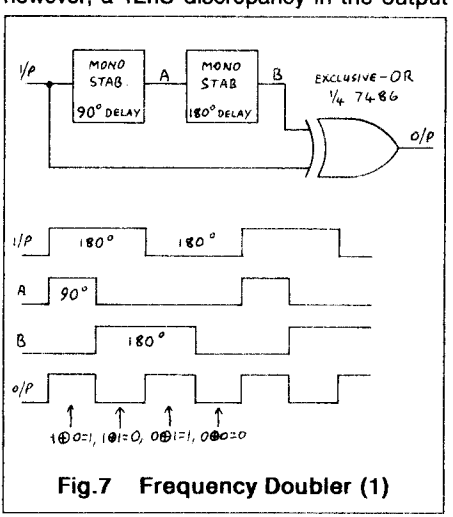


Fig.7 Frequency Doubler (1)

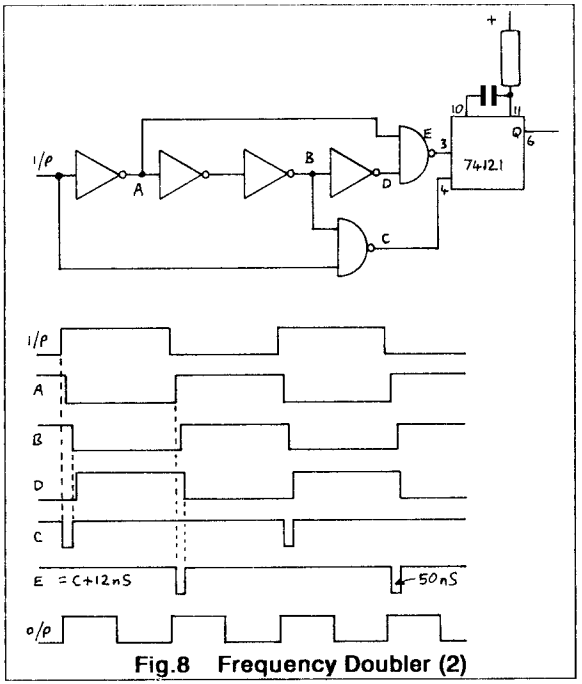


Fig.8 Frequency Doubler (2)

waveform which, if the multipliers are cascaded, would result in irregularities at high frequencies only.

In this circuit two edge-detectors drive a monostable from both halves of the input square-wave. The period of the monostable is one quarter of the input period. The 12nS discrepancy arises because of the difference in delay between the edge-detectors of one gate.

Frequency Doubler (3)

The best circuit is the third one (Fig,9) in which there is no difference between alternate cycles of the output frequency.

This circuit uses an Exclusive-OR gate to alternately invert the input half-cycles so that the monostable is triggered twice in each input period. The reversing of the polarity is achieved by the use of a bistable driven by the monostable Q-output. This type of multiplier may be cascaded several times without problems.

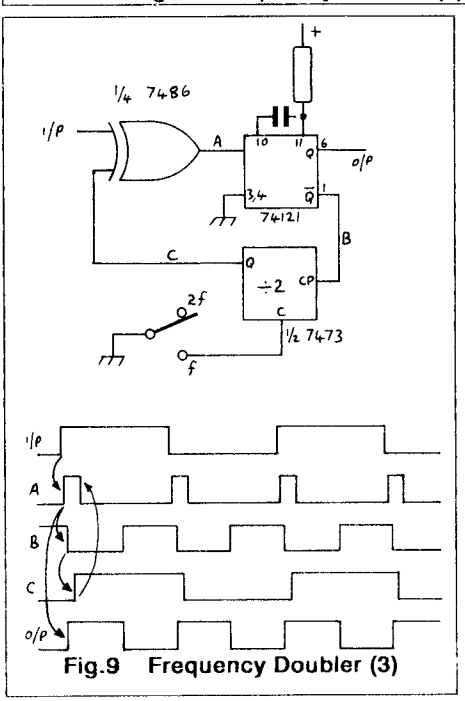


Fig.9 Frequency Doubler (3)

Using Switches (1)

Switches, or relay contacts, may be used to give IC's input information, but they suffer from the problem of bounce. This means that the contacts actually open and shut several times for each action. If the circuit being controlled is a bistable, then this will result in the many contacts each triggering the bistable and the result will be meaningless.

A method of reducing the bounce to zero is wanted, i.e. the contact should be made only once per action. This is not practical mechanically and so must be done electronically by means of capacitors or latches.

The capacitor method is shown first. All this does is to remove the high frequency content by simple integration. Fig.10

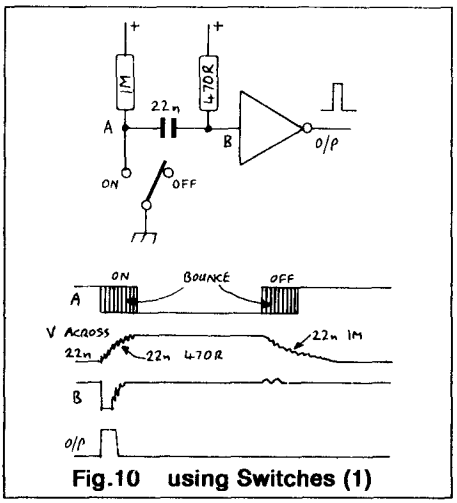


Fig.10 using Switches (1)

shows the system. There are two time-constants involved for the ON and OFF actions. Switching ON pulls down the IC input at the first touch because of the short time-constant. The first bounce open removes the short from the 1M resistor and the long time-constant takes over to hold down the input voltage.

On releasing the switch the bounce has no effect because the long time-constant is then present. This system is suitable for triggering bistables, but only from the leading-edge, i.e. the push of the button.

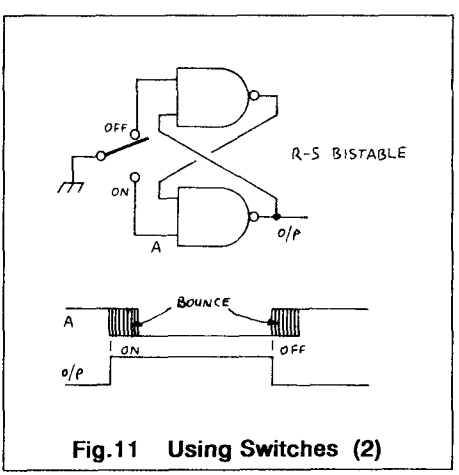


Fig.11 Using Switches (2)

Using Switches (2)

The best answer to the problem of multiple contacts is to use a latch circuit which does not respond to the repeated input voltages. Fig.11 shows the system. This has the disadvantage of requiring a two-pole switch.

Short delays

In some circuitry a short delay is often needed to overcome a timing problem. Such a short delay can be provided by the use of the circuit shown in Fig.12. The 1n capacitor is used as an integrator with the low output impedance of the gate and gives about 50nS of delay.

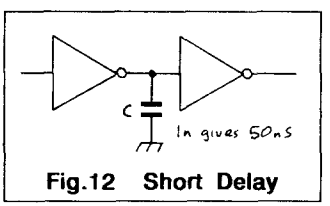


Fig.12 Short Delay

Although the gate will drive capacitive loads without trouble the rise-time of the output waveforms will suffer so that such an output can not be used to drive a bistable without another gate to sharpen it up again. 1n gives about 50nS delay to both back and front of the waveform.

Differentiation again

The arrangement for obtaining the positive-going edges of pulses is shown again in Fig.13. This is the preferred method of obtaining pulses. If negative edges are required the circuit of Fig.5

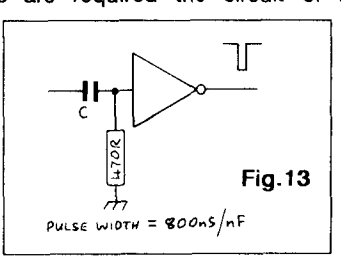


Fig.13

should be used. In the case of Fig.13, the pulse width of the output is approximately 500nS/nF - 47n gives around 25uS.

When using a NOR-gate in this way, there is no difference in the action - the positive-edge input (as in Fig.13) results in a negative output pulse just as a NAND-gate does.

Removing a half-line from picture time

When grille, or colour bar generators are used to make test signals, the usual source of drive is Mixed Blanking. This gives the test signals directly without the need for blanking out the signals during the line and field blackout times as is necessary if Line and Field drives are used. Whilst this gives good results it also gives one half-line at the top of the picture with a half-line displacement of the test signal. This is of no great consequence but does spoil the otherwise perfect pattern. The following circuit gives a simple method of eliminating this half-line from the driving signal, without affecting the rest of the pattern beyond a 24nS delay.

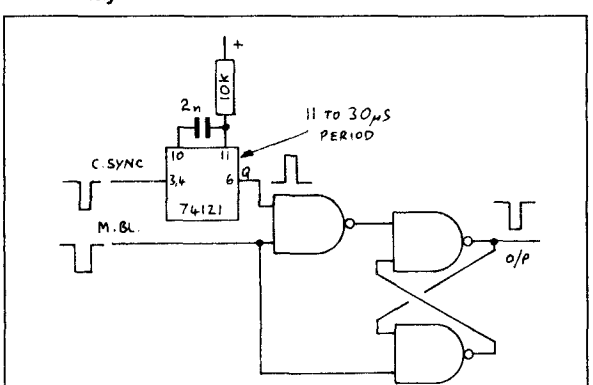


Fig.14 Removing Half-line from Picture

A monostable is triggered by Composite Syncs and has a period of between 11 and 30uS. This pulse is used to gate the Mixed Blanking in a NAND-gate and the output

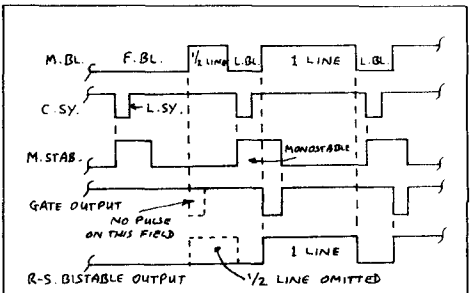


Fig.15 Removing Half-line from Picture

consists of negative-going pulses which start at the end of each blanking pulse - including the long one during the field interval. These pulses are used to trigger an R-S bistable latch whose other input is the Mixed Blanking input. The bistable thus regenerates Mixed Blanking. However, because the monostable period was less than half a line, only one long field blanking period gives rise to a trailing-edge pulse; the other does not. The missing one is from the field containing half-lines. The latch thus receives two successive leading-edge pulses during this interval and consequently ignores the second one. The result is therefore Mixed Blanking with a half-line missing. See Fig's 14 and 15.

Line Standards Detector

The two most common TV line standards are 525-lines, 60-fields per second and 625-lines, 50 fields per second. An automatic standards detector could be a useful device where both of these standards are in use. The basis of detection is that the two field periods are different. They are 16 2/3mS for 525 and 20mS for 625.

The detector shown in Fig.16 is given as an example of the use of the Dual retriggerable monostable 74123, and can be split into two parts. The first part consists of two

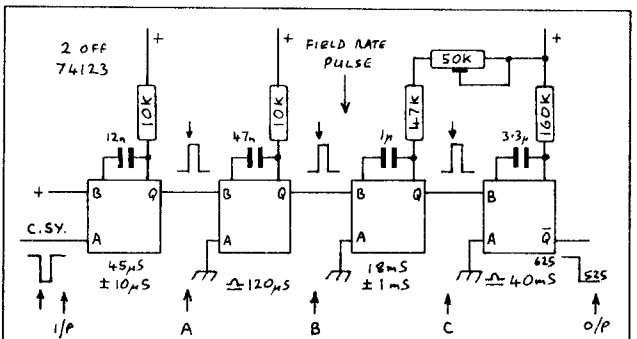


Fig.16 525/625 Standards Detector

monostables which generate a field rate pulse, and the second of the detector proper. The field rate pulse can be derived from any source but the circuitry shown enables it to be generated from Composite Syncs. The action is shown in Fig.17.

Incoming syncs trigger the first monostable which has a period of about 45uS. This is longer than a half-line and so during the field period when half-line pulses are present, the monostable Q-output remains up. The second monostable has a period of greater than one line and so its Q-output is high except during the field interval - i.e. it gives a field pulse out.

These field pulses trigger the third monostable which has a period of 18mS +/-1mS. This value is between the two standards field periods and so on 625/50 the monostable output is a series of 18mS pulses with 2mS gaps. On 525 the output is continuously high. This state of affairs is detected by the fourth monostable which has a period of some two fields. Its Q-output is continuously high on 625 because of the input pulses but on 525 there is no input (only d.c.) and so no output occurs. There is no need for great accuracy in the various periods except for the 18mS one and so variable timing controls should not be necessary.

Fig.18 shows an alternative method of obtaining the field pulse from composite syncs. The advantage is that smaller capacitors are involved. The circuit operates by detecting pulse-width differences between syncs and equalizing pulses.

The 3.5uS monostable period is set between the limits of these two kinds of pulses which are 2.35uS and 4.7uS and its output used to gate the second monostable. The period of this one may be any value from the minimum of some 30nS to some 15mS.

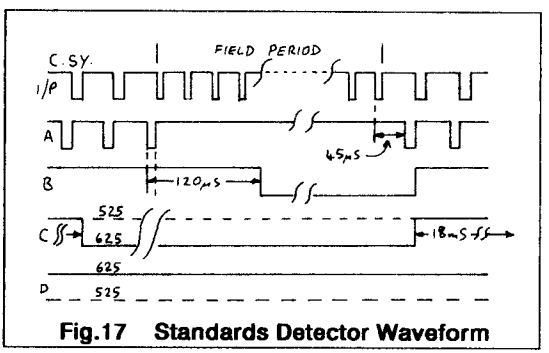


Fig.17 Standards Detector Waveform

Fig.19 shows the action of the gating on the triggering of this monostable and it can be seen that the triggering takes place at the trailing edges of the two groups of the equalizing pulses. If the monostable period is shorter than half a line then the output is 10 such pulses. If it is longer then the output is one long pulse. Either way, the 18mS monostable is provided with a trigger which causes it to make a field rate pulse. Thus the nett effect is the same but with smaller capacitors -indeed the second monostable may work without one at all.

If mixed blanking is the only available feed then only three monostables are required to do the job. The first one is given a period of greater than one line and thus

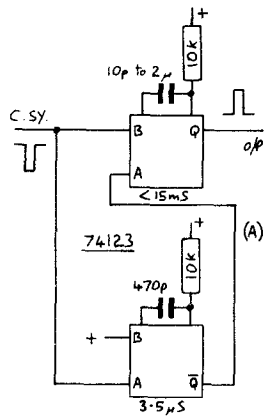


Fig.18 Alternative Field Pulse Generator (from syncs)

produces the field rate trigger directly for the second monostable (18mS). See Fig.20.

This application of the 74123 is one that could be considerably more difficult to do without the retriggerable facility.

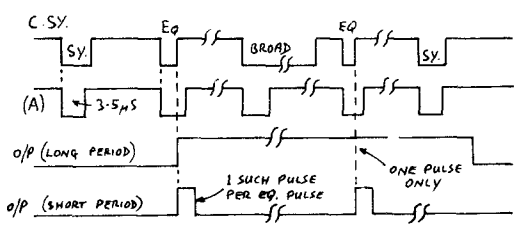


Fig.19 Waveforms for the Fig.18 Circuit

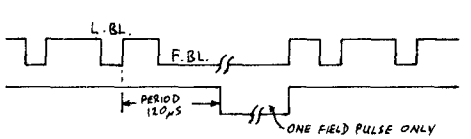


Fig.20 Waveforms when Mixed Blanking used as input to 120uS M/S of Fig.16

Conclusions

This series about TTL digital integrated circuits should by now have given the reader a good idea of how to use the various basic devices.

Of course there are very many variations on those covered plus a whole host of more specialised chips. There are several books available which list the current range. There are very few rules to follow and these are quite simple because the designers have eliminated the difficult ones in the basic design of the ICs.

Since the devices are digital it does follow that a good knowledge of pulse techniques helps a great deal, but for television purposes the greatest asset is a thorough knowledge of the various standard pulses from the SPGs.

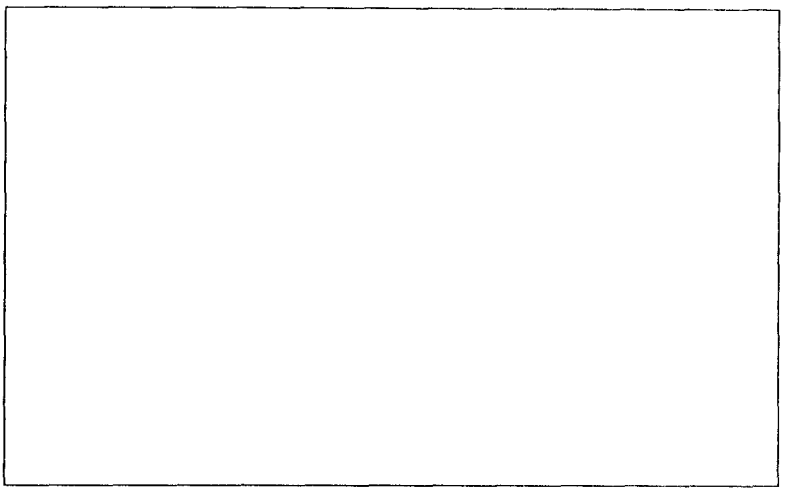
The derivation of the IC circuitry is then largely a matter of common sense, but trial-and-error plays a large part in it!

The best way to work out logic circuits is to have a go yourself and see what happens. It is not very likely that you will do them any harm even if you change the interconnections whilst they are on. You will usually require a good oscilloscope because the pulse rise-times are very short and spikes can easily be missed - even with a professional oscilloscope of high bandwidth.

In future issues

This series has not discussed shift registers in any detail so far, nor has it mentioned several other Medium Scale Integration (MSI) devices such as memories, coders, decoders, arithmetical units etc. These and other types will follow in later issues. MOS devices may be mentioned in the future, as may certain linear ICs.

RGB TO COMPOSITE VIDEO CONVERTER



This article first appeared in the October 1989 issue of Elektor Electronics and we thank the editor and ELV France for their permission to reproduce it here.

THE ELV RFK7000

Nearly all of today's home computers and personal computers (PC's) are capable of supplying RGB output signals for driving a colour monitor.

The ELV RFK7000 RGB-to-CVBS (chrominance-video-blanking-sync, or as we usually call it Composite Video) converter described here allows computer-generated colour pictures (or RGB signals from other sources) to be recorded on a VCR, displayed on a normal broadcast receiving TV set, or used as an amateur TV transmit source.

A very useful feature of this converter is that it will code both Digital or Analogue RGB signals to Composite video.

CONNECTING THE RFK7000

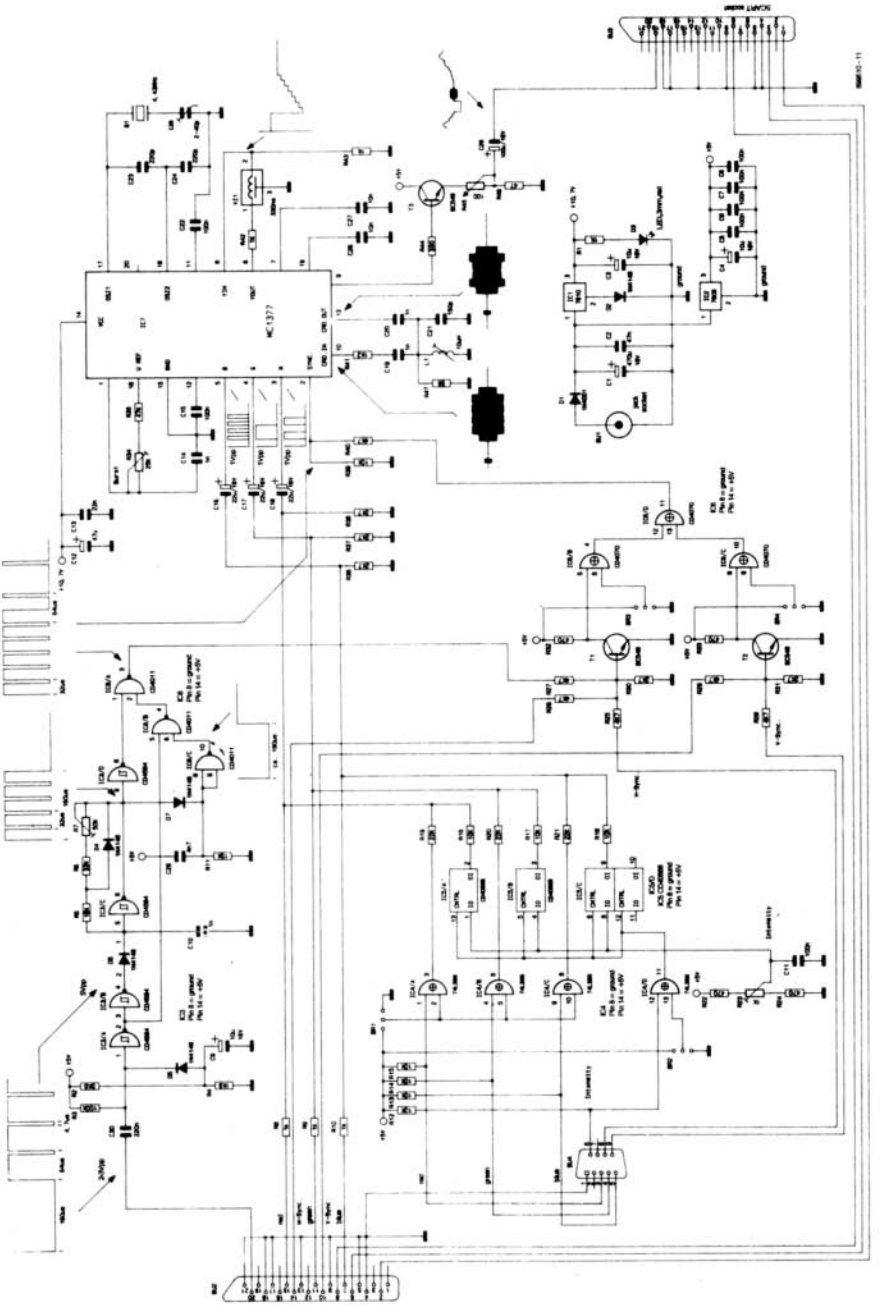
The RFK7000 has four connectors on its rear panel:

BU1 ... this is a 3.5mm jack socket for inputting the 12V DC supply.

BU2 ... this SCART socket takes the three ANALOGUE RGB signals at an amplitude of around 1,5V p-p. Analogue RGB signals allow an almost infinite number of colour combinations to be displayed.

BU3 ... Via this SCART socket the RFK7000 supplies the CVBS signal to the TV set, video recorder or whatever. A front panel VIDEO LEVEL potentiometer allows the CVBS signal output level to be adjusted over a wide range.

BU4 ... this 9-way sub-D connector accepts DIGITAL RGB signals at TTL level as supplied by most computers. The three signal lines and the associated intensity line give a maximum of sixteen colours.



Fig,1 RFK7000 RGB to CVBS Converter

CIRCUIT DESCRIPTION

The circuit diagram of the RFK700 is shown in Fig.1.

DIGITAL RGB INPUT

The digital RGB signals are applied to the converter via the 9-pin socket BU4. This input is intended mainly for IBM PC's and compatibles equipped with colour graphics adaptor (CGA).

A CGA card supplies the three RGB signals plus an intensity signal that allows any basic colour to be switched to half intensity. This results in a maximum of sixteen different colours. The pinning of the 9-way connector is as follows:

Pin 1 ..... ground

Pin 2 ..... not connected

Pin 3 ..... red

Pin 4 ..... green

Pin 5 ..... blue

Pin 6 ..... intensity

Pin 7 ..... not connected

Pin 8 ..... horizontal sync

Pin 9 ..... vertical sync

The RGB and intensity signals are applied to XOR gate inputs (IC4). Jumpers Br1 and Br2 enable the RGB and/or intensity signal to be inverted, so that the entire video signal can be inverted if desired.

The intensity signal is coupled into a matrix network via a CMOS switch. The second brightness level can be adjusted with preset R23.

The three RGB signals are taken to the analogue inputs (pins-3, 4 and 5) of PAL encoder IC7 (MC1377) via a resistor network composed of R16-R21 and R36-R38. At the chip inputs the RGB signals have an amplitude of about 1V p-p at maximum intensity.

Each synchronisation signal is first fed to a transistor buffer stage, T1 and T2, and from there to an XOR gate in IC6. The polarity of the sync signals can be set as required with the aid of jumpers Br3 and Br4. XOR gate IC6b supplies the composite sync signal at digital level. This negative-going signal is fed to pin-2 of IC7 via voltage divider R39 and R40.

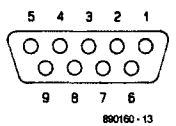
PAL ENCODER

The type MC1377 PAL encoder IC from Motorola forms the nucleus of the circuit because it performs the bulk of the signal conversion functions. The colour subcarrier frequency is adjustable with trimmer C25, while the position of the colour burst on the rear porch of the CVBS signal is adjusted with R34.

ANALOGUE RGB INPUT

The circuit takes analogue RGB signals from the SCART socket BU2. This input is intended for computers such as the Atari ST range or Commodore Amiga's, or other sources having an analogue or quasi-analogue RGB output. Since the RGB output level supplied by these computers is usually 1.5 to 3V p-p potential dividers R8-R9-R10 and R36-R37-R38 are required to ensure that the converter inputs are driven with a maximum level of 1V p-p.

The RFK7000 allows separate as well as composite sync signals to be applied to the SCART input. Separate horizontal syncs at pins-10 and 14 are fed to T1 and T2 via 4.7k resistors. The function of the transistors is similar to those used for the digital sync signals as discussed earlier. A composite sync signal as supplied by, for instance, the ATARI ST, is supplied via pin-20 of the SCART input socket. This signal is peculiar because it lacks horizontal sync pulses during the vertical blanking interval. The MC1377, however, cannot work properly without these pulses. The circuit around IC3 and IC8 converts the composite video signal into a standard composite video signal that can be handled by the MC1377.



9-way sub-D video connector

front view

Pin	Signal
1	ground
2	ground
3	red
4	green
5	blue
6	intensity
7	n.c.
8	h-sync
9	v-sync

Fig.2 IBM PC CGA Socket Pinning

The composite sync signal at pin-20 of the SCART input socket has an amplitude of 2 to 3V p-p. A clamping circuit composed of C30-R2-R3-R4-D5-C9 is used to derive a direct voltage from the composite sync signal. This direct voltage is given a digital level to control gate IC3a. A subsequent gate IC3b inverts this control voltage. Gate IC3c and surrounding components C10-R5-R6-R7-D4 form an oscillator that is disabled outside the vertical blanking interval by means of D6. This means that the oscillator supplies horizontal sync pulses during the raster blanking interval only. The number of pulses, and with it their spacing (32uS), is adjusted with preset R7. Gate IC3d normally supplies a steady logic high level, but positive-going horizontal sync pulses during the vertical blanking interval.

The length of the raster blanking interval is determined by components D7-C29-R11 and inverter IC8c, whose output level changes from low to high at the end of the vertical sync. This event enables the regenerated horizontal sync pulses from pin-2 of IC3a to be added via IC8b, so that the output of the sync generator, pin-8 of IC8, supplies a normal composite sync signal. If the input signals for the converter are obtained via SCART socket BU2, the jumpers on Br1 and Br2 must be set in a manner that ensures low levels at the output of XOR combination IC4 (Br1 and Br2 at +12V).

CGA AND 50/60 Hz

The colour graphics adaptor (CGA) in IBM PC's and compatibles supplies a vertical scanning frequency of 60Hz. Most modern TV sets are capable of detecting this and switch automatically from 50 to 60Hz. Older types, however, may require the vertical sync to be corrected if the picture rolls. In most cases this adjustment is fairly simple to make by means of the vertical hold control on the TV set.

If the picture is not correctly centred use the MS-DOS command **MODE CO80,R** to shift the entire picture one character to the right.

OUTPUT CIRCUIT AND POWER SUPPLY

The composite output signal is supplied by buffer T3, level control R45 and electrolytic capacitor C28.

The RFK7000 has two on-board voltage regulators so that it can be conveniently powered from a standard mains adaptor with 12V DC output at about 300mA. The unregulated input voltage is applied via socket BU1 and fed to buffer capacitor C1 via D1, which affords polarity protection.

Capacitor C2 serves to suppress noise. Regulator IC1 has a diode D2 connected to its ground terminal to raise the output voltage from 10V to approximately 10.7V. This provides the supply voltage for the PAL encoder MC1377, which requires a minimum of 10.5V for correct operation. Capacitor C3 serves to eliminate any risk of oscillation . LED D3 is powered by R1 and indicates that the RFK7000 is switched on. Finally, the 5V supply for the digital circuits

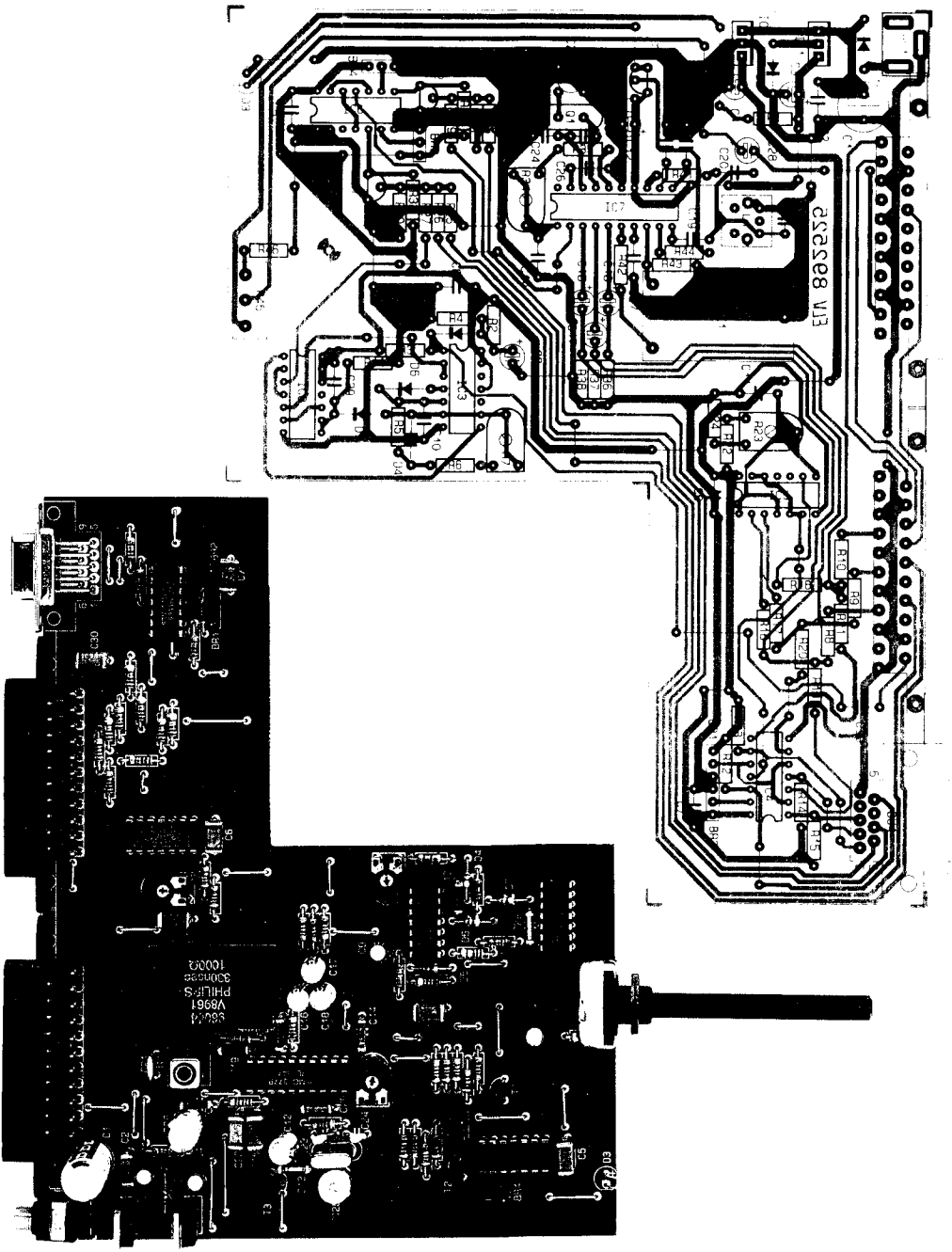
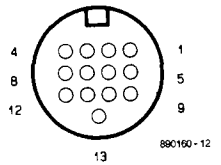


Fig.4 RFK7000 PCB Layout and Component Overlay



Atari ST 13-way monitor connector

front view

Pin	Signal
1	audio output
2	composite sync
3	port IO87; YM-2149 sound generator
4	monochrome sense
5	audio input
6	green
7	red
8	+12 V via 1k2
9	horizontal sync
10	blue
11	monochrome video
12	vertical sync
13	ground

Fig.3 Atari ST Monitor Socket Pinning

is formed by regulator IC2 in combination with decoupling capacitors C4 to C8.

CONSTRUCTION

The RFK7000 is relatively simple to build because all parts are accommodated on the single printed circuit board supplied with the kit. Construction is expected to take about 3 hours.

Start by inserting the lowest profile parts, the 29 wire links (do not solder them as yet). Next, bend all resistor wires to obtain the correct pitch and insert them in the PCB in accordance with the parts list and the component overlay on the PCB. Push the terminals apart after inserting the resistors to ensure that they do not drop from the board as it is turned and pushed firmly on a flat surface. Solder all wire terminals,and cut them off as close as possible to the solder joint.

Next, turn the board and fit the seven diodes, eight ICs, capacitors, etc. in the normal manner. Lastly, mount the four connectors and the video level potentiometer on the board. Check your work by inspecting all solder joints.

Remove the nut from the 3.5mm jack socket, and fit the rear panel of the enclosure to the rear side of the PCB. The two SCART sockets and the 9-way sub-D socket are each secured with the two M3*10mm screws inserted through the socket flanges from the outside of the rear panel. Each screw is secured with two M3 nuts. Mount and tighten the nut on to the jack socket.

The front panel supplied with the kit is also quite simple to mount. Remove the nut from the level control potentiometer, mount the front panel, and secure the nut again at the outside. The potentiometer spindle is cut to about 10mm.

Next, fit the collet knob and secure it on to the spindle. Insert the PCB with the front and rear panel attached into the guides in the bottom half of the enclosure.

JUMPER SETTING

Most CGA's in IBM PC's and compatibles supply positive H-sync and V-sync signals. Some cards, however, supply a negative v-sync signal. The horizontal sync signal is fed to the base of T1 via pin-8 of socket BU4 and R25, and the vertical sync signal to the base of T2 via pin-9 of BU4 and R28.

Assuming that positive sync signals are applied, either the horizontal or the vertical sync signal must be inverted to ensure a negative going composite sync signal at pin 11, the output of IC6d. This may be achieved in two ways;

1) Pin-6 of IC6b is tied to +5V via Br3, and pin-9 if IC6c to ground via Br4;

2) Pin-6 of IC6b is tied to ground via Br3, and pin-9 of IC6c to +5V via Br4.

Since most CGA card, supply positive going RGB signals, Br1 is connected to ground to ensure that the signals are not inverted by gates IC4a through IC4C.

The same applies to the intensity signal: pin-13 of IC4d is normally connected to ground via Br2. The value of R23 determines the effect of the intensity bit on the colours, and may be adapted to individual requirements. The jumpers on the board are fitted to allow the RFK7000 to accept sync polarities from CGA cards other than the standard types around. In case of doubt, consult the manual supplied with your CGA card.

ALIGNMENT

The alignment of the RGB-to-CVBS converter concentrates mainly on PAL encoder IC7. Alignment is straightforward, and can be carried out without an oscilloscope. Apply a digital RGB signal to BU4 (if necessary, refer to the pinning shown in Fig.2), and connect a monitor with CVBS input to BU3. Adjust C25 and R34 alternately until the colour appears on the monitor.

Alignment with the aid of an oscilloscope is even simpler because the instrument allows R34 to be adjusted beforehand. Connect the scope to the output of the RFK7000, pin-19 of BU3. Adjust R34 until the colour burst starts at 0.5 uS after the horizontal sync pulse.

Next, adjust the cross-colour filter, L1-C21. Use an insulated trimming tool to adjust the core of L1. Watch the picture on the monitor, and minimize the moving cross-colour patterns that occur typically at colour boundaries. This adjustment is also possible with aid of an oscilloscope.

This completes the adjustment of the RFK7000 for use with CGA-compatible PC's. No further alignment is required if the separate sync signals are applied to the SCART input socket. If, however, composite sync is applied to pin-20, preset R7 has to be adjusted.

Although the Atari ST range of computers supplies separate sync signals to the monitor socket (pinning: see Fig 3), composite sync is used on the SCART cable provided with some ST's. Preset R7 is used to set the pulse spacing of the horizontal sync signal generated during the vertical blanking interval. The pulse spacing may be measured at pin 8 of IC3d, and should be about 32uS. The actual value is fairly uncritical, the important thing is that the MC1377 receives an even number of horizontal sync pulses during the raster blanking interval. This is required for correct synchronisation of the internal PAL bistable.

Constructors not in possession of an oscilloscope simply adjust R7 until colour shows up on the screen. Some re-adjustment of R34, R7 and C25 may be required for optimum results, because these adjustments have a fairly large range and some interaction. In most cases, however,the alignment of the RFK7000 is straightforward by optimising the colour fidelity with the aid of the monitor.

Finally, it should be noted that the graphics card or computer used to drive the converter must be programmed to supply 50Hz vertical sync pulses if picture are to be recorded on VCR. This is not required for most vertical scanning rate is adjusted either automatically or manually to sync at 60Hz. The RFK7000 is not suitable for NTSC systems.

The RFK7000 is available in kit form or ready made from: ***ELV France, B.P.40, F-57480 Sierck-Les-Bains, France. Tel: (33) 82 83 72 13***

The kit is available under reference 44.525BKL at £66.50. The complete unit is available undrer reference 44.525F at £119.50.

COLOUR SLOW SCAN TV

ALMOST THE STATE OF THE ART !

R.W.J.HUMPHRIES B.Sc.

G4UKL

The art of the slow-scanner is continually evolving; there is always something new, something discarded, something being tried, better software, modified hardware, a continuous probing for the ultimate in resolution, colour purity and speed. Not surprisingly amateur interest and development has found commercial echoes and in turn the amateur has benefited from industrial spin-off.

All the information given below is for high-resolution colour, but every system supports monochrome, some up to near photographic quality in the slower speeds. There are many stand-alone computer programmes for black and white SSTV with lesser resolution and certainty, these give a fair start to addiction but are not included here.

The purpose of this article is to outline the mainstream developments, indicate what is available and from what sources for colour SSTV. It cannot be definitive or exhaustive, successful refinement and innovation by individuals working alone or in groups world-wide takes time to filter through. If you haven't seen any modern high-resolution colour slow-scan TV lately, do get an invite to the shack of the nearest competent devotee. The contemporary approach is as far removed from the surplus ex-radar tube as is the spark-gap transmitter (not perhaps the best analogy, some of the CW one hears suggests spark-gap is still current!). Those of you already hooked read on, you will probably find something you didn't know about or haven't yet got.

START HERE:

There are three practical approaches to high-res colour SSTV, choice depends on how much you can spend and whether you want a system which can be expanded later into other modes of operation. There are several modes in current use, none compatible with another so unless prior thought is given for later hardware/ software modification you may be confined to RX/TX in a single mode. With a choice, an appropriate mode for prevailing band conditions, distance and set-up of the other station can be made.

CHOICE 1:- SPECIALIST SSTV COLOUR CONVERTERS.

There are two types both of which require a minimum CGA colour monitor, ideally with RGB or analogue input. A composite signal is available but yields a less sharp picture and sometimes patterning.

VOLKE-WRASSE MODEL SC1.

Mainly confined to the European market this German designed converter is capable of very high resolution pictures in various speeds. Fax TX/RX is included. The picture produced is square ie a 1:1 aspect ratio. It is not able to TX/RX pictures in any mode or speed other than its own and as

far as is known there is no modification available to effect this. This converter has lost ground to the rival ROBOT system because of the flexibility of the latter's computer interfacing and microprocessor control. The manufacturers of the SC1 appear unwilling to upgrade or improve their system to make it universally compatible and acceptable.

ROBOT 1200C.

Widely used throughout the world,this line-sequential converter uses an 8031 microprocessor and has a 4:3 landscape aspect ratio display. It embodies computer interfacing via a conventional parallel port and includes many in-built functions and a graphics facility. No fax. The 1200C produces very good on screen pictures with a B/W or colour print-out function. There are no manufacturers extra options all upgrades and computer software has been developed by amateurs. The major modifications universally made include the addition of three extra high res memories to make four in all (8 with a slightly reduced resolution). The addition of other modes for TX and RX, computer interfacing and a mouse to provide on-screen picture manipulation and graphics overlay.

As you would expect this is accomplished in the main by modification to the circuitry, substitution and addition of IC's and the replacement of the master Eprom (sending data to the microprocessor) with a customised version.

You know now that the various modes in use are not compatible, each one having its own dedicated system of timing, format, horizontal and vertical sync (or its absence), in addition to the commercial modes, such as Robot and Volke-Wraase.

Aternative modes giving superior performance have been developed by G3OQD (New Mode) ,GM3SBC (Scottie mode) and more recently Amiga via The Black Belt system of N4EJI. All capable of yielding superior results with considerably less susceptibility to QRM and QSB. Additionally their ability to receive pictures from very low signal sources is remarkable.

LM9000

This is virtually identical to the Robot 1200C sold mainly in the antipodes.

MODIFICATIONS AND MODES IN MORE DETAIL

Robot 1200C

The four memory modification for the Robot was developed entirely by G3OQD and entails removal of the 1200C analogue and main board so that additional wiring can be made, a track identified and cut and after reassembly, eighteen 56K ram memory chips are substituted with 256K D-rams, and the upgraded eprom fitted. This requires a fair degree of confidence and skill with a soldering-iron. G3OQD offers a service to do this, 1200C purchasers arranging for the converter to be delivered from the supplier to G3OQD who will make the necessary changes, test the entire system and send on the 1200c ready for use. See New Mode by G3OQD below.

SCOTTIE MODE BY GM3SMC

The only SSTV system to use a mouse to draw on the screen. It has a picture TX/RX system giving cleaner, clearer colour and greatly enhanced resolution over the original Robot and includes both SC1 and Robot compatibility. A piggy-back board and cabling support a dedicated mouse interface (mouse recommended is by Atari and is not provided). The mouse gives real-time access to the monitor enabling the user to write or draw directly on the screen in any desired colour or brush style, or used in conjunction with the built-in art package produce custom screens. Also included in the eprom is a dual text generator, cut and paste, picture manipulation facilities and a video editor which it is claimed removes received QRM.

The system requires the replacement of the existing 12Mhz crystal and some delicate soldering to chip legs. All facilities are accessed from pop-up menus at the bottom of the monitor and chosen by the mouse. No computer is necessary for Scottie operation.

Both this mode and the G3OQD version 2.4 Eprom require the substitution of the Robot standard 12Mhz crystal by a high stability precision type (supplied with Scottie), if this is not effected there is every likelihood that sloping pictures will result. As a further aid to frequency stability a dedicated 5V controlled voltage source can be used to feed the crystal oscillator.

'NEW MODE' BY G3OQD

This is a customised replacement Eprom, which unlike the Scottie mode requires no circuit modifications, just plug in and go. The 256K Eprom includes Robot, Volke-Wrasse and Scottie modes (the latter RX/TX only. No mouse). It will also receive fax. Accessed through the Robot touch-pads no computer is needed, it is capable of the highest resolution and will continue to receive pictures under extreme conditions of QRM and QSB. This Eprom is under continuous development and future versions are expected to include the Amiga mode and character sets. SSTV'ers who own both New-Mode and Scottie Eproms will be pleased to know that both can be combined into a single chip, whilst retaining all the facilities of both systems. In practice the New Mode Eprom is added to the existing Scottie Eprom, the conversion is being carried out by G3OQD.

EA5FIN

Eprom twinning board: Circuitry is available for a piggy-back PCB which will hold both the G3OQD and GM3SBC Eproms. The board fits into the vacated Eprom socket and parallels 24 of the 28 pins on each Eprom, the remaining four being switched. The author has constructed two boards, both functioned but with some instability after 30 minutes or so into a session, probably due to interaction between the 24 pairs of connected, unswitched pins. A PCB is being produced which will obviate the tedious tightly packed wiring involved and which may give greater stability. This method of having both Eproms resident at the same time will appeal to amateurs wishing to retain their Eproms for future individual upgrades.

SOFTWARE FOR SSTV CONVERTERS.

SC1 ... The SC1 has no computer interface and as far as is known no software has been produced.

1200c 'DIGIVISION' ... This excellent programme by G4FJY is for use with BBC micros only, including Models B and Master 128, but not Archimedes. Standard supply is on an 80 track disc with versions available for single/dual floppies or Winchester on request. The programme consists of a suite of ten menu-driven programmes which used in conjunction with an external interface transfers data to the Robot 1200c via the printer and user ports of the micro (interface supplied).

The programme carries out all the essential picture save and retrieve operations in C1 and C2 modes, has a paint-on screen facility, colourful character sets, mirror, inlays, border and colour manipulation facilities. Very user-friendly and reliable. Language BBC BASIC + Assembler.

1200C ... Programmes for use with XT/AT IBM clones and the Amstrad 1640. All the following software requires the computer to have an 8255 chip interface board resident in an expansion slot and connected to the Robot 1200C's parallel port. Until recently the only suitable board was the PIO-12 from the American Metrabyte Corporation but cheaper interfaces, dedicated specifically for the purpose, are being produced at half the price.

Software is usually identified by the call-sign of the author, the following programmes for IBM clones are available.

W5ZR ... Is a compiled Quick Basic suite, menu driven with all Robot functions supported plus some novel features making it very suitable for contest operation. Whilst the large graphics facility is fine for W5ZR, it has a singular anomaly in that this feature generates only four characters across the screen, too few for most call-signs. Menu driven, with many sub-menus and some sub-sub menus, it has a unique and very effective method of picture storage. Once familiarised it becomes friendly and easy to use. Language: Quick Basic.

K6AEP ... The oldest programme. It will save and load pictures from disc, access the Robot graphics character set and other functions. Menu driven, it requires some effort to become fluent with the well-packed screen. A good straight programme with no fancy embellishments. Language: Microsoft Basic version 2.0/3.0.

W1ZR ... This has an radically different approach. Fundamentally a general purpose SSTV utility programme to work with the Robot 1200C, it is designed to be called from MS-DOS once for each function to be performed, returning to DOS on completion of that function. With no programme permanently resident in memory it does not tie up the computer. There is no on-screen menu but a shell programme such as Norton Commander (supplied) can be tailored to call up the functions with appropriate arguments. Included is a comprehensive demo programme with examples, pictures and a printable user-manual. Not the easiest of programmes to master but great if you want to use the computer for zapping aliens whilst working SSTV. Language: Microsoft-C version 4.00.

I3XQW ... A straightforward menu driven programme which supports all essential functions and internal 1200C goodies. Included is a useful procedure which will call up two other popular programmes (W5ZR and KC5VC) allowing their facilities to be added to the programme. Has many sub-menus for exploration. Language: GW Basic.

KC5VC ... Written by the late Jim Williams this programme is probably the most popular. Developed over several years up to the final versions 39.0E and 39.5E, it has a wide range of sophisticated functions, superb graphic and picture manipulation, stereo picture production, overlays, cut and move, mirror, picture reversal, plain and fancy borders, auto transmit in all major modes and speeds, log-book, CW ident before transmit, general CW transmit are but some of the menu-driven facilities. For the needy, there is even a CW practise routine. All-in-all a comprehensive, user-friendly programme.

Unfortunately Jim died before he could put the finishing touches and debug the last two releases (39 and 39.5), but this work has now been completed by the author, who will exchange bugged copies received from KC5VC for the debugged version 39.5R.

The programme will continue to be developed into the future by Dick Isely (WD9GIG) who has acquired the copywrite, a new version (40.0) will be released in early Spring 1990. This will also be available in Europe from G3OQD.

Z17 ... P.D. software: Little is know of this software. The author's version does not run far on XT/AT computers, exasperatingly hanging-up. In place of the conventional menu the programme simulates the entire Robot front panel on the computer screen, using the function keys etc. to access the facilities.

When the running problems have been sorted out and the read.me files re-drafted in an adult manner, this could be a usable and worth-while addition to SSTV. The novel graphic simulation of the 1200C will appeal to many.

In the interests of completeness a further software/hardware addition for EGA XT/AT computers is described.

This is a Gen-lock board which mates to an existing EGA Paradise graphics board in the computer (other boards may work). Its prime function is to overlay or copy the computer screen onto camera or VCR displays for titling and graphic overlays, which it does very well.

Unfortunately it will only just function through the Robot 1200C camera input the resultant resolution being too poor to be of any practical value whatsoever.

The 1200C would need to support EGA to get a CGA image overlay from the computer.

AMIGA SYSTEM (formerly the Black Belt system by N4EJI). The full version of this is not yet on sale in Europe. It consists of a hardware box and software for Amiga computers with 1 Mbyte memory and a digitiser interface between the computer and camera. The Amiga mouse is utilised and the system requires an RGB monitor.

This combination will receive and transmit pictures in Robot, Scottie, New Mode and the new Amiga ATV mode (Amiga TeleVision). Additionally it supports the old speeds of 25.5.,51 and 102 seconds. The new form of colour slow scan included is a very narrow-band system requiring, it is claimed, only 400hz of band space. It is also claimed that by using the narrow-band filter on the transceiver pictures will continue to be received despite QRM right down to S0 levels.

Also included in the programme are colour graphic fonts, weather/news fax and a comprehensive package of picture manipulation facilities.

The new ATV mode is of course incompatible with all other modes. In the USA the complete package including a computer and monitor costs around $1300. It will eventually be marketed in Europe.

CHOICE 2:- COMPUTER ONLY

AMIGA SOFTWARE: This is available in the UK for most Amiga computers. Its mode is confined to the German Volke-Wrasse square format. It works remarkably well in both colour and black and white. An updated more mode compatible version has been muted for some time but has yet to appear.

BBC SOFTWARE RX-8: This,the most recent software only system developed for BBC Micro owners uses programmes blown onto Eproms. The system receives and transmits in colour with variable speeds, but does not support the modern high resolution modes used by the enthusiastic slow-scan operators. Its advantage is that it offers a relatively cheap entry into colour SSTV from a reliable source. *(See the review elsewhere in this issue).*

CHOICE 3:- BUILD YOUR OWN

DIY ROBOT-1200

A very informative article on this topic appeared in CQ-TV 148. The basic building blocks being a full set of PC boards which build up into a clone of the Robot 1200C known as the LM9000. The boards together with full instructions, circuitry and documentation are supplied by VK3LM. A video tape to aid construction is also available.

Several LM9000s have been built in the UK with every satisfaction and at a considerable saving over the cost of a new 1200C. Some specialised chips may need tracking down and intending constructors in the UK should consult the mine of useful information in the article by G8LSB in CQ-TV 148 before proceeding.

G3WCY/G4ENA

This scan converter has been around for some time, many have been built and are in successful use. A very useful Eprom

based upgrade which will control the programme from a BBC computer appeared in CQ-TV 148. This modification allows the saving of much higher quality pictures than the conventional tape save.

SOURCES

Volke-Wraase agency: Mr.A.Corker G4NJI, 59 Foljambe Road, Eastwood, Rotherham, Yorks ,S65 2UA. Tel: 0709 68098.

Robot(UK) Ltd., Building 232, East Midlands Airport, Castle Donnington, Derby, De7 2SA. Tel: 0332 812446

LM9000 (Do it Yourself): VK3LM, John Wilson, TV Enterprises, RMB 4201A, Yallangatta Valley, Victoria 3701, Australia.

G3WCY/G4ENA PC Boards and circuitry from the B.A.T.C.

BBC Eprom upgrades from Mr.B.Roberts, G4VYG, 52 School Lane, Toft, Cambridge, CB3 7RE. Tel: 0223 262895.

Robot 1200C New Mode Eproms, interface boards, oscillator boards, four memory upgrades, two-in-one Eprom: Mr.M.Emmerson G3OQD, 6 Mounthurst Road, Hayes, Bromley, Kent BR2 7QN. Tel: 01 462 4223 (After 6pm).

PC XT/AT Robot interface boards: Newsome Electronics, 19675 Allen Road, Trenton, MI 48181 U.S.A. TEL: (313) 479 2100

PC/AT Robot interface board UK agents for the Metrabyte Corporation's PIO-12: Keithley Instruments Ltd., 1/3 Boulton Road, Reading, Berks. RG2 0NH. Tel: 0734 861287.

Gen-lock board: Vine Micros Ltd., Marshborough, Sandwich, Kent, CT13 0PG.

BBC Computer Digivision System: Mr.P.Turner G4IJE, 61 Primley Lane, Sheering, Bishops Stortford, Herts, CM22 7NH.

W5ZR Software: Mr.B.Beyt W5ZR, 301 Tampico Street, New Iberia, LA 70560, U.S.A.

KC5VC Software: Mr.G.Isely WD9GIG, 736 Fellows Street, Saint Charles, IL 60174 U.S.A. Tel: 708 584 3510

I3XQW Software: Sr.Pietro Mescalchin I3XQW, Via Monte 1, 35125 Padova, Italy. Tel: 049 684392

W1TR P.D. Software: Mr.T.G.Gladowski, 20 Stedman Street, Chelmsford, Massachusetts 01824, U.S.A. Tel: 617 256 3283

Z17 Software: Mr.T.N.Huddleston, 67 Drumcallan Road, Downpatrick, Co.Down, Northern Ireland. Tel: 0396 613197

Debugged copies of KC5VC versions 39.0 and 39.5 for original purchasers: Mr.R.W.J.Humphries G4UKL, Wayside, Treverva, Nr. Falmouth, Cornwall, TR10 9BN. Tel: 0326 40595

New purchasers and updates of KC5VC software European agent: G3OQD address above.

Amiga systems: Advanced Electronic Applications Inc., PO Box C-2160, Lynnwood, WA 98036, U.S.A. Tel: 206 775 7373.

Amiga software: ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Arundel, West Sussex, BN18 0BD.

RX-8:Technical Software, Fron, Upper Llandwrog, Caernarfon, Wales, LL54 7RF. Tel: 0286 881886.

Scottie EPROM: Mr.E.J.Murphy GW3SBC,65 Silverknowes Crescent, Edinburgh, EH4 5JA, Scotland.

EA5FIN : Sr.A.Lambrieux, Camino, Sotoavento, Murcia 30370 La Manga, Spain.

If you have any SSTV news concerning hardware, software, or whatever, or news of regular slow scan nets on any band, please let me know. The address, as ever, is on page-2, the 'Who To Write To' page, at the front of this issue ..... Mike.

USING OSCILLOSCOPES

Part–3

Mike Wooding G6IQM

Continuing the investigation of oscilloscopes, how and where to use them, I shall be looking at the Horizontal Control System in this part of the series. Again, I must thank Tektronix Inc. for their help, advice and permission to reproduce information contained in their publications.

horizontal as well as vertical data. The horizontal system of the oscilloscope supplies the second dimension, by providing the deflection voltages to move the electron beam horizontally. The horizontal system also contains a *sweep generator*, which produces a sawtooth waveform, or *ramp* (see Fig.2) that is used to control the

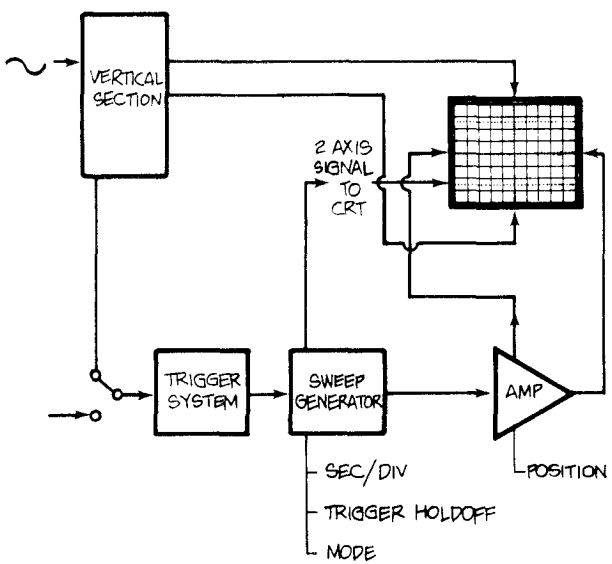


Fig.1 Horizontal Control System Block Diagram.

THE HORIZONTAL CONTROL SYSTEM

A block diagram of a typical oscilloscope horizontal control system is shown in Fig1.

To draw a graph the oscilloscope requires oscilloscope's sweep rates. This ramp waveform is processed by an amplifier stage and then applied to the horizontal deflection plates of the CRT. The horizontal system also provides the Z axis of the oscilloscope, this axis determines whether or not the electron beam is turned on, and

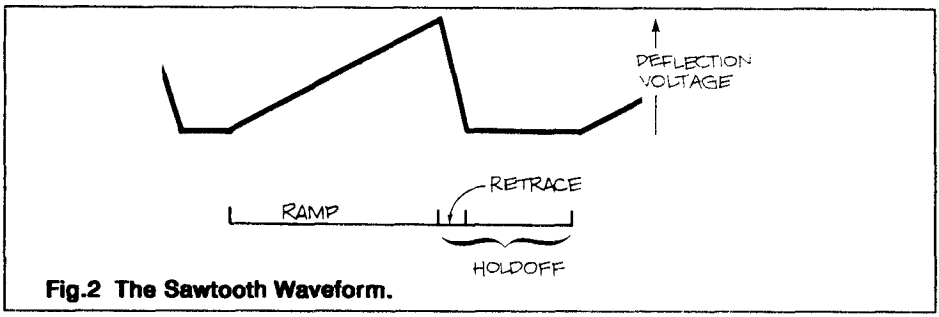


Fig.2 The Sawtooth Waveform.

The **SAWTOOTH WAVEFORM** is a voltage ramp produced by the sweep generator. The rising portion of the waveform is called the ramp; the falling edge is called the retrace; and the time between the ramps is called the holdoff time. The sweep of the electron beam across the screen of an oscilloscope is controlled by the ramp, and the return of the beam to the left side of the screen takes place during the retrace.

It's the sweep generator that makes the unique functions of the modern oscilloscope possible. The circuit that made the rate of rise in the ramp linear – a refinement pioneered by Tektronix – this was one of the most important advances in oscillography. It meant that the horizontal beam movement could be calibrated directly in units of time. The advance made it possible to measure time between events much more accurately on the oscilloscope screen.

Because it is calibrated in time, the sweep generator is often called the **TIME-BASE**. It lets the user pick the time units, observing the signal for either very short times measured in nanoseconds or microseconds, or relatively long times of several seconds.

HORIZONTAL SYSTEM CONTROLS

There are many variations in types of oscilloscopes, from the simplest basic single beam model to the multiple beam/multiple timebase models. In order to explain all of the controls available on the latter type of instrument would take a very long time, therefore I am going to base this description on a single timebase model with a sweep delay facility – the Tektronix 2213, which is shown on the next page. This oscilloscope, although having some features not available on the sort of equipment most of us own, is an excellent example on which to base this series. The horizontal system controls are as follows: Horizontal **POSITION, HORIZONTAL MODE, SEC/DIV, VARIABLE SEC/DIV, MAGNIFICATION** – these are the controls to be found on all oscilloscopes – plus **DELAY TIME** and **MULTIPLIER**.

HORIZONTAL POSITION

Like the vertical position control, the horizontal position control is used to change the location of the waveforms on the screen, only in this case in the horizontal plane. Very often the control has a built in vernier drive, allowing for very accurate positioning of the waveform on the graticule.

HORIZONTAL MODE

Single timebase oscilloscopes usually have only one horizontal operating mode, but some models, including the 2213 used in this series, offer normal, intensified or delayed-sweep modes.

Other models offer dual timebases, in

which the main, or **'A'** timebase is undelayed (like the sweep of a single timebase instrument) while the second, or **'B'** timebase, is started after an adjustable delay time. Also, some dual timebase models offer the facility to view both sweeps at once; the A sweep intensified by the B, and the B sweep by itself. This is called an *alternate horizontal operating mode.*

SWEEP SPEEDS

The **SEC**onds/**DIV**ision switch lets the user select the rate at which the beam sweeps across the screen; changing the settings of the switch allows the user to look at longer or shorter time intervals of the input signal. Like the vertical system volts/div switch, the control's markings refer to the screen's scale factors. If the **SEC/DIV** switch setting is 1ms, that means that each horizontal major division on the graticule represents 1ms, and the total screen will display 10ms.

Most models of oscilloscopes also have an **XY** position (sometimes called **X EXT**) on the **SEC/DIV** switch for making X-Y measurements, to be described later in this series.

VARIABLE SEC/DIV

Besides the calibrated speeds set by the position of the **SEC/DIV** switch, the sweep speed can be varied by turning the **VAR** control found usually in the centre of the **SEC/DIV** switch. This control has a **CAL** position, usually at the extreme clockwise end of its travel, which sets the sweep period as determined by the setting of the **SEC/DIV** switch. Rotating the variable control anticlockwise slows the sweep speed from the setting of the main switch. The range of the control is such that any sweep speed can be set between the range settings of the main switch. Some of the more sophisticated digitally controlled oscilloscopes give a readout on the screen of the settings selected for the vertical and horizontal controls, thus the user can set an exact sweep speed even with the variable control. However, with most instruments the only calibrated settings are those of the main control when the variable control is set to its CAL position.

MAGNIFICATION

Most oscilloscopes offer some means of horizontally magnifying the waveforms on the screen. The effect of magnification is to multiply the sweep speed by the amount of magnification.

On the Tektronix 2213 this control is activated by pulling out the variable control knob. This enables a magnification factor of x10, that is the setting of the **SEC/DIV** switch is **DIVIDED** by a factor of 10 (eg: if the **SEC/DIV** setting is **0.05us**, with the magnification enabled this becomes 0.05/10us = **0.005us**, or 5 nanoseconds).

This facility is very useful when looking at signal points that occur very closely together in time.

DELAY TIME AND MULTIPLIER CONTROLS

As stated earlier, I doubt that many members' will own an oscilloscope with these enhanced facilities, but a brief description will be given in this series on their operation and use.

The delay time and multiplier controls are used in conjunction with either the intensified or delayed sweep operating modes. On dual timebase instruments fitted with these facilities the B sweep delay time control is usually a 10-turn type. Further descriptions on these facilities will be dealt with later in this series under the heading 'Delayed Sweep Measurement' in part-7.

This completes part-3 of this series. In part-4 I shall be describing the Trigger System of an oscilloscope.

GB3TG - *THE GATEWAY!*

Dave McQue G4NJU - (RMG Special projects co-ordinator, TV and Microwave)

On Saturday the 9th of December 1989 GB3TG went on the air in beacon mode only on 10.150GHz. With the aid of Nigel G8IFF, Mark G6XEG and Colin G1YEB the RF head and video modulator were installed at the top of a 20ft scaffold pole, which in turn was secured to two stout wall brackets. Then the power supply and video source were connected in the 'Equipment Room'.

Although the site is at the highest point of Great Brickhill, I had some concern that the signals would not clear some trees and buildings, at least for close in reception in Fenny Stratford. However, the beacon program was run in on the Spectrum, the doors were locked, and off we went to Mark's abode, which is some 60km from the site in the centre of the azimuth coverage.

The receiver was set up and lo and behold a P5 picture appeared. Of course, Mark's place is some 160ft AGL, and at one time was coveted as an alternative site! Never mind, I took the receiver home and once again, at 4km from the site, I have a P5 signal.

So what! you may say. Well, the transmitter is a Gunn diode oscillator of about 10mW (-20dBW). The aerial is a waveguide with twenty half-wave slots milled in the broad face. I did have three of these aerials made, but now G8OZP and G8JMJ have one each. Hopefully they will both use them for other 10GHz repeaters.

To continue, the beamwidth should be about 70 degrees in azimuth and 5 degrees in elevation, giving a gain of about 20dBi, so the current ERP is around 0dBW (1W). The beam heading is 315 degrees true, so that the 70 degree arc covers the built-up area of Milton Keynes.

My receiver uses a modified LNB down converter into an Amstrad tuner. Steve G8JMJ fitted a new dielectric resonator 'Puck' in the LNB, which puts the local oscillator on 9GHz, so a standard satellite receiver tuner can be used. The sensitivity is much greater than the Mitsubishi diode mixer I have used up to now.

The first receiver aerial used was a PW 45cm dish with a 'Penny feed'. It looked through my shack window at an angle to the window of 20 degrees! Signals then appeared to be so good that I tried a 10dB horn as found on a Solfan movement detector. Then there were some sparklies so I finally settled on a 9 x 11cm horn, which is just good enough to give a P5 picture.

Now effor is being concentrated on the Gateway proper. The next stage is to get a system going as a repeater on 10Ghz. The input frequency will be 10.250GHz. I have a low-noise front end, but in order to use a common aerial for transmit and receive a circulator is required. To avoid having to modify an isolator I would be grateful if anyone has a cheap spare with SMA connections. I have been promised a 100mW PA, which will push the ERP up to 10W! Any interest and assistance from anyone fairly local will be gratefully received.

As an aside, it does appear that the fallout of gear from the domestic satellite scene is going to make it easier to get on to ATV on both the 24cm and 3cm bands. The tunable IF's cover all of the 24cm band, while many of the older LNB's can be modified down to cover 10GHz using the same tunable IF. Of course, for use on 24cm a low-noise preamp, followed by

another amplifier, to give a total of at least 40dB of gain will be required. Also, as our amateur deviation level is less than that used by commercial satellites, some more video gain is required to produce the standard level. In one such receiver I have used, this just meant turning up the internal video gain control. I hope to be able to source similar units in the near future, preferably with manual tuning of both vision and sound subcarrier frequencies. Watch this space!

SCREWING PROBLEMS !

Peter Delaney G8KZG

In making up the metalwork for project you may need to use self-tapping screws, the list shown here gives the recommended hole sizes for the most useful sizes of screw.

SCREW No.	CLEAR HOLE	PILOT HOLE	DRILL No.
2	2.25	1.95	48
4	2.9	1.95	41
6	3.5	2.95	32
8	4.2	3.4	29
10	4.8	3.8	25

SEVERNSIDE TELEVISION GROUP

NEW 24cm FM TV TRANSMITTER

Severnside Television Group are proud to announce G4BVK's superb new "state of the art" FM TV Transmitter. This unit will be setting the benchmark for 1990 and beyond. Featuring a phase locked loop oscillator running at output frequency, two channels are available (1249 and 1255 Mhz standard - others to order). RF output is 3 W from the SC1043 amplifier module, providing clean and stable power. The RF circuitry is in a separate die-cast box, and uses surface mount components throughout. Of course, 6 MHz inter-carrier sound is provided with mic and line level inputs. Front panel control of video and sound levels is featured. Standard video pre-emphasis is included, along with some clever video clamping circuitry which eliminates much of the distortion some designs produce, and hence allows this transmitter to provide particularly good colour performance. The power requirement is 13.5 V dc at 1.25/1.5 A, and the complete unit is housed in a die cast box size 188 x 120 x 57 mm. Like all STG products, this unit is a fully built and tested item, ready for you to just plug in a camera, mic and aerial before putting your own ATV station on air !. The cost is £220 plus £2.50 postage.

24 cm PRE-AMP

Also from G4BVK's stable, our 24 cm high performance GaAsFET pre-amp is now well established in ATV circles as the hottest design around !. But whilst it is very sensitive, it is also quite docile and stable, unlike some other types. This is achieved by meticulous attention to construction detail, employing internal screening partitions and SMD components. Hence you get around 17 dB gain with a noise figure of 1 dB, all from a 12 V dc powered box size 110 x 60 x 30 mm. One of the prototypes is up the masthead on GB3ZZ, where it has survived over a years battering from the transmit signal radiating only 2 m away, night and day ! Our G7ATV/P contest team have won many contests using one aswell. The cost is still only £52.00 plus £1.50 postage. NB ; this pre-amp does not contain RF change-over circuitry.

24 cm AERIALS

Our ever popular 18 element aerials continue to sell like hot cakes, with over 200 now in use. Besides being such good value for money, the reason is that this is one of the few genuine wideband designs around, suitable for both the repeater input AND output channels. The unobtrusive design looks like an ordinary TV aerial to the neighbours, but it packs a solid 10 dB gain into its 900 mm length. A mast clamp suitable for masts up to 55 mm o/d is provided, and the price is still just £14.00 plus £2.50 postage.

COME AND MEET US

STG will be at the BATC Convention on 6th May, Longleat Rally on 24th June and the Bristol Rally on 16th September.

ORDERING INFORMATION

Please make cheques payable to SEVERNSIDE TELEVISION GROUP, and send to us at 15,Witney Close, Saltford, Bristol BS18 3DX. Please allow 28 days delivery. Telephone queries on 0225 873 098, evenings and weekends only please !.

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 £70.00

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.

AUTO BOARD FOR THE 8-WAY EXPANSION BOARD. THIS BOARD HAS BEEN DESIGNED TO PLUG INTO THE 8-WAY BOARD TO PROVIDE AUTO SELECTION OF ANY NUMBER OF EPROMS FITTED AND TO DISPLAY THEM IN TURN. A VARIABLE SCAN RATE FROM 5 TO 90 SECONDS PER TESTCARD IS POSSIBLE, AS WELL AS HOLD. PRICE £10.00.

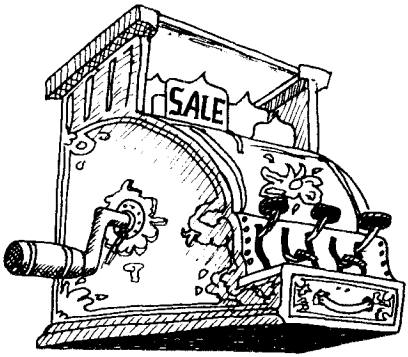
EPROM SERVICE FOR THE CIRKIT TEST CARD GENERATOR. A FAST RELIABLE SERVICE WITH A RANGE OF DESIGNS INCLUDING BATC, IBA LOOK-ALIKE, EBU TYPES 1 & 2 TEST CARDS, CONTEST NUMBERS, TEXT, GREY SCALE PLUS MANY MORE. THESE EPROMS ARE TO THE FULL SYSTEM I STANDARD. SAE FOR FURTHER DETAILS OR TEL. GEOFF ON (0903) 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, TOFTWOOD, MILL LANE, HIGH SALVINGTON, WORTHING, SUSSEX, BN13 2SX



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 June. Tel: 0788 890365.

FOR SALE

BIRD POWER SENSORS for Bird Thruline Power Meters. Each sensor has recently been checked and calibrated on a Hewlett Packard calibration rig. Elements: Type 150-2 150-250MHz 2.5W (Checked OK for 2M). Type 5C 100-250MHz 5W. Type 10C 100-250MHz 10W. All £20.00 each, p&p included. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF. Tel: Home 0788 890365 (answerphone), Work 0788 76125 x35.

PYE SUPER LYNX CAMERAS, two off in perfect working order with C-mounts ... £55 each plus carriage. One COSMICAR TV lens 12.5mm f1:1.9 C-mount ... £35 plus carriage. One VARIFOCAL TV lens 16 to 32mm f1:1.6 ... £35 plus carriage. Both lenses suit above cameras, or any 2/3" tube camera with C-mount. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby. Tel: Day 0788 76125 x35, Night 0788 890365.

EME POWER METER c/w DIRECTIONAL COUPLER, 144MHz to 2.4GHz (yes 2M to 13cm!) 0.5W to 2kW on 2M, 200W on 70 and above; plus automatic VSWR measurements. As new, less than 1 year old ... £200 (new £290+). Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby. Tel: Day 0788 76125 x35, Night 0788 890365.

BELL CURRENT METER Model 1776 complete with P102 clamp ... £30.00. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby. Tel: Day 0788 76125 x35, Night 0788 890365.

AMSTRAD DMP2000 9-PIN DOT MATRIX PRINTER. Standard parallel centronics interface. Plain and tractor feed. Usual features -control structure identical to Epson. As new, hardly used ... £125 ono. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby. Tel: Day 0788 76125 x35, Night 0788 890365.

FASTCOM - ATARI ST COMMS PROGRAM. Superb GEM program for the Atari ST range of computers: RTTY, Viewdata, Packet, etc. Original disc with manual ... £10 plus p&p. Complete set (28) of CQ-TV back issues from 121 to 148 in mint condition. Offers to Don Breckell G6FAZ, 82 Park Farm Road, Feniscowles, Blackburn, Lancs, BB2 5HP. Tel: 0254 209789

SSTV, CW, AMTOR & RTTY RECEIVE PROGRAM complete with 16K VIC 20, chess cartridge, games tapes, hardware projects and books ... £35. 14" RGB monitor ... £35. D.Smith Tel: 081 695 6651.

74510 IC's Brand new. Maplin price is £1.80 each. Stock up now at sensible prices. £5 for a tube of 15, or 10 tubes for £40 (i.e: less than a sixth of list price !). SONY AV3400CE Portable Video Recorder in good clean condition with original carrying case ... £50. carriage at extra cost - larger items are best collected. Peter Delaney G8KZG, 6 East View Close, Wargrave, Berks. Tel: 0734 403121.

COMPACT OUTBOARD STEREO AUDIO SPEAKER-AMPLIFIERS for Amiga computer, as new. £12 posted (cost £20). Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH. 0604-844130.

SALE OF EQUIPMENT OF THE LATE TOM LEIGHTON G3XFQ: YAESU FT211RH 45W ... £250. FT747GX c/w FM BOARD, Microphone, all filters, as new ... £450. TR9500 70CM Multimode ... £280. MICROWAVE MODULES MTV435 70CM TV TX ... £80. FORTOP TVD100 Video Demod ... £15. ICOM IC28H FM TX ... £290. 3 off J-BEAM LW8/2M Yagis, new ... £20 each. HF Vertical, needs attention ... £15. 70CM 8-element Beam ... £25. YAESU FC1000 AUTO ATU, as new ... £300. DRAE SSTV TRANSCEIVER ... £150. Contact Paul G4SXU on 0423 566430 (evenings and weekends).

TRIO TS830S in perfect condition with 3 new valves extra ... £475. STRUMECH 60ft down to 20ft tower with electric winch ... £750. ROBOT 1200c colour SSTV transceiver ... £775. ROBOT 800C colour SSTV transceiver .. £400. Arthur Bevington G5KS, 53 Knottsall Lane, Oldbury, Warley, West midlands, B68 9LG. Tel: 021 552 4456.

NEWNES RADIO & TV ANNUAL MANUALS from number one to 1975/6 ... offers. Avometer AM/FM Signal Generator type TFM with service manual ... offers. Avometer Electronic (valve) test-meter, AC/DC 250mV to 2500V with EHT (10kV) unit, complete with leads and manual ... offers. Mr.G.Fenn, 80 Huncote Road, Narborough, Leics, LE9 5GN. Tel: 0533 862531.

BARCO CTVM 3/37 broadcast quality 14" colour monitor, medium resolution version (PILS tube). As new condition. Locks up to VHS etc. Insured for £3750, accept offer in region of ... £500. SCOPEX 4s6 oscilloscope, displays video waveform OK, suit beginner ... £40. GRUNDIG Infra-red controller package, TX + RX (Tele Pilot TVP355) ... £10. AKG professional headphones ... £2. REDIFFUSION 8-channel RF transcoder, video out with Mod ... £2. WOOD & DOUGLAS FM-TV demodulator, 52MHz input, video out, boxed ... £30. RADCOMS 1982 through 1986 ... free to good home. FRINGE ELECTRONICS TV and FM diplexer, masthead mounting ... £5. Andrew Smith G6LTZ. Tel: 0908 211346 (evenings).

13CM 38-element Yagi (Micromax). Unused in perfect condition ... £40 ono. Don't worry about posting or collecting it, you can collect it from me at the Convention. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Ner. Rugby, CV23 8UF. Tel: (day) 0788 76125 x35, (night) 0788 890365.

EXCHANGE & WANTED

WANTED GRID DIP METER, 24CM receive equipment. Circuit for Heathkit GR78 shortwave receiver. D.Smith Tel: 081 695 6651.

OLD CAMERA TUBES (and similar imaging devices) of various types and age, and related data etc., for historic (!) collection. Particularly welcome would be an Orthicon, a stripe-filter Vidicon, an Image Isocon or a 1.5" Vidicon. Tubes that are not operable are suitable, so if you replace tubes in cameras don't throw the old ones away, but please contact: Peter Delaney G8KZG, 6 East View Close, Wargrave, Berks. Tel: 0734 403121.

WANTED: 'DRAINPIPE' i.e, tubular shape CCTV camera, e.g. Marconi BD871 (V321) or EMI. Sony CVM-306UMP quad-system 9" monitor. 405-line SPG (and other 405 stuff !). Murphy industrial TV camera (the one with a fibreglass case !). Sony camera switcher (passive). Band-1 set-top aerial, the type with a large loop and a walnut bakelite base. All old TV literature, especially CCTV sales leaflets and catalogues. Odhams Television Annuals of the 50s and 60s. 2" x 2" slides of test cards and captions to borrow and copy or buy. Callsign generator or similar using real diodes in a matrix. Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604 844130.

LATE NEWS - CQ-TV AWARD

Bob Webb G8VBA

Two awards have recently been issued: No.45 Bronze to Dave G4EIX in Telford and No.46 Bronze to Craig EI3FW in Delgany, County Wicklow. Congratulations to both stations.

Arrangements are in hand to present a Diamond award at the Harlaxton Manor Convention. This will be only the fifth diamond award to be issued ! You still have time to check your logs before the Convention and put in your claim for an award ... see you there ... 73 Bob.

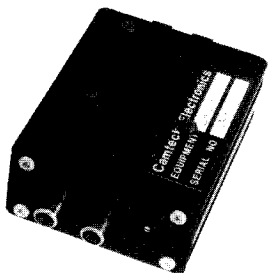
CQ-TV Award, Bob Webb G8VBA, Nithsdale, 78 Station Road, Rolleston-on-Dove, Burton-on-Trent, Staffs., DE13 9AB. Tel: 0283 814582.

CAMTECH ELECTRONICS CE

NEW.. 24cm COLOUR TV TRANSMITTER

This product uses the very latest surface mount component technology to give a unique small size and highly reliable product. The transmitter may be used with colour or mono video signals and an audio sub carrier input is provided.

Specification



R.F. Output	0.5 Watts
Frequency	1240 - 1320 MHz
Modulation	FM with CCIR Pre-emphasis
Video input	75 Ohm 1v pk-pk composite video
A.S.C. input *	75 Ohm 800mV pk-pk intercarrier sound
Power Supply	12v DC @ 350mA
Size (WxHxD)	64 x 32 x 84 mm

Composite video and Audio Sub Carrier inputs are via phono sockets, RF output is via an SMB socket. Power supply is via a 2.5mm DC power socket. All plugs/leads available P.O.A.
* We recommend the use of our Audio Sub Carrier + Vogad board for intercarrier sound.

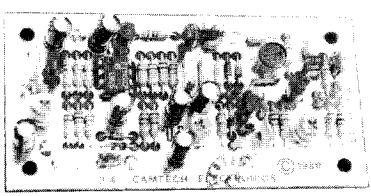
£76.00 P&P £2.00 NOW AVAILABLE LEAD KIT @ £10.00

****

NEW.. AUDIO SUB CARRIER + VOGAD

Our Audio sub carrier + vogad unit is a complete audio modulation system designed for amateur television. The circuit consists of a microphone amplifier with speech compressor, audio filtering and a 6MHz oscillator / FM modulator.

Specification



RF Frequency	6MHz Adg.+- 500KHz
RF Output	0 to 1v pk-pk
Deviation	+- 50 kHz
Microphone Input Sensitivity	4mV RMS
Power Supply	12v DC @ 16mA
Size of PCB	85 x 43 mm

Kit £21 P&P £1.00

Built & Tested £27.60 P&P £2.00

ORDERS: U.K. -------- Please add VAT @ 15% and then P&P
OVERSEAS, --- (VAT NOT chargeable) please add P&P at £6.00

Camtech Electronics, 21 Goldings Close,
Havehill, Suffolk, CB9 0EQ
Tel: 0440 62779

WOOD & DOUGLAS ? YES, WOOD & DOUGLAS !

We're still around and going stronger than ever! Despite the fact that it is nearly 24 months since we last advertised, we still receive a regular flow of orders for our wide range of amateur radio kits.

Why hide our light under a bushel ?

Because the many amateurs in professional radio communication activities spotted the fact that we were a source of high quality, well engineered, radio products that could make their busy engineering lives that much simpler. The result is a £1M turnover company providing professional equipment in the OEM, broadcast and security industries, and employment for 20 enthusiastic people.

So why advertise now ?

To update our faithful followers that we have moved.

Not just to any factory, but to a unique, purpose designed headquarters that will give us 10.200 square feet of production space.

Where is it ?

From the address it looks a long way from Youngs Industrial Estate, but in fact it is just over the county boundary, less than a mile and a half distance. The phone numbers should also be noted as these have recently changed.

If you would like to know more about W&D, our products, either amateur or professional, then send a large stamped addressed envelope for a catalogue. Our many years of experience in amateur radio, telemetry modules, video links and radio talkback make us a prime source to satisfy your needs.

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Baughurst
Basingstoke
Hampshire RG26 5LL
Telephone: (0734) 811444 Fax: (0734) 811567

WOOD & DOUGLAS

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Access

VISA