# CQ-TV MAGAZINE
No. 154

## BRITISH AMATEUR TELEVISION CLUB

MAY 1991


# THE 1991 CONVENTION

## HARLAXTON MANOR

## SUNDAY MAY 5th

**Full details on page–38**

PHOTOGRAPH BY *KRYSTYNA RYDZINSKA*

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## MEMBERSHIP

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

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

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

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

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



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

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

# CONTENTS



CLOSE FOR PRESS FOR THE NEXT ISSUE ..... **20th JUNE 1991**


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

# WHO TO WRITE TO

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

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

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

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

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

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

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

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

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

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

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

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

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

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

# POSTBAG

## THE SEVERNSIDE FANCY DRESS!

Dear Mike,

We hereby announce the Annual Report of the Severnside TV Group .... no we shall not be telling the secret of our success! .... only of our silly couple of hours once a year. The Severnside TV Group's Fancy Dress evening was held on Sunday 6th January 1991) (we had time to get over the Christmas festivities).

Starting with our Chairman, Viv G1IXE made a lovely "Parrot", we tried not to ruffle her feathers as her beak looked nasty, but the "Pink Panther", Ivor G1IXF appeared to keep her in order, while talking through his 'nose'. Next, a subtle G4NXI John, entitled "Fly Fishin" (it was catching flies, not what you thought). Alan G7DRU had us all guessing in his disguise as "The Turk". Bryan G4YQR and Phil G1HIA kept each others "spirits" up with "The Witch" and "The Indian Scout" respectively, in order to join in the fun.

"Colonel "Gadafi" emerged as G0FDD Cliff, looking every bit the part. Our Chief Engineer, Steve G8KUW, was desperate for snow as he became "The Skier" for the evening. real ingenuity was evident from terry G4YTH in "The Arts", a video made of himself as the senile old painter busy at his easel. Last came myself, G0AWX jean, as "The Mad Labeller", I had been involved in the production of our newsletter, so produced labels in the form of callsigns bearing no resemblance to any of the friends they represented, but they all recognised their own during my stint.

Last year I challenged anyone to copy our idea, no one replied in CQ-TV, it proves the 'ole west country' is still good for a laugh. You don't know what you are missing folks!"

73 ... Jean Fletcher G0AWX

## RECOLLECTIONS

Dear Mike,

I submit these notes with the hope that they may be of use to you as 'Bait' to draw other members to submit replies, ideas or suggestions, which could provide you with copy for future issues of CQ-TV.

I am a retired, but still very active constructor, who started assembling radios on wooden chassis with shiny Bakelite front panels, and those big glass things called valves, which used to light up the room when in use. All connections were made with 16SWG wire in dead straight lines and pure 90 corners, held together with nuts and bolts. Hence the title of my notes (see the article 'Recollections of a Nuts and Bolts Man', elsewhere in this issue ... Ed), although I cannot claim originality. In the distant past another member once used the phrase and I thought it very appropriate.

My prized collection of CQ-TVs contains issues from number 30, and what was probably the first handbook issued (now minus its outer cover) dated 1956, with not a transistor or an IC to be seen!

How I used to get mad with those shark-like retaining springs on the EF80s, which together with the 5FP7 made the FSS. And what about the brilliant? pictures from the very high? EHT of 2.5kV on the green VCR97 CRT, complete with the luxury of the plastic oil-filled magnifying lens!!!

I trust you will forgive me if my ageing memory is incorrect in some cases, and if you as Editor decide not to publish any of this correspondence no apologies necessary Mike. Your task is difficult enough as it is and I fully understand.

Wishing you and all the other Committee members, who unselfishly give their time unpaid, to make CQ-TV and the Club the No.1 amateur magazine and Club in the world. The very best for the future.

73 .. Bill Mercer, Athens.

*Many thanks for your letter and kind thoughts Bill. It is a pleasure for me to hear*

*from any of our Members, and those that have been in the Club for so long form the basis of what we have today. All the best for you in the future ... Mike*

## MORE ON THE DD9DUK CONVERTER

Dear Ed,

I completely agree with G8PX, the CF300 device is not suitable for the 24CM down-converter described in the V Compendium. Having built two of these there was considerable trouble with the RF and mixer stages oscillating. The only final cure was to change the CF300s in both stages for the 3SK96 devices.

The two converters were real pigs to stabilise, and at one stage in the proceedings I nearly gave up on the project. However, after some thought I came back to it and changed all the coffin capacitors for surface-mount types - made it even worse! Screens and more screens to no avail. Yes, almost chucked them both in the bin - so much wasted time!

In desperation I re-read the article and thought that I might try 3SK96s instead. The result was no oscillations at all! Bingo! I thought, cured. Yes, but compared with my own Wood & Douglas tuner they were poor on overall gain. Using a pre-amp in front improved things but I am still very disappointed with their performance. They are now abandoned, not a good design in my opinion.

73 ... Peter Johnson G4LXC.

## CROPREDY TEST GENERATOR

Dear Mike

Andy G8SUY and myself have been getting odd problems with colourisers for the Cropredy Test Card Generator. It transpires that the timing capacitor on pin-15 of the TEA2000 is critical. We have 33k resistors and around 360pF capacitors. It gives all sorts of weird colour loss if the Burst is too late, as is the case with the components supplied with the kit.

*Taken from a packet message to me ... Ed.*

*P.S: I have just received some modification information from John G8MNY concerning this unit, and I shall be publishing it the next issue ... Ed.*

## THE CF300 YET AGAIN

Dear Sir

Far be it for me to nitpick, but the CF300 device used in K.Kraus's circuit is actually already a GaAsFET. As such it is probably worth taking special precautions. I know that CQ-TV constructional articles are generally not for the uninitiated, but then I have blown a few up myself already (not in this circuit). However, the culprit can easily be power supply transients caused by simply turning on and off!

The inductance of a couple of inches of power lead can generate a large transient voltage, which the low-C, very small channel simply cannot withstand. However, mortality is not always immediate and can result in in-service failures. Gate punch-through seems to be common (no gate current should flow).

I suggest:

a) Altering IC1 to a 5V (7805) regulator.

b) fitting an 8V Zener diode across C6, cathode up.

c) definitely fitting the CF300 last of all

d) wearing a wrist-strap to earth

Altering R2 to get Id = 20mA may be worthwhile at Vdd = 5V.

This may also involve negative bias for gate-1 and a wholesale rearrangement of the circuit, including sequencing the gate bias supply on first, to prevent excess current at switch on (source direct to ground, or R2 = 0). I would certainly be interested if anyone has any troubles of this nature, and what their solutions are.

Also, don't forget that endlessly cascading

preamps can result in a very low noise figure, but will severely curtail the strong-signal performance, and you may suffer from interference that isn't really there. Optimising Dynamic Range can be a thorny subject and involves a little more work.

Graham McLeod G8PHA

## REPEATER LICENSING

Dear Mike,

After reading your editorial in CQ-TV 153 I heaved a sigh of relief. I had come to the conclusion that apathy towards ATV repeaters existed only in Yorkshire. As with GB3RT we have an informal group with only six paid up members this year, even though I sent out 37 news letters to people using the repeater either for RX or repeater mode.

I have just paid the RSGB the £25 + VAT they required for "Administration", plus £50 site fee to the IBA. We have recased all our equipment in the 19" rack, had to buy new feeder for the TX aerial and the new logic is ready for installation. Where does the money come from? You've guessed it, the few who have paid subs this year, plus Ken G8VDP, Trevor G8CJS and myself.

Is it worth all the effort!

Regards ... Barry Keedy G6LIC

# NEWS ROUNDUP

## MICROMAX RF SYSTEMS

I have been informed that Micromax RF Systems of Wolverhampton are back in production of 24CM equipment. Available once again are the following items:

38 element Loop Yagi ..... £85 c/w boom mounting. P&P extra.

24CM PAs:

Single Valve Cavity ..... £175 Twin Valve Cavity ..... £300 Valves extra @ £30.00 each P&P extra

Power Supply for above ... £175 Courier delivery ... £10

Micromax request a deposit of 25% with orders and delivery is quoted at 14 to 21 days.

Micromax RF Systems, 5 Pinfold Crescent, Penn, Wolverhampton. Tel: 0902 343746.

## AUSSAT ASSISTS AMATEUR TV TESTS

For some time the Gladesville Amateur Radio Club has conducted a series of test transmissions each week in Sydney using UHF TV channel 35. These tests came to the attention of AUSSAT executives, who approached the Club to find out more. AUSSAT then offered Gladesville the use of a transponder to conduct the tests over a wider coverage.

Arising from this, a test transmission was planned for November 14, a joint operation between the Gladesville Amateur radio Club and the NSW Division of the WIA. The satellite to be used was AUSSAT-2 - the most westerly of the three AUSSATs - on transponder 5, using an unencoded PAL mode of transmission. The footprint was expected to cover at least south-eastern Australia, including the State capitals Brisbane, Sydney, Canberra, Melbourne, Hobart and Adelaide; not forgetting of course all the country regions of south-east Australia.

Electronics Australia, Dec 1990

## NEW TUNER/DEMOD FOR 24CM ATV

Initial advertising blurb has just reached the editorial office of a new satellite receiver module that is now available in the U.K.

This unit claims continuous coverage from 950 to 1750 MHz, a tunable sound subcarrier demod stage tunable from 5 to 8.5 Mhz, and video and audio outputs. The power supply requirements are simply 13.5 Volts.

The dealer price is quoted at DM 198.00 (approx £70) per single item and I am led to believe that this price will be extended to members.

I hope to have a model to review ion the near future, or at least full details. However, if anyone is interested contact the address below and state that you are a BATC member.

B&B techno GmbH, Zollamtstrasse 48, D-6750 Kaiserslautern, West Germany.

## BATC/ATV PACKET MAILBOX

Yours truly has set up a packet mailbox here at Rugby call sign GB7RBY, on which I shall be holding files of bulletins and info relating to ATV (FSTV and SSTV) that appear on the system.

Also, any messages you may wish to send to me for editorial purposes or general club business, or for transmission to any other committee member may be addressed to me at the BBS. GB7RBY @ GB7RBY

## 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 'Services for Members' supplement in this magazine are available - a description of most of the various PCBs and components can be found in the 'What's What' supplement included with CQ-TV 149.

To avoid delay and inconvenience, please be careful to include the correct amount of VAT with your order, i.e: 15% of total; goods AND postage (unless an overseas member).

Payment should be by cheque or crossed Postal Order in favour of BATC - do NOT send cash or postage stamps please.

## VIDICONS

Tubes available from Members' Services include electrostatic or deflection, and low-light types not available prior to CQ-TV 152 to club members. Prices vary depending on the size, type and grade of tube.

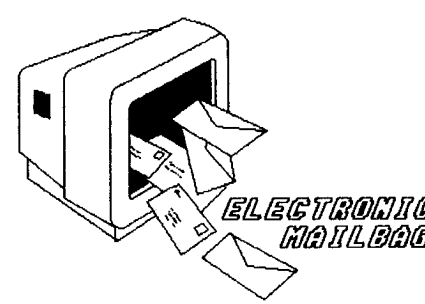
A tube guide appeared in CQ-TVs 149 and 150. Please contact Members' Services for further information.

The stripe filter tubes used in domestic type colour cameras are not available through the BATC, and normally must be ordered direct from equipment suppliers.

## BATC PCBs

Occasionally a rogue printed circuit board featuring bad drilling or poor etching escapes the careful scrutiny of Peter Delaney, our Members' Services man. This is a VERY RARE occurrence but, nevertheless, may happen from time to tiome.

If you receive a sub-standard PCB from Members' Services PLEASE return it for replacement or refund.



# EDITORIAL

## Mike Wooding G6IQM

*I have given over the Editorial column this issue to a letter from Dave McQue G4NJU, who is Vice Chairman and Special Projects Manager for the RSGB repeater management Group. His letter is by way of an official response from the RSGB to my Editorial in the last issue concerning repeater charges.*

Dave McQue G4NJU
Vice Chairman RSGB RMG
6 Laburnam Grove
Bletchley
Milton Keynes
MK2 2JW

27th February 1991

Dear Mike,

As a member of the Repeater Management Group of the RSGB I would like to comment on your Editorial in the last edition of CQ-TV.

The members of the RSGB, through their subscriptions, have been supporting the amateur repeater network for 17 years by paying the licence fees and covering the administration costs.

There are now over 270 repeaters, not counting packet nodes. All installed and run by volunteer groups of licenced amateurs. Each group holds a mandate to operate their repeater on behalf of the Society.

**INTRODUCTION OF CHARGING:**

The Council of the Society, which is the elected Board of Governors, at their meeting in July 1990 to approve the budget for 1990/91, decided to pass on a part of the repeater administration expenses to the individual repeater groups. The actual charges were set after consultation with the RMG. They were fully explained in the REPEATER REPORT sent to each group last November. Any RSGB member is free to make representations to his regional Council member.

**POLICY ON LICENCES:**

It is the agreed policy for the RSGB to hold, and pay for, the licences for amateur repeaters for the following reasons:

**a)** So that the network is properly coordinated

**b)** because the Radio Communications Agency (RA) require the RSGB to preprocess and deal with all repeater applications.

**c)** for the RSGB to maintain the list of shut down operators and all other ongoing administration functions including a 24 hour emergency contact availability.

(The only individual repeater applications the RA deal with are for business users, who pay £750 per year, per repeater, for their licence. They are also required to use only type approved equipment.)

**REPEATER RUNNING COSTS:**

The most significant expense for many repeater groups is site rental. The Society has been able to negotiate bulk terms at VERY favourable rates for the groups using sites owned by such as the BBC and IBA. (Commercial rates of around £1000 per annum are common today.)

**INSURANCE:**

The RSGB pays for public liability insurance for each repeater to protect the Society from claims arising from faults in the installation. While many groups have their own insurance, which can provide extended

cover for their members while working on the equipment, this has proved difficult and not cost effective to verify. In at least one case where a group claimed to have insurance and a claim arose, it was found that in fact they had not!

**RSGB COSTS:**

The administration costs include, but are not limited to:

Insurance 300 x £15 = £4500

RMG meetings etc ....,..... £2000

Packet Working Group ... £1000

Although a lot of work is done by the volunteer members of the RMG, the PWG and the Licensing Advisory Committee, there are the not inconsiderable costs of HQ staff and facilities in maintaining records, chasing groups for their site rental, and liaison meetings with the Agency. Secretarial work, telephone, computer and copying facilities have not been costed in the above figures.

**INCOME** 300 x £25 = £7500

From these figures it will be seen that the RSGB will continue to pay the licence fees, as required by the RA, which amount to 300 x £12 = £3600, and in addition continue to provide all the uncosted HQ facilities.

Many of the 2M repeater groups have a large membership due to their particular popularity. However, it is recognised that the minority interest groups, such as TV and Microwave, and even some 70cm groups, may feel the pinch.

Many amateurs feel that membership of their local group is sufficient to indicate their support of repeaters in general, so it will be up to the goodwill of the wealthier groups, who have had many years of free licence, etc., provided by the RSGB, to support the pioneers through a central fund administered by the RMG.

It might be that the BATC would wish to contribute to this fund in order to support the TV repeaters.

If anything, the charge has brought home to many amateurs the fact that repeaters don't just happen and somebody has to pay.

**ONGOING DEVELOPMENTS:**

The repeater network started as an experiment in 1973 and is still so classified. Several novel extensions have been agreed in recent times.

The RSGB news is now read, and seen, on at least one TV repeater.

My own 10GHz TV repeater, GB3TG, is now working. It is licenced for linking to GB3TV at Dunstable. When that station is back on after its refit we shall be testing 'Gateway Mode'.

As for the voice repeaters, after a long period of technical stagnation, two further developments have now been approved.

The use of Continuous Tone Coded Squelch Systems (CTCSS) can now be used optionally to improve the quality of service, especially in the reduction of the effects of co-channel coverage overlap.

*Dave's letter has been edited here in order to make it fit the available space. The section cut out deals with a brief explanation of the CTCSS system. Should you wish information on this system please contact Dave QTHR ... Ed*

Finally, if you want your local repeater to remain in action you now know how to help. Further information can be obtained in the RSGB call book, where the repeaters are listed, together with their contact person. Queries from groups should be addressed to their zone representative. More general ones to G4AFJ our chairman. TV applications to Graham G3VZV. Anything special technically, e.g: linking, can be addressed to me.

Yours sincerely ... Dave McQue G4NJU
Vice Chairman and Special Projects
RSGB RMG

# CAN YOU GET SKY TV MISTER?

THIS LIITLE ARRAY IS TO BE FOUND IN JOHN STANDEN'S BACK GARDEN !

JOHN, OF NE SATELLITE COMMUNICATIONS *(NATURALLY)* USES THE 6M DISH FOR C-BAND RECEPTION OF SIGNALS FROM ETHIOPIA, AFGHANISTAN AND BOTSWANA

JOHN ALSO USES THE DISHES FOR THE RECEPTION OF EARTH IMAGING PRIME DATA FROM THE METEOSAT BIRDS

PERHAPS I CAN PERSUADE HIM TO WRITE ME AN ARTICLE ON HIS ACTIVITIES!

PHOTOGRAPHS TAKEN BY OUR *WORTHY* CHAIRMAN TREVOR BROWN G8CJS.

TYHE LOVELY LADY IS TREVOR'S WIFE PAULINE

# VIDEO MIXING DESK AND EFFECTS GENERATOR

**Part–4**

*The series of articles making up this project first appeared in the January, February, March and April issues of Elektor Electronics, and we wish to thank the Editors for their permission to reproduce them in CQ-TV.*

## A.Rigby & G.Dam

In this final instalment in this project we deal with the connecting-up of the completed printed circuit boards, and the assembly into the enclosure. Also, a detailed setting-up procedure is given, which is no luxury given the complexity of the video mixer. Notes on the practical use of the unit round off the article.

Mechanical work on the ESM enclosure may be started when the three modules described in the previous instalments (switching board, remodulator board, keyboard and power supply) are complete and ready for interconnecting.

The sloping panel of the ESM enclosure probably requires most mechanical work. Fortunately, the drilling template supplied with the front panel foil for the mixer allows the panel to be cut and drilled in a straightforward manner. To begin with, fix the template to the inside of the front panel with the aid of a few drops of glue. Next, use a jigsaw to cut out the slots for the slide potentiometers and the holes for the switches. Work carefully and take your time to reposition the workpiece if required for a particular sawing angle.

Determine the locations of the holes in the rear side of the enclosure through which the video in/out sockets are accessed. Drill these holes at a relatively small diameter, then use a reamer to provide the necessary clearance. The use of a reamer is preferred over a larger drill because its larger cutting surface results in less vibration of the workpiece and, as a result, better holes.

The screw holes in the front panel are drilled and carefully enlarged to accept countersunk M3 screws. The heads of these screws must be flush with the surface of the front panel to prevent the self-adhesive foil being damaged. Secure each M3 screw at the inside of the front panel with a drop of glue or Loc-tite (if you can get hold of it). Next, turn 10mm long metal PCB spacers with internal M3 threading onto the screws. The spacers hold the

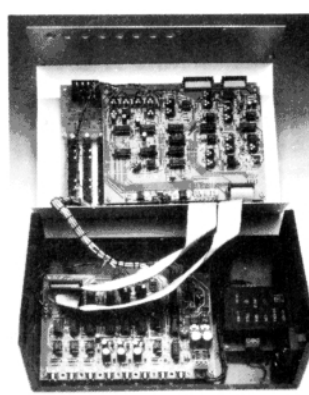


**Fig.16 The completed Prototype**

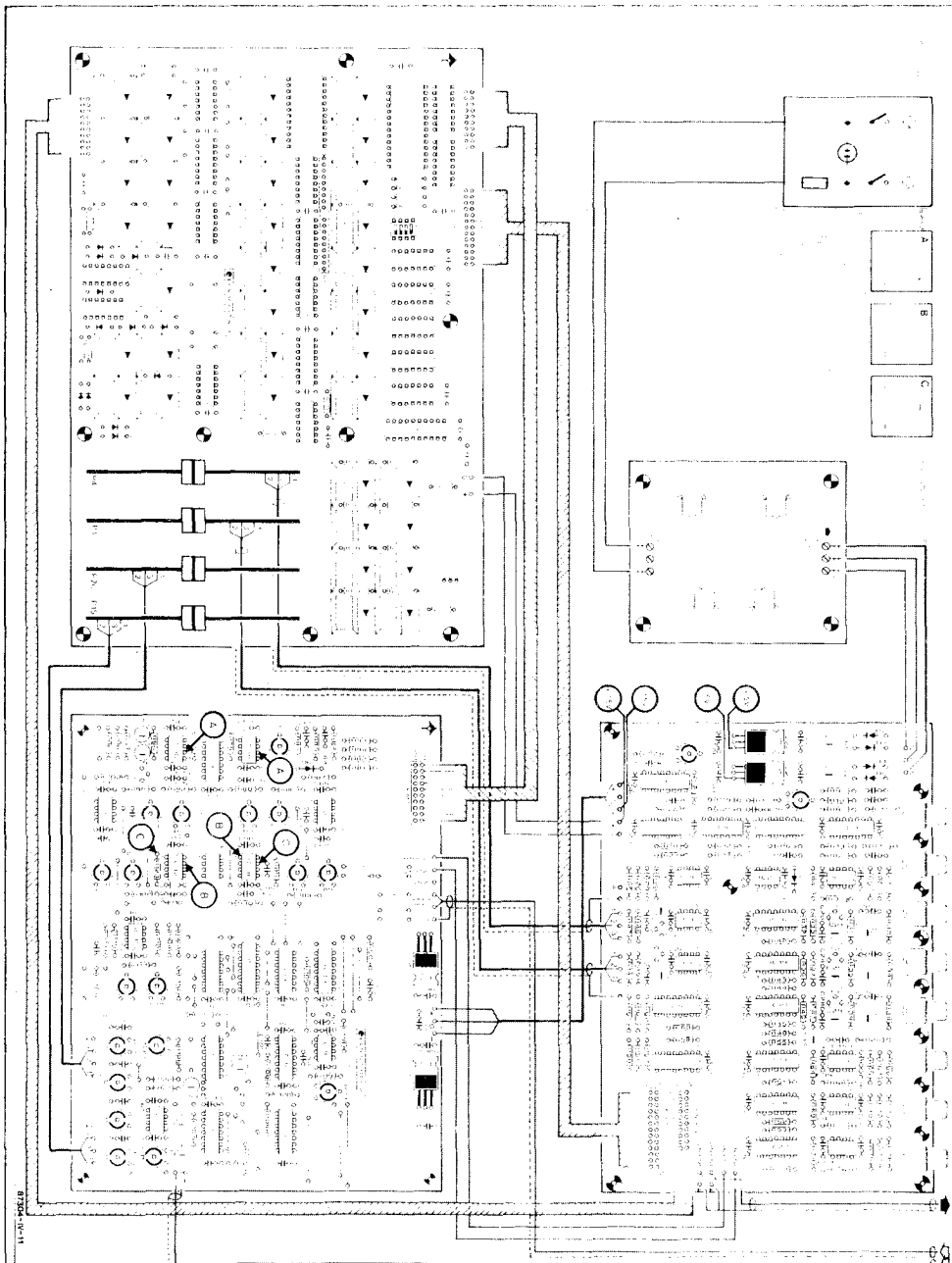


**Fig.17 Wiring Diagram of the Video Mixer**

keyboard PCB and allow this to be removed without the need of loosening the screws underneath the front panel foil, which is likely to be damaged by such an operation.

The photograph in Fig.16 illustrates the way in which the printed circuit boards are arranged in the enclosure. Provisionally install the boards in the case to obtain a like arrangement. Mark and drill the holes in the bottom plate to enable the switching board and the transformer board to be secured on it. Next, mark and cut a rectangular clearance in the left side panel of the enclosure to accept the mains socket with its integral switch and fuse.

## FIRST TEST

For a first test, install the switching board and the transformer board in the enclosure. Connect the input terminals of the transformer board to the mains socket, and the output terminals to the switching board. The complete wiring diagram of the video mixer is given in Fig.17. Points where the supply voltage may be measured are indicated to assist in checking and fault finding.

After powering up it will be found that the MAX452s on the switching board run fairly warm. This is perfectly normal, however, and no cause for alarm.

First, the presence of the synchronisation signals is checked with the aid of an oscilloscope. Apply a composite video signal to socket $K_3$ (VIDEO-1 input) and adjust $P_2$ until the signal at pin-13 of $IC_5$ is high for 60uS. Similarly, adjust P3 for a "low" duration of 11uS.

## TESTING THE KEYBOARD PCB

A global test is carried out on the keyboard PCB before it is secured to the inside of the front panel. First, connect the keyboard to the switching board by means of the short flatcables mentioned in the relevant parts list. Next, make a cable tree to connect $P_1$, $P_4$ and the power supply of the keyboard to the switching board. The connections of $P_1$ and $P_4$ must be made in screened wire.

| Presets | Effects selection | Adjustment of |
|---|---|---|
| P14; P16 | S14, S1 or S3 | span of P15 |
| P19; P21 | S14, S2 or S4 | span of P20 |
| P6; P7 | S15, S1 or S3 | symmety and amplitude of H- triangle |
| P10; P11 | S15, S2 or S4 | symmetry and amplitude of V- triangle |
| P17; P18; P22 | S16; S1 or S3 | unity-gain amplifier |
| | S17, S1 or S3 | |
| | S18, S1 or S3 | |
| | S28, S1 or S3 | |
| P23 | S16, S2 or S4 | inverter |
| | S17, S2 or S4 | |
| | S18, S2 or S4 | |
| | S26, S2 or S4 | |
| P5; P8, P9 | S21, S1 or S3 | shape, amplitude and d.c. setting of H- parabola |
| P12; P13 | S20, S2 or S4 | amplitude and d.c. setting of V- parabola |
| P17; P18; P22 | S19, S2 or S4 | unity-gain amplifier |
| | S20, S2 or S4 | |
| | S21, S1 or S3 | |
| | S27, S2 or S4 | |
| | S28, S2 or S4 | |
| | S29, S2 or S4 | |
| P23 | S20, S1 or S3 | inverter |
| | S21, S2 or S4 | |
| | S27, S1 or S4 | |
| | S29, S1 or S3 | |

**Table 2 Overview of Adjustments**

The screening braid is connected at the side of the switching board only. The cable trees should have a length that obviates the need of disconnecting them when the video mixer is disassembled for tests and adjustments.

After switching on, it will be noted that most keyboard controls are inactive if no video signal is applied, since this ensures the presence of the central synchronisation. With a signal applied, it must be possible to control each LED by actuating the associated key. Effects are, however, not achieved at this stage since the modulation board is not yet connected. None the less, the passing of the video signal from $K_3$, $K_4$ and $K_5$ to outputs $K_6$, $K_7$ and $K_8$ may be verified by actuating $S_5$-$S_{12}$. The KEYLOCK function may also be checked. When actuated, it should negate any effect of $S_{14}$-$S_{29}$ being pressed. If these tests check out so far, mount the modulation board at the rear side of the switching board (their copper sides face one another). Ensure sufficient distance between the boards by using 10mm long PCB spacers.

Potentiometers $P_{20}$ and $P_{15}$ may be connected to the modulation board by normal, light-duty wire wire without screening.

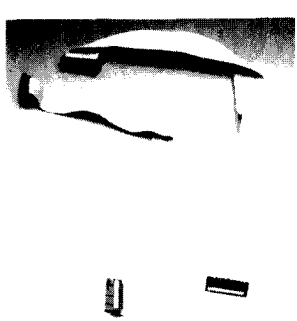


Fig.18 Flatcables with IDC sockets

The construction of the video mixer is, in principle, complete after connecting the power supply lines. Fig.18 shows some of the pre-folded flatcables that interconnect the boards.

## ALIGNMENT

Having got this far you are probably anxious to see the first effects from your video mixer. Start the alignment by connecting a composite video source to the VIDEO-1 input, and a monitor to the output. Neither INPUT-2 nor INPUT-3 is provided with a video signal so as to achieve a black background when these inputs are selected. The black background is required initially to adjust the effects.

The effects shown in the pictograms with potentiometers $P_{15}$ and $P_{20}$ may be tested already. Very likely, however, they are not as they should be because the PCB has not yet been aligned. Run a quick check on the other video inputs by applying the video signal and selecting them with the functions SEL-1, SEL-2 and SEL-3. To make the effects visible at output $K_6$, $K_7$ or $K_8$, switches $S_8$ and $S_{12}$ must be actuated.

## MODULATION BOARD

The adjustment of the modulation board is fairly extensive. For clarity's sake, it is, therefore, listed in Table 2. Before starting the adjustment procedure, set all presets on the modulation board to the centre of their travel.

Initially, switches $S_1$, $S_8$, $S_{12}$, $S_{14}$ and $S_{30}$-$S_{34}$ are actuated. Only $S_1$-$S_4$ are used during the adjustment - all other switches are left at the above settings.

Apply the video signal to socket $K_3$. First, the span of $P_{15}$ and $P_{20}$ is optimised. This is achieved when the extreme values of the control voltages correspond to the peak values of the horizontal and vertical ramp voltages. The effects used for the adjustments are, therefore, the vertical and

horizontal curtain-wipe, both of which make use of the associated ramp voltages.

Switches $S_1$ and $S1_4$ select the horizontal wipe effect with video-1 to the left and video-2 (black) to the right. Actuate slide potentiometer $P_{15}$ to check that a vertical line moves across the screen. The line marks the transition between the two video signals.

Adjust $P_{16}$ and $P_{20}$ until the extreme positions of P15 correspond to the extreme left and right side of the screen respectively.

These adjustments interact to some extent and must be repeated a few times for best results. Presets $P_{19}$ and $P_{21}$ are adjusted similarly for the vertical wipe effect. They set the lower and upper limits that can be reached by $P_{20}$.

The above adjustments should be carried out with some precision as they are important for a number of other effects. If necessary, reduce the vertical and/or horizontal picture width on the monitor to ensure that the whole of the picture is visible.

After the adjustments, the monitor picture width and height controls are returned to their original settings to move the blanking transitions out of the visible area.

First, the triangular voltages are adjusted. Initially, select the double horizontal wipe effect and concentrate on symmetry. The wipe is opened to the extent that the disappearing video signal is just about visible to the left of the horizontal curtain ($S_1$ or $S_2$).

Adjust $P_6$ until the narrow area with the video signal in it is equally wide at both sides of the curtain. Move $P_{15}$ to the other extreme setting and adjust $P_7$ until the curtain just about closes (look at the top of the triangle).

The vertical double wipe ($S_2$ or $S_4$) is adjusted in a similar manner. Preset $P_{10}$ is adjusted until one picture line only is visible at the top as well as at the bottom of the picture. Slide $P_{20}$ to the other extreme setting and adjust $P_{11}$ until the curtain just does not open.

The next step in the adjustment involves the unity-gain amplifier. Select the diagonal curtain ($S_{16}$ and $S_1$ or $S_3$). Adjust $P_{18}$ until the video signal applied covers the whole of the picture area.

During this adjustment, $P_{15}$ must be set such that the curtain is not, or practically not, visible. Presets $P_{17}$ and $P_{22}$ are adjusted until the curtain can be moved just off both sides of the screen (both with $S_1$ and $S_3$). Next, complete the adjustments listed in Table 2. Small corrections may be effected by $P_{17}$, $P_{18}$ and $P_{22}$.

Next, set up the inverter. Once more use the diagonal curtain ($S_{16}$), but this time with the other two selections ($S_2$ or $S_4$). Adjust $P_{23}$ until the curtain disappears from the screen at the extreme settings of $P_{15}$. As with the unity-gain amplifier, the other effects may be used to check the correct setting of $P_{23}$.

The parabolic voltage is the last adjustment on this board. Use either $S_{21}$ and $S_2/S_4$ (horizontal parabola), or $S_{20}$ and $S_2/S_4$ (vertical parabola). Preset $P_5$ defines the symmetry of the horizontal parabola; $P_8$ the amplitude; and $P_9$ the DC setting. These presets must be adjusted to prevent unwanted side-effects in the picture as $P_{15}$ is operated. Presets $P_{12}$ and $P_{13}$ are adjusted likewise to shape the vertical parabola.

This completes the adjustment procedure and the video mixer should now provide all of the functions. If small corrections are required for particular effects, consult Table 2 to see which presets are involved.

Since a number of adjustments interact, it may be necessary to repeat the entire setting-up procedure a few times. Always remember, however, that any change in any one setting affects the following adjustment.

## FOR OSCILLOSCOPE OWNERS

The adjustment of the video mixer is greatly facilitated if an oscilloscope is available. The adjustment of $P_{15}$ and $P_{16}$, for instance, merely entails matching the maximum voltage at the potentiometer with the peak value of the ramp at pin-6 of $IC_{26}$ ($P_{15}$) and pin-6 of $IC_{30}$ ($P_{16}$).

Similarly, the minimum value of the potentiometer voltage is made to correspond to the minimum value of the relevant ramp. these levels are simple to observe and set with the aid of an oscilloscope.

The adjustment of the remaining waveforms is equally simple: the signal levels must correspond to the effective span of potentiometers $P_{15}$ and $P_{20}$. Presets $P_6$, $P_7$, $P_{10}$ and $P_{11}$ define the level of the triangular voltage, while $P_5$, $P_8$, $P_9$, $P_{12}$ and $P_{13}$ are used for the calibration of the parabolic voltages.

The oscilloscope is used to give $P_{17}$, $P_{18}$ and $P_{22}$ settings that result in identical signals at pin-9 of $N_{59}$ and pin-7 of $IC_{35B}$, independent of the setting of P15.

Finally, $P_{23}$ is adjusted until the direct voltages of the signals at pin-7 of $IC_{35B}$ and pin-6 of $IC_{36}$ are at an equal level.

## LET'S USE IT

To close the article, some hints are given as regards the practical use of the many functions offered by the mixer.

To begin with, we make a short tour around the keyboard areas. The source selection is effected in the top right-hand corner. here, the user selects the video signals which are sent to the recorder or monitor. If, for instance, video signal 1 ($S_5$ selected) is being recorded, the preview output may be connected to a monitor to watch the signals at inputs VIDEO-1 ($S_{10}$) and/or VIDEO-2 ($S_{11}$). Also, the preview mode ($S_{12}$) allows a particular picture effect to be pre-selected. This is useful in many cases to "practice", i.e. to get they effect right beforehand so as to prevent it giving the wrong results once actually applied.

The fading controls effectively cause the mixer to switch between these two video sources. These sources are selected with the aid of keys SEL-1/SEL-2 ($S_{32}$ and $S_{33}$) as well as with SEL-2/SEL-3 ($S_{34}$ and $S_{35}$).

The superimpose switches, $S_{30}$ and $S_{31}$, are located at the left hand bottom corner of the front panel. The superimpose effect is obtained by first wiping to a double picture with $P_1$, followed by swapping the superimpose selection with $S_{23}$ and using $P_1$ again for the fade-out. In this way the superimpose function is used to change between two video signals. Functions SIMP-1 and SIMP-2 therefore correspond to the SEL-1/2 and SEL2/3 keys, $S_{32}$-$S_{35}$, so that the superimpose function may be used to switch between all possible video sources.

The functions of effects switches $S_1$-$S_4$ will be evident after having followed the setting up procedure. A few additional points should be noted, however. Switches $S_{14}$-$S_{21}$ are fitted along a blue line on the front panel, and switches $S_{26}$-$S_{29}$ along a white line. The effects along the blue line are grouped such that the selected video sources are switched when changing from the top options ($S_3$ or $S_4$) to the lower options ($S_1$ or $S_2$). For the "mixed out" function ($S_8$ and/or $S_{12}$) this means that a "hard" transition, or cut, can be made.

Another advantage of the arrangement in groups is that effects may be changed in the "mixed out" mode without problems with fading controls $P_{15}$ and $P_{20}$ set to their extreme positions. Since these settings do not affect the "mixed out" signal, it is possible to switch from video source 1 to video source 2 via effect A. Both A and B are effects found along the blue line.

The effects joined by the white line do not offer the above possibilities. The use of

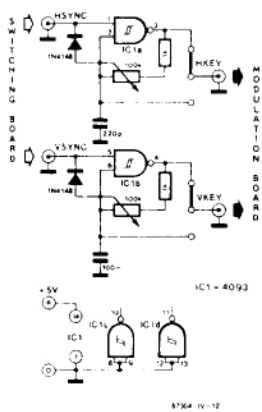



**Fig.19 Experimental Generator**

"white" effects first requires the currently displayed video source to be selected via the output function (so, apparently nothing happens). Next, the desired effect along the white line is selected, and the relevant potentiometers are set such that the signal at the preview mix output is an exact copy of that at the recorder output. Next, the mix output is re-enabled (nothing happens so far) and, finally, the desired effect selected.

This may look complicated on paper, but is really quite straightforward in practice. Most differences in the operation arise from the differences between the two types of effect.

Switch $S_{22}$ allows externally defined effects to be selected. The range of these effects is practically without limits and invites the use of experimental circuits.

Among the possible external effects is, for instance, the placing of a particular video signal inside a frame, with another signal in the background. This may be achieved by providing $K_4$ (VIDEO-2) with a signal that consists of maximum black-to-white transitions, e.g. a rectangular wave.

Further, connect the KEY-OUT output of the switching board to the HKEY input of the modulation board. This arrangement allows the signals at inputs VIDEO-1 and VIDEO-3 to be combined under the control of of the signal at input VIDEO-2.

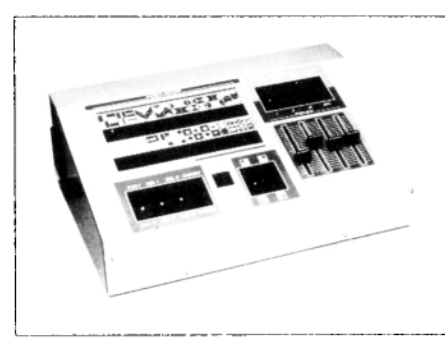
Slide control $P_{15}$ is used in this mode to control, depending on the signal supplied by source 2, the grey level at which the switching between sources 1 and 3 takes place.

This option may be made permanently available on the mixer by fitting a pair of extra connectors at the rear panel. The horizontal and vertical effects may be extended in a similar manner.

Fig.19 shows the circuit diagram of an experimental effects generator which is intended to get you started with your own experiments with the video mixer ( remember that external effects are selected by $S_{22}$).

The generator consists of two oscillators whose output frequencies are determined with the aid of presets. The horizontal and vertical synchronisation pulses stop the oscillators and enable the diodes to discharge the timing capacitors. This is done to ensure correct synchronisation as with mixed video signals.

The outputs of the NAND gates are connected to the H-KEY and V-KEY inputs to create bars and rectangles in the picture



(depending on the selection made by $S_1$-$S_4$). The number of rectangles is determined by the oscillator frequency settings.

The generator is, of course, intended as guidance only for the design of more complex external effects generators, which should give the user of the video mixer even more possibilities to use his/her creative power.

The three PCBs for this project are available from Elektor Electronics (Publishing), Down House, Broomhill Road, London SW18 4JQ. Tel: 081 877 1688.

The PCB reference numbers and their prices (inc VAT) are as follows: Part-1 ref. 87304-1 is £31.36, Part-2 ref. 87304-2 is £18.71 and Part-3 ref. 87304-3 is £18.69. If the PCBs are ordered singly add £2 post and packing.

If all three PCBs are ordered together please enquire form Elektor the p&p amount to be added. A pre-programmed EPROM is also available under part number 5861 at a cost of £11.50. A front panel is also available under part number 87304-F at a cost of £18.98.

# CAPACITATING CAPACITORS

## Mike Wooding G6IQM

I receive quite a few letters here at the CQ-TV office from time to time, and I often get asked over the air by the locals about what sort of capacitor should be used where, and will this type replace that type, etc. This is quite a complex subject, but I have put a few ideas and facts together, cribbed a bit from a past RadCom article, and come up with the following information for you. This will be by no means a complete Bible on the subject, and any recommendations will not be cast-in-stone, but I hope that it may resolve not a little of the confusion surrounding this confusing aspect of electronics.

Primarily, for the benefit of our oldest and newest students in electronics, I shall only refer to the ubiquitous device as a Capacitor, and not as I am often inclined to do as a Condenser. The two terms refer to the same device, they only serve to give away the user's age!

In general terms, you can think of any capacitor as a frequency-dependant resistor, which will not allow DC to pass, but which will let AC through. In theory (but certainly not in practice) the higher the frequency, the less impedance the capacitor will present to it. The simplest kind of capacitor would consist of two pieces of wire placed a short distance apart and separated only by the air between them; in fact the neutralising capacitors in a VHF linear amplifier consist more-or-less of just that. The air in this case forms what is known as the **DIELECTRIC** of the capacitor, i.e. the material which separates the two elements of it. If you need more capacitance, you bring the wires closer together; if you need still more you change the wires to plates, which is virtually how you make an air-spaced variable capacitor.

Unfortunately you cannot obtain very high values of capacitance by using air as a dielectric. The largest air-spaced capacitor in any catalogue on my shelves is a 750pF

device, whereas for some applications, such as power supply reservoir capacitors, you need ten million times more capacitance than that.

I suppose you could make a 7500uF air-spaced capacitor, but according to my calculations you would need about a square mile of space for it!

I some ways, as we will see, air is a very good material for a capacitor dielectric, but in one specific way it is the worst. The **PERMITTIVITY** of a dielectric material is the ratio of the capacitance of the capacitor using that dielectric to the capacitance of the same capacitor using a vacuum as a dielectric. The permittivity of dry air is approximately equal to 1 – that is to say that it is almost the same as that of a vacuum. Every other dielectric material has a higher permittivity than air, which implies that a capacitor using an air dielectric will be larger than a capacitor using anything else. It is this fact (together with another which we will come to shortly) which makes large capacitor values possible in practical components; for instance a 100,000uF component for use in a power supply can be about 6" long and 3" in diameter.

When we talk about CERAMIC or TANTALUM or SILVER-MICA capacitors, we are really referring to the dielectric material used in their construction. Permittivity is given the symbol  (the Greek letter epsilon) and in some ceramics  is more than 1000, so ceramic capacitors can pack quite a lot of capacitance into a small size.

In the case of a tantalum capacitor – or any other dielectric for that matter – we should also bear in mind that it is not so much the permittivity of the dielectric which allows these components to have very high capacitance for their size, as the fact that their construction permits the spacing between the plates to be very small indeed, typically a few molecules.

The situation is similar for dielectrics such as MICA. The permittivity of this substance is only about 6, but it has high **DIELECTRIC STRENGTH** – which basically means that you can apply a high voltage across a very thin layer of it without it breaking down. So, if you coat both sides of an exceedingly thin mica sheet with silver and attach leads to each side, you have a capacitor with a combination of quite high capacitance and high working voltage for its size; it is known as a SILVER-MICA capacitor.

It is important to bear in mind that different dielectrics vary markedly in their dielectric strength; this is why a silver-mica capacitor of 350V DC working is likely to be similar in size to a 63V DC working polycarbonate, although both have similar permittivities.

The two main reasons for the very wide variety of dielectrics used in capacitors – there are at least 20 – are that a very wide capacitor range is needed in electronic circuitry, and also that all dielectrics have some more or less undesirable properties, which makes certain types of capacitor unusable in certain situations.

Taking the first point, that of the wide range of values needed, the lowest value of a capacitor that you can go to a shop and buy is probably 2.2pF, whereas the highest is more likely 2.2F. That is a difference of 1012, or if you prefer, 1,000,000,000,000; it is about a million times higher than the range of resistors normally used to put it in perspective. No one dielectric would cope with that sort of range and allow manageably-sized components.

On the second point of the properties of dielectrics, all sorts of losses occur in dielectrics, and some of them vary very much with frequency. At very low frequencies various forms of leakage in the dielectric have time to manifest themselves, such as DC leakage currents and sundry other long time-constant effects. At very high frequencies some of the processes which make certain types of dielectric work at all do not have time to become effective,

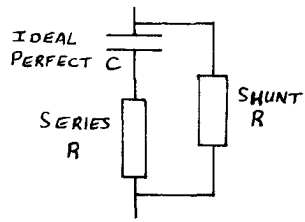



**Fig.1 Losses in a Capacitor**

and therefore cause losses. In a nutshell, this is why all capacitors can be represented as a perfect capacitor in series with a resistor and with a shunt resistor across the entire assembly, as shown in Fig.1. In Fig.2 is given a chart of the approximate usable frequency ranges for capacitors with differing dielectrics, which might go some way towards showing just how widely dielectric properties vary.

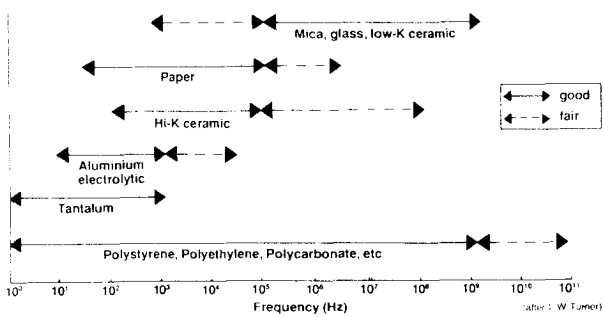



**Fig.2 Frequency ranges of Dielectrics**

Another point to think about is leakage current, which I mentioned briefly before. In theory, a capacitor blocks DC; in practice all capacitors allow a small current to pass when a DC voltage is applied across them, and the magnitude of this **LEAKAGE CURRENT** varies enormously depending on what dielectric is used.

A vacuum is the best in this respect, closely followed by Teflon, glass, polystyrene and other plastics such as polypropylene. Far and away the worst are electrolytics, whose leakage characteristics are absolutely dreadful!

If we charge a given capacitor to a particular level, the time it takes for the charge to leak away to 36.8% of its initial value is given by RC, where R is the leakage resistance and C is the capacitance. For a polystyrene capacitor, to reach this level will take several days; for a typical electrolytic you will be lucky to measure any more than 30 seconds or so.

High-permittivity ceramics are not brilliant either, as they will only give you a few minutes, whereas the average tantalum might manage an hour or two. Of course, the fact that electrolytics have high leakage current (and also poor accuracy - most of them have a tolerance of something in the order of -20% to +50% of their marked values!) does not much matter for the sorts of uses they are put to.

This brings me to another point, which is the stability and accuracy of the marked value. As I have just stated, electrolytics do not do very well with regard to accuracy, but it does not matter, because what you want an electrolytic to have above all else is high capacitance in a usable physical size.

A power supply reservoir capacitor also needs to be able to handle ripple-current, which can be in the order of several Amps. In the face of those requirements, poor absolute accuracy of capacitance value and high leakage-current, whose magnitude varies dramatically with temperature, applied voltage and a few other things, are not relevant. Neither is a 10% increase in capacitance when the temperature is raised from 20 to 70 degrees, nor a 10% reduction in capacitance when the frequency is raised from 50Hz to 10kHz, particularly important when considering electrolytic capacitors.

However, if the requirement is to construct a stable LC oscillator, for example, you do not want to use a capacitor whose value is as vague as a politician's election promise, which will change its value with temperature willy-nilly (rather like the weather men!) or which exhibits high leakage current.

You would also like the component to have a capacitance which is quite close to the value marked on it, so that the circuit at least stands a chance of having a frequency of oscillation in the same ball-park as that intended.

In this application you would probably use polystyrene or silver-mica components, the latter if a high working voltage is required.

Most silver-mica capacitors have a stability of around 1%, and a very low temperature coefficient; precision polystyrene capacitors can have even better temperature coefficients, going as low as 20 parts per million change per degree centigrade. By comparison, ceramic capacitors are pretty poor in several respects.

Ceramic capacitors fall into three main groups, distinguished by the permittivity of their dielectric material:

- So-called "Low-K" components have low leakage, close tolerances and high stability, and they can be obtained with different temperature coefficients; they can generally be obtained in values up to around 330pF.

- The "Medium-K" devices generally run to around 5000pF, but these display a non-linear negative temperature coefficient and do not have especially low losses.

- The "High-K" ceramic capacitors are good for decoupling applications, but not much else; they provide high capacitance in a small size, but relatively lowish working voltages, and their values change markedly with time, temperature and applied voltage.

Ordinary disc ceramic capacitors have tolerances of the order of -20% to + 80% of their marked values as manufactured, and the values will wander all over the place in everyday use. However, ceramic capacitors usually exhibit low series inductance, which makes them exceptionally useful for decoupling purposes.

Incidentally, large electrolytics have frightfully high series inductance, which is why reservoir and smoothing capacitors in power supply circuits should always have ceramic capacitors connected across them to provide some decoupling at high frequencies.

It can be safely assumed that the average electrolytic capacitor is going to start to look more like a low-Q inductor than a capacitor as the frequency winds up beyond about 20kHz or so.

Thus, do not assume that a supply line with a 10uF electrolytic to earth must be perfectly well decoupled from a RF point of view. In other words, you need that well known and loved formula Xc = 1/2 fC with a pinch of salt when thinking about electrolytic capacitors at high frequencies. Just because the formula says that the reactance of a 10uF capacitor at 1MHz is 0.016-ohms does not mean that a real-life 10uF electrolytic will look like 0.016-ohms at 1MHz, it most certainly will not - life ain't that easy! Tantalum capacitors are better in this area, but not that much better.

**Note:** an oft times ill remembered point when using those favoured three legged series of voltage regulators, is to connect in the order of 0.1uF ceramic capacitors across the input and output terminals, and also from each terminal to ground - they have a tendency to "whistle" like the blazes otherwise!

The bottom line of all this - and there is much more which could be discussed - is that the type of capacitor you use in a given circuit has to be chosen with an eye on what it is actually doing in that circuit. There may be a number of possible ways to achieve a given capacitance in a

## CAPACITORS

| Type | Capacitance range | Maximum voltage | Accuracy | Temperature stability | Leakage | Comments |
|---|---|---|---|---|---|---|
| Mica | 1pF-0.01μF | 100-600 | Good | | Good | Excellent, good at RF |
| Tubular ceramic | 0.5pF-100pF | 100-600 | | Selectable | | Very low values available, several tempcos available (including zero tempco) |
| Ceramic | 10pF-1μF | 50-1000 | | Poor | | Small, inexpensive, very popular, can be self-resonant 100kHz |
| Mylar | 0.001μF-10μF | 50-600 | Good | Poor | Good | Inexpensive, good, very popular |
| Polystyrene | 10pF-0.01μF | 100-600 | Good | | Excellent | High quality, large, good for signal filters |
| Polycarbonate | 100pF-10μF | 50-400 | Good | Good | Good | High quality, good for integrators |
| Glass | 10pF-1000pF | 100-600 | Good | | Excellent | Long term stability |
| Porcelain | 100pF-0.1μF | 50-400 | Good | Good | Good | Good, inexpensive, long-term stability |
| Tantalum | 0.1μF-500μF | 6-100 | Poor | Poor | | High capacitance, with acceptable leakage, polarized, small, low inductance, very popular |
| Electrolytic | 0.1μF-0.2F | 3-600 | Terrible | Ghastly | Awful | Not recommended except in power supply filters (use tantalum for high-capacitance requirements), polarized, short life |
| Oil | 0.1μF-20μF | 200V-10kV | | | Good | High-voltage filters, large, long life |

**Fig.3 Dielectric properties**

particular size, but the designer has to think of such things as in the following list:

- The maximum DC and AC voltage which will appear across the capacitor.
- How much AC current the capacitor will have to pass and at what frequency.
- How accurate the value needs to be and how much or little it can be allowed to change with time, temperature and working voltage.
- How much leakage current can be allowed.
- A few other things we have not discussed here such as power factor, dielectric absorption, and – for a production engineer one of the most important considerations – price.

Finally, in Fig.3 I have reproduced a table from the excellent book *The Art of Electronics* by Rorowitz and Hill by kind permission of *The Cambridge University Press.* This illustrates the strengths and weaknesses of different dielectric materials.

In Fig.4, by kind permission of *RS Components*, I have reproduced a table of capacitor colour codes, for those of us who can never remeber which way they go etc.

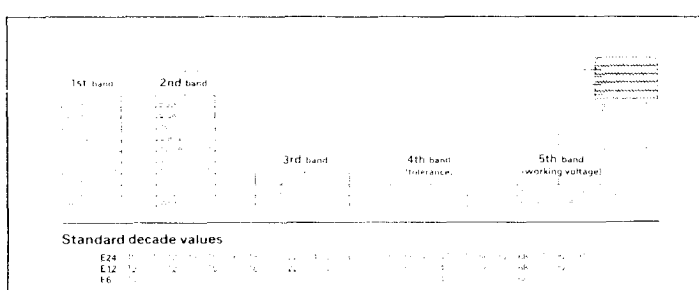



**Fig.4 Capacitor Colour Code**

# TVRO IN THE EARLY DAYS

## Trevor Brown G8CJS

In 1975 NASA launched the ATS6 satellite to broadcast to the Indian sub-continent. Steve Birkhill was living in Sheffield at that time where signal strengths from the satellite were some 30dB down on the footprint over India. However, he succeeded in receiving some very respectable pictures.

I first met Steve in 1982 when he had set himself the challenge of receiving pictures from the OTS satellite operating in the KU band, with PAL transmissions for Brian Haynes.

The dish he used was an eight foot ex-military piece of hardware, with a very crude non-polar mount that needed a great deal of muscle to position.

The home-made LNB was a mixture of waveguide and Vero board, producing an IF of 450-950MHz for the also home constructed receiver to work on. The 450-950MHz IF was tuned across to produce a 70MHz fixed second IF, which was then demodulated using a Phase Lock Loop circuit.

The results were every bit as good as those from the commercial equipment that can now be found in the high street stores!

# PROGRAMMING EPROMS FOR THE TELETEXT PATTERN GENERATOR

**Michael Sheffield ZL1ABS**

Having built the Teletext pattern/callsign generator from the ATV Compendium (page 25) the next thing to do is to program an EPROM with your callsign or a test pattern.

There are 24 lines of 40 characters each in a screen of Teletext information. Each line starts by defining the background and character colours.

Using an example: Red background and Blue characters to say 'CQ de ZL1BQ'. The hexadecimal codes from the character set shown in Fig.1 would be set out like this:

| ADDRESS | DATA | COMMENTS |
|---|---|---|
| 0000 | 01 | ALPHA RED |
| 0001 | 1D | NEW BACKGROUND |
| 0002 | 04 | ALPHA BLUE |
| 0003 | 20 | SPACE |
| 0004 | 43 | C |
| 0005 | 51 | Q |
| 0006 | 20 | SPACE |
| 0007 | 64 | d |
| 0008 | 65 | e |
| 0009 | 20 | SPACE |
| 000A | 5A | Z |
| 000B | 4C | L |
| 000C | 31 | 1 |
| 000D | 42 | B |
| 000E | 51 | Q |

If a line of double-height characters is required (much easier to read off-air) the double-height command can be used after the character colour command. For example:

| ADDRESS | DATA | COMMENTS |
|---|---|---|
| 0000 | 02 | ALPHA GREEN |
| 0001 | 1D | NEW BACKGROUND |
| 0002 | 03 | ALPHA YELLOW |
| 0003 | 0D | DOUBLE HEIGHT |
| 0004 | 41 | A double-height |
| 0005 | 54 | T double-height |
| 0006 | 56 | V double-height |

The next line after the double-height line is not available for use as its 'space' is already used. The character height resets to normal at the end of the line.

Where the background is to be black the **NEW BACKGROUND** command is not needed. For example:

| ADDRESS | DATA | COMMENTS |
|---|---|---|
| 0000 | 1C | BLACK BACKGROUND |
| 0001 | 06 | ALPHA CYAN |
| 0002 | 42 | B |
| 0003 | 72 | r |
| 0004 | 36 | 6 |
| 0005 | 36 | 6 |

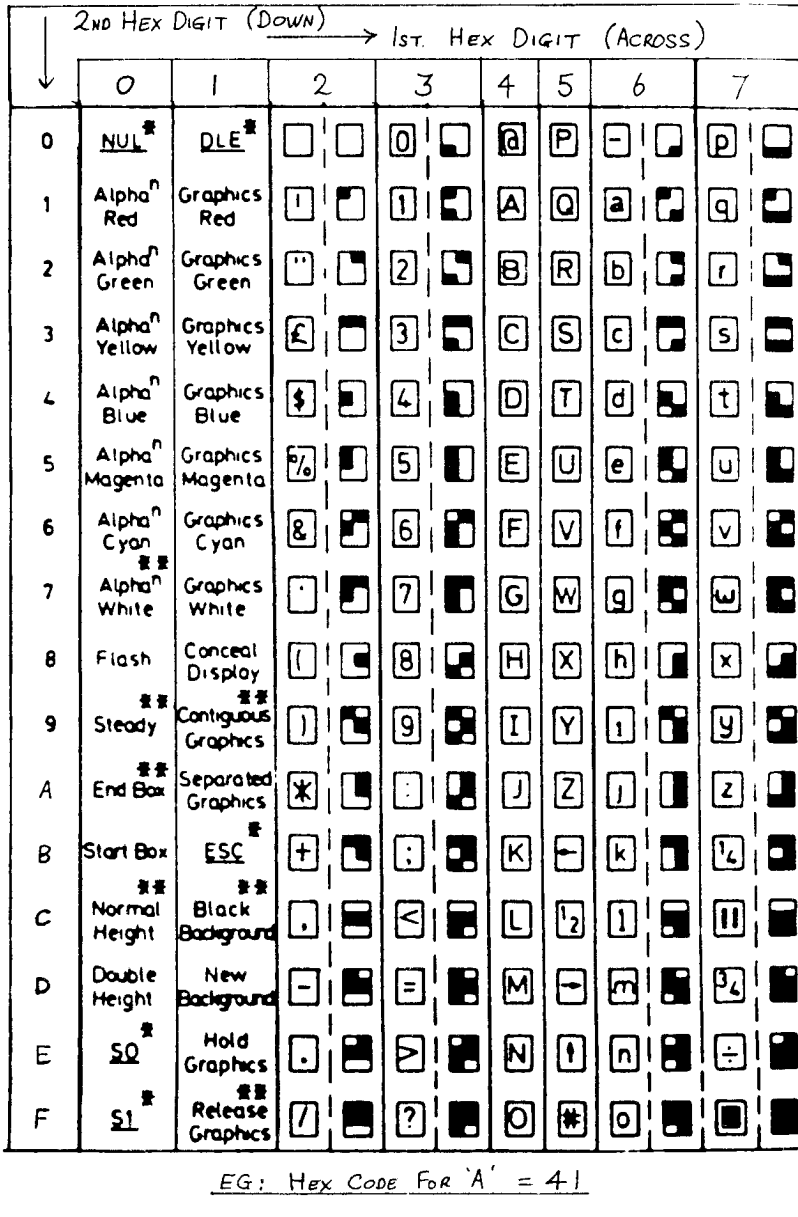



**Fig.1 Hexadecimal Codes for the Teletext Character Set**

A favoured pattern for amateurs is COLOUR BARS. To produce these the graphics mode is selected. To keep the pattern continuous through the colour change characters, the HOLD GRAPHICS function must also be selected. For example:

| ADDRESS | DATA | COMMENTS |
|---|---|---|
| 0000 | 1C | BLACK BACKGROUND |
| 0001 | 1E | HOLD GRAPHICS |
| 0002 | 17 | GRAPHICS WHITE |
| 0003 | 0D | DOUBLE HEIGHT |
| 0004 | 20 | SPACE |
| 0005 | 7F | SOLID GRAPHIC BLOCK (S.G.BLK) |
| 0006 | 7F | S.G.BLK |
| 0007 | 7F | S.G.BLK |
| 0008 | 7F | S.G.BLK |
| 0009 | 13 | GRAPHICS YELLOW |
| 000A | 7F | S.G.BLK |
| 000B | 7F | S.G.BLK |
| 000C | 7F | S.G.BLK |
| 000D | 7F | S.G.BLK |
| 000E | 16 | GRAPHICS CYAN |
| 000F | 7F | S.G.BLK |
| 0010 | 7F | S.G.BLK |
| 0011 | 7F | S.G.BLK |
| 0012 | 7F | S.G.BLK |
| 0013 | 12 | GRAPH'S GREEN |
| 0014 | 7F | S.G.BLK |
| 0015 | 7F | S.G.BLK |
| 0016 | 7F | S.G.BLK |
| 0017 | 7F | S.G.BLK |
| 0018 | 15 | GRAPH'S MAGENTA |
| 0019 | 7F | S.G.BLK |
| 001A | 7F | S.G.BLK |
| 001B | 7F | S.G.BLK |
| 001C | 7F | S.G.BLK |
| 001D | 11 | GRAPHICS RED |
| 001E | 7F | S.G.BLK |
| 001F | 7F | S.G.BLK |
| 0020 | 7F | S.G.BLK |
| 0021 | 7F | S.G.BLK |
| 0022 | 14 | GRAPHICS BLUE |
| 0023 | 7F | S.G.BLK |
| 0024 | 7F | S.G.BLK |
| 0025 | 7F | S.G.BLK |
| 0026 | 7F | S.G.BLK |
| 0027 | 1C | BLACK BACKGROUND |
| 0028 | 20 | SPACE |
| 0029 | 20 | SPACE |

Larger callsigns and text can be produced, using graphics on several successive lines to build them up. Trevor Brown G8CJS has supplied some fonts for four line high letters and numbers. They are used as in the

following example for characters ZL1:

| ADD | DATA | Z | | L | | 1 | |
|---|---|---|---|---|---|---|---|
| 0000 | 03 1D 14 20 | 23 23 23 6B | 20 | 35 00 00 00 | 20 | 00 6E 00 00 | 20 |
| 0040 | 03 1D 14 20 | 00 00 38 21 | 20 | 35 00 00 00 | 20 | 00 6A 00 00 | 20 |
| 0080 | 03 1D 14 20 | 60 26 00 00 | 20 | 35 00 00 00 | 20 | 00 6A 00 00 | 20 |
| 0C00 | 03 1D 14 20 | 2D 2C 2C 2C | 20 | 2D 2C 2C 2C | 20 | 00 2E 2C 00 | 20 |

Some rough font examples using graphics:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 36 23 23 69 | | 37 23 23 6 | | 96 23 23 69 | | 6B 23 23 69 |
| A | 75 70 70 7A | B | 75 70 70 7A | C | 35 00 00 00 | D | 6A 00 00 6A |
| | 35 00 00 6A | | 35 00 00 6A | | 35 00 00 60 | | 6A 00 00 6A |
| | 25 00 00 2A | | 2D 2C 2C 26 | | 29 2C 2C 26 | | 2E 2C 2C 26 |
| | 37 23 23 69 | | 37 23 23 23 | | 37 23 23 6B | | 35 00 00 6A |
| E | 75 70 70 00 | F | 75 70 70 70 | G | 35 00 00 2A | H | 75 70 70 7A |
| | 35 00 00 00 | | 35 00 00 00 | | 35 00 2C 6C | | 35 00 00 2A |
| | 2D 2C 2C 2C | | 25 00 00 00 | | 2D 2C 2C 2E | | 25 00 00 2A |
| | 00 6B 21 00 | | 23 6B 23 21 | | 35 00 60 26 | | 35 00 00 00 |
| I | 00 6A 00 00 | J | 00 6A 00 00 | K | 35 38 21 00 | L | 35 00 00 00 |
| | 00 6A 00 00 | | 34 6A 00 00 | | 37 22 64 00 | | 35 00 00 00 |
| | 00 2E 24 00 | | 29 26 00 00 | | 25 00 00 29 | | 2D 2C 2C 2C |

## EPROM PAGE SELECTOR

I use 2764 type EPROMs in my pattern generator, which allows me to store four pages in one device. In order to provide a rotating display I use the circuit in Fig.2 to automatically select the pages in sequence, displaying each one for a preset time.

This preset time is determined by the timing components in the 555s circuitry, the 10uF capacitor and the 15K resistor.

The two lines labled A11 and A12 and connected to the two address lines on the Eprom, enabling the upper and lower 'halves' of the EPROM to be selected in sequence.

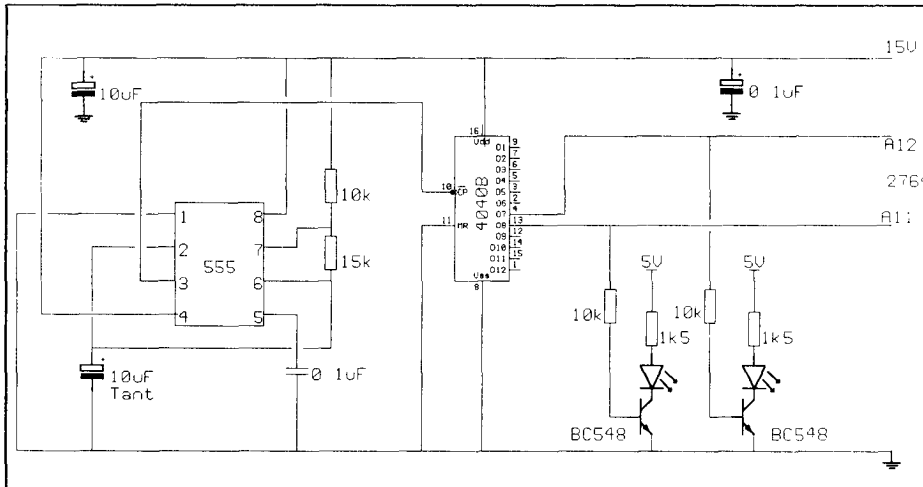



**Fig.2 EPROM Switcher**

# TALKING REPEATERS !

**Trevor Brown G8CJS**

Having recently been involved in the rebuild of the control logic of GB3ET (Emley Moor 24CM FM ATV) I investigated the SP0256 digi talker chip, with a view to implementing it into the new logic. The circuit worked well, but the SPO256 left something to be desired in its speech quality, in fact it sounds like a Dalek with a sore throat!. Because of this the unit was not included in the final logic solution.

I realise that coming from't part of't country that I do you may find it hard to believe that we reject any speech on the basis of clarity!. However, despite the shortcomings of the device we are reproducing the circuit here because it works well and is simple and inexpensive to build, and will enable you to evaluate the device for yourself.

The circuit of the digi talker is in two halves, and is shown complete in Fig.1. The left half is the generator and the right half is the actual digi talker. The talker requires a 6-bit word supplied to B0 through to B5, and is strobed on C7, which is used to stop the incoming data when it arrives too fast. This is the logic of a Centronics port for the computer buffs amongst us.

## THE GENERATOR

The generator half of the circuit pushes the 6-bit words across to the digi talker. The data words are stored in an EPROM and are addressed by the CD4040 CMOS counter, which is clocked by the free-running clock oscillator in gate A. The counter is a ripple counter and can generate some invalid states before settling on a valid count. The counter is advanced on the negative edge of the clock pulses, the strobe pulse is generated half a clock cycle later, on the positive clock cycle, to give the counter time to recover from any invalid states, before indicating to the digi talker that the data is valid. The clock pulses pass through gate B, where they can be stopped by input C7, should the data come too fast for the digi talker. The pulses can also be stopped by a logic 1 on the D7 input of the EPROM. This is so that we can mark in the speech data and end of the data, so that any unprogrammed part of the EPROM will not be presented as speech data. To start the speech again, all that is required is to reset the counter by opening SW1, a normally closed switch, and allowing the reset pin to go high, and thus reset the counter. When the switch is released, the counter will run from the first address and the chosen phrase will be generated.

To avoid switch bounce problems in this circuit, the first data in the EPROM should be several pauses, i.e: decimal 4, so that if these are repeated no audible problem will result.

## THE EPROM

To programme the EPROM you will need to refer to the table in Fig.3. The SPO256 does not work on whole words, but parts of words. These parts of words are shown in the table, along with the corresponding decimal number that should be programmed into the EPROM. The EPROM programmer I used appeared in CQ-TV 147, and is shown here in Fig.2. The programmer interfaces to a Spectrum computer and can be built in a single evening on the Club PCB called 'Flex' (see Members' Services supplement). It does require the purchase of some custom software from the GB3ET group (see the advert elsewhere in this issue). The Group can also supply MS preprogrammed with the phrase of your choice.

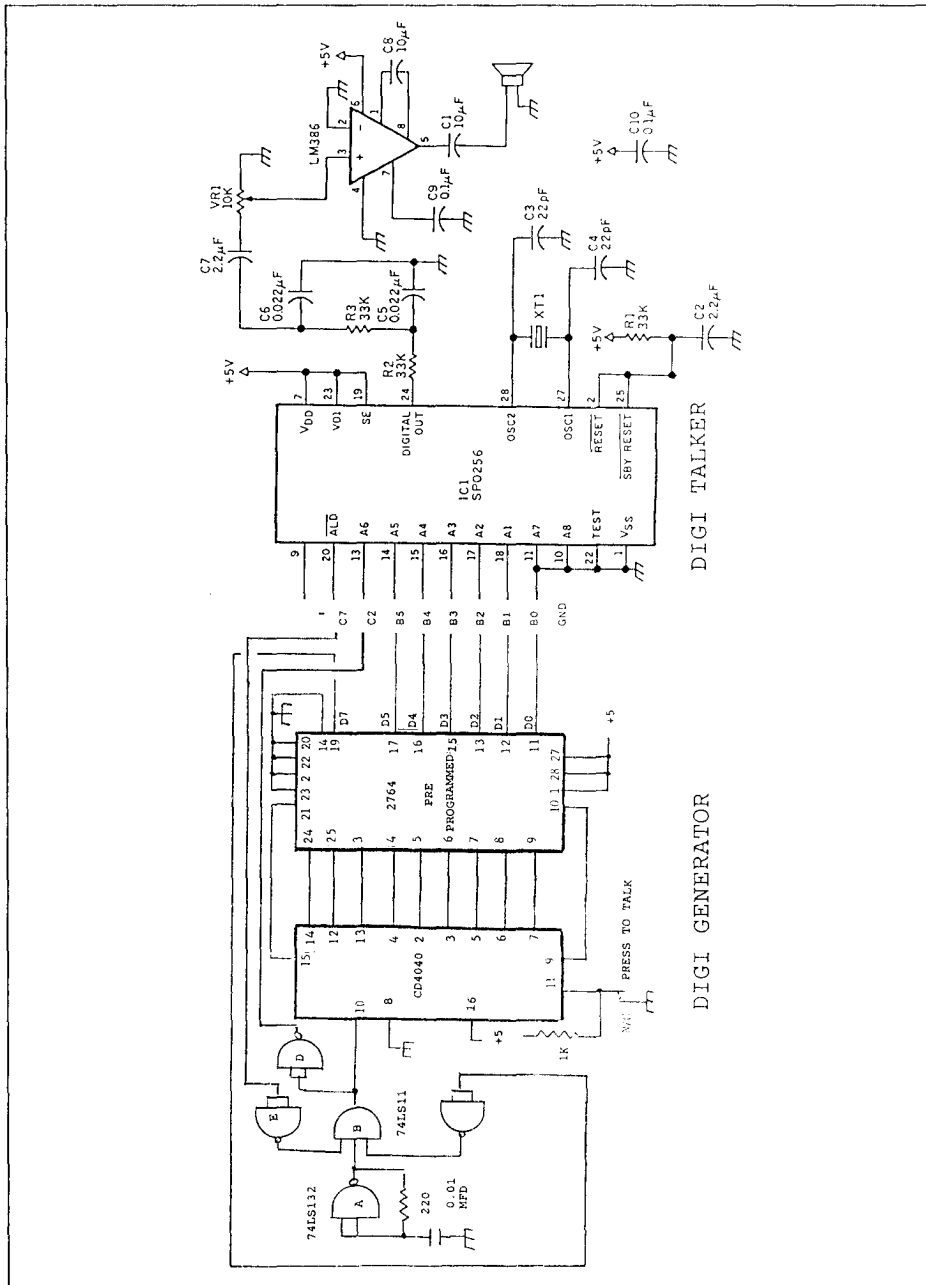



**Fig.1 The complete circuit of the Digi Talker**

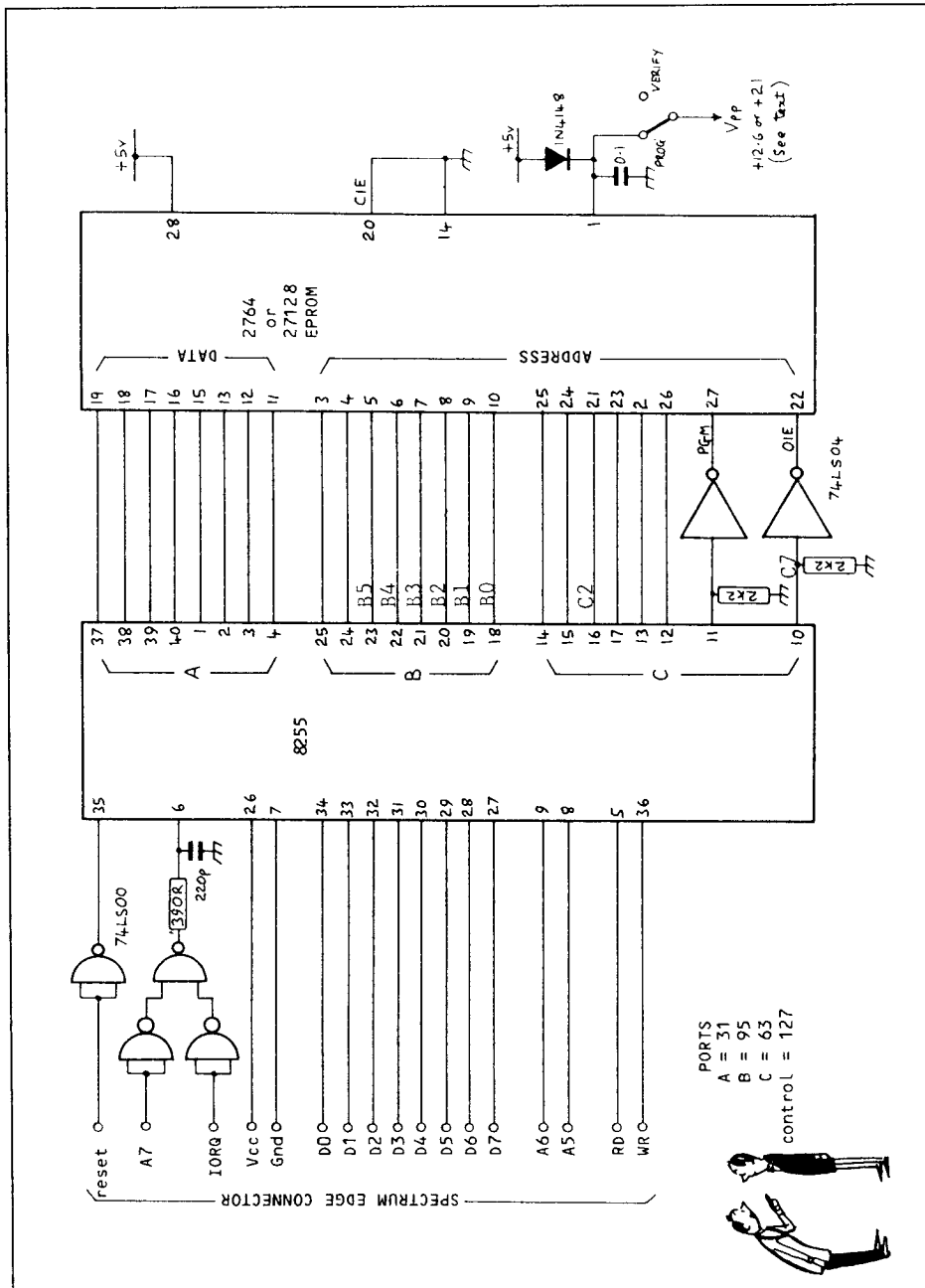



**Fig.2 The Spectrum EPROM Programmer**

**SHORT VOWELS**

| | | | |
|---|---|---|---|
| 7 | EH | E | bend |
| 12 | IH | I | fitting |
| 15 | AX | U | succeed |
| 23 | AO | U | aught |
| 24 | AA | O | cot |
| 26 | AE | A | fat |
| 30 | UH | OO | cook |

**LONG VOWELS**

| | | | |
|---|---|---|---|
| 5 | OT | OY | toy |
| 6 | AY | Y | sky |
| 19 | IY | E | see |
| 20 | EY | EA | great |
| 22 | UW | O | to |
| 31 | UW2 | OO | food |
| 32 | AW | OU | out |
| 53 | OW | OW | snow |
| 62 | EL | L | angle |

**COLOURED VOWELS**

| | | | |
|---|---|---|---|
| 47 | XR | AI | hair |
| 51 | ER | ER | computer |
| 52 | ER2 | IR | bird |
| 58 | OR | OR | store |
| 59 | AR | AR | farm |
| 60 | YR | R | clear |

**RESONANTS**

| | | | |
|---|---|---|---|
| 14 | RR | R | read |
| 39 | RR2 | R | brain |
| 49 | YY | U | computer |
| 25 | YY2 | Y | yes |
| 45 | LL | L | luck |
| 46 | WW | W | wool |

**VOICED FRICATIVES**

| | | | |
|---|---|---|---|
| 18 | DH | TH | they |
| 54 | DH2 | TH | bathe |
| 35 | VV | V | even |
| 43 | ZZ | Z | zoo |
| 38 | ZH | GE | beige |
| 27 | HH | H | he |

**VOICELESS FRICATIVES**

| | | | |
|---|---|---|---|
| 29 | TH | TH | thin |
| 40 | FF | F | fire |
| 55 | SS | S | sat |
| 29, 40, 50 | | | double for initial positions |
| 57 | HH2 | H | hoe |
| 37 | SH | SH | shirt |
| 48 | WH | WH | whig |

**VOICELESS STOPS**

| | | | |
|---|---|---|---|
| 28 | BB | B | rib |
| 63 | BB2 | B | big |
| 21 | DD | D | could |
| 33 | DD2 | D | do |
| 36 | GG | GU | guest |
| 61 | GG2 | G | go |
| 34 | GG3 | IG | wig |

**AFFRICATES**

| | | | |
|---|---|---|---|
| 17 | T | T | its |
| 13 | TT2 | T | to |
| 42 | KK | C | computer |
| 8 | KK3 | K | crane |
| 9 | PP | P | pub |
| 41 | KK2 | K | sky |

**VOICED STOPS**

| | | | |
|---|---|---|---|
| 10 | JH | J | jury |
| 50 | CH | CH | church |

**NASAL**

| | | | |
|---|---|---|---|
| 16 | MM | M | milk |
| 11 | NN | N | earn |
| 56 | NN2 | N | no |
| 44 | NG | NG | bans |

**PAUSES**

0 10ms and 1 20ms, use before stops and affricates, and between words.

2 50ms, use before voiceless stops, voiced fricatives and between words.

4 100ms and 5 200ms, use between clauses and sentences.

**Fig.3 Table of Programming Codes**

```
 5 REM BATC DIGI TALKER
10 OUT 127,136: REM set port
15 READ a
20 IF a=255 THEN GO TO 50
25 OUT 95,a: REM data to port B
30 IF IN 63>127 THEN GO TO 30: REM chip busy
35 OUT 63,0: OUT63,4: REM strobe
40 GO TO 15: REM repeat for next data word
45 STOP
50 RESTORE: GO TO 15
60 DATA 4, 7, 1, 43, 13, 52, 16, 12, 11, 20, 1, 17, 4, 255
```

NOTE: Data tables can be put anywhere in a BASIC program, but it is customary to put them at the end for reasons of clarity.

**Fig.4 BASIC programme for Emulator**

## TEST EMULATOR

In order to be able to test and adjust phrases before committing them to EPROM you need an emulator. The EPROM programmer shown in Fig.2 can be made to double as an emulator, and to this end I have indicated on the circuit diagram where it should be connected to The digi talker, i.e: B0, B1, B2, B3, B4, B5, C2 and C7. The supply rails can also be 'poached' from the Spectrum. The software to run the emulator is in BASIC and can be typed in and run from the keyboard. The short program is shown in Fig.4. The selected speech numbers should be entered into the data statement at line 60 of the program, in place of the example which is already there for you to try. The table should be terminated with 255.

Once you have put together your digi phrase and are happy with it, all that is required is to change the end-phrase terminator from 255 to 133, so that it will stop the hardware clock. If you are using the custom software for the programmer, you will have to convert your data to Hexadecimal format and enter it using option-6. Alternatively, by using option-5, you can drop into BASIC and enter the BASIC program shown in Fig.5, which will allow you to enter the numbers in decimal by [RUN 200]. When you have entered all the numbers [BREAK] the program and [RUN ENTER] to get back into the EPROM programmer software. Option-4 will then enable you to examine the data, which will be displayed in Hex. format. Option-3 will then allow you to 'blow' the EPROM. Remember to alter the terminator to 133.

```
200 LET b=30000: PRINT AT 19,0;"enter 133 to exit to basic"
210 INPUT "enter decimal number"' ' ,a
220 POKE b,a
225 IF a=133 THEN GO TO 250
230 LET b=b+1
240 GO TO 210
250 STOP
```

**Fig.5 BASIC program for entering Decimal Codes**

# 10GHZ ATV THE EASY WAY !

**Part 3**

**Jim Toon G0FNH**

Well, by now you should have a working 10GHz system. The idea of this series was to whet your appetite for 10GHz and get your mind off the home brew.

Many seemed to think that it would be hard to do (10GHz that is), but as you can see it is very easy to accomplish, and when you have got the hang of it you can go on to making contacts from up them large hills! However, in the mean time, let's see if we can improve the system.

One way is to use a longer horn than the Solfan one, and so with this in mind we will set about it. At the same time we will also discuss the manufacture of a novel 10GHz dipole aerial; very useful for test purposes.

## So how does a Horn AE work?

When excited by microwave energy (the aerial that is!) a horn aerial works in a similar way to a megaphone, in that it restricts the energy of the microwave radiation into a narrow path, thus reducing the tendency for spreading. This, therefore, increases the intensity of the radiation along a particular path, or beam.

It is this property of being able to focus microwave beams which makes the horn aerial so useful. The energy can be directed and therefore illuminate distant objects, or be transmitted to a distant receiver with the minimum of interference from nearby transmitters. It also allows the effective power and range to be increased because the power is concentrated into one useful beam.

OK then, that's a VERY brief look at what a horn aerial does, so let's make one!

## CONSTRUCTING A 20dB

To make our 20dB horn all that is required is some 1/16" sheet copper or brass (or any other plate that you can solder). If a thickness other than 1/16" is used then allowances will have to be made in the construction of the flange end of the horn - see Fig.1 plate-2.

Referring to Fig.1 plates 1 and 2 and Fig.2: Firstly, cut out the flange, ensuring that the middle section is 0.9" x 0.4". Next, cut out the four sides sections making sure that they are nice and square. These four sections are then soldered together taking special care that they are square and that no solder gets on the insides.

I find that a very easy way of ensuring that the sides are all square is to cut a length of sheet plate about 6" long and about 1" wide folded lengthwise. This plate is clamped to two of the sides with small G-clamps and then the sides soldered together. When cold, move to the next side and so on.

Finally, the flange is soldered on nice and square, and all that is needed is a coat of spray paint, and that is it - a 20dB horn.

## A 10GHz DIPOLE!

Now we move on to the dipole shown in Fig's.3 and 4. For this project you will need some semi-rigid coax 0.141" in diameter. This can be be obtained at most rallies, usually with small SMA connectors on the ends. A piece around 90mm long is required. Also needed is one male SMA socket, one female SMA socket, a short length of waveguide 1.5" long with a small end plate and one flange.

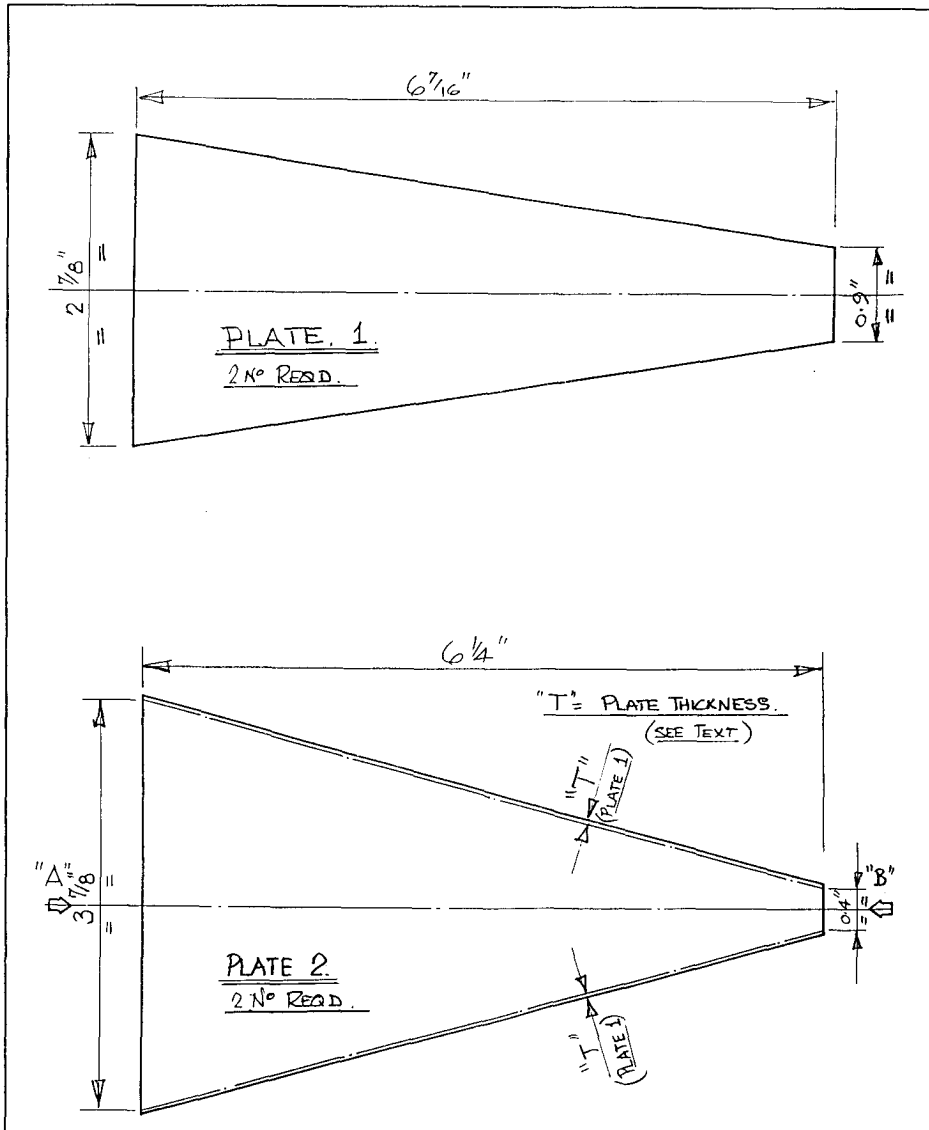



**Fig.1 Detail of Plates for Horn Aerial**

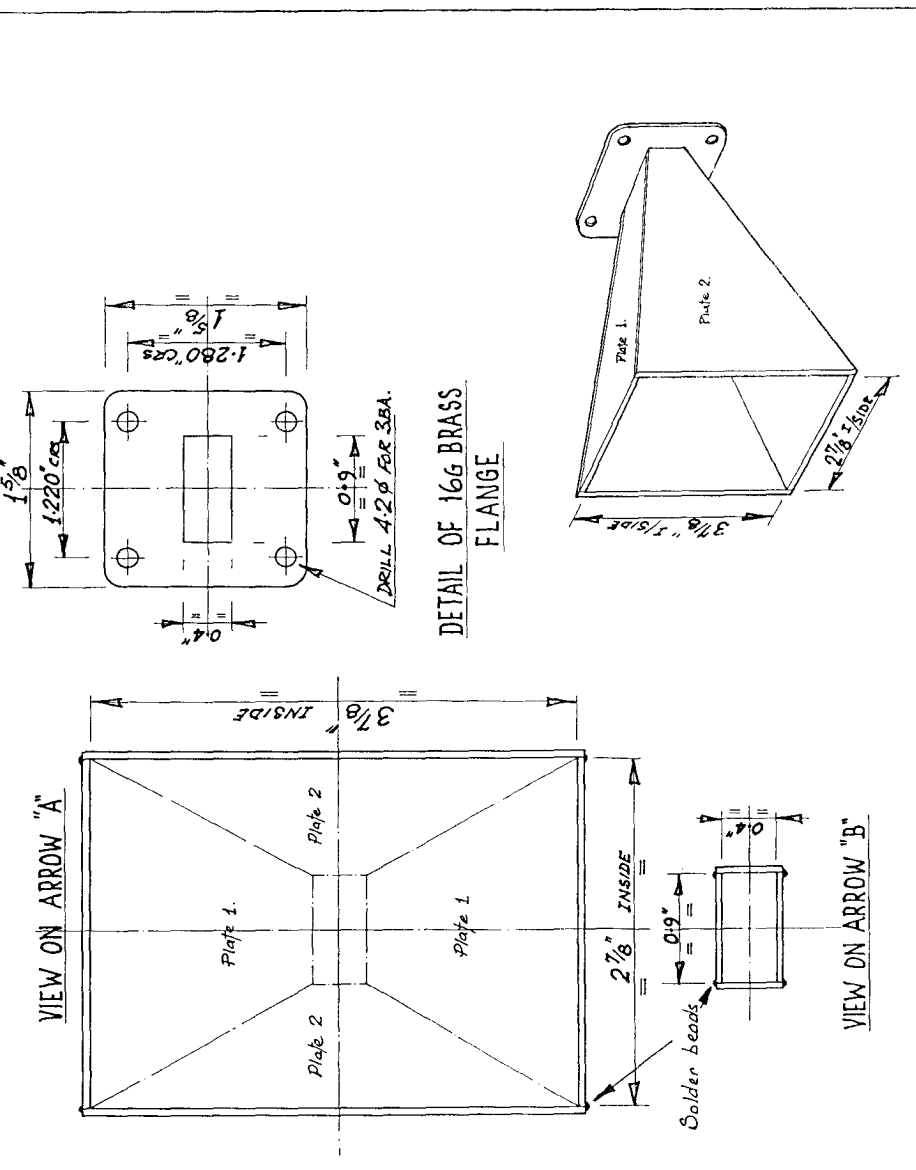



**Fig.2 Horn Aerial**

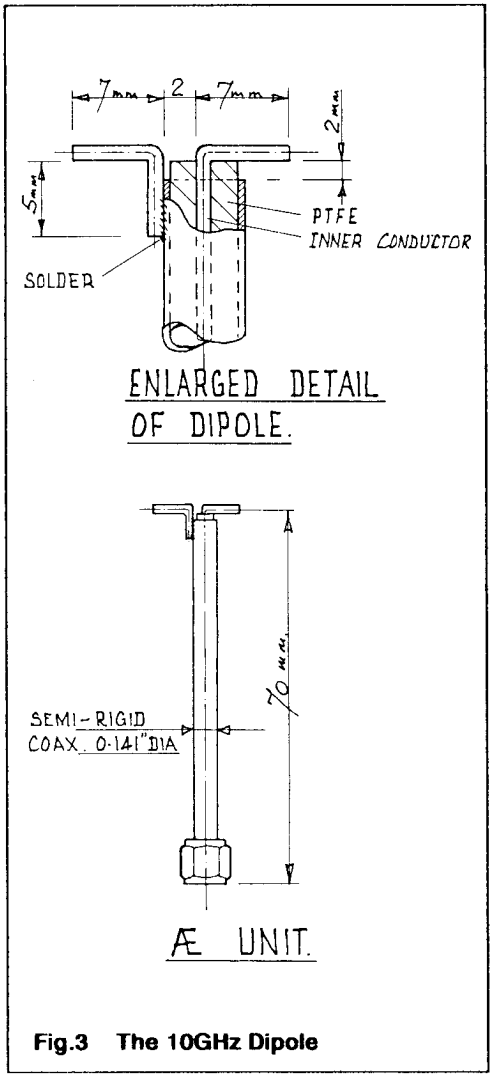



**Fig.3 The 10GHz Dipole**

Firstly, take the length of semi-rigid coaxial cable. Mark approximately 18mm down from one end and, with a sharp knife, score all the way round. Slowly bend the coax back and forth until the outer copper sheath breaks and then slide the sheath off to reveal the inner PTFE insulation. Mark 2mm up the revealed inner PTFE and strip it off the inner conductor, making sure that the inner conductor is not cut or scored. Save the PTFE as it is useful stuff!

Next, bend the inner conductor at right angles and measure from the bend 7mm and cut off the surplus. Retain the piece you have just cut off and bend it at right angles at about 5mm from one end and solder to the outer copper sheath of the semi-rigid coax as per Fig.3. Mark off from the bend at 7mm and cut off the surplus. Now fit an SMA female socket (these solder very easily) and that's it.

Now we come to the waveguide transition as shown in Fig.4. Cut off a piece of waveguide 1.5" long and square up the ends. Mark from one end 7mm centrally on the waveguide and drill a 3/16" hole. Fit the SMA male socket into the hole and mark off the four holes shown in Fig.4 and drill and tap them 8BA. Fit the bolts and file flush on the inside of the waveguide. Ensure that the bolts do not protude into the inside of the waveguide. The inner pin of the SMA socket DOES need to protude 6mm into the waveguide.

If the pin of the SMA socket is too short you will need to solder a small piece of wire onto it to make it protude the necessary 6mm.

When this has been achieved, remove the SMA socket and solder on the flange and end plate, then spray paint. Refit the SMA socket and that's it. Don't forget that the dipole needs to be horizontally polarised in use and not vertical.

I find the dipole very useful for setting up receivers.

**DO NOT FORGET: DO NOT, LOOK INTO A HORN OR GET TOO CLOSE TO A MICROWAVE DIPOLE WHEN IN USE. EYES DO NOT LIKE MICROWAVES AT ALL!**

In part-4 of this series I hope to be explaining how to make a 10GHz wavemeter. Have fun ... Jim .

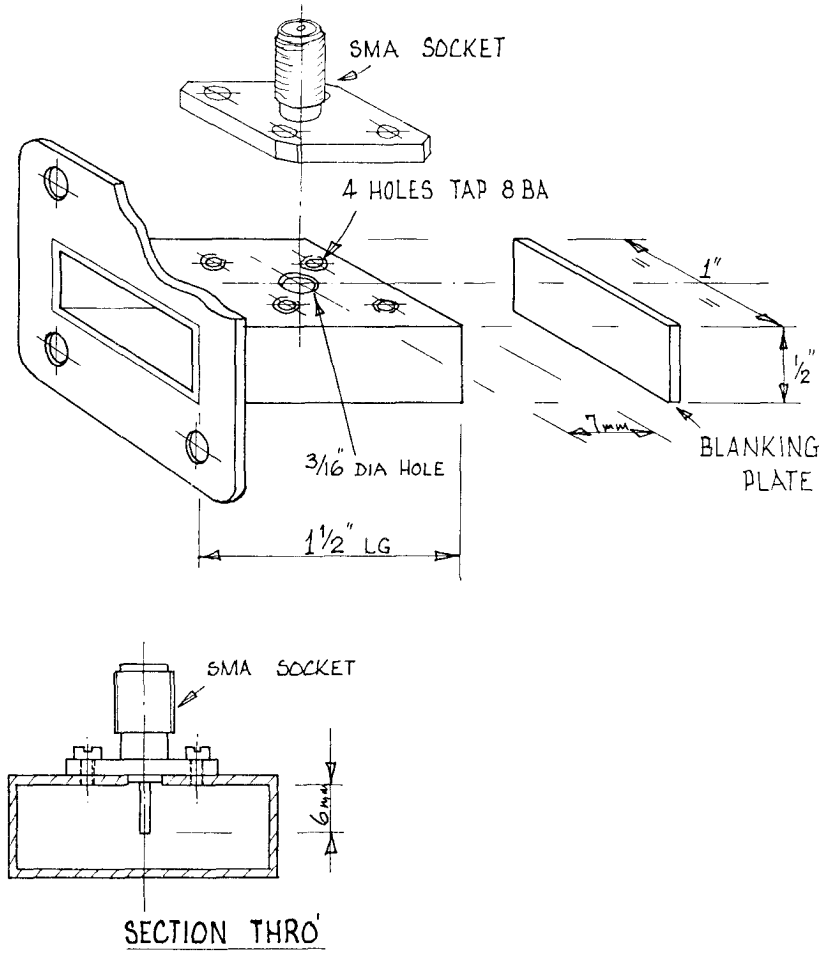



**Fig.4 Details of the Dipole Mount and Feed**

# CONVENTION 91

Once again, Gregory Gregory's Gothic pile is the venue for this year's Convention, and it looks like being even bigger than ever.

By the way, Gregory Gregory was the very rich guy who built the place in the last century, as I'm sure everyone who went last year will know!

The building hasn't moved since last year, but the road map is again printed overleaf to help you find the place. It is, in fact, very easy to find: just off the A1. The village of Harlaxton and the entrance to the Manor lie on the A607 Grantham to Melton Mowbray road. Signposts will be erected on the day.

A "Talk-in" will be provided by the Grantham Amateur Radio Society on 2M and probably 70cm as well.

Please note that the driveway up to the Manor is long, and littered with speed bumps. The Harlaxton staff will direct you to your parking space after you've parted with your entrance fee at the gatehouse, so please obey their instructions!

**OPENING TIME:** Doors open 10.00 AM. This also applies to those staying overnight on Saturday (unless you are a trader, or an exhibitor – or even (hint, hint) a volunteer helping to set up!). Quite apart from some of the best bargains going before the doors open, the traders object to having people under their feet as they set up!

**ENTRANCE CHARGE:** Yes, 'fraid so, there will be an entrance fee of 50p per person. Children under fourteen years free.

Please note that there will also be a 'Conscience Box' for those staying overnight to pay!

**CAR BOOT TRADERS:** Please identify yourself at the entrance, whereupon you will be charged £5 for a car/small estate car, rising to £15 for a large van (or more, at the discretion of the gate person).

There will be pitches in the inner circle as well as outside the circle. First come – best pitch!

**TRADERS:** All traders **MUST** withdraw their vehicles from the rear of the Manor after unloading. This is a COMPULSORY FIRE REGULATION.

***PLEASE SUPPORT OUR INDOOR TRADERS & EXHIBITORS – THEY MAKE CONVENTIONS POSSIBLE***

**THE NIGHT BEFORE:** This year we have the bar to ourselves in the Manor (that doesn't mean its free!). A guided tour of the house by a member of the Harlaxton staff will take place at 8.00pm. Please note that this will be the only tour (it became too difficult to coordinate during the day last year). Cost is £2.00 per person, payable in advance by 27th April (Why not? just add it to your accommodation booking).

**VOLUNTEERS:** Last year it was very pleasing to see the number of people helping. If you can spare an hour on the day, could you please contact PAUL Marshall on Lincoln (0522) 703348 before the event. We start the day at 6.00 AM !!

**ACCOMMODATION:** Once again the Manor is making its student accommodation available. The booking arrangements are slightly different this year.

All bookings must be paid for IN ADVANCE by 27th April. This is to smooth booking-in the day before – contact Paul Marshall on Lincoln (0522) 703348.

Prices are as follows:

Bed & Breakfast: £17.25 each per night
Bed, Breakfast and Evening Meal: £22.25 each per night

Single-roon supplement for a twin-bedded room: £5.00

Family rooms: children under 2 years – no charge, children under 14 years – half price

Meals (not staying over night): Breakfast - £3.50. Evening Meal -£5.00

Prices are inclusive of VAT. All cheques payable to: HARLAXTON MANOR ENTERPRISES Ltd.

**CAMPING:** All bookings for this facility are to be through the CQ-TV editor, Mike Wooding on 0788 890365. A charge of £6.00 per night will be made again this year.

**ON THE DAY:** All the usual attractions will be there including this time, the *Worthing Group and the Craft Fair !!!*

Licensed Bar and Refreshments will be available all day!

For full details see the programme

We look forward to seeing you on the day. Don't forget, if you can spare us an hour or so we can use your help ..... Paul Marchall

## 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 map below).

The main routes are as follows:

From the North or South ... A1 - turn off onto A607 and head towards Melton Mowbray.

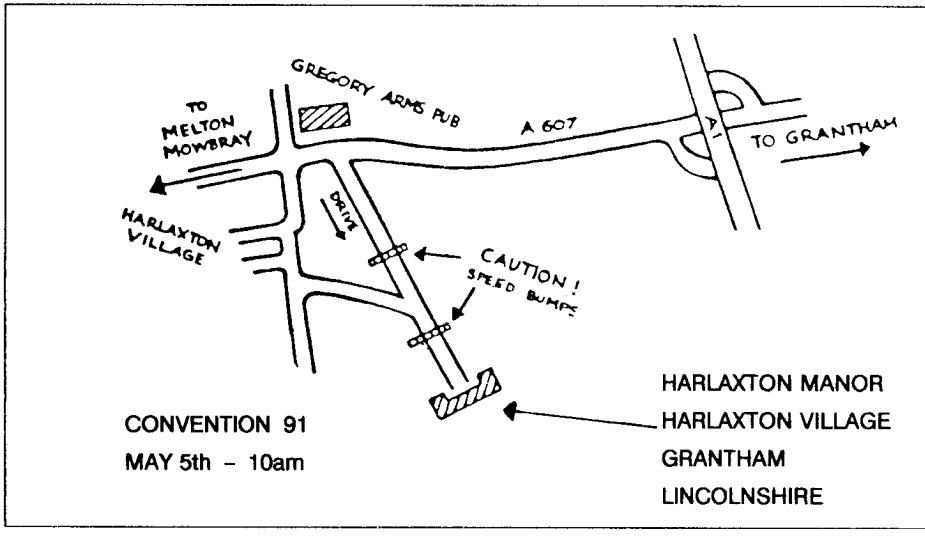
From the West ... A52 - join the A1 Southbound near Barrowby Village, then turn off onto the A607.

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

Please note: coaches and very large vehicles please follow the directions as above, and then into the Manor via the Tradesmens Drive (signposted HGV).

**TRAVELLING BY RAIL:**

To Grantham - main London/Edinburgh line (Kings Cross to Grantham takes approximately 1 hour). Good rail connecrtions East and West. Taxi from Grantham to Harlaxton (3 miles) in the reion of £4.00.



# LOGIC CIRCUITS

**Part–9**

**John Wood G3YQC**

## LINEAR INTEGRATED CIRCUITS – OPERATIONAL AMPLIFIERS

*If some of this material looks a trifle dated, then please remember that this is a virtual re-print of a series by Arthur Critchley which appeared in CQ-TV during the early nineteen seventies – JW.*

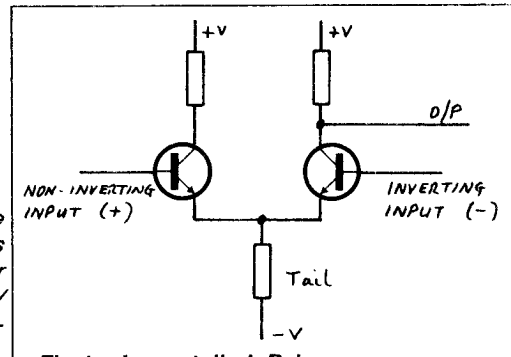



**Fig.1 Long-tailed Pair**

A Linear IC is by definition an IC which has a linear transfer characteristic – that is, the output is a replica of the input; unlike a digital IC whose output is either high or low. Being an IC it contains several transistors and can therefore be arranged to have a high gain.

There are really two types of IC loosely called Operational Amplifiers (Op.Amps for short) and these are Op.Amps and Video Amplifiers. In this article we are concerned only with the Op.Amps since the principles apply equally well to both types. The main difference between the two is the signal handling range. Op.Amps are principally intended for analogue computer applications but have been found to be very useful devices in all kinds of fields.

The input side of an Op.Amp usually consists of a long-tailed pair system so that both inverting and non-inverting amplifiers are possible without changing the package. The long-tailed pair being used because the effects due to temperature on the transistors largely cancel out. See Fig.1.

Op.Amps are generally arranged to have the inputs and output(s) normally at the same DC potential. For convenience this is usually zero volts. (Video Amps often do not). The voltage handling range is typically +/–10 volts with a supply of +/–12 volts or more. Zero-voltage reference of course demands the use of two supply rails which is a disadvantage for amateurs but it is possible to operate the ICs with only one supply rail.

Operating OP.Amps from a single supply rail is a tricky business though, and generally it is best to use two rails. But, to return to the long-tailed pair, it is obvious that its output potential cannot be the same as its inputs and so a second pair is often used to further increase the gain whilst bringing the DC conditions back again to those of the inputs. Fig.2 shows this.

This is the basis of many Op.Amps but some other refinements are also incorporated. These may take the form of constant-current sources for the tails of the pairs, voltage regulators for the rails and output emitter-followers for low-impedance outputs. In order to reduce differential-gain problems (i.e. HF gain changing with

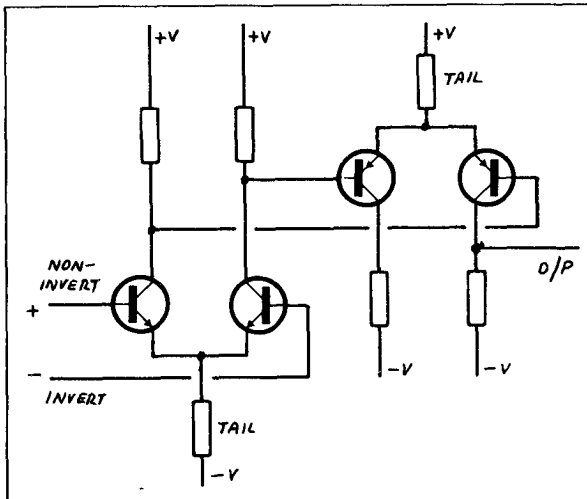



Fig.2 Cascaded Long-tailed Pairs

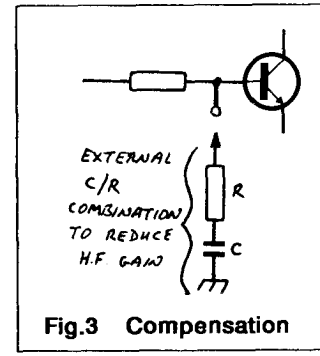



Fig.3 Compensation

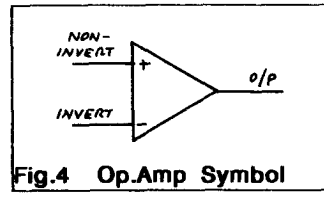



Fig.4 Op.Amp Symbol

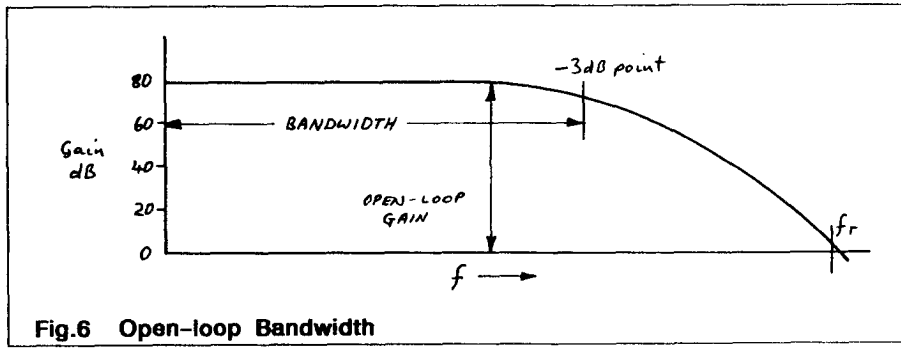



Fig.6 Open-loop Bandwidth

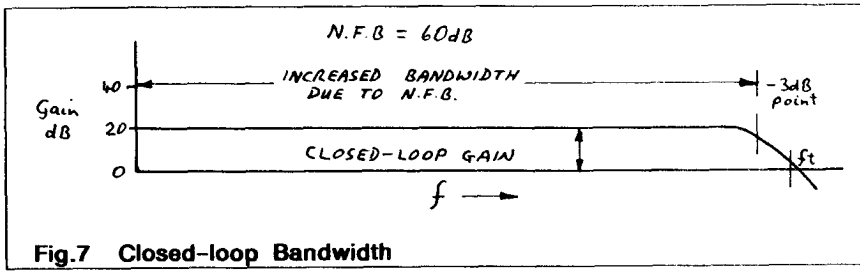



Fig.7 Closed-loop Bandwidth

L.F. signal levels) the output stages may be of totem-pole or complementary construction. There are also internal feedback loops to stabilise the gain as well as arrangements for very high input-impedances.

The problem of high-frequency stability with very high gain is a very real one and nearly all Op.Amps have at least two terminals which can be used to give high-frequency roll-off of the gain (and phase) by adding a capacitor/resistor combination. See Fig.3. For the moment though, this problem will be overlooked and an ideal Op.Amp considered.

In general we are not interested in what is inside the package and so the Op.Amp can be represented by the symbol shown in Fig.4.

The gain in an Op.Amp can be typically 10,000 or more - this is called the open-loop gain - and for most purposes is excessive since this amount of gain is usually available only in the mid-band frequencies. To take advantage of the lower gain at high frequencies negative feedback is applied to reduce the gain to a more useful level. This effectively widens the bandwidth - as shown in Figs 5 and 6.

Since the Op.Amp handles voltages, the adding of negative feedback is simply a matter of applying some portion of the output back to the inverting input. This can be a DC connection because of the similar potentials and so the DC conditions are stabilised as well as the gain.

Suppose we connect the output directly to the input? What will happen? Well, the feedback is 100% and so the gain, by the well known formula for gain with feedback, is:-

$$G = \frac{A}{1 + AB}$$

where A is the Open-loop gain and B is the feedback fraction. However, since A is so high, the 1 can be ignored. (This sort of thing is common in Electronics theory - all kinds of things can be ignored at times - the secret is in knowing which and when). The gain is now:-

$$G = \frac{A}{AB} = \frac{1}{B} = 1$$

In this case B is 1 so the gain is also unity.

What then, is the advantage of such a circuit? The negative feedback modifies the input impedances to such an extent that the input impedance is now effectively many megohms whilst the output impedance is only a few ohms. This, then, is a kind of Super emitter-follower and is in fact known as a voltage-follower (or buffer).

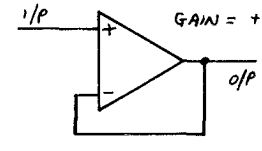



**Fig.7 Voltage-follower**

If we require some gain then the voltage fed back has to be less than 100% and a potentiometer is a convenient way to do this - as in Fig.8.

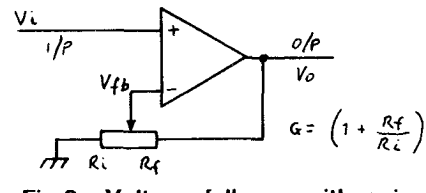



**Fig.8 Voltage-follower with gain**

The voltage fed back is Vfb.

$$Vfb = \frac{Vo * Ri}{Ri + Rf}$$

i.e:

$$B = \frac{Ri}{Ri + Rf}$$

So the gain is:

$$G = \frac{1}{B} = \frac{R + Rf}{Ri} = \frac{1 + Rf}{Ri}$$

This is independent of the IC and has a range of from unity to A. The voltage fed back to the inverting input is proportional to:-

$$Vfb = Vi * G = \frac{Vi}{B}$$

Thus the two inputs to the Op.Amp have the SAME voltage on them and hence NO DIFFERENCE between them. In other words, the IC has balanced the voltages. This is the principle of the 'virtual-earth' of which more later.

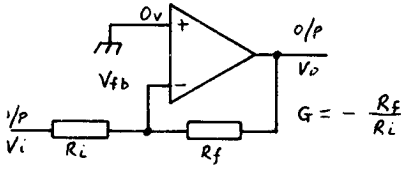



**Fig.9 Invertor**

Suppose we now swop over the input and earth potentials as in Fig.9? We know that the inputs must have the same voltage on them and that this must be 0 V, or earth. For a balance then, the output voltage must be of negative polarity. We could draw a see-saw to represent this as in Fig.10. The gain is now seen to be simply:-

$$G = \frac{-Vo}{Vi} = \frac{-R}{Ri}$$

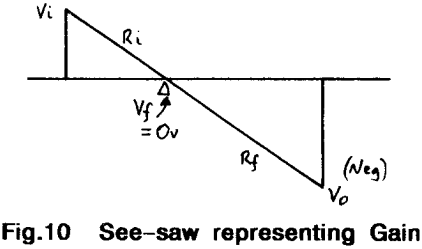



**Fig.10 See-saw representing Gain**

This expression for gain is even simpler than that for the voltage follower. By changing the values of Rf and Ri the gain can be varied from zero to A.

The negative-feedback modifies the input and output impedances as previously mentioned. For the purposes of explanation, series resistances are assumed in the output and the non-inverting input (source resistance). See Fig.11.

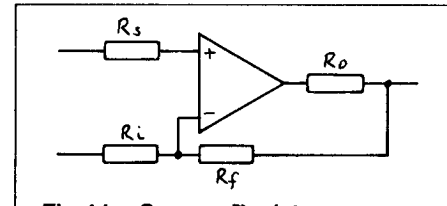



**Fig.11 Source Resistances**

For the voltage-follower the voltage at the inverting terminal is an exact replica of the source voltage and so the source resistance has the same voltage at both its ends and hence no current flows in it. In other words it is of infinite resistance. In practice it is effectively a very high resistance; in fact Rs magnified by A / G, i.e. A x Rs.

The output voltage changes less than it would have done with no feedback (when the gain would have been A). This is equivalent to a lower output series resistance and is in fact very low indeed, being equal to

$$\frac{Ro}{(A \times B)} = \frac{Ro}{A}$$

For the invertor similar reasoning applies but this time the input resistance is found to be equal to the input resistance Ri since the inverting input will always have 0v on it. (Vi appears across Ri - if Rs is low). The output impedance is virtually as for the voltage-follower - very low.

Incidentally, the gain stability and distortion are also improved by the same factors.

Unfortunately, Op.Amps are not perfect devices and the input transistors have to draw base current from some place. This has to be the source and so the base current has to come through the input resistances, which means that to keep a DC balance the two DC source resistances must be equal at all times. The effective resistance on each input is equal to all the resistances on the input in parallel. In the two cases mentioned this is Ri in parallel with Rf. So both inputs must have this effective resistance present as in Fig.12.

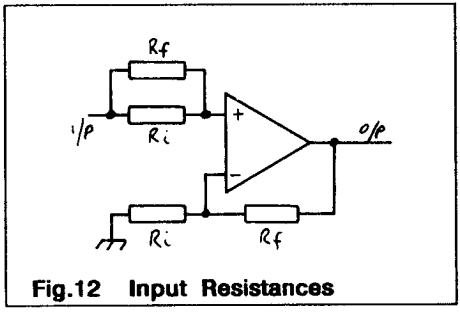



**Fig.12 Input Resistances**

This leads to an interesting case with the voltage-follower arrangement as in Fig.13. Here the extra Rf is earthed instead of being paralleled. The DC resistance is the same but the voltage is now reduced to:-

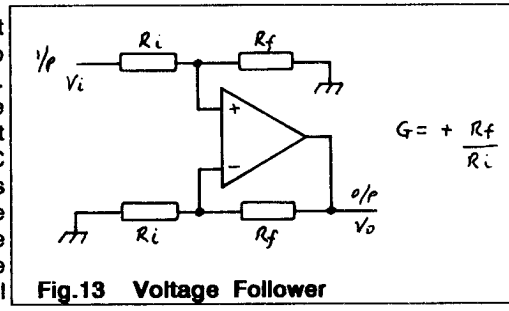



**Fig.13 Voltage Follower**

$$V * \frac{Rf}{Ri + Rf}$$

The gain is therefore:

$$G * \frac{Rf}{Ri + Rf}$$

or

$$\frac{Ri + Rf}{Ri} \times \frac{Rf}{Ri + Rf} = \frac{Rf}{Ri}$$

i.e. the same as for the invertor (but Positive).

So we now have a common arrangement for both types and the resistances must be kept in these proportions at all times. This is the basic system for the use of an Op.Amp.

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# I²C Part-3 - THE VISION SWITCHER

The third board in the I²C project is a video switcher. It has been designed as an eight in, two out board. This means that you can feed up to eight video signals into the board and each of the two outputs can be connected to any one input, independently of the other.

The circuit features vertical interval cutting and broadcast quality performance.

The circuit diagram is shown on two double pages in parts-1 and 2, and at first sight may appear rather complex, but don't be discouraged as this is not so. Further study of the circuit diagrams reveals that there are four parts to the circuit:-

- A) Input stage
- B) Channel select
- C) Video amplifier
- D) I²C decode and latch

## CIRCUIT DESCRIPTION

There are eight identical input circuits. The purpose of these is to buffer the incoming video and provide a high impedance input to the board, so that more than one board may be strapped together and so the video signal can be either looped or terminated.

The video signal is fed in via the 6.8uF DC blocking capacitor, and onto the gate of the FET. The PNP transistor wrapped across the FET linearises it.

The output from the FET is then fed to the video switch ICs. The DC bias for the FET is fed to its gate via the 1M resistor. This bias signal is derived from two places:

1) Firstly the 'no signal' condition forces the output to zero volts because the 6V8 zener diode bias's the FET to the correct point, at this point the second PNP transistor is switched off.

2) Secondly, when video is present, the sync tips will turn on the second PNP transistor, effectively clamping the sync tips to the reference voltage fed to each input stage.

This form of clamp works better than the more familiar 'diode clamp' as it only clamps the sync pulse, without affecting the rest of the video signal.

The outputs of the clamps feed the GX414 four channel video selector IC's. These have their inputs wired in pairs, i.e: IC1 and IC2 have channels-1, 2, 3, and 4 as their inputs, and IC3 and IC4 have channels-5, 6 ,7 and 8 as inputs. The outputs of IC1 and 3 are commoned via 22 Ohm resistors to feed one video amplifier, and IC2 and IC4 feed the second video amplifier.

The two video amplifiers are identical. The input signal is fed via a damped inductor to the base of TR3. This point is shunted to ground by a variable capacitor to set the HF roll off of the video amplifier. The damped inductor sets the bandwidth of the amplifier and also counteracts the effect of a rather nasty peak in the response of the GX414 switches.

The inverted signal at the collector of TR3 is fed to the base of TR8 (VC1 allows the response to be trimmed flat) where it is once more inverted and fed to the bases of the output pair, TR9 and 16, with D4 adjusting the DC conditions for these two transistors which are configured as complementary emitter followers.

The output point is fed back to the emitter of TR3 to act as a bias stabilising network and the gain of the circuit is set by RV2. The output of the video amplifier is fed via a 75 Ohm resistor to present the correct impedance to the outside world.

The two I²C signals (SDA and SCL) are fed to IC6 which decodes the data into eight

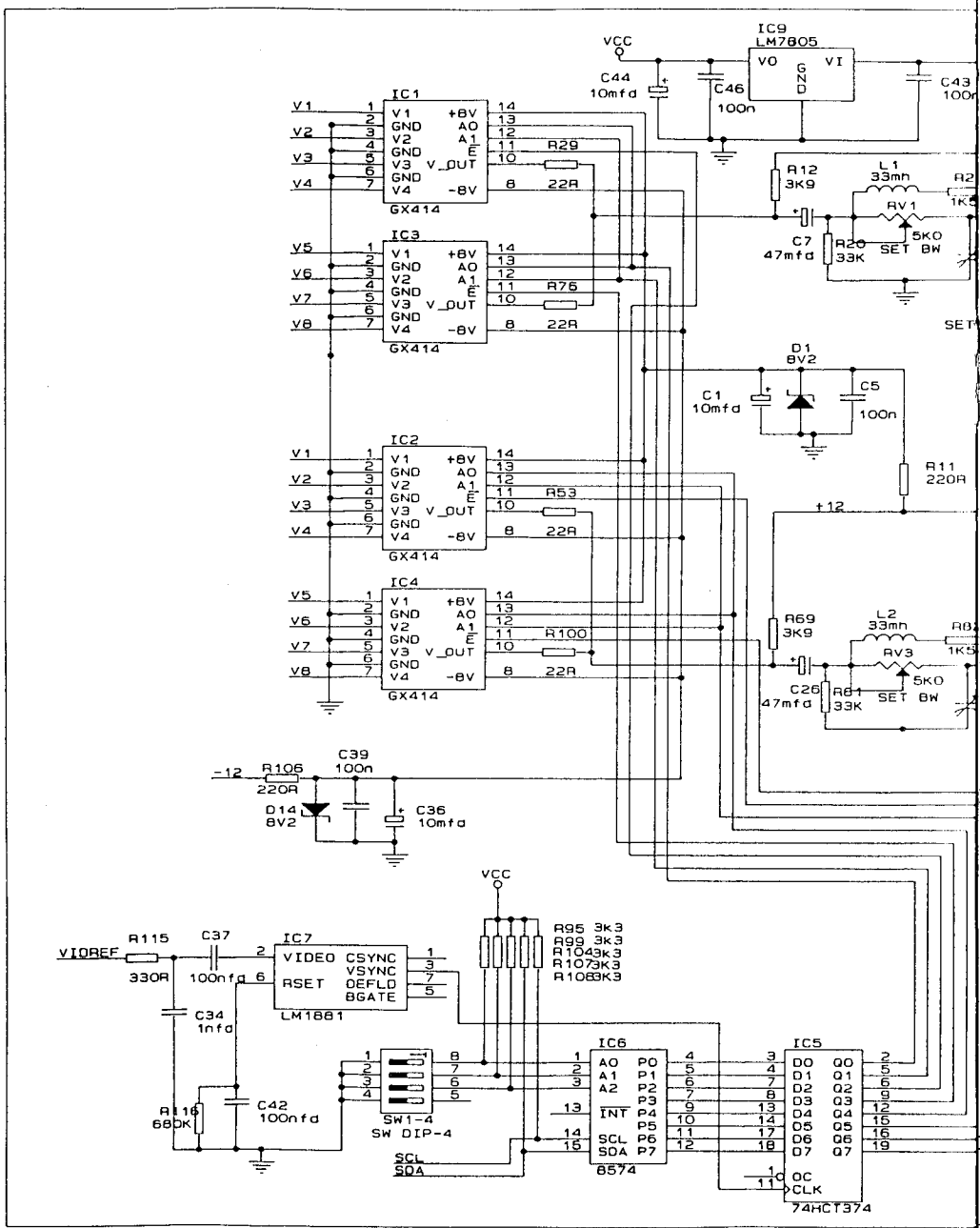
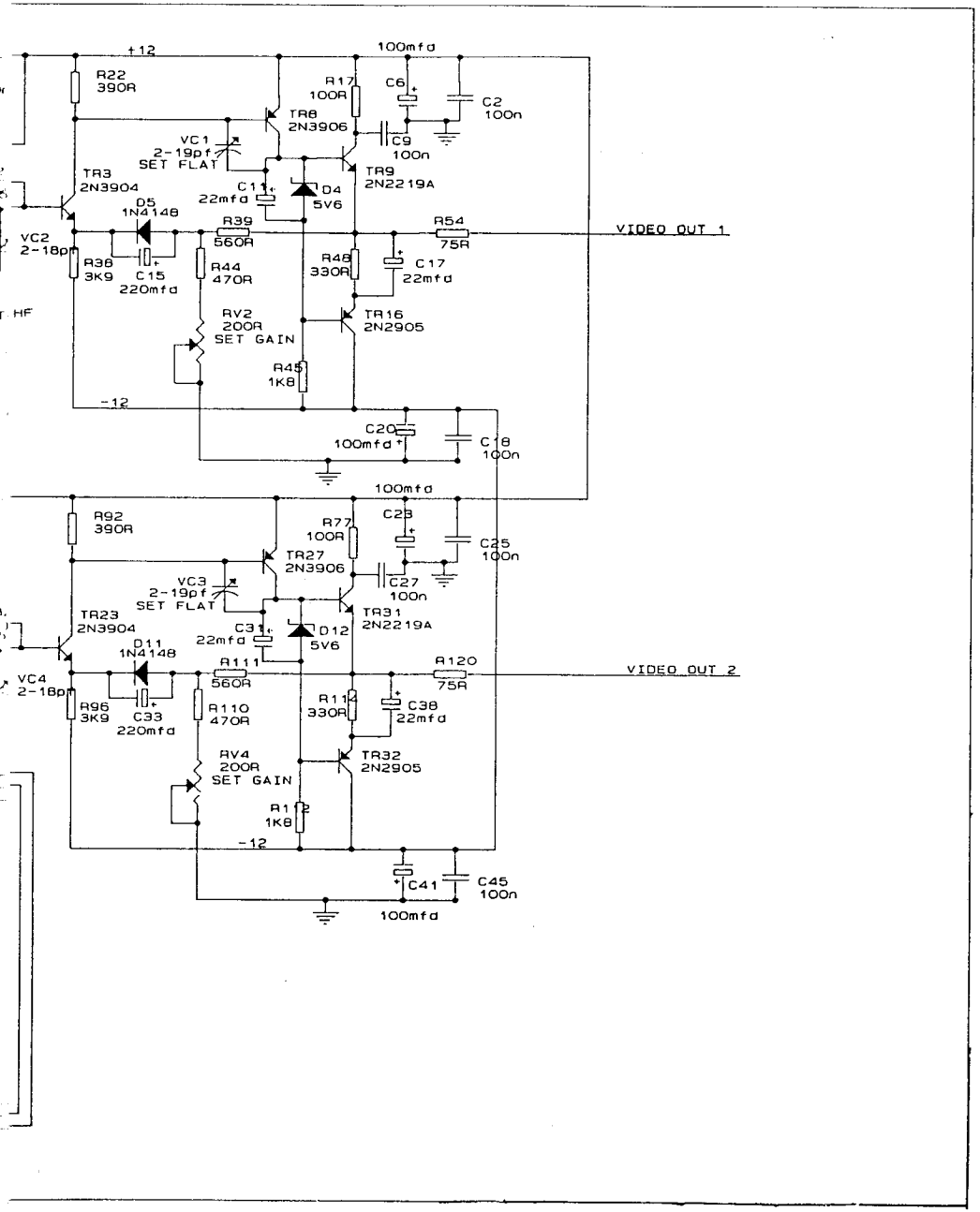



**Fig.1 Vision Switcher Circuit Diagram Part-1**


+12
100mfd
R22
390R
R17
100R
C6
C2
100n
TR8
2N3906
C9
100n
VC1
2-19pf
SET FLAT
TR3
2N3904
C11
22mfd
D4
5V6
TR9
2N2219A
D5
1N4148
R39
560R
R54
75R
VIDEO OUT 1
VC2
2-18pf
R38
3K9
C15
220mfd
R44
470R
R48
330R
C17
22mfd
RV2
200R
SET GAIN
TR16
2N2905
R45
1K8
-12
C20
100mfd
C18
100n
100mfd
R92
390R
R77
100R
C23
C25
100n
TR27
2N3906
C27
100n
VC3
2-19pf
SET FLAT
TR23
2N3904
C31
22mfd
D12
5V6
TR31
2N2219A
D11
1N4148
R111
560R
R120
75R
VIDEO OUT 2
VC4
2-18pf
R96
3K9
C33
220mfd
R110
470R
R114
330R
C38
22mfd
RV4
200R
SET GAIN
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C41
C45
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100mfd

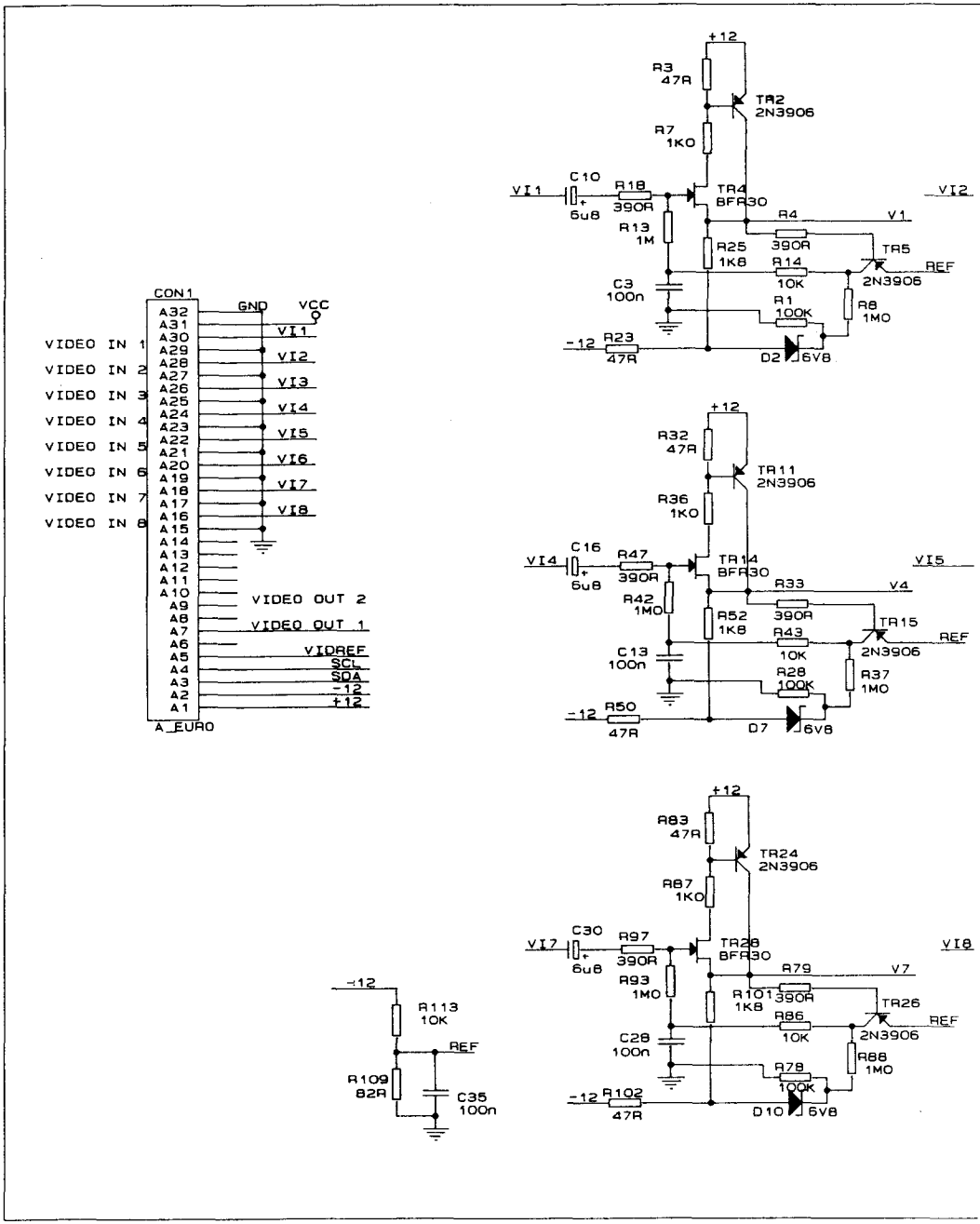
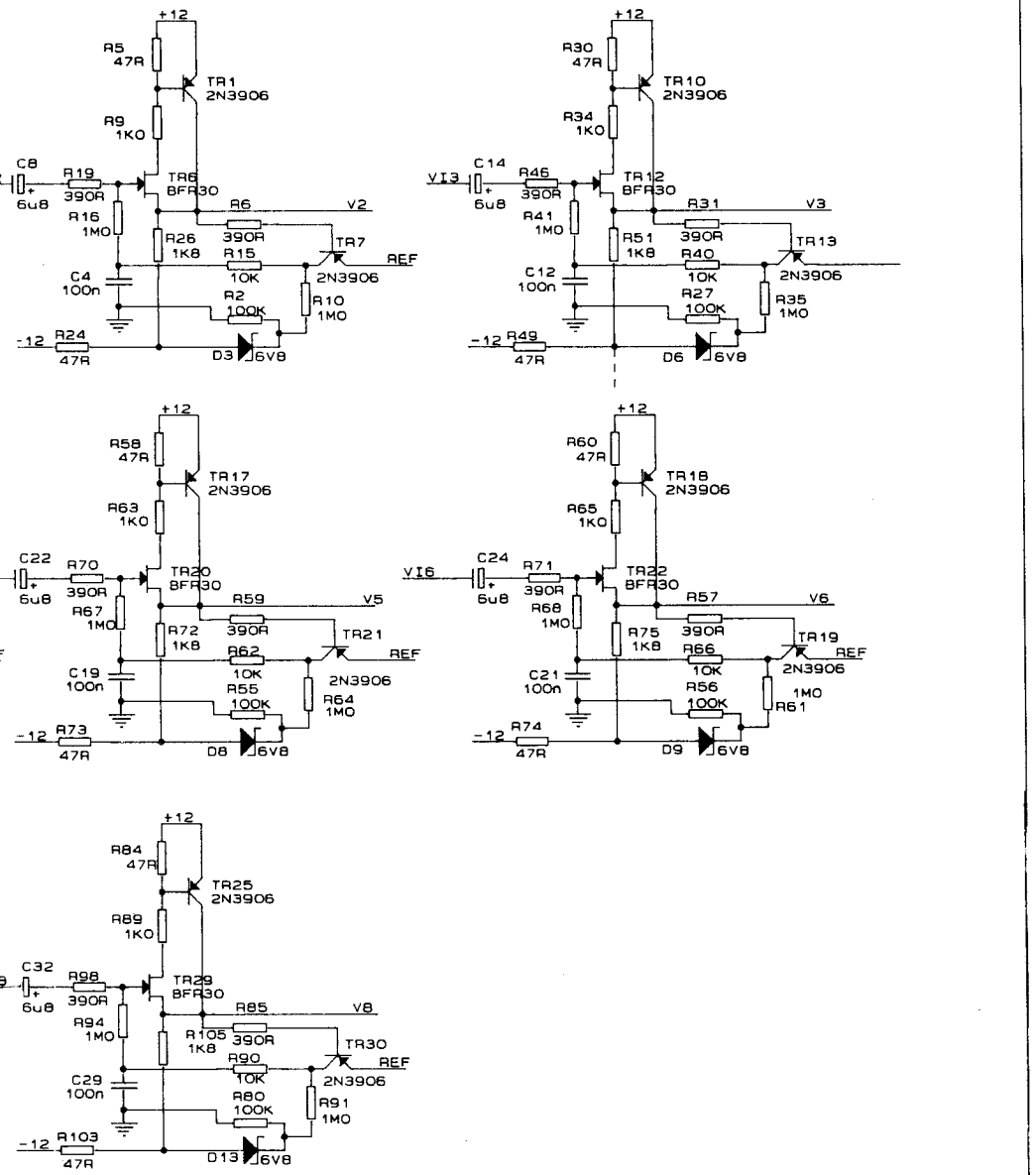



**Fig.1 Vision Switcher Circuit Diagram Part-2**


+12
R5 47R
TR1 2N3906
R9 1KO
C8
R19 390R
TR6 BFR30
6u8
R16 1MO
R6
V2
R26 1K8
390R
R15
TR7
REF
10K
2N3906
C4 100n
R2 100K
R10 1MO
-12
R24 47R
D3 6V8
R30 47R
TR10 2N3906
R34 1KO
C14
R46 390R
TR12 BFR30
VI3
6u8
R41 1MO
R31
V3
R51 1K8
390R
R40
TR13
10K
2N3906
C12 100n
R27 100K
R35 1MO
R49 47R
D6 6V8
R58 47R
TR17 2N3906
R63 1KO
C22
R70 390R
TR20 BFR30
6u8
R67 1MO
R59
V5
R72 1K8
390R
TR21
REF
R62
10K
2N3906
C19 100n
R55 100K
R64 1MO
R73 47R
D8 6V8
R60 47R
TR18 2N3906
R65 1KO
C24
R71 390R
TR22 BFR30
VI6
6u8
R68 1MO
R57
V6
R75 1K8
390R
R66
TR19
REF
10K
2N3906
C21 100n
R56 100K
1MO
R61
R74 47R
D9 6V8
R84 47R
TR25 2N3906
R89 1KO
C32
R98 390R
TR29 BFR30
6u8
R94 1MO
R85
V8
R105 1K8
390R
TR30
REF
R90
10K
2N3906
C29 100n
R80 100K
R91 1MO
R103 47R
D13 6V8

outputs. These are fed to an octal latch IC5 which stores the data sent over the I²C bus. These signals enable the GX414's and decide which inputs are connected to which outputs. The data is clocked into the latch during the vertical interval, so that the picture will not 'jump' when switched.

The vertical interval is detected by IC7, an LM1881 sync separator. The vertical pulse output is fed to the clock input of IC5, the latch. The other enable input to IC7a is fed from the I²C bus chip IC6 and provides a 'GO' signal to activate the switching process.

The four DIP switches set the I²C address at which the switcher sits, so that if more than one switcher is required then separate control over them is possible, by moving the switches to different positions.

The input to the sync separator has been brought out via the connector so that it can be fed from which ever source you want rather than being connected to channel-1. If it is fed from any other source than one of the sources fed to channels-1 to 8, then it will need to be terminated on the connector into which the card plugs with a 75 Ohm resistor.

## CONSTRUCTION NOTES

One point about the construction. The through hole plated printed circuit card that will be available from BATC Members services is quite densely populated and whilst it is possible to use quarter watt resistors for the clamp circuits it will look neater if you can use one eighth watt ones - sorry about that !!!

We have also reproduced in this issue a component list for populating the CPU and VDU boards. Some values have been optimised from the values given on the circuit diagram in the light of experience gained from the production PCBs. Therefore, please adhere to the list rather than the circuit diagram.

We hope to have an I²C 'clinic' and demonstration at the Convention, so please bring along your ideas, questions, and any problem boards.

# FIELD BULLETIN 3

## VDU BOARD

Component reference list and values for the I2C VDU board. This list replaces the values suggested on the published circuit diagram.

NOTE: on the circuit diagram reference C1 becomes C26. The correct C1 is 10nF and is a decoupling capacitor.

**CAPACITORS:**

| Quantity | Value | Components |
|---|---|---|
| 3 | 10nF | C1, C25, C3 |
| 2 | 18pF | C10, C15 |
| 3 | 10uF | C11, C12, C6 |
| 2 | 22nF | C13, C26 |
| 2 | 10nF | C14, C2 |
| 1 | 68nF | C16 |
| 1 | 27pF | C17 |
| 2 | 15pF | C18, C24 |
| 1 | 100pF | C19 |
| 1 | 270pF | C20 |
| 1 | 10nF | C21 |
| 1 | 470pF | C22 |
| 1 | 1nF | C23 |
| 1 | 10nF | C4 |
| 2 | 1uF | C5, C7 |
| 1 | 47nF | C8 |
| 1 | 220pF | C9 |
| 2 | 3-22pF | VC1, VC2 |

**INTEGRATED CIRCUITS:**

| | | |
|---|---|---|
| 1 | 74LS138 | IC1 |
| 1 | PCF8583 | IC10 |
| 1 | 74LS04 | IC11 |
| 1 | 74LS541 | IC2 |
| 1 | 74LS174 | IC3 |
| 1 | 74LS32 | IC4 |
| 2 | 7417 | IC5, IC6 |
| 1 | SAA5243 | IC7 |
| 1 | 6264 | IC8 |
| 1 | SAA5231 | IC9 |

**CONTINUED OVERLEAF**

| Quantity | Value | Components |
|---|---|---|
| **INDUCTORS:** | | |
| 1 | 15uH | L1 |
| **RESISTORS:** | | |
| 14 | 4k7 | R1, R10, R11, R12, R13, R14, R15, R16, R2, R3, R4, R5, R6, R9 |
| 1 | 1k0 | R20 |
| 1 | 330 | R25 |
| 3 | 1k5 | R26, R27, R28 |
| 2 | 3k3 | R7, R8 |
| 2 | Wire Link | R22, R23 |
| **TRANSISTORS & DIODES:** | | |
| 1 | 2N3819 | TR1 |
| 1 | 2N3906 | TR2 |
| **MISCELLANEOUS:** | | |
| 1 | 6MHz Crystal | Y1 |
| 1 | 8.75MHz Crystal | Y2 |
| 1 | AB_EURO | CON1 |
| 3 | 3-pin Header | CON2, CON3, CON4 |
| 3 | IN4148 | D1, D2, D3 |
| 1 | 3.8V NICAD | NICAD |

## CPU BOARD

An extra track has been found which, if left in, will cause problems. The offending track is between the junction of C18, Y2 and C26. Cut this track near C26.

Two tracks are missing and the connections should be hard-wired. they are as follows:

IC4 pin-19 to IC2 pin-19

IC5 pin-1 to IC5 pin-19

| STK | QTY | RX, TX AND SSTV PCBS & COMPONENTS | EACH | P&P | TOTAL |
|---|---|---|---|---|---|
| 42 | ..... | 13.875 MHz Crystal | £4.00 | 0.25 | ..... |
| 43 | ..... | SAA5231 genlock IC | £6.50 | 0.25 | ..... |
| 44 | ..... | SAA5243PE Teletext IC | £11.50 | 0.25 | ..... |
| 45 | ..... | PCF8583 Clock IC | £6.00 | 0.25 | ..... |
| 46 | ..... | 4 rail power supplies PCB | £3.00 | 0.35 | ..... |
| 47 | ..... | VSB 70cm Transmitter PCB set ** | £15.00 | 0.65 | ..... |
| 48 | ..... | 13.14 MHz Crystal ** | £5.00 | 0.25 | ..... |
| 49 | ..... | 70cm DSB Transmitter PCB | £3.00 | 0.35 | ..... |
| 50 | ..... | 108.875 MHz Crystal | £7.00 | 0.25 | ..... |
| 51 | ..... | ATV Up-Converter PCB | £2.25 | 0.25 | ..... |
| 52 | ..... | Amateur Television AM IF PCB | £1.50 | 0.25 | ..... |
| 53 | ..... | FM TV Demodulator PCB | £3.00 | 0.35 | ..... |
| 54 | ..... | 24cm GaAsFET Converter PCB | £3.50 | 0.35 | ..... |
| 55 | ..... | Gunn Diode Modulator PCB | £2.50 | 0.25 | ..... |
| 56 | ..... | 10 GHz Head Unit PCB | £2.50 | 0.25 | ..... |
| 57 | ..... | Tunable IF PCB | £2.50 | 0.25 | ..... |
| 58 | ..... | 6 MHz Audio Subcarrier Gen PCB | £1.50 | 0.25 | ..... |
| 59 | ..... | G3WCY SSTV Scan Converter PCB set | £10.00 | 0.65 | ..... |
| 60 | ..... | G4ENA Colour etc. SSTV mods PCB set | £5.00 | 0.35 | ..... |
| 61 | ..... | G4ENA SSTV Transmit mod to 'WCY PCB | £6.00 | 0.35 | ..... |
| 62 | ..... | G4ENA Auxiliary PCB | £2.00 | 0.25 | ..... |
| 63 | ..... | SSTV Sync and Pattern gen PCB | £3.00 | 0.35 | ..... |
| 64 | ..... | SSTV SPG/Pattern 2732 EPROM | £12.00 | 0.25 | ..... |
| 65 | ..... | MC1445 Gated Video Amplifier IC | £3.50 | 0.25 | ..... |
| 66 | ..... | TEA2014 Video Switch IC | £1.10 | 0.25 | ..... |
| 67 | ..... | TEA5114 Video Switch IC | £1.50 | 0.25 | ..... |
| 68 | ..... | 4.433618 MHz Crystal | £2.75 | 0.25 | ..... |

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| 69 | ..... | 5 MHz Crystal | £2.75 | 0.25 | ..... |
| 70 | ..... | 6.0 MHz Crystal | £1.50 | 0.25 | ..... |
| 71 | ..... | BATC diamond button-hole badge | £0.40 | 0.25 | ..... |
| 72 | ..... | BATC round lapel badge | £0.50 | 0.25 | ..... |
| 73 | ..... | BATC blue diamond clutch-pin badg | £1.50 | 0.25 | ..... |
| 74 | ..... | BATC key fob | £0.75 | 0.25 | ..... |
| 75 | ..... | BATC round equipment stickers | £0.15 | 0.25 | ..... |
| 76 | ..... | BATC square windscreen stickers | £0.10 | 0.25 | ..... |
| 77 | ..... | Set of Ferrite cores for VSB Tx | £0.20 | 0.25 | ..... |
| | | ZERO RATE ITEMS | EACH | P&P | TOTAL |
| 78 | ..... | BATC Test Card | £0.50 | 0.35 | ..... |
| 79 | ..... | BATC Reporting Chart | £0.12 | 0.35 | ..... |

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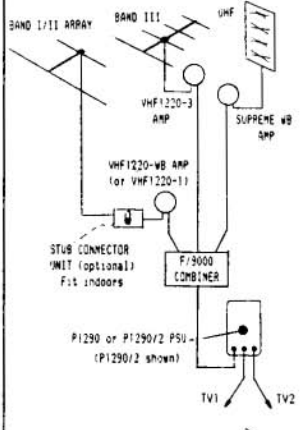


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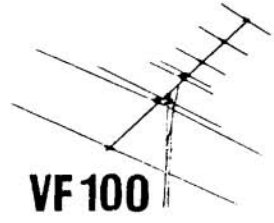
*Fig.1: A suggested DX-TV aerial system incorporating 'Fringe Electronics' amplifiers and a single power source. The P1290/2 power unit can be used to pass signals to two receivers.*



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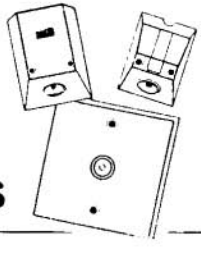

# VHF COMMUNICATIONS

**VHF COMMUNICATIONS** magazine is published four times per year and is available from KM Publications, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF (Tel: 0788 890365). The yearly subscription is **£12.00**, which is payable by personal cheque, postal orders or bankers draft made payable to VHF Communications. This subscription includes surface mail charges, air mail is extra. The magazine is a **MUST** for the radio amateur interested in VHF, UHF and Microwave working, containing, as it does, detailed constructional articles for equipment operating in these bands.

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11 - NOISE FIGURE AND NOISE SPECTRUM MEASUREMENTS
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# USING OSCILLOSCOPES

**Part–7**

**Mike Wooding G6IQM**

Rather than attempt to describe how to make every possible measurement, in this and the next part of the series I shall describe common measurement techniques you can use in many applications. I shall be describing simple exercises that you can carry out on your oscilloscope, using the probe compensation signal (often called CAL or PROBE ADJUST) as the source signal to be measured.

## FOUNDATIONS: AMPLITUDE AND TIME MEASUREMENTS

The two most basic measurements you can make are amplitude and time; almost every other measurement you will make is based on one of these two fundamental techniques. Since the oscilloscope is a voltage measuring device, voltage is shown as amplitude on your oscilloscope screen. Of course, voltage, current, resistance, and power are related:

Current = Voltage / Resistance

Resistance= Voltage / Current

Power = Current x Voltage

Amplitude measurements are best made with a signal that covers most of the screen vertically.

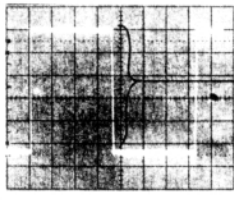



**Fig.1 Amplitude Measurements**

**Exercise 1: Amplitude Measurements (Fig.1)**

**1** ... Connect your probe to the Channel 1 BNC connector and to the probe adjustment jack. Attach the prove ground strap to the collar of the Channel 2 BNC, or some suitable earthing point.

Make sure your probe is compensated and that all the variable controls are set in their detent positions.

**2** ... The trigger MODE switch should be sent to NORM for normal triggering. The HORIZONTAL MODE should be NO DLY. Make sure the Channel 1 coupling switch is set to AC and that the trigger SOURCE switch is on internal and the INT switch on CH 1. Set the VERTICAL MODE switch to CH 1 as well.

**3** ... Use the trigger LEVEL control to obtain a stable trace and move the volts/division switch until the probe adjust square wave is about five divisions high. Now turn the seconds/division switch until two cycles of the waveform are on your screen.

(The settings should be 0.1 V on the VOLTS/DIV and 0.2 ms on the SEC/DIV switches).

**4** ... Now use the CH 1 vertical POSITION control to move the square wave so that its top is on the second horizontal graticule line from the top edge of the screen. Use the horizontal position control to move the signal so that the bottom of one cycle intersects the centre vertical graticule line.

**5** ... Now you can count major and minor divisions down the centre vertical graticule line and multiply by the VOLTS/DIV settings to make the measurement.

For example, 5.0 divisions times 0.1 volts equals 0.5 Volts. (If the voltage of the probe adjustment square wave in your

oscilloscope is different from this example, that is because this signal is not a critical part of your oscilloscope, and tight tolerance and exact calibration are not required).

Time measurements are also more accurate when the signal covers a large area if the screen. Continue with the set-up you had for the amplitude measurement, but now use Exercise 2 to make a period measurement.

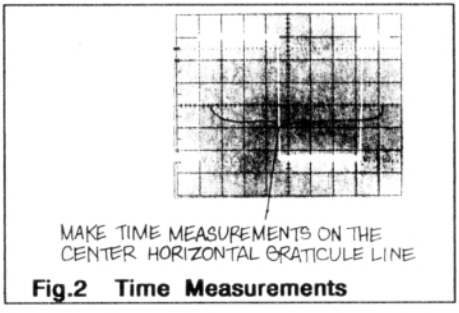



**Fig.2 Time Measurements**

**Exercise 2. Time Measurements (Fig.2)**

Time measurements are best made with the centre horizontal graticule line.

Use the instrument settings from Exercise 6 and centre the square wave vertically with the vertical POSITION control. Then line up one rising edge of the square wave with the graticule line that is second from the left-hand side of the screen with the HORIZONTAL POSITION control.

Make sure the next rising edge intersects the centre horizontal graticule.

Count major and minor divisions across the centre horizontal graticule line from left to right as shown in Fig.2.

Multiply by the SEC/DIV settings; for example, 5.7 divisions times 0.2 milliseconds equals 1.14 milliseconds.

(If the period of the probe adjustment square wave in your oscilloscope is different from this example, remember that this signal is not a critical part of the calibration of your oscilloscope).

## FREQUENCY AND OTHER DERIVED MEASUREMENTS

The voltage and time measurements you just made are two examples of direct measurements. Once you have made a direct measurement, there are derived measurements you can calculate.

Frequency is one example; it is derived from period measurements. While period is the length of time required to complete one cycle of a periodic waveform, frequency is the number of cycles that take place in a second. The measurement unit is a Hertz (1 cycle/second (or 1.14 milliseconds) means a frequency of 877 Hz.

Derived Measurements are the result of calculations made after direct measurements. For example, alternating current measurements require an amplitude measurement first.

The easiest place to start is with a peak-to-peak amplitude measurement of the voltage - in this case 330 volts - because peak-to-peak measurements ignore positive and negative signs. The peak voltage is one-half of the peak-to-peak value (when there is no DC offset), and is also called a maximum value; it is 165 V in this case.

The average value is the total area under the voltage curves divided by the period in radians; in the case of a sine wave-the average value is 0 because the positive and the negative values are equal.

The RMS (Root Mean Square) voltage for this sine wave - which represents the line voltage in the United States - is equal to the maximum value divided by the square root of 2: 165/1.414=117 volts. You get from peak-to-peak to RMS voltage with:

peak-to-peak / (2x the square root of 2)

More examples of derived measurements are the alternating current measurements illustrated in Fig.3.

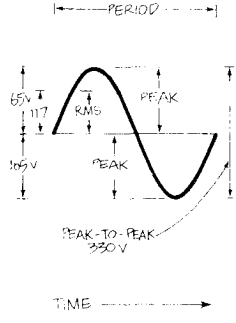



**Fig.3 Derived Measurements**

## PULSE MEASUREMENTS

Pulse measurements are important when you work with digital equipment and data communications devices. Some of the signal parameters of a pulse were shown in Fig.5 in part-6 of this series (CQ-TV 153), but that was an illustration of an ideal pulse, not one that exists in the real world. The most important parameters of a real pulse are shown in Fig.4.

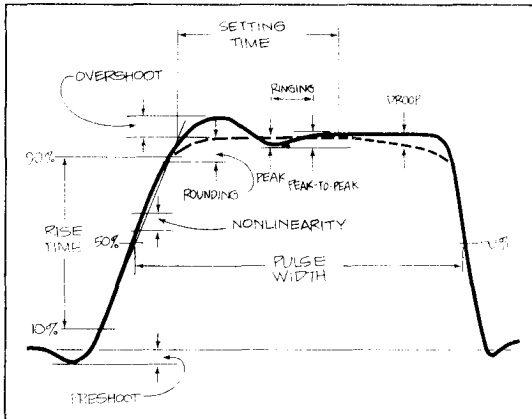



**Fig.4 Pulse Measurements**

Real Pulse Measurements include a few more parameters than those for an ideal pulse. In the diagram above in Fig.4 several are shown. Pre-shooting is a change of amplitude in the opposite direction that precedes the pulse. Overshooting and rounding are changes that occur after the initial transition. Ringing is set of amplitude changes -usually a damped sinusoid - that follows overshooting. All are expressed as percentages of amplitude.

Settling time expresses how long it takes the pulse to reach its maximum amplitude. Droop is a decrease in the maximum amplitude with time, and non-linearity is any variation from a straight line drawn through the 10 and 90% points of a transition.

Use Exercise 3 to make derived measurements with the probe adjustment square wave.

**Exercise 3. Derived Measurements**

With the period measurement you previously made in Exercise 2 calculate the frequency of the probe adjustment square wave. For example, if the period is 1 millisecond, then the frequency is the reciprocal, 1/0.001 or 1000 Hz. Other derived measurements you can make are duty cycle, duty factor, and repetition rate. Duty cycle is the ratio if pulse width to signal period expressed as a percentage: 0.5 ms/1ms, or 50%.

But you knew that because for square waves, it is always 50%. Duty factor is 0.5 and the repetition rate (describing how often a pulse train occurs) is 1 per second in this case, because the repetition rate and frequency are equal for square waves.

The probe adjustment signal on your oscilloscope might differ slightly from this example; calculate the derived measurements for it. You can also calculate the peak, peak-to-peak, and average values of the probe adjustment square wave in your oscilloscope.

Do not forget that you need both the alternating and direct components of the signal to make these measurements, so be

sure to use direct coupling (DC) on the vertical channel you are using.

Use the direction in Exercise 4 to make a pulse measurement on the probe adjustment square wave.

**Exercise 4 Pulse Width Measurements**

To measure the pulse width of the probe adjustment square wave quickly and easily, set your oscilloscope to trigger on and display Channel 1. Your probe should still be connected to the Channel 1 BNC connector and the probe adjustment jack from the precious exercises. Use 0.1 ms/division and the no delay horizontal mode. Use AUTO triggering on the positive slope and adjust the trigger LEVEL control to get as much of the leading edge as possible on your screen.

Switch the coupling on Channel 1 to ground and centre the baseline on the centre horizontal graticule. Now use your horizontal POSITION control to line up the 50% point with the first major graticule from the left side of the screen. Now you can count divisions and subdivisions across the centre horizontal and multiply by the SEC/DIV switch setting to find the pulse width.

## PHASE MEASUREMENTS

You know that a waveform has phase, the amount of time that has passed since the cycle began, measured in degrees. There is also a phase relationship between two or more waveforms: the phase shift (if any).

There are two ways to measure the phase shift between two waveforms. One is by putting one waveform on each channel of a dual-channel oscilloscope and viewing them directly in the chop or alternate vertical mode: trigger on either channel. Adjust the trigger LEVEL control for a stable display and measure the period if the waveforms. Then increase the sweep speed so that you have a display something like the lower drawing in Fig.7 of part-6 of this series (CQ-TV 152). Then measure the horizontal distance between the same points on the two waveforms. The phase 'shift is the difference in time divided by the period and multiplied by 360 to give you the phase shift in degrees.

Displaying the two waveforms and measuring when one starts with respect to another is possible with any dual trace oscilloscope, but that is not the only way to make a phase measurement.

Look at the front panel of your oscilloscope and you will probably see that the vertical channel BNC connectors are also labelled X and Y. The last position on the SEC/DIV switch is XY, and when you use it the oscilloscope's time base is bypassed. The Channel 1 input signal is still the horizontal axis of the oscilloscope's display, but now the signal on Channel 2 becomes the vertical axis.

In the X-Y mode, you can input one sinusoidal on each Channel and your screen will display a Lissajous pattern. (They are named after Jules Antoine Lissajous, a French physicist; say "LEE-zashu"). The shape of the pattern will indicate the phase difference between the two signal. Some examples of Lissajous patterns are shown in Fig.5.

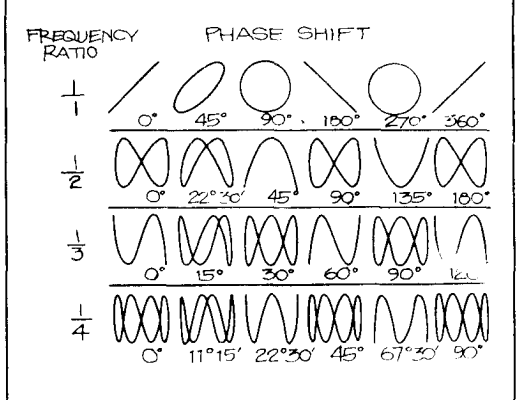



Fig.5 Frequency Measurements with Lissajous Patterns

Frequency measurements with Lissajous patterns require a known sine wave on one channel. If there is no phase shift, the ratio between the known and unknown signals will correspond to the ratio of horizontal and vertical lobes of the pattern. When the frequencies are the same, only the shifts in phase will affect the pattern. In the drawings in Fig.5 overleaf, both phase and frequency differences are shown.

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

This concludes part-7 of this series. In the next part I shall continue with the subject of making measurements, starting with a further explanation of the use of XY measurements.

---

# REPEATERAID !!!

## AFFILIATED GROUPS

One of the prime objectives of the BATC is to promote the hobby of Amateur Television, and as the transmitting side of the hobby is the backbone of the club, your Committee has decided to do more to help the Repeater Groups and other Local groups.

The BATC would like **ALL** repeater Groups to Affiliate to the BATC. It is the intention of the BATC to improve contact and mutual support between the BATC and the local groups to promote our hobby. Many joint benefits will flow from closer contact some of which are listed below.

## AFFILIATION BENEFITS

**a)** Half price advertising in CQ-TV and other club publications.

**b)** Substantial discounts on club publications when ordered in bulk.

**c)** On the mailing list for News and information sheets. (note 5)

**d)** Reduced price trading tables at BATC conventions. (note 6)

**e)** Free non trading table at BATC conventions.

**f)** Applications for grants to aid the continuing operation of TV repeaters will be given consideration.

**g)** Startup help in getting a repeater licensed and operational, PCB's, Components, Licensing and site advice etc.

**h)** Listing of repeaters in CQ-TV and other BATC publicity.

**j)** Help with constitutional and other administrative matters.

**k)** Publication of groups meeting place/ dates/agenda/programmes.

The affiliated Group should meet the following conditions:-

**1.** Have a clause, in its constitution, to the effect that they support the BATC and its objectives. (note 2)

**2.** Supply a complete list of their members annually with the affiliation fee. (note 3)

**3.** Pay the affiliation fee of £1.00 (no CQ-TV ) £9.00 (with CQ-TV) per annum, or such fees as from time to time be set by the Committee of the BATC. (note 4)

**4.** Support the BATC at exhibitions and other events.

**5.** Supply the information required for (k) above.

The BATC is often approached for information and news of local meetings and events, and a list of affiliated groups would enable the BATC to direct potential local members in the correct direction.

**Notes**

**1.** The current thinking is that the value of the grant would depend on the proportion and number of BATC members in the repeater group. Hence the need for the list in item 2.

**2.** The BATC realises that few groups will have such a clause in their constitutions, but hopes that it will be added in due course.

**3.** The need for a list of members is not an absolute requirement, however it would make any grant difficult.

**4.** The main purpose of the £1.00 fee is to keep records up-to-date.

**5.** The plan is to send out a newsletter between issues of CQ-TV, four times a year. This will contain local and BATC news, urgent topics, perhaps some members adverts as well.

**6.** TV repeater group operators only.

It is hoped to start this project immediately with the first lists of groups and meetings in the next CQ-TV. So act as soon as possible. Affiliation forms and further details are available from myself.

None of the above is immutably cast in stone and will be adapted in the light of developments.

B. Summers G8GQS (QTHR) Hon Treasurer BATC. December 16, 1990

# RECOLLECTIONS OF A 'NUTS & BOLTS' MAN

## Bill Mercer

*These notes were submitted by Bill Mercer, who is now resident in Greece, by way of his recollections of a long association with the Club and amateur television. I have included his address here as I an sure that Bill will be only too pleased to hear from other members, and to receive any answers or comments to his questions ... Ed*

Bill Mercer, Thaskalaki No. 16, Athens II526, Greece.

**A:** Although I can understand how the time in ns for a luminance delay line is the difference in bandwidth between the luminance and the chrominance signals passing through a coder or decoder, there are some conflicting values quoted in recent issues of CQ-TV.

In the 'Amateur TV Handbook' from 1956 Nigel Walker gave the circuit for an excellent PAL coder to System-I (which I built), in which the luminance delay line was 500ns. Later issues of CQ-TV (134, 139

and 143) show coders with a delay line of 200ns. Does this mean that in these later circuits the chrominance bandwidth is wider than it should be, or has the bandwidth of the luminance been somehow restricted?

If one of these 200ns coders is used with a normal System-I receiver, with say some 500/600ns delay in the decoder, surely there must be severe misregistration of luminance/chrominance and probably excessive chrominance crawl?

It is a pity, quite naturally, that the PAL coders in CQ-TV have all been designed with the UK system in mind. I am sure that there are many continental constructors like myself, who would like to see a no compromise PAL coder for the unsymmetrical and narrower bandwidth of System-B/G. Any offers?

**B:** During the construction of the Sync Regenerator from CQ-TV 115 the BLO, S/C Phasing, Black and Burst Generator and the Process Amplifier from CQ-TV 136, I noticed that wherever TTL pulses were fed to the base of a fast switching transistor (I use BSX93), at the collector the pulses had been stretched. In such cases I had to shunt the base-emitter junction with some 2k2 and sometimes reduce the series current limiting resistor, to make sure that the transistor was turned hard on.

Should I assume that the series resistor, together with the base-emitter capacitance, or the storage time of the transistor, was delaying the pulse?

In all cases the modifications above have completely cured the original problem. Am I the only constructor to encounter such difficulties?

**C:** Having built the BLO from CQ-TV 136, and having read somewhere of problems with the reference pulse fed to pin-5 of the TDA3950A, I checked with the Motorola handbook and noted that with the 'A' version of the device, pin-5 requires a minimum of 9V peak-to-peak (p-p), normally the Burst portion of the Sandcastle pulse.

CQ-TV 150 page 27 shows the same BLO and labels the pulse to pin-5 as BG, so I added a one transistor amplifier/inverter, fed from bar-BG and +12V, to produce 1v p-p as reference. However, I noticed that if I used BG as the reference, the VAS output from pin-13 starts and stops with the leading edge of BG and caused disturbances in the Burst of the Black and Burst generator. Using horizontal blanking as the reference gave VAS start and stop coincident with the leading edge of horizontal sync, and no interference with the Burst.

The same circuit uses a fixed chrominance filter, 5uH and 220pF, in the emitter of Q1. My experience shows, that to obtain the best recovery of chrominance on pin-3 of the TDA3590A, an adjustable high-Q filter resonated at 4.43MHz is required, even though I originally used close tolerance components.

By mistake I fitted a 10nF in place of C16 and found that the adjustments of RV3 and C21 to be non-critical. After fitting C16 with the specified 1nF I had problems with RV3 and sometimes streaky colours, so I put back the 10nF?

I should point out here that I have combined the CQ-TV 115 Sync Regenerator, slightly modified, with the CQ-TV 136 BLO, but without the TBA920. Instead. I took the horizontal blanking from the sync regenerator to pin-5 of the TDA3590A as stated previously. This gives a sync regenerator similar to that in CQ-TV 136, but if correct CCIR syncs are at the input, they also appear at the output.

I must say that the aforementioned circuits work superbly, and much credit must be given to their designers.

**D:** After building the 8-input switcher from the 'ATV Handbook Vol. 2' I decided that I now required the A/B mixer from the same source. This I built, as with all previous projects, on self-designed PCBs (not to Club standards). I included on-board +/- 12V supplies on a common heatsink, and a

separate board for the temporary Key Signal Generator. The two IC Clamp Pulse Generator was also included on the mixer board.

When both inputs were fed with the same composite video signal, 100% bars, and all the necessary adjustments as outlined in the Handbook carried out, a smooth fade was possible from A to B and vice versa. However, although the output from the B was 700mV blanked video, the output from the A was composite video. After changing over all the ICs and readjusting as before, the results were the same. No fault could be found with the Key Generator.

A second fault I observed was that when either channel was faded down to black, there remained some 20mV of chrominance envelope. At this time I decided my single-sided PCB was the cause of these problems so I immediately ordered the Club-standard double-sided PCB.

Upon receipt of the PCB I was surprised at the poor quality. On the track side I found three short-circuits, where tracks passed between IC pins. On the ground-plane side, the film for hole clearance must have been misaligned, for in all cases the clearance was to one side, and if I had attempted to install the components the leads would certainly have shorted to ground. My solution was to countersink all non-grounded holes on the ground-plane side with a large drill. I must assume that my PCB was the exception to the rule.

I now started from scratch, using all new ICs and components, and carefully aligned the offset trimmers (10 turn), making minor changes to the resistors feeding them. I even fitted 10 turn gain adjust trimmers and the same for black level. The offset voltage was correct at 0.0V on A pin-8 and B pin-4 of the MC1495s, and the keying signal changed from 0.0V/black to 0.7V/peak white on pins A 4 and B 8. To my dismay the video outputs were exactly as before, and the 20mV of chrominance remained at black!

I began to wonder if I had not understood the operation of the mixer. Was it designed for only blanked video inputs? Was it suitable for my 100% colour bars or only for 95% bars (where there is no chrominance below black level)? Was this the reason for the 20mV of chrominance?

Checking the PCB interconnections in the Handbook implied that the mixer was capable of composite video in, and the 100% bars should not have caused any problem.

After much head scratching I threw the mixer into the 'pending' draw and started designing a PCB for a Heart Pulse-Rate Counter, to help three technical school students who come to see me often for help!!!

**E:** There seems to be some confusion regarding the specification of Field Drive. In CQ-TV 127 page 33, Field Drive is shown as 2.5H/160us, starting with the leading edge of the first broad pulse in the sync group. In CQ-TVs numbers 75, 77 and 84 the duration of field drive is given as 7.5H/480us, starting with the first pre-equalising pulses. This second specification is confirmed in several professional equipment manuals.

From what I remember this argument has appeared several times in other issues of CQ-TV. Can we have as final statement?

**F:** Having constructed some years ago the Handbook Electronic test card (superb), and modified the PCB for adding information into the black rectangle, I have a need for a MANUALLY operated EPROM blower, with any information regarding how to manually program the 2716 EPROM, single 5V supply.

I do not own, or understand, those newfangled machines called computers! I prefer the old fashioned way, since time is no problem to me and I only require short programs.

# EASY-PC - CAD PACKAGE

**REVIEW**

**Mike Wooding G6IQM**

## INTRODUCTION

An important aspect of any electronic designer or constructor's work is to produce circuit diagrams and printed circuit board layouts for their designs or projects. Having done a little of this type of work myself over the years, I can say with confidence that, even for the most adept, it is not the easiest of subjects to tackle. For many, having to design a circuit, or produce a printed circuit board for a given circuit schematic, is a daunting task, even for the simplest of circuits.

However, there are now available for owners of computers of all types, quite a profusion of Computer Aided Design (CAD) software packages, to assist in such areas. The most popular home computer for the more serious user is now becoming the ubiquitous PC (personal computer), or one of its various clones. So, having looked around at what CAD packages are available for the PC, I decided to have a look at what appeared to be, from the advertising blurb, one of the better ones - **EASY-PC**, from Number One Systems Limited.

## EASY-PC

EASY-PC is a CAD package for IBM PC/XT/AT/386 computers, or true compatible clones, running under MS-DOS version 2.0 or later. The basic requirements for running the software are a minimum of 512k of memory, with a CGA, EGA or VGA graphics adaptor, preferably with a colour monitor (especially pertinent if multi-layered printed circuit boards are to be designed). The software does not support Hercules graphics adaptors.

To enable the software to be used with greatest ease a Microsoft Mouse, or equivalent, is a useful addition. To obtain hard copies of designs an IBM Graphics compatible 9 or 24-pin dot matrix printer is required, or with the now upgraded version of EASY-PC, a Hewlett-Packard LaserJet II or equivalent laser printer can be used. Unlike some of the rival CAD packages available, a maths co-processor is not required to run this software successfully.

## THE USER MANUAL

The package is very well presented. An A4 sized ring-binder contains the instruction manual, thus allowing for the easy insertion of updates, etc. into the instructions. The software itself is supplied on two 360k 5.25" discs or one 720k 3.5" disc, both formats being supplied with the package.

The initial pages of the instruction manual deal with the copyright license agreement and any 'Stop Press' information that has not been included in the manual. There is also a READ.ME file on the discs that contains any later information concerning changes, etc., to the software. After these initial pages the instruction manual proper is entered. The first section deals with the computer requirements and how to load and configure the software and/or install it onto a hard disc.

The configuration is simplicity itself. Unless you are using a CGA display adaptor there is no user configuration to be done. If you are using a CGA adaptor, the only configuration to be carried out is to copy and overwrite the main EASYPC.EXE program previously loaded with the ECGA.EXE one provided on the disc. That completes the configuration. A function-key command prompt strip is

also supplied in the manual for copying or cutting out and placing above the keyboard.

The next and main section of the user manual is a very full and detailed description of how the software is used. The 'training' method is extremely easy to follow and is based on a tutorial, taking you through the multivarious stages and features using a printed circuit board design supplied as a file on the discs. I have never used such a complex CAD package before, but after only a couple of hours going through this tutorial, I was becoming quite conversant with the very user-friendly package.

After running EASY-PC you are presented with the opening title screen for a few seconds, and then the main menu with the following options:

- 1 ... Design Layout.
- 2 ... Design Schematic.
- 3 ... Create Layout Symbol.
- 4 ... Create Schematic Symbol.
- 5 ... Exit to DOS.

## PRINTED CIRCUIT BOARD LAYOUTS ... Option-1

Selecting any option 1 presents the user with the main drawing screen, which consists of a rectangle in the centre of the screen enclosing a cross-shaped cursor. At the bottom of the screen is a status line, giving, amongst other information, the X and Y coordinates of the present cursor position. Along the top of the screen are located three small shaded squares, which indicate the cursor access points for three drop-down menus.

Moving around the screen is accomplished using either the cursor control keys on the keyboard (either the 2,4,6 & 8 keys on the numeric keypad, or the separate cursor-control keys if fitted to your keyboard) or the mouse.

***Note:*** *As with all software packages utilising a mouse, the mouse driver utility must be loaded in before EASY-PC. This is usually done automatically by the AUTOEXEC.BAT and or the CONFIG.SYS files, which are run by the operating system of the computer on switch-on.*

The drop-down menus are actuated by positioning the cursor over the shaded area, at which the menu appears. Menu items are selected simply by moving the highlighted bar over the desired function and pressing the ENTER key. Alongside each menu item is also given the alternative function key command, which will select the item without using the drop-down menu. These function key commands are also given on the function key command prompt strip mentioned earlier.

Once a layout is loaded it is displayed within the rectangle enclosing the centre area of the screen. This rectangle represents the maximum size of circuit board that can be accommodated in one go, that is 17 inches square. The cursor position, as mentioned earlier, is given by the X and Y coordinates shown on the status line at the bottom of the screen. The coordinates reference point is the bottom left-hand corner of the rectangle, and they vary numerically from 0 to 17.

```
        EASYPC - MAINMENU


   1. Design layout.
   2. Design schematic.
   3. Create layout symbol.
   4. Create schematic symbol.
   5. Exit to DOS.



   Enter function number :
```

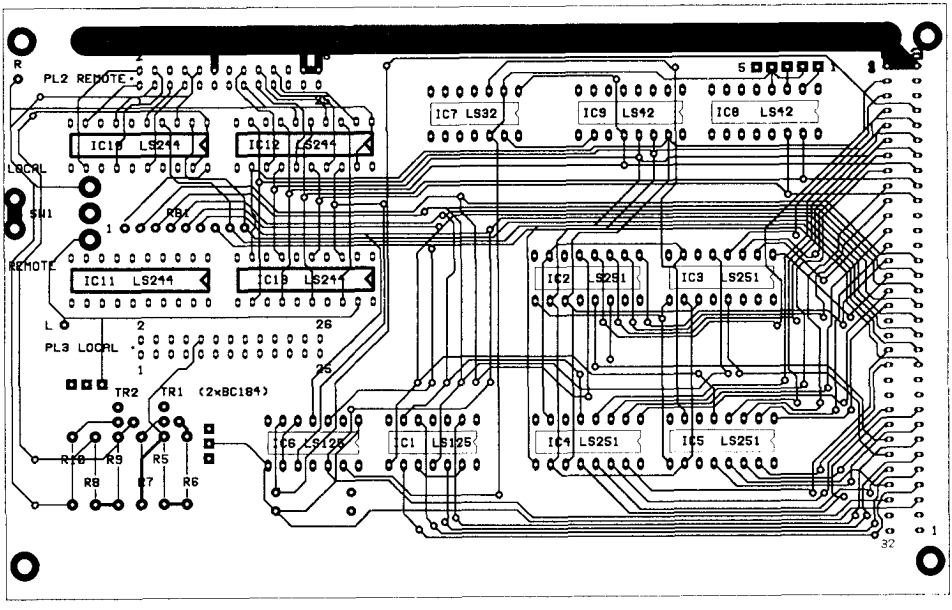
Initially, the drawing area is shown at lowest magnification, and as such would be very difficult to work in. However, by positioning the cursor within the drawing area and pressing Z on the keyboard, the display is magnified by a factor of two, with the position marked by the cursor located at the centre of the screen area. Pressing Z again magnifies it further again by a factor of 2. This can be repeated until the maximum magnification factor of 12 times is reached, at which the entire screen area represents an actual board area of approximately 1/2" square. There are two other ways of actuating the zoom which are dealt with in the manual.

For fast movement around the display at high zoom levels a panning facility is available, whereby positioning the cursor at the edge of the display beyond which the view is required and pressing the P key. The view is moved across the layout such that the cursor position is now at the centre of the screen. Again, there are other methods of selecting this facility, a useful one of which is the ability to use the centre button on some three button mice (mouses?!).

There are various other facilities available to help the user get around the screen, such as a grid over the entire screen, a scale around the edge of the screen and a full-screen cross-wire cursor instead of the small default version. I found that the large cross-wire and the outer edge scale was my preference. There is also a feature which allows you to reference the current cursor coordinates, and then all distances as indicated by the cursor X and Y coordinates on the status line are measured from the reference point, rather than the default bottom left-hand corner of the layout.

That covers very basically the facilities available for moving around the screen. However, the package needs must be used to realise just how powerful these apparently simple-sounding features really are.

Loading and saving layouts is also a simple function key or mouse operation, and



directories of the various libraries can be easily displayed on-screen without disturbing the layout.

Having familiarised oneself with the basics above, the powerful intricacies of the package can be explored. The tutorial in the user manual takes you through a guided tour of these, demonstrating by means of using the circuit board layout included on the disc. You are instructed how to lay down tracks, change track widths, lay down solder pads, vary the size, shape and orientation of them and select which of the eight board conductor layers to put them on or, in the case of tracks, route them to.

Included within the package is a library of pre-drawn symbols, such as single-in-line and dual-in-line IC pad patterns, various transistor pad patterns, etc. These symbols can be loaded into the layout, repeated, moved, re-orientated, etc., which saves a lot of time for the designer not having to draw his/her own.

As well as the ability to design circuit board layouts for boards with up to eight conductor layers, the top and bottom silk screen layers and etch-resist layers can also be designed.

It would be wholly inadvisable of me to try and emulate the instructions by explaining, even in the briefest terms, how all the design functions are utilised and accomplished. Suffice it to say that all the features available will allow highly complex printed circuit boards to be designed with the minimum of difficulty. A full list of the main features is included at the end of this review.

## CIRCUIT SCHEMATICS ... Option-2

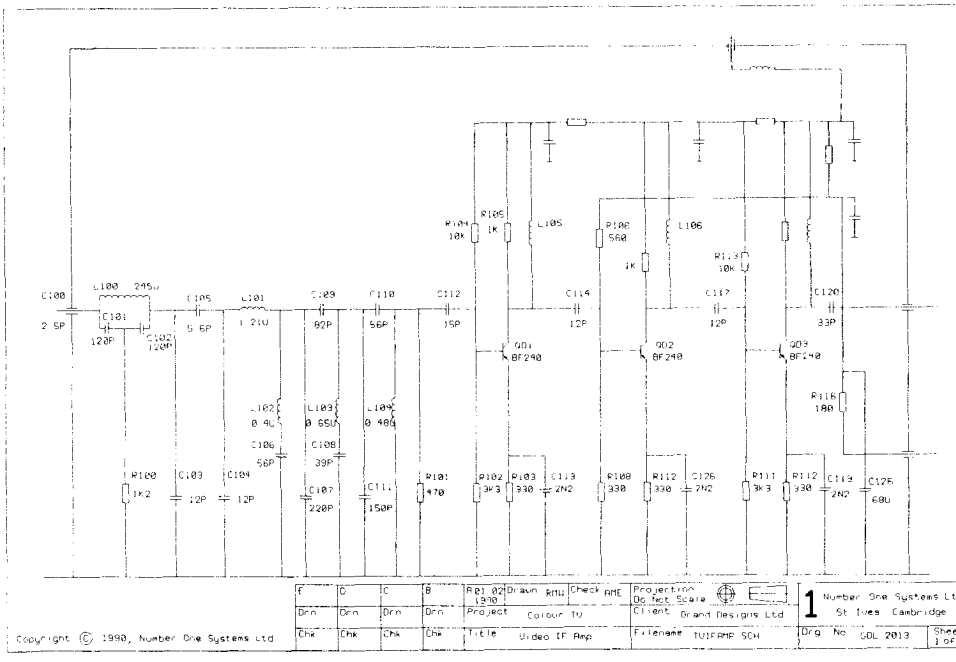
Option-2 on the main menu leads us into the other main function of the software package, drawing circuit diagrams (schematics). Upon selecting this option, as before, the user is presented with the main drawing screen at minimum zoom factor. Moving around the drawing screen, zooming, panning, etc. are all facilitated in exactly the same way as for the layout section described above. The only main difference is that, whereas in the layout option the user has a choice of up to eight board layers, obviously in the schematic drawing mode only one layer is permitted.

As with the PCB layout designing option, a library of pre-drawn symbols is included on the discs, which includes the basic symbols for resistors, capacitors, inductors, transistors, basic gates, etc. Again, these allow for much quicker designing and drawing of circuit diagrams, and help the user to produce neater and repetitively reproducible drawings.

Very powerful editing facilities are available in the package which apply to both this mode and the layout drawing one. These facilities allow previously drawn circuits/layouts to be modified, added to, sections deleted, or other circuits/layouts to be merged into them. Block editing features allow areas of circuits/layouts to be saved, deleted and moved. Symbols within the circuits/layouts can be changed or modified, either singly or on a global basis.

## CREATE LAYOUT SYMBOL and CREATE SCHEMATIC SYMBOL ... Options 3 & 4

These options are self-explanatory, they allow the user to modify existing or create his/her own symbols and save them into the libraries. The rules to be observed when designing/altering symbols are simple to follow, essentially symbols for circuit schematics must not contain solder pads as connection dots. Symbols for board layouts can be designed for all layers, lines included in the symbol are restricted to layers 0 and 9 (top and bottom silk screen layers) as is any text, and solder pads can be on all layers or just layer 1.




## PRINTING YOUR DESIGN

As mentioned earlier, layout and circuit designs can be saved and loaded to and from disc. For hard copies of the designs an IBM graphics compatible 9 or 24-pin dot matrix printer is required (for users of HP LaserJet II or compatible laser printers see the EASY-LASE section later in this review).

To obtain a printed output the BLOCK mode is selected from the left-hand drop-down menu (or by pressing the appropriate function key). The user can then 'rubber-band' a box around the desired section to be printed (or all of the circuit/layout if required) by positioning the cursor at the lower left-hand corner of the section required, clicking the left mouse button and drawing a box around the section. When the required section is enclosed in this box a further press of the left mouse button 'fixes' it in place.

Once the box has been defined, selecting the middle drop-down menu reveals a selection of actions that can be performed on the box, including Draft, Normal and Bold printing. Selection of one of these options presents the user with the options screen for setting the printer defaults, after setting these as necessary (or if necessary) the selected layout can be printed.

## THE MAIN FEATURES OF EASY-PC

- High speed operation. Zoom and pan at typically 1-2 seconds (Eurocard board) on 8086 based PCs, much faster on 286 and 386 based machines. *(On my 386 based machine this was timed at virtually instantaneous).*

- Permanent What You See Is What You Get (WYSIWYG) display - tracks and pads always appear on screen full width and solid.

- Multilayer boards with up to 8 conductor layers, top and bottom silk screens and solder resist layers.

- Up to 17 x 17 inch (430 x 430mm) board size.
- Surface-mount technology supported.
- Up to 1500 ICs, up to 5000 tracks (with up to 12000 segments), up to 4000 solder pads (in addition to those used in ICs), up to 100 different symbols per board, and up to 6000 text characters per circuit diagram.
- 128 different track widths from 0.002 to over 0.5 inches (0.05 to 13mm). Maximum of eighth widths per board.
- 128 different solder pad sizes from 0.002 to over 0.5 inches (0.05 to 13mm). Maximum of sixteen sizes per board.
- Solder resist artworks with suitable pad clearances can be produced automatically.
- Grid, 0.1 inch (2.54mm) with snap to 0.1, 0.05 or 0.025 inch (2.54, 1.27, 0.63mm). Pads and tracks, etc. can also be located off grid to a resolution of approximately 0.002 inches (0.05mm).
- Auto-via facility for interconnections between layers.
- Pad shapes include edge connector fingers, circular, oval, square and rectangular pads, with or without holes.
- Over 400 library symbols included with the package.
- Repeat, Move, Rotate, Mirror and Erase Block and Feature operations. Complex track areas, pads and symbols can be repeated at a single key stroke.
- Tracks and angles can be fixed at 45° or 90°, or run at any angle

That completes my look at the main program. However, there are various other utilities included in the package, EASY-PLOT, EASY-GERB, EASY-DRILL and EASY-LASE, and I shall briefly describe these and their uses.

## EASY-PLOT

EASY-PLOT is the utility program which takes files created by EASY-PC and converts them into HPGL format, for output either direct to a pen plotter or to a disc file for downloading at a later date.

The main features include:

- Choice of various draft modes for speed.
- Selection of a wide range of pen sizes and pen writing speeds.
- Selection of x0.25, x0.5, x1, x2, x3 or x4 output scale.
- The ability to plot a section of a layout or schematic.
- A0, A1, A2, A3 or A4 output.
- The ability to position the plot anywhere on the paper.
- The ability to select various pens on multi-pen plotters.

## EASY-GERB

EASY-GERB is a utility program which takes printed circuit board files created by EASY-PC and converts them into Gerber Photo-Plot format, for downloading to a photo-plotter.

The main features include:

- Selection of which layers are to be plotted.
- Selection of whether or not an etch-resist solder mask is required and selection of the required clearances.
- Change the current work file.
- Start plot, which automatically detects which layers have been used in the layout design and creates the appropriate files.

## EASY-DRILL

EASY-DRILL is a utility which takes printed circuit board files created by EASY-PC and converts them into NC DRILL format to

drive an Automatic Numerically Controlled drill.

The main features include:

- The option to change the current work file.
- Generate a drill file.
- The ability to adjust drill sizes without having to alter the pad sizes in the original EASY-PC board layout file. Drill sizes can be selected in either Imperial or Metric values.

## EASY-LASE

EASY-LASE is a utility program which takes printed circuit board and schematic files created by EASY-PC and converts them into HP-PCL format to drive a Hewlett-Packard LaserJet II or compatible laser printer.

Upon loading EASY-LASE you are first prompted for the file name of the layout/circuit to be printed. Once that has been entered and found the program reads the file, scans the layout/circuit and presents the main menu.

Listed on the menu screen are all the details of the layout/circuit, including the number of tracks, solder pads, symbols, holes and the amount of text. Also given is the actual board size for layouts and whether the layout or circuit will fit on the selected paper size at the selected scale.

A full range of user-selectable options are available and are:

- Direction of output to a choice of ports, i.e: COM1, LPT1, etc.
- Resolution, i.e: 300dpi, etc.
- Number of copies (maximum 99).
- The facility to print layers separately or together.
- The ability to scale the layout/circuit so that it will fit the selected paper size. This is automatically calculated and prompted on-screen.
- Avoid or Fill in the holes in the centres of the solder pads.
- Print out the solder pads only.
- Select the paper size, i.e: A4, Legal, etc.
- Printer offset (defaults to 0.5 inches in from the bottom left-hand corner of the paper).
- Selection of a rectangular area of the layout/circuit to be printed.
- Automatically centre the output on the paper.
- Save new setup or restore previous setup.
- Enter a compensation factor for the printer in use, which is determined by closely examining a special test file to be printed out from the disc with 0 compensation values (the initial default setting).
- Change the input file

Finally in this review I must mention that an extra library of pre-drawn schematic symbols is available called EASY-PC Library, which contains more than 1000 extra circuit diagram and layout symbols, covering eight IC logic families and a range of popular microprocessors, memories and support chips. An additional PCB layout library contains a selection of widely used board outlines, including Eurocards and PC Adaptors.

## CONCLUSIONS

I found the package very well presented and extremely user-friendly. After a couple of hours I was able to move around within the main program with ease, using both the drop-down menus and function keys with relative ease. The seemingly complex drawing and editing facilities are, in fact, very simple to use, once the key strokes and mouse commands have been practised and experimented with a few times.

Manipulation of the library symbols is also simple and very time saving, compared with drawing your own.

The user instruction manual is very detailed and concise. I particularly liked the tutorial section, which I found to be most instructive, especially when compared with other commercial software packages that I use, where the user is expected to be a mind-reader and miracle worker!

All-in-all I could not find anything I did not like with the package. Again, I found it very user-friendly and, within the constraints of my limited experience and knowledge of layout and circuit drawing and design, I could find nothing untoward, or nothing that the package seemed unable to cope with. Highly recommended for both full commercial and amateur use.

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

EASY-PC is priced at £98.00 + £4.75 p&p + VAT for the U.K. Europe - £98.00 + £10.00 p&p & Airmail. U.S.A - $195 including p&p and Airmail. All other countries - £110 complete including Airmail.

EASY-PC Library is priced at £38.00 + £4.75 p&p + VAT for the U.K. Europe - £38.00 + £10.00 p&p & Airmail. U.S.A - $75.00 including p&p and Airmail.

Both packages are available from: Number One Systems Limited, Harding Way, St.Ives, Huntingdon, Cambridgeshire, England, PE17 4WR. Tel: 0480 61778. International Tel: + 44 480 61778. Fax: 0480 494042.

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# IN THE STUDIO

## Part–12

**John Goode**

As most readers will be aware, high-performance versions of both VHS and Video-8 are currently available (S-VHS & Hi-8), and both are capable of delivering picture quality that in some respects is superior to that of High-Band U-Matic. Both formats are being offered to the professional video market as being suitable for news-gathering, the difference being that S-VHS is offered as a complete format with editing, whereas Hi-8 is purely for acquisition. Sony intend that original Hi-8 recordings are edited up to SP HB U-Matic, or Betacam SP, and a mains Hi-8 recorder is available that acts as a source machine for Sony's professional Edit Controllers.

The point about these enhanced formats is that the horizontal resolution of the luminance signal has been increased to over 400 lines (equivalent to a bandwidth of about 5MHz), and this encroaches onto the upper part of the video spectrum where the chrominance signal resides. As the signal processing used in colour-under recorders makes it impossible to reproduce the PAL signal with the correct frequency-interleaving of luminance and colour, the wide luminance bandwidth will cause unacceptable interference to the colour if a composite PAL signal is formed.

It follows, therefore, that PAL composite outputs from these machines have to have their luminance bandwidths restricted to about 3.5MHz (about 0.7MHz better than VHS). In order to view the full 5MHz resolution a special 4-way output connector known as the "S-Connector" is provided, that keeps the luminance (Y) and chrominance (C) separate. naturally, the benefit of this will only be obtained if the picture monitor it is being viewed on also has an S-Connector, so keeping the luminance and chrominance separate prior to colour decoding. This mode is known as "Y-C443" or sometimes just "Y-C" operation.

The Y-C mode of operation will only provide full luminance bandwidth so long as Y and C are kept separated. This means that original recordings must be made using cameras that provide a Y-C output; obviously, this form of interconnection is provided within all S-VHS and Hi-8 Camcorders. As soon as a composite PAL signal is introduced to the chain, improvement is reduced, as any filter that separates Y and C for recording, or colour decoding, will restrict the Y bandwidth to at best about 3.5MHz. ideally, then, the whole of the video system, including signal processing, mixing, etc., should operate in the Y-C mode.

However, if the Y-C signal is applied to a wideband timebase corrector that has a suitable input, the correct frequency relationship between Y & C will be restored, and a composite PAL output can be formed with the wideband luminance in the same way as it would be in (say) a broadcast camera. Several manufacturers now make these TBCs, and they offer various input and output options; composite PAL, component Y, U and V (for Betacam SP and MII), Y-C443 and Y-C924, a mode used when directly dubbing between High Band U-Matics.

The Y-C924 mode transfers the signal direct from source to copy U-Matic, with the chrominance signal left at the "colour-under" frequency of 924kHz; this avoids two stages of frequency heterodyning, thus maintaining signal-to-noise performance (the luminance signal obviously has to be kept separate from this). TBCs that are fitted with Y-C924 ports can therefore be

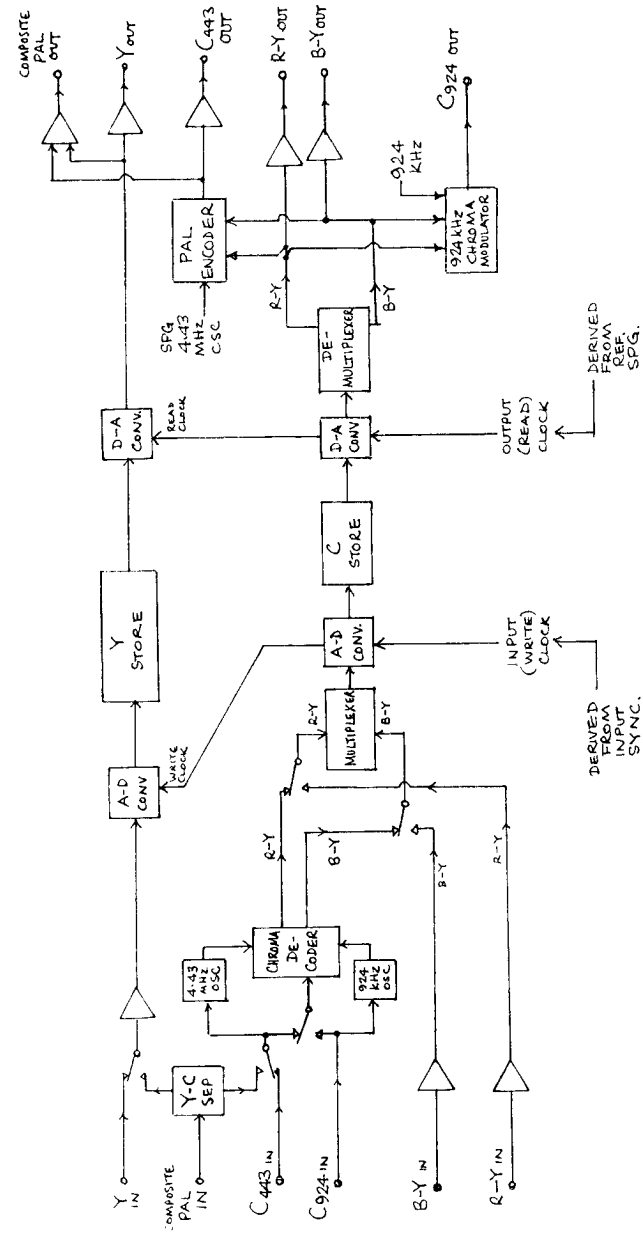


**Fig.1 Typical Multi Input/Output Timebase Corrector Block Diagram**

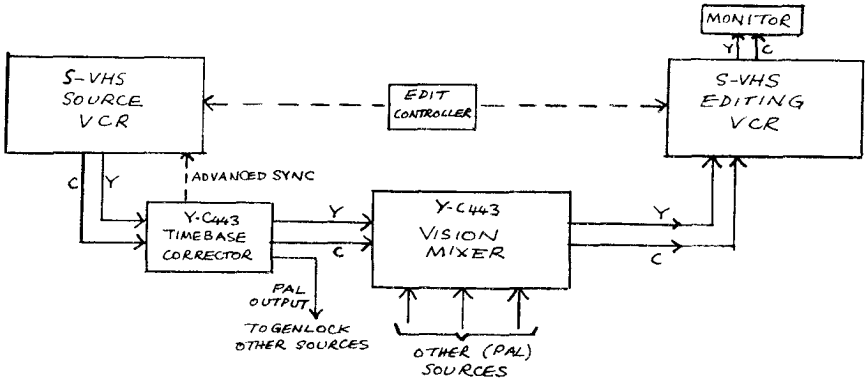


**Fig.2 S-VHS Y-C443 Editing System**

included in the dubbing chain, giving good colour signal-to-noise performance, and at the same time stabilising the signal.

By analogy with the above, it will be seen that it is also possible to have other "colour-under" Y-C signals, for instance Y-C629 for VHS and Y-C685 for Standard U-Matic. However, these are not normally catered for in TBC designs. Note that in contrast to the other Y-C signals, the Y-C443 mode is not related to any particular tape format, and could be derived from any suitable PAL encoded signal source. An example in block-diagram form of a multi-input/multi-output TBC is shown in Fig.1.

In Fig.2 I have shown the kind of setup for editing that is recommended for use with S-VHS. In it the Y-443 mode is used throughout the tape path; other PAL sources are converted to Y-C443 within the mixer, which must have parallel Y and C mix and effects stages, so that full luminance bandwidth can be passed on to the editing machine. This obviously makes upgrading from a composite PAL editing system quite expensive.

The philosophy with Hi-8 is somewhat different. Sony see this as a lightweight "acquisition" format only; that is, original material is shot on Hi-8, and then edited "up" to either High-Band SP U-Matic or Betacam SP. To this end, as well as Camcorders, Sony have produced a studio recorder that can be used as a source machine in any of its professional edit suites. This machine, model EVO-9800P, has a digital chrominance noise reducer and picture stabiliser built in, and is consequently not cheap! The proposed method of operation is illustrated in Fig.3; the timebase corrector gives a correctly related wideband PAL output, which is then fed in to a professional editing system.

The merits of the two systems are as follows. S-VHS in the Y-C443 mode throughout undoubtedly gives the widest luminance bandwidth, but its colour processing is not much better than normal VHS, and saturated colours are an embarrassment. Also, when editing, even though the original sound may be on the FM tracks, the linear sound tracks must be used, if sound and picture need separating. At 0.9" per second this is not exactly Hi-Fi!

Although the bandwidth of the luminance in Hi-8 gets restricted to about 3.5MHz because of PAL operation, the chrominance and sound quality of the edit setup in Fig.3 is noticeably superior -

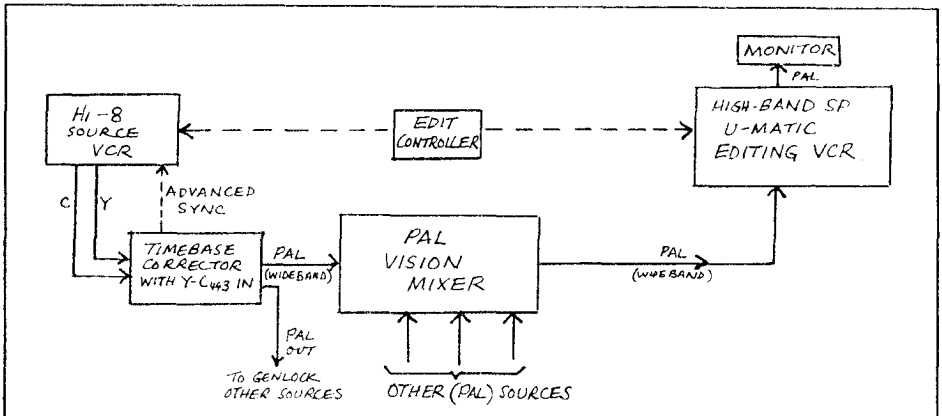


**Fig.3 Hi-8 Editing System (Audio not shown)**

subjectively, anyway, I find it better. Original sound on Hi-8 is recorded digitally (PCM), and it is then transferred to the linear tracks of the SP U-Matic which run at 3.75" per second.

Finally, you will have noticed reference to "SP" U-Matic in this article. This is a "Superior Performance" version of High-Band U-Matic, using a higher-coercivity cassette (with indexing holes), allowing the luminance FM to be moved up the band by 0.8MHz. (The colour under frequency remains 924kHz). The High-Band luminance is 4.8 - 6.4MHz; SP is 5.6 - 7.2MHz. Because the deviation has remained at 1.6MHz, and the colour frequency is unchanged. Sony claim that there is compatibility between High-Band and SP, but that has NOT been my experience. SP tapes played on non-SP HB machines tend to streaking on peak white and sharp vertical transitions. It is best to regard SP as " super-high-band" mode. In addition, the sound on SP can have Dolby C noise reduction.

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# NARROW BANDWIDTH TELEVISION ASSOCIATION

The Narrow Bandwidth TeleVision Association, founded in 1975, specialises in the mechanical and low definition aspects of ATV, and offers genuine (moving) TV within a basic bandwidth of 6 - 7 kHz. The techniques, basically an updated form of the Baird system, are a unique mixture of mechanics, electronics and optics. Membership is open World-wide on the basis of a modest yearly subscription (reduced for BATC members), which provides an annual exhibition and quarterly 12-page newsletter, together with other services.

For further details write to: **DOUG PITT, 1 BURNWOOD DRIVE, WOLLATON, NOTTINGHAM, N28 2DJ.** Telephone: 0602 282896.

# BROADCAST BAND DX-TV RECEPTION

**Garry Smith and Keith Hamer**

Reception conditions throughout the period December 1990 to February 1991 have been far from dull. F2 activity dominated the scene during January and February, although at the time of writing (end of February) conditions have quietened down somewhat. Unfortunately, not everyone has been able to join in the fun; the severe gales on December 8th damaged or destroyed quite a few aerial systems.

Sporadic-E has been active for the time of year with some fairly hectic openings on several dates. Tropospheric reception on Band-III and at UHF was particularly good during the middle of January, with the USSR, Poland, Czechoslovakia, Finland and Austria noted.

*The following logs are edited highlights of those which appear in TeleRadio news (issues 50 and 51). Many thanks to the following enthusiasts who have supplied reception reports: Ian Johnson, Simon Hamer, Peter Chalkley, Garry Smith, Chris Howles, Bob Brooks, David Glenday and Stephen Michie.*

## DECEMBER LOG

**01/12/90:** Short Sporadic-E opening with signals from USSR at 1050 UTC.

**02/12/90:** Intense tropospheric opening with signals at Band-III and UHF from Eire, France, Belgium, The Netherlands, Luxembourg, Germany, Denmark, Norway and Sweden.

**09/12/90:** Weak F2 activity from the south-east on channel-E2 at 0940 UTC

**12/12/90:** Meteor shower activity during the day on channels-E2, R1, R2 and IB (Eire).

**13/12/91:** Meteor shower reception in Band-I from Denmark, Eire, Czechoslovakia and Norway. Spain E4 noted via Sporadic-E at 2217.

**14/12/90:** Swedish and various Norwegian test cards seen during the morning on E3.

**15/12/90:** Intense Sporadic-E activity during the morning from central and south-east Europe. Countries identified included: France, Germany, Yugoslavia and Italy.

**26/12/90:** Norwegian and Swedish Band-I signals identified throughout the day.

**29/12/90:** Sporadic-E signals noted at 0930 UTC from Spain on channel-E2.

**30/12/90:** Spanish E2 transmission via Sporadic-E at 1025 UTC.

## JANUARY LOG

**03/01/91:** A day to remember for F2 activity - perhaps a record breaker! At 0900 UTC Australian DDQ-0 commercial network identified on channel-A0, plus mystery 525-line signals on A2, which are though to have originated in the Philippines. At 1000 BCNZ New Zealand was identified on NZ1 (zero offset). USSR R1 and various E2 and E3 transmissions also noted. Chinese signals identified on channels-C1 and C2 (57.75MHz). Transatlantic DX

from Canada/USA at 1245 UTC. Meteor shower activity around 1800 UTC brought in Sweden, Denmark, France and Italy.

**04/01/91:** Sustained meteor shower activity produced Iceland E4, Spain E2, USSR R2, Eire IB, Germany E2, France L3 and Italy IA. Band-III signals included Norway E5, Denmark E5, Sweden E8 and Eire ID.

**05/01/91:** Unidentified signals on channels-E2 and E3 via F2 between 0900 and 0930 UTC. At 2258 UTC 525-line pictures were resolved from the west.

**12/01/91:** F2 conditions produced sustained signals from the USSR on R1 for most of the morning. From time to time pictures appeared on E2 from stations in the Far East.

**13/01/91:** Unidentified F2 reception on channels-E2 and R1 during the morning.

**14/01/91:** Tropospheric reception from Denmark, Sweden, Norway and Germany. A mid-afternoon Sporadic-E opening produced good quality pictures throughout Band-I from Hungary, Germany, Spain and Italy.

**15/01/91:** Intense tropospheric lift produced pictures in Band-III and at UHF from the USSR (channels-R7 and R29), Poland (R8, R10 and R30), Finland (E7 and E9), Austria (E8 and E24), Czechoslovakia (R6, R10, R26 and R36), Germany, Denmark and The Netherlands. Germany and the USSR were also seen during a Sporadic-E opening at 1600.

**16/01/91:** Another memorable day for E2 exotics! Between 0900 and 0920 New Zealand TV was monitored on 45.240, 45.250 and 45.260MHz. and Australia on 46.172 (commercial net.) and 46.240MHz (ABMN-0). Other signals included Thailand E2, the USSR R1, Dubai E2, Iran E2 and possibly Zimbabwe E2 at 1300. Throughout the afternoon an intense Sporadic-E opening in Band-I produced Germany, Hungary, Italy, Yugoslavia, Spain and the USSR.

**21/01/91:** Meteor shower reception from Czechoslovakia and the USSR.

**22/01/91:** Various Scandinavian signals resolved, including Norway E2 via Sporadic-E, Denmark E10 (DR network) and TV-2 on channels E22, 26, 27, 30, 33 and 40. The Danish stations were received via tropospheric reception.

**24/01/91:** Tropospheric reception from Germany, mainly at UHF.

**27/01/91:** Tropospheric ducting produced Switzerland E31 (+PTT SRG-1) and E34 (+PTT TSI).

**31/01/91:** F2 reception on channels-E2 and R1 until 1255 UTC approximately.

## FEBRUARY LOG

**06/02/91:** F2 reception with many unidentified signals on channels-E2 and R1. Mystery 60Hz grid resolved on R1 at 1016 UTC.

**08/02/91:** Intense F2 opening with the USSR R1, an unidentified transmitter E2 and a brief glimpse of Australia on channel-A0 at 46.25MHz.

**12/02/91:** Unidentified transmission on channel-E2 with Arabic script noted at 0840 UTC via F2 reception.

**15/02/91:** Intense F2 opening with the USSR R1, unidentified E2 transmission in Arabic and weak line syncs noted at A0.

**16/02/91:** Intense F2 activity during most of the morning with the USSR R1, unidentified transmissions with Arabic script on E2 and Australia A0 for three minutes at moderate

strength. At 0925 UTC, amongst the jumble of signals on R1, a 60Hz (525-line) programme seemed to be present.

**17/02/91:** Excellent steady pictures via F2 from the USSR on channel-R1, including a report of Chinese text on this channel.

**19/02/91:** The UEIT test card from the USSR was resolved via F2 on channel-R1 at 0923 UTC, plus weak unidentified signals on E2.

**22/02/91:** F2 opening in progress at 0900 UTC. EBU test card from Iran received on channel-E2, P2 quality with very little multipath distortion.

## MIDDLE EAST MYSTERY SOLVED!

The heavily modified PM5544 test card received via F2 on 30/10/89 (it was also seen in June 1985 by Mika Alamaki in Finland) is almost certain to have come from Iraq, even though there aren't any channel-E2 outlets listed.

A recent BBC-2 "Late Show" featured various news intros from the Middle East and the Iraqi logo was shown. During the F2 reception on 30/10/89 the test card changed to a stationary caption with logo, which remained on the screen for many minutes before it disappeared under heavy QRM (see CQ-TV 149 page 42). The distinctive features of the logc upon its dark background can easily be identified when a video recording made during the reception is played back and viewed from a distance. The logo was located in the top-left quarter of the screen.

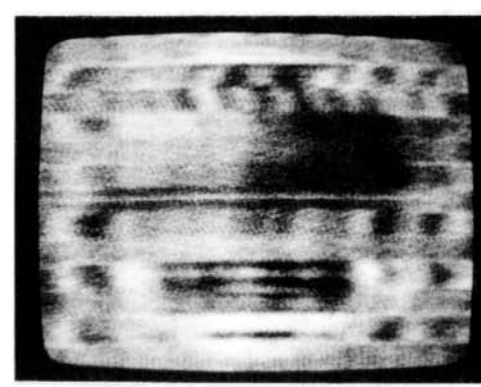
Very little information about Iraqi TV has become available over the years and, as far as it is known, nobody has ever successfully obtained details about test cards, etc., used. Looking back, there wasn't anywhere else left in the Middle East from where the mystery PM5544 could have originated. All the published data indicates that extensive use is made of high-power transmitters in Band-III. With TV3 (Thailand) using channel-E2 (unlisted), we wonder how many other countries are using E2 that we don't know about?

P.S. Did anyone see the selection of "DX-TV" aerial pictures shown as the opening theme for a recent "Late Show"?

## EURO NEWS

**GERMANY:** At 1958 local time on December 15th 1990, DFF-1 (the East German 1st network) finally came to an end when ARD-1 (West German) programmes were fed into the network. ZDF programmes were already being aired via some of the ex DFF-2 transmitters. DFF-1 and DFF-2 have merged to form a combined programme under the name "OST-3" (O3), but it is expected that this will be phased out by the end of 1991. This temporary "third" service (also known as "DFF Landerprogramm" is aired via other DFF-2 transmitters.

The assimilation and reorganisation of the TV networks is proving to be a major



**Heavily disguised PM5544 from Iraq (chan-E2)**


**Transmitter identification slide of the old DFF-1 network in East Germany**

headache. Apart from the technical aspects, such as transmitter reallocation and the change from SECAM to PAL colour, there is the eventual problem of who is going to own what!

**FRANCE:** A new network known as "CANAL J ENFANTS TV7" is on test. A cable network in Rouen is converting some TDF-1 and A2 programmes to the D" MAC system as an experiment.

**HUNGARY:** There are late evening screenings of unedited news programmes of ZDF and BBC, complete with Hungarian subtitles.

**USSR:** The logo "TCH" has caused quite a lot of confusion and many DXers have thought this to have originated from Czechoslovakia, especially since this is their ITU code!! Apparently, "TCH" are the initials for one of the mains news programmes broadcast over the CT-1 network; these are displayed throughout the broadcast.

The Moscow channel-R3 transmitter will soon carry three hours of Super Channel per day, according to a contract between Super Channel and Sovtelexport.

**YUGOSLAVIA:** Since November 11th 1990 TV Titograd has been renamed "TV Crne Gore". "TV Studio M", Yugoslavia's first private TV station, should now be on air using channel-E59. It was due to enter service on January 1st 1991. Yugoslavia's first private radio stations "Radio M" 101,0MHz and "M Sarajevo" (no frequency details) also commenced on this date.

The Serbian government has stopped programmes of RTV Pristina in the Albanian language and the Albanian newspaper "Rilindja" in Kosova. However, "Hrvatski Radio" Studio Zagreb (1st prog) relays the news in the Albanian language at 2130 UTC daily.

**ITALY:** Since the introduction of the new Italian law for TV and Radio on January 1st 1991, "TV Koper-Capodistria" is no longer relayed through Italy, and the redundant relays of "TVK-Cap" will be sold off to other stations. "TV-Koper-Capodistria" no longer has separate programmes in the Italian and Slovenian languages. Programme hours have been cut - broadcasts now take place between 1600 and 2200 CET (instead of 1230-0130). Sports programmes are no longer shown.

**BELGIUM:** The NICAM stereo system is under test from the RTBF "Tele 21" channel-28 outlet at Wavre. The text "ESSAIS SO STEREO NICAM SUR WAVRE CANAL 28" is superimposed across the PM5544. Test transmissions commenced during mid-December.

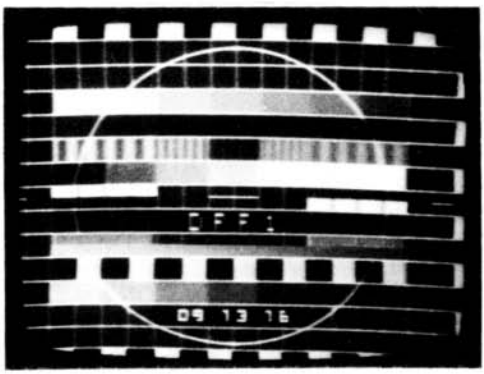
A Teletext service was due to start from the Wavre RTBF transmitter last September, but due to financial problems this was postponed.

The Genk transmitter on channel-47 has also carried stereo test transmissions.

**DENMARK:** The VHF transmitters in Bands-I and III will remain in operation longer than expected because there are plans to introduce the NICAM stereo

system on DR transmitters at VHF (and also UHF DR outlets Tole and Kobenhaven).

*Information kindly supplied by: Gosta van der Linden and the BDXC, Netherlands; Bernd Trutenau, West Germany; Roger Bunney, UK; Dalibor Frkovic, Yugoslavia; Bertrand Prince, France; David Glenday, UK; Garry Smith, UK.*




**Test card radiated by DFF-1 before changeover**

# GET YOUR GEAR TESTED !

As with previous years at our conventions there will be a Test & Measurement facility where you can have your equipment and projects checked against all sorts of measurements as listed below.

This year the Test & Measurement facility has enlarged its range of equipment available to check/measure members' equipment.

The facility is able to measure :-

1) RF Power (to 18GHz),

2) Frequency (to 18GHz),

3) Spectrum Analysis (to 1.5GHz & 10GHz),

4) Swept Frequency / Network Analysis (to 12.4GHz). This is for setting up filters and aerials (VSWR), i.e: Matching screws on penny feeds! etc.

5) Noise Figure (10MHz to 1500MHz and 10/11GHz LNB's). i.e: 2M / 70cms / 23cms preamps & receivers and 10GHz LNB's.

This should cover most measurement requirements, however, if anyone has a particular requirement (24GHz or LIGHT!) then please ring Mr P.Bicknell (G8KFW). Tel:021-554-5252 x 429 (Works No) before the convention, to see if we can accommodate it.

The test equipment is being provided and operated by: Dave (G8NND), Paul (G8KFW) and Steve (G8JMJ), and the BATC wish to extend their thanks to them for this service.

# CONTEST NEWS

## Bob Platts G8OZP

Firstly the full International 1990 ATV contest results as promised in the last issue. A total of 151 entries from six countries, spread over five bands and two sections. TX/RX and RX-only helped make the event another success. Thanks go to VERON and in particular to PA0SON for organising the event. Details of the 1991 event can be found in the Contest Calendar at the end of the contest news.

## 1990 INTERNATIONAL ATV

### 70CM SECTION-1

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| PE1HXD | 14588 | 50 | GW4ATG/P | 652 |
| F3YX | 11105 | 40 | PE1BXL | 394 |
| GW7ATG/P | 10020 | 45 | PE1HXD | 652 |
| G7ATV/P | 9470 | 35 | G8EQZ | 316 |
| F8MM | 8856 | 29 | FE6CMB | 395 |
| FC1LJA/P | 8206 | 42 | F1HRS | 443 |
| FE6FZK | 7804 | 36 | F1FY | 396 |
| PA3DCP | 7395 | 43 | ON4YZ | 317 |
| PA3DLS | 6954 | 60 | DC7JD/P | 333 |
| PE1LZZ | 6941 | 63 | PE1HXD | 378 |
| PA3FMZ | 6761 | 43 | ON4YZ | 267 |
| G8MNY | 6584 | 33 | ????? | ??? |
| G4DVN'P | 6425 | 29 | ON4YZ | 550 |
| PA3BZM | 6378 | 32 | ON4YZ | 278 |
| PE1BZL | 6038 | 38 | F3YX | 396 |
| DL2KBH | 5861 | 41 | ????? | 241 |
| ON4YZ | 5574 | 34 | FC1HRS/P | 560 |
| F6CMB/P | 5261 | 32 | FE8MM | 396 |
| PA3MM/P | 5177 | 9 | ????? | 271 |
| ON7MB | 5143 | 20 | G4DVN/P | 504 |
| ON1WW | 4755 | 31 | PE1HXD | 251 |
| FC1FDG/P | 4730 | 21 | FC1HRS | 348 |
| ON51D | 4707 | 27 | F6FZO | 247 |
| FC1DUJ | 4638 | 18 | FC1LJA | 313 |
| DJ1KF | 3890 | 25 | ????? | 262 |
| DL901 | 3744 | 20 | ????? | 341 |
| F6ANZ/P | 3401 | 13 | ????? | 266 |
| ON5VL | 3336 | 27 | PE1HXD | 298 |
| PA0BOJ | 3277 | 28 | PE1HXD | 198 |
| F6ELI | 3198 | 15 | ????? | 359 |
| FE5BV | 3066 | 11 | FC1DUJ | 224 |
| G8OZP/P | 2982 | 14 | G4VTD | 220 |
| PE1KRU | 2971 | 17 | PA3BZM | 260 |
| PA3CVM | 2984 | 16 | PE1HXD | 255 |
| PE1HLR/A | 2932 | 26 | PE1HXD | 168 |
| DH8YAL | 2922 | 25 | ????? | 189 |
| FC1BPO | 2914 | 15 | F6FZO | 185 |
| DC1JD | 2776 | 9 | ????? | 332 |
| ON1AXF | 2688 | 29 | PE1HZD | 254 |
| FC1ACA | 2610 | 10 | FF1PJC | 260 |
| ON4KBF | 2603 | 21 | F3YX | 261 |
| F7AVU | 2363 | 12 | G4NNG/P | 210 |
| PA6ROT | 2293 | 33 | PE1HXD | 187 |
| G6IQM | 2204 | 15 | G7ATV/P | 169 |
| FF1OEN | 2169 | 13 | FC1DCB | 169 |
| ON5MO | 2165 | 20 | F3YX | 260 |
| F6ESU | 2130 | 12 | FF6PJC | 178 |
| F6FZO | 2058 | 11 | FC1LJA | 187 |
| HB9AFO | 1981 | 8 | ????? | 290 |
| F6IQG | 1873 | 10 | FC1LJA | 254 |
| G8ONX | 1747 | 14 | GW7ATG/P | 150 |
| DJ7JG | 1596 | 11 | ????? | 201 |
| OE5MLL | 1567 | 13 | ????? | 255 |
| EI3FW | 1515 | 6 | G4DVN/P | 272 |
| FD1DCB | 1464 | 4 | ????? | 252 |
| PA0SON | 1357 | 10 | PE1HXD | 217 |
| PA2ENG | 1330 | 13 | DL9OI | 202 |
| G8GKQ | 1239 | 11 | G1XRC/P | 156 |
| FC1DBN/P | 897 | 6 | G4DVN/P | 369 |
| OE5MKL/P | 836 | 12 | ????? | 70 |
| G8VOI/P | 805 | 7 | G7ATV/P | 121 |
| FC1LWN | 802 | 11 | FC1LJA | 117 |
| PA3AOG | 790 | 9 | PE1BZL | 93 |
| G6WLM | 781 | 9 | G8MNY/P | 90 |
| FC1HPR | 749 | 10 | FC1LJA | 137 |
| ON6UA | 690 | 9 | ON4KBF | 71 |
| ON4KBA | 549 | 7 | PE1HXD | 277 |
| PA3DJR | 483 | 12 | PE1LWC | 70 |
| G8EGG | 479 | 5 | G3NNG/P | 74 |
| ON5LK | 458 | 13 | ON5ID | 63 |
| FE9PY | 402 | 3 | FC1FDG | 127 |

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| ON9CAA | 233 | 4 | DL2KBH | 53 |
| ON2AGA/P | 212 | 5 | ON5VL | 80 |
| EI6EV | 198 | 7 | EI3FW | 32 |
| DC6CF | 138 | 3 | ????? | 48 |
| ON1AAE | 83 | 2 | ON2AAO | 47 |
| ON1JU | 22 | 1 | ON5VL | 22 |
| ON5EE | 14 | 1 | ON5VL | 14 |
| ON6XV | 11 | 1 | ON5VL | 11 |

## 1990 INTERNATIONAL ATV

## 70CM SECTION–2

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| NL8722 | 1456 | 51 | DL9OI | 288 |
| FF1PJC | 2671 | 18 | ON5ID | 274 |
| PA3ECU | 2160 | 25 | DL9OI | 237 |
| PA3DEA | 2130 | 24 | DL9OI | 236 |
| PE1AFJ | 1912 | 20 | DL9OI | 236 |
| PD0PPA | 1628 | 13 | DL9OI | 304 |
| PA3DZA | 1427 | 13 | PE1HXD | 199 |
| NL5184 | 1411 | 19 | DL9OI | 198 |
| PA3FNO | 1202 | 15 | DL9OI | 200 |
| PA0FHV | 1068 | 13 | PE1HXD | 180 |
| FC1LQC | 1023 | 10 | F6ELJ | 220 |
| F6EAO | 825 | 9 | FC1DUJ | 208 |
| ON!L1790 | 786 | 11 | PE1HXD | 260 |
| F1HOM | 270 | 7 | F3YX | 270 |
| EA3ESL | 130 | 1 | ????? | 130 |
| FD1LRX | 122 | 1 | FF6ZKT | 122 |
| F1CMX | 100 | 2 | FF8MM | 57 |

## 1990 INTERNATIONAL ATV

## 24 CM SECTION–1

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| G7ATV/P | 3123 | 26 | G4DVN/P | 213 |
| PE1KWX | 2654 | 17 | ON4YZ | 238 |
| G4WGZ/P | 2550 | 15 | GW7ATG/P | 223 |
| FE8MM | 2525 | 11 | FC1AGO | 277 |
| DJ7JG | 2406 | 14 | ????? | 200 |
| PA3FMZ | 2231 | 17 | ON4YZ | 267 |
| G4DVN/P | 2129 | 10 | G7ATV/P | 213 |
| PA3DLS | 2106 | 24 | PA3DEE | 187 |
| ON1WW | 1772 | 14 | PE1KWX | 135 |
| PA3DEE | 1727 | 16 | PA3DLS | 186 |
| GW7ATG/P | 1686 | 7 | G4NNG/P | 223 |
| ON4YZ | 1670 | 12 | PA3FMZ | 267 |
| FC1BPO | 1664 | 8 | ON4YZ | 152 |
| PA0BOJ | 1406 | 14 | PA3FMZ | 123 |
| PE1LRS | 1361 | 16 | PA2ENG | 136 |
| PA2ENG | 1208 | 10 | PE1LRS | 136 |
| ON5ID | 1163 | 10 | F8MM | 217 |
| G6IQM | 1140 | 8 | GW7ATG/P | 168 |
| DF0BU | 987 | 14 | ????? | 112 |
| F6FZK | 944 | 9 | ON4YZ | 220 |
| DL2KBH | 932 | 14 | ????? | 149 |
| G8VOI/P | 910 | 8 | G7ATV/P | 121 |
| ON4AXF | 901 | 10 | PA3FMZ | 174 |
| F3YX | 873 | 7 | FC1BPO | 151 |
| PA3CWS | 814 | 6 | PA2ENG | 88 |
| DH8YAL | 760 | 10 | ????? | 128 |
| PE1HLR/A | 777 | 9 | PA6ROT | 109 |
| ON4MKL/P | 712 | 16 | ????? | 70 |
| ON7MB | 657 | 9 | ON6PD | 70 |
| G8EGG | 497 | 5 | G3NNG/P | 74 |
| HB9AFO | 485 | 4 | ????? | 238 |
| PA6ROT | 464 | 9 | PA0BOJ | 67 |
| ON5MO | 369 | 7 | ON5ID | 60 |
| F6CMB | 368 | 3 | DK6IJ | 116 |
| G8ONX | 352 | 6 | G4DVN/P | 90 |
| FC1ACA | 320 | 3 | FE8MM | 232 |
| G8GKQ | 304 | 5 | G7ATV/P | 72 |
| PA3CVM | 273 | 5 | ON1AXF | 66 |
| F6FZO | 161 | 1 | F3YX | 161 |
| ON9CAA | 140 | 4 | DL3KBH | 53 |
| PA3AOG | 137 | 4 | PA3FMZ | 47 |
| DC6CF | 130 | 2 | ????? | 48 |
| FC1HPR | 113 | 2 | F6FZK | 30 |
| ON5VL | 54 | 1 | ON1WW | 54 |
| G6WLM | 53 | 3 | G6IQM | 24 |
| FE5BV | 38 | 1 | FC1AHH | 38 |

## 1990 INTERNATIONAL ATV

## 24 CM SECTION–2

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| NL5184 | 628 | 10 | PE1LRS | 141 |
| PE1BZL | 603 | 8 | PE1DWQ | 164 |
| PE1LZZ | 438 | 9 | PE1KWX | 138 |
| PA0SON | 34 | 1 | ON1WW | 34 |

## 1990 INTERNATIONAL ATV

### 13 CM SECTION–1

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| DJ7JG | 101 | 2 | ????? | 89 |
| PA3DEE | 55 | 2 | PE1AIG | 44 |
| PE1LRS | 11 | 1 | PA3DEE | 11 |

## 1990 INTERNATIONAL ATV

### 13 CM SECTION–1

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| G0ETZ/P | 50 | 1 | G1XRC/P | 25 |
| HB9AFO | 4 | 1 | ????? | 2 |

## WINTER 1990 CONTEST

This event really lived up to its name, with thick snow and very poor propagation conditions covering most of the country. Several stations were on, but unfortunately only two logs were received.

Congratulations to John G8MNY for making first spot on both bands. Too much snow and not enough 240 Volts was Editor Mike's comment. However, his best DX of 94Km on 70cm was a good achievement for such poor conditions.

## WINTER ATV 1990

### 70CM

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| G8MNY | 514 | 8 | G6LES | 73 |
| G6IQM | 226 | 2 | G4ZYJ | 94 |

## WINTER ATV 1990

### 24CM

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| G8MNY | 206 | 5 | G4CRJ | 59 |
| G6IQM | 38 | 1 | G8ONX | 19 |

## 1991 WINTER CUMULATIVE

The first contest of 1991 saw better conditions, with a total of eleven entries, which is a bit down on previous years. The very healthy signal put out by John of the ATG group puts him well into first place with 5635 points. Best DX goes to John G8MNY, whose 400W peak sync penetrated 279Km of British January weather to contact Richard G4YTV in Yorkshire.

Power is not always the main requirement as proved by G0IMP. Neville's score and DX of 208Km was achieved with only 10W of power, well done.

Impeccable Quality Modulation Mike (that's new – took you long enough though Gunn Diode!) found enough time away from the word processor to gain first slot on 24cm, as well as third place on 70cm.

Steve G6WLM again proves that power is not everything, his score of 140 was attained with just 0.5W from the transmitter.

## 1991WINTER CUMULATIVE

### 70CM

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| G7ATG | 5635 | 36 | G4WGZ | 223 |
| G8MNY | 1948 | 13 | G4YTV | 279 |
| G6IQM | 1868 | 22 | G4YTV | 181 |
| G0IMP | 1098 | 11 | G8MNY | 208 |
| G4WGZ | 923 | 13 | G7ATG | 223 |
| G6WLM | 557 | 10 | G7ATG | 69 |

## 1991 WINTER CUMULATIVE

### 24CM

| Callsign | Pts | QSO's | Best DX | @Km |
|---|---|---|---|---|
| G6IQM | 892 | 16 | G7ATG | 94 |
| G7ATG | 763 | 11 | G6IQM | 94 |
| G4WGZ | 174 | 6 | G8BUA | 22 |
| G8MNY | 157 | 5 | G8BUA | 29 |
| G6WLM | 140 | 7 | G6IQM | 24 |

## LATE NEWS

The BATC contest entry/log sheets have been altered. the new style is a single sheet per band, combining entry form and log on one page. Copies are available on receipt of an SAE from me.

Danish SSTV 1991 Contest: BATC members are invited to enter this contest which takes place on May 4th and 5th. The duration is from 0000 on the 4th to 2400 on the 5th, times are Central European. Bands: 80/40/20/15/10/6 and 2M, frequencies as Region-1 plans. Logs should contain the following information for each entry: QSO NUMBER, TIME, STATION WORKED, BAND, POINTS, BONUS POINTS and a RUNNING TOTAL. Scoring is 2 points for the first contact in a country and 1 point for each contact in that country thereafter. 1 point bonus for each Danish contact worked. Each station can be worked on each band. First, second, third, fourth and fifth places will receive certificates. Logs should be sent direct to the following address, to arrive there by 03/06/91: SSTV EDITOR, KARL EMKJER, SOBORGHUS PARK 8, DK-2860 SOBORG, DENMARK.

Those of you who are waiting for certificates may be wondering why the delay in getting them out. The answer is simple, I ran out of stock and the new batch has taken longer to get printed than expected.

I look forward to meeting some of you again at Harlaxton this year, so until then, 73 ... Bob G8OZP.

Logs sheets etc. can be obtained from: Bob Platts, 8 Station Road, Rolleston-on-Dove, Burton-on-Trent, Staffs., DE13 9AA.

# CONTEST CALENDAR

**MAYDAY MICROWAVE**

Monday May 12th

0001 GMT to 2359 GMT

FSTV 24CM and above

**SUMMER FUN JOINT EUROPEAN**

Saturday June 8th to Sunday June 9th

1400 GMT Saturday to 1400 GMT Sunday

Slow Scan & Fast Scan TV all Bands

**INTERNATIONAL ATV**

Saturday Sept 14th – Sunday Sept 15th

1800GMT Saturday – 1200 GMT Sunday

Fast Scan TV all Bands

# TV ON THE AIR

## Andy Emmerson G8PTH

Spring is sprung, the rally and contest seasons are upon us and ... it's time for another round-up of ATV news. A quick peep in the filing cabinet finds a pile of letters, so let's air them without further ado (count the cliches in that sentence!).

## NEWSLETTERS

Several of the more enlightened TV repeater groups send me their newsletters: these often contain valuable nuggets of information, which I am happy to relay here to a wider audience. In addition their publicity receives a bit of a boost. So many thanks to the Rugby, Severnside and Kent groups for their good work.

I have also "acquired" a copy of the Home Counties news-sheet this time, I can pass on some of their news as well. As for the other groups, well we must assume they went into hibernation for the winter, but how about putting me on your mailing list?!?

## MEN OF KENT

The Kent Television Group seems to be going from strength to strength, with 14 paid-up collaborators. They number G4BBH, G8SUY, G8GHH, G6GHP, G4AYT, G4GJA, G4CZJ, G8NVH, G4DVG, G1FWR, G4GUO, G4BFS and G3OGX. As this is not an exclusive club, more will be very welcome. On the technical front, it has been decided to adopt the Teletron logic for the repeater on account of its simplicity. This was duly purchased from BATC club sales. A prototype vision switcher (CQ-TV 141) was also constructed to complement the Teletron, as used on GB3ET. The next item required was the sync detect circuit, a suitable one being found in CQ-TV 144 using the NE567 PLL.

This was their first failure! On examination with the 'scope it was found that a small amount of video was still present on the syncs, upsetting the NE567 and causing it not to detect 15.625kHz. More head scratching and another circuit was found to take place of the transistor in front of the NE567 (CQ-TV 138). With a quick circuit mod the 1458 op-amp was installed and tested - Bingo! It worked better than hoped, sync could still be detected even when the video had disappeared into the noise. This mod is now being built into the final board.

Another problem encountered was the tone oscillator filter circuit (CQ-TV 144) for the CW ident tones coming out of the Teletron board. Overshoot was suffered on the rising edges, causing the morse to sound clicky and very unnatural (just like computer generated morse!). A new approach was pursued using a 741 op-amp in an active band-pass filter circuit; this has proven to be very successful and will be incorporated into the final logic board. Circuit details can be obtained from G8SUY.

The PA block (using an Icom SC1040 kindly donated by ICOM UK), was constructed and soak tested for 36 hours, producing a continuous healthy and clean 19 watts for the duration of the test. Further site tests have been proposed and will be reported in due course. If you cannot wait you can always ring Andy G8SUY on Faversham 0795-531541.

Having agreed that the proposed repeater would be sited at Whitstable, the purchase of aerials was the next logical step. The group has decided on two Alford slots, and the SWR on the trial system has turned out to be excellent and the performance far better than expected. A final decision on this matter has yet to be made.

## HOME COUNTIES NEWS

The High Wycombe repeater's aerial system has been completely replaced with a new set of flat plates made by Dave G3MPS before he emigrated to Australia. These are about 10 feet higher and are giving much improved results to the east.

The black brick PA went lost power and has been replaced: so far so good, with the repeater back on full power. A new experimental feature on the repeater is an additional sound carrier on 5.7MHz. This relays 144.75MHz whenever the repeater is on, making 2 metre talkback easier and has proved useful.

Recently, Mike G8LES built a transmitter for G8CKN to use during GB2RS news broadcasts. Tests show that on just 2 watts. Roy can produce on GB3HV a P4 picture, which is not bad for 35 miles! Initially Mike will relay Roy's pictures to the repeater so that he can insert captions and photos etc..

The first experimental (not properly scripted) news broadcast took place on Sunday January 6th with G8CKN transmitting directly to the repeater. This revealed a couple of technical problems which should not be difficult to resolve. After this, the club will send a tape and letter to the RSGB to formally start the service. This will be the first time GB2RS news has been televised and a great achievement for the club and ATV in general. Well done Home Counties Group and to G8LES for getting Roy on the air: this certainly ought to create new interest in ATV.

## GERMANY CALLING

The latest newsletter from the German ATV club indicates there is trouble brewing. They are seriously considering ceasing their affiliation to their national club DARC, the equivalent of the RSGB over there. The cause of these bad relations is that the DARC is apparently unable to reconcile the wishes of narrowband-mode users with wideband amateur television. It appears that the 70cm band there is being reduced by two MHz and the DARC is reportedly not prepared to allow the ATV, packet and RTTY representatives to take part in the necessary replanning of the band.

This does not augur well for the future and we must all hope something practical does emerge in the end. In the meantime, the "threatened" groups have united and AGAF (the ATV club) has linked up with the packet radio groups IGAF, Ampack-Bayern and Nord><Link to form a common strategy to protect the interests of "technically experimental radio". This is an excellent move and one which could well be copied elsewhere.

## NEW KID ON THE BLOCK

Phil G6GLD (I thought G6s were extinct but there I am proved wrong again!) hails from Royton near Oldham in Lancashire. He is just setting up an ATV station with a Sony b/w TV, Microwave Modules converter and 6-element cubical quad antenna. I didn't know you could get 70cm quads but he says it all works well, probably on account of the 600ft ASL location. He says "I always look forward to your ATV page in PW. It's excellent, I wish there was more of it". So do I Phil, so do I, but thanks for the kind words.

## SSTV REVIVAL

"Just to let you know there is life on SSTV ..." So starts a letter from Eric GW8LJJ. There is a qualification of course and that is that the life is in South Wales. But just as the Anglo-Saxons and Romans made life so unpleasant for the Celts in England that they withdrew to the relative safety and isolation of Wales, so perhaps it is that the Principality will become the last stronghold of SSTV in Britain. Be that as it may, I'll allow Eric to resume his tale.

"The latest newcomer is Bill GW0CIO. His QTH is Aberbargoed and he used a

Spectrum to view SSTV until he saw the receive set-up of Cecil GW8MTJ at Blackwood, Gwent. Bill has now thrown his Spectrum away! Cess has built the G3WCY/G4ENA converter and has separate transmit and receive units. The latest development is a sampling camera (1970s) with extra mods of his own. I have seen pix from his system both over the air and direct and I am impressed with the results. In fact I think my "digital" RX system limits the results seen!

"Bob GW3OVD of Abercarn, Gwent used a computer but abandoned it long ago in favour of the, yes, converter circuit; again the same method has been adopted of using separate TX and RX methods.

Glen GW7GTW of Maes-y-cwmmer, mid-Glam. used to have a Spectrum, so did Keith GW8TRO and Peter GW4EAI, both of Pontllanfraith. I could have said Blackwood but I felt you probably needed another Welsh word for your vocabulary (dead right Eric, I've actually bought a Welsh language cassette course!). Not much seen of Keith with his "separates", nor of Peter with his RX converter.

"Glen is our local SSTV repeater. He is the only one who can receive anything from me down in the "well" of Barry, but he cannot pick up anything from Bob. So Bob sends his SSTV pix to Cess, who records them and then plays the recording via two metres to Glen who records them and plays the results over the air to me. Then I transmit SSTV pix to Glen and the whole process is reversed. By the time Bob receives my pictures I've gone to bed!

"My set-up consists of - you've guessed - separate RX/TX converters but I'm also playing with a sampling camera. I would never use a computer for SSTV and Cess doesn't even have a a computer anyway. We are sat on 144.500 most evenings and weekends, and would welcome any SSTV contacts. Yes, even computer graphics until you get "converted". Hope this will be of some interest."

## FROM NEW ZEALAND ...

The world's best letter writer Mike ZL1ABS has been at it again: this time he has sent a list of printed circuit boards for many video and RF projects, all ATV-related. The list is five pages long and several old favourites from "Television" magazine (all the test pattern generators) are included. You might well find something useful here and the boards would not cost much to post from New Zealand. I'll be happy to send you a copy of the list in return for two unused second class stamps plus a SAE. My address is 71 Falcutt Way, Northampton, NN2 8PH.

## ... AND THE USA

From St Louis (with the final "s" pronounced!), Missouri writes Dave Williams WB0ZJP. He has had some good fortune and acquired a British-made Quantel DFS1500 digital fieldstore synchroniser. Once he has found out how to use it (unfortunately there was no documentation), it should be a useful addition to the shack, enabling him to mix non-synchronous video sources.

"We have been fairly busy here," he continues, "John KD0LO and myself have put an ATV repeater on the air. It's on top of an eleven-storey building in West County St. Louis. Input is on 923.25MHz, output on 421.25 MHz. It runs 25 watts to a 6dB vertical omni." For those unused to the American scene I should explain that in the USA amateurs have access to the so-called ISM (industrial, scientific and medical) band from 902 to 928MHz. At one thime this was widely used for microwave ovens there, but as these have changed to more efficient magnetrons operating in the 2GHz region, the frequencies became available to other users. To begin, ATVers had the band more or less to themselves, albeit on an unprotected basis, but now many other users including radio-paging, cordless TV videosenders and even radio-

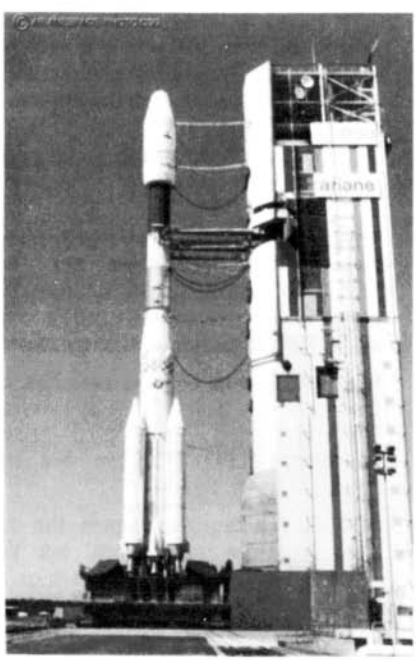
connected PABX extension phones are all in there. In Britain the band is allocated to the military and cellular radio, although one police force reportedly caused temporary chaos by setting up a surveillance TV channel around 910MHz!

## SOFTWARE MATTERS

Some while back I mentioned a package called "AVT Master" and remarked that it was little short of fraudulent that the UK importer charged the US dollar price, only in pounds. With a nearly two-to-one exchange rate this is indefensible and of course, there has been no explanation offered. Accordingly Mr Everall G6FTA is minded to order it from the States but has heard a tale that the US version won't work in the UK. He finds this unlikely but wonders if anyone can say for definite and why. If you know please give him a ring on 0992-27166 - and tell us as well!

## OLD FILM

I'll repeat this plea since nobody has responded - yet! If anyone has any old film of ATV activity of more than 20 years ago, please let me know. The archives of ATV are pretty thin and unless we preserve material now it is lost forever. Please drop me a line if you can help - all costs will be refunded.



THE ARIANE 44L VEHICLE FLIGHT 39 AS IT WAS BEING REDIED TO LAUCH AT THE ARIANESPACE FACILITY AT KOUROU FRENCH GUIANA WITH ASTRA 1B ON BOARD

# A COUPLE OF QUICKIES FROM ERIC !!

**Eric Edwards GW8LJJ**

A couple of 'quickie' circuits from our man in Wales. These two simple projects can be easily assembled in an evening, and both produce interesting and useful effects.

The first circuit produces a display of four separate pictures on the screen, each occupying a separate quadrant, which can prove to be a source of amusement on your ATV transmissions.

The second circuit is for the SSTV enthusiasts and provides a simple and effective way of switching between SSTV sources and microphones, without all the clicks, whistles, bangs and losses of audio often encountered.

## 4 x 1/4 DISPLAY

### IN THEORY

The circuit of the four x 1/4 picture display unit is shown in Fig.1. Line and field drives are converted to TTL levels before being used to trigger the dual monostable 74123.The timing is set up by 10K pre-sets in association with the timing capacitors on pins-14, 15, 7 and 6. The pre-sets should be set up half way to start with. Accurate settings can be made on the final picture display.

The delayed line and field pulses are fed to to the logic circuitry and an invertor. The necessary 'on and off' controls the two 4066 bilateral switches. All the outputs of the 4066s are joined together. Because the level is below the required 1 volt an amplifier has to be used to raise this. I have used a grounded base circuit which gives good results. The output level is set by the pre-set to 1 volt across 75 Ohms.

### IN PRACTICE

The four 1 volt video sources (they must all be at the same level) are fed into the unit. The two monostable pre-sets are adjusted to give equidistance on the four picture screen i.e: field half way down and line half way across, such that the four pictures occupy an equal quarter of the screen each. The output level should be set for 1 volt p-p across 75 Ohms.

The output MUST be fed into a processing amplifier or vision mixer, as there is no blanking etc. on the waveform. A simple VSB circuit could be used.

The result from this unit is a very pleasing effect of four quarter screen pictures, each occupying a quadrant of the screen.

## SSTV-MIC VOGAD SWITCHER

### IN THEORY

The circuit of this VOGAD unit is shown in Fig.2. The unit allows fast, modern switching between two sources. In one case, between an SSTV source from, say, an SSTV converter and a microphone.

Momentary push-button switches operate the flip-flop, which is reset by two inverters. On depressing either push-button the associated LED indicates the required input.

A VOGAD integrated circuit, the 6270, is used to allow 'hands free' talk back. A balanced microphone is used to reduce hum and feedback, etc. Consequently, pins-4 and 5 of the VOGAD IC must NOT be connected to ground. The 1K pre-set adjusts the output level from the VOGAD circuit to that required by the radio.

**IN PRACTICE**

This unit can be built into a small box, with the push-button switches and LEDs mounted together, perhaps with a gooseneck microphone. Any low impedance balanced microphone will do, I use an AKG 600 Ohm and it works well.

Instant SSTV transmit takes place by simply depressing the SSTV push-button. This autonomically changes from the microphone input to the SSTV input. On depressing the microphone button the reverse takes place.

I use the unit on the same PSU as the 2M radio system and no noise or feedback problems are encountered, even when running 50W from my open valve linear.

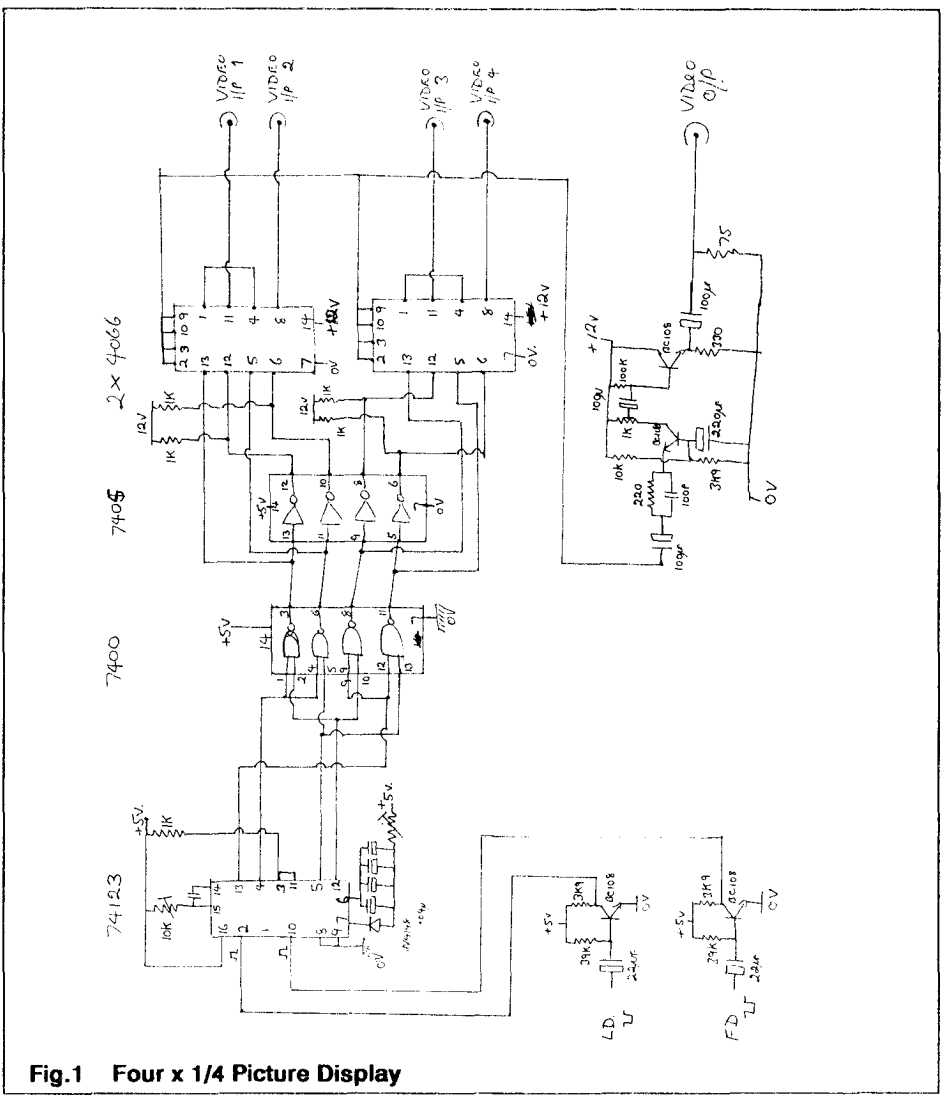



**Fig.1 Four x 1/4 Picture Display**

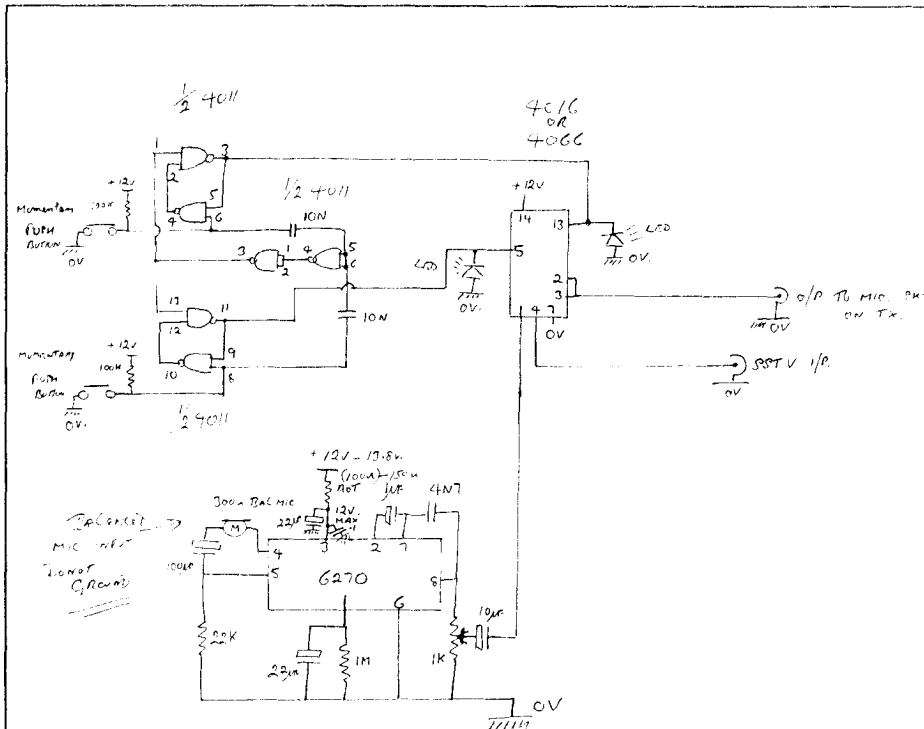
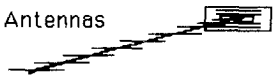



**Fig.1 Four x 1/4 Picture Display**

## Severnside Television Group

### STG 24cm Antennas

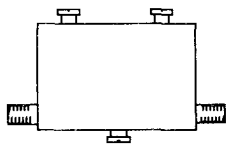


Our ever popular 24cm 18 element wideband Yagi is a must for all ATV stations. Specially designed to cover the whole band for repeater working. Look at some of the features....

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

Price still only £14.00 + £2.50 p&p
(UK delivery only)

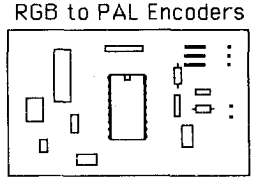
### 3 Pole & 5 Pole 24cm Filters



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

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

### RGB to PAL Encoders



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

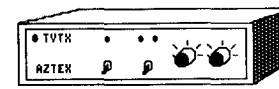
Introductory price £32.00 inc p&p

**Severnside Television Group**

15 Witney Close Saltford Bristol BS18 3DX
(0225 873093) after 7pm & weekends
Please allow 28 days for delivery.


## Aztex Electronics

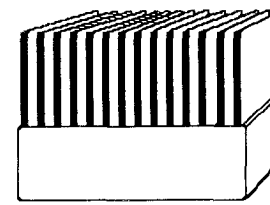
### 24 cm Transmitters




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

Price £245.00 + £5.00 p&p

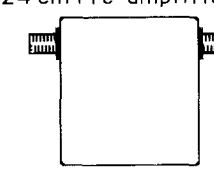
### 24cm Power Amplifiers



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

Price £150.00 + £5.00 p&p

### 24 cm Pre-amplifiers



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

Price £52.00 + £1.50 p&p

**AZTEX Electronics**

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

## THE WORTHING AND DISTRICT VIDEO REPEATER GROUP

GB3VR ATV REPEATER BRIGHTON

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

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

# FOR SALE

**AZTEX 2.5W 24CM ATV TRANSMITTER**, 2-channels crystal locked, 1249 & 1256MHz, composite video and microphone and line audio inputs ... £190. **ATV RECEIVER** complete comprising Wood & Douglas 24DC50 24CM downconverter and Camtech Video IF, tuning meter (analogue -uncalibrated) and loudspeaker, enclosed in small metal cabinet ... £150.00 complete. **AZTEX 24CM GaAsFet PREAMPLIFIER** - approx 14dB gain - can be masthead mounted if weatherproofed ... £35. 2 off Micromax 38-element **QUAD LOOP YAGIS** for 24CM ... £40 each. **HITACHI AUTO FOCUS CCD CAMERA** and external PSU ... £225. **PANASONIC CCD COLOUR CAMERA**, auto iris, internal PSU, very neat, measures only 10" x 2.75" x 3.5" ... £225. 12" **B&W MONITORS** ... £30 each. **CROPREDY Test Card generator with Colouriser** - just needs an EPROM blowing for your call sign etc. - cased ... £25. **DESK Video Switcher**, 8-inputs, 2-outputs, sequencing on one output - £25. Offers on any of the above. carriage at cost or will take to Harlaxton. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr. Rugby, Warks., CV23 8UF. Tel: 0788 890365 (home/answerphone), 0788 576125 x35 (work). Fax: 0788 890365.

**HITACHI** and **PANASONIC** camcorder manuals: Hitachi models: VM-200E, VM-500E. Panasonic models: NV-MS5, NV-M10, NV-MC20, NV-MS50, GR-C9EG/EK. Offers on the lot or will split. D.Dell G4WLA, 12 Penfield Gardens, Dawlish, Devon, EX7 9NQ. Tel: 0626 863217.

**LAP-TOP Computer**, Olivetti M15 complete with power supply/battery charger and carry case. Twin 720K discs, MS-DOS 3.3 and various software ... £350. Also Epson FX800 printer c/w sheet feeder ... £175 Ian Shepherd G4EVK. Tel: 0949 **61267**.

**SATELLITE RECEIVER** Amstrad SRX2000 in good working order, with remote control, modified for 48 channels, includes manual. Suitable for Astra and other birds. Sorr7y no dish, uses Marconi type LNB. Offers please to Russell Greenberg, 45 Worcester Crescent, Mill Hill, London, NW7 4LP. Tel: 081 959 4061 evenings only.

**IVC MONO MIXER MEA 5100** as new & boxed with circuit & data, 4 I/P A B with wipes £30 inc post (BATC SALE). Rotary Converter 24V. DC to 240V AC 0.52A. Offers (BATC SALE). Apple II plus computer with twin disk drives, software, books etc, best offer over £25.00 secures. (BATC Sale). 12" Green screen monitor, suit Apple or BBC, Good condition £25.00 (BATC Sale). Pye Video Matrix 19" 3U rackmount Reed relays £20 (personal sale). B.Summers G8GQS QTHR 081 998 4739 Answerphone.

Unused 23-24CM **WIDEBAND AERIAL.** 38-element Loop Yagi, complete with mounting frame for mast fitting ... &85 cash inc. p&p. Unused Racal-Dana 200MHz **FREQUENCY COUNTER** model 9914A ... £175 cash inc. p&p. Short shelf life Racal-Dana **DIGITAL MULTIMETER** model 4008 complete with PSU ... £150 cash inc. p&p. New condition recalibrated AVO 8 Mk.V complete with case and leads ... £70 cash inc. p&p. Siemens REL3U84a/b **THERMAL MILLIWATTMETER.** 0 to 0,5 Watt in 5 switched ranges - 0.5W, 200mW, 100mW, 50mW & 10mW. Read from 3" meter scale marked in dB and mW. Built-in calibrator, Sensor head - 50 Ohm stored in cavity on instrument face. Minimum readable power 1mW. AC mains, metal case, approx. 172 x 62 x 6". Short form manual with instrument. Frequency range 0 to 12.4GHz ... £125 inc. courier delivery. If payment is required by cheque please telephone. F. Smith, 5 Pinfold Crescent, Penn, Wolverhampton, WV4 4ET. Tel: 0902 343746.

**FOR SALE:** A selection of various remote controls: Philips 58620VLP; Sony RM101; Hitachi 1GV + N2V, RMVT151E + 401E, 552W + 506N + 200224; JVC UM3 R6/AA, RMC705. All at £2 + p&p. Peter Connor G8XTE, 20 Longfield, Lotton, Ivybridge, Devon, PL21 9SN. Tel: Cornwood 319.

**BARGAIN CLEAROUT** for personal callers only (Cash & Carry!). Several tons of stuff including: Ex-BBC white & grey units ... from £1.00; 19" rack chassis ... from £1.00; New MUSA 'U' links ... £1.00; MUSA plugs, BNC plugs, new BNC plugs, plugs with coax wired ... from 20p; New 75-ohm coax ... from 9p; Multicore cable (10 to 200 way!); Rotator cable ... from 20p; New Audio Jackfields ... from £5.00; Video Monitors ... from £5.00; VDUs ... from £5.00; Video Matrix ... £55.00; Bulgin plugs/sockets; 19" Blanking Plates; EMI 2001/2005 spares; Marconi CCUs, Coders, Transformers; plus literally 1000's of items too numerous to list. Tel: 021 446 4346 for an appointment to call. P.S. Anything not sold in 2 months goes down the scrap-yard, so please give it all a good home.

**Cox VISION MIXERS,** EV Waveform and Vector Monitors, JVC Video/Audio Switcher, Studio Master 16 into 4 Audio Mixer with Parametric Equaliser, Rank Cintel Flying Spot 35mm Slide Scanner, 16mm Sound Follower, twin track, Tektronix 7000 series Storage Oscilloscope, U-Matic tapes, etc. Please ring for details, I can bring anything to Harlaxton. Simon Gough. Tel: 0234 852789.

**QUAD 405 Power Amplifier,** QUAD 33 Preamplifier and Quad FM4 Tuner. All in immaculate condition and in original boxes ... £300. Also Technics SL1500 Turntable with SME 3009/II and Ortofon Cartridge ... £150. Ian Shepherd G4EVK. Tel: 0949 61267.

**"405 ALIVE" MAGAZINE,** now in its third successful year, covering 405-line technology and programming from the 30s to the 80s. Subscribers find it irresistible! Four 64-page issues for £10 or have a sample copy for £2.50 post paid. Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH.

**NEW DRSI Packet Radio** (dual-port 1200/RS232 or TTL serial) PC card with G8BPQ/AA4RE software ... £110. Altron 32 foot 2-section mast/head unit base plate mount, excellent condition ... £275. Can deliver reasonable distance at cost. Paul G4XHF. Tel: 0293 515201 evenings preferred.

**TWO IKEGAMI VF302** B&W viewfinder cameras including C-mount lens ... £25 each. Steve Catlin G8HLM. Tel: 0604 847467.

**TEST CARD VIDEOS FOR SALE:** 55 minute video presentation made for the BATC "The Development of the TV Test Card". Andrew Emmerson interviews George Hersee, designer of Test Card F. Lots of old test cards included. And also ... "Exotic TV Idents", which covers East Germany, USSR, Poland, Czechoslovakia, Estonia and Romania and other exotic locations such as Mongolia, Libya, Algeria, New York, "BBC London". Plus many west European countries, as well as satellite channels. In all there are over 80 test cards, station idents, news programmes and start-of-day recordings, lasting 49 minutes in all. Explanatory captions describe each segment and the recordings were made on broadcast equipment in a TV studio "somewhere in Eastern Europe". Wages there are a tenth of what we earn and the recordist desperately wants a dual-standard colour TV, so all profits on this remarkable tape will go to him. If DX-TV is your hobby here are the rare test cards in living colour, like you've never seen them before! Both tapes are VHS/PAL and cost £9.99 including postage. Please allow 14 days for delivery. Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604-844130.

**AT LAST** - an affordable telecine service! If you want 16mm films (only 16mm) transferred to VHS but cannot afford the customary £25 an hour charges, how does £15 per item sound? VAT, tape and postage extra, but you can collect/deliver and supply your own tape to save money if you prefer. Quantity prices are negotiable, too. Equipment has 430 lines resolution (better than S-VHS!) and handles optical and magnetic sound. Ring or send SAE for details. Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604-844130.

**DRESSLER EVV70 0GaAsFET** masthead 70cm pre-amp and interface. Bought second-hand and never used (by me), nice piece of kit ... £70. Illuminated diascope for I.O. camera, new condition, with power supply for lamp. Slides onto lens, takes two 2" x 2" slides ... £50 or swap. High voltage capacitors, ideal for your linear! Four 220uF at 400V with clips, new ... £6. Two 1000uF at 400V, ex recent equip ... £4 pair. Postage £1.50 extra. Video Circuits Ltd 625 line sync pulse generator and pattern generator. Valve, quite big, beautifully made, about the size of a grocery box. Circa mid 60s, with orig. handbook.

Produces Line Drive, Field Drive, Mixed Blanking, Mixed Syncs, plus the usual crosshatch, greyscale etc ... £10. All above not tested but probably working - you sort them out. All items cheaper if collected! Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604-844130.

# EXCHANGE & WANTED

**WANTED: SOLENT MINI TX 24CM** (20mW) plus information on modifying Satellite receivers for 24CM ATV use, particularly the Amstrad range. Andy Dunham G6OHM. Tel: 03543 3791 After 2pm only please.

**WANTED: COPIES** of manuals for VTRs, IVC826P or similar. Sony AV3620, Rank Nivico KU820. All costs refunded. Martin Loach G8UDJ. Tel: 0865 735821.

**WANTED: AKAI 1/4" VTR,** any model or condition considered. Also require 405-line SPG. Martin Loach G8UDJ. Tel: 0865 735821.

**WANTED: PRECISION PHASE POT.** for TEK 526 Vectorscope, and 10k wire wound pot. for Avo 160 valve tester. Mike G8CTJ. Tel: 0455 250570

**WANTED: CIRCUIT** diagram and/or layout of power board in Robot 300 SSTV converter. All costs refunded. G.Tew G8GZC, Beech House, Pretty Oak, Chard, Somerset, TA20 3PT. Tel: 0460 64376.

**WANTED:** Dallmeyer Lenses for Marconi Mk1 Image Orthicon camera. These lenses date from the early 50's are black in colour with an iris control ring ( hand operated ). The mounting is a large screw thread 2.25" diameter. The lens are required to complete the appearance of the camera which is believed to be the best surviving example. Please check your loft/junk boxes etc. B.Summers G8GQS QTHR 081 998 4739 Answerphone.

**WANTED:** Does anyone have copies of ITA "play lists" (covering orchestras, titles, LP numbers, etc., etc.) for music used with their test card transmissions? The lists covering January-June 1958, July-December 1958, January-June 1959 and July-December 1959 are of particular interest. Also, does anyone have copies of "BBC Music Reporting Forms" for Trade Test Transmissions from 1960 to 1983. If you can help please telephone Keith Hamer on 0332 513399 after 1700.

**WANTED:** Spares and accessories for Philips LDK 44 cameras. TFS ROM for Acorn BBC "B" Teletext Adaptor. Steve Catlin G8HLM. Tel: 0604 847467.

**WANTED, CAN ANYONE HELP?:** Workshop manual/circuit diagram, etc., for Viewfinder TV Camera VF302. Original or photocopy. F.Northwood, 3 Kempton Close, Spalding, Lincolnshire. Tel: 0406 330596.

**WANTED:** buy/borrow/swap old TV programmes on 16mm film. I'm gradually building up an interesting archive! Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604-844130.

**HELP WANTED!** I am putting the final touches to a demonstration set-up of Sony's first home video system, circa 1966. Yes, it's a high definition 405 line system, in glorious black and white and uses the latest reel-to-reel technology! I'd be very pleased to hear from anyone who can lend or donate original sales literature, carrying case for camera, two-camera switcher, also the little accessories such as oil, cleaning tools, splicing tape, microphone etc. A thousand blessings on you if you can help. Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604 844130.

**WANTED:** A Spectrum Centronics printer or interface, or the software to go with the early Kempston one I will be very pleased to have it to list out the control programs for GB3TG. Dave McQUE, 6 Laburnam Grove, Bletchley, Milton Keynes, MK2 2JW. Tel: 0908 378277. G4NJU @ GB7BEN.

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

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**Camtech VIDEO-IF board.....**

Camtechs VIDEO-IF board is a complete video IF amplifier and FM demodulator system designed for the amateur TV market, with specifications comparable to a professional system. The VIDEO-IF board also has an audio sub carrier demodulator and AF amplifier, all on a single Euro card size PCB.

The circuits employ some novel techniques and established circuit ideas, which together with todays state of the art semiconductor devices, puts this product at the top of its class.

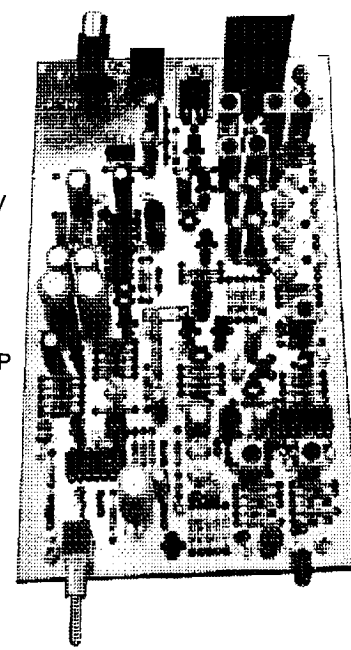
The VIDEO-IF board is available as a kit or built and tested assembly. The kit however is not suitable for the inexperienced, as there are over 180 components! A comprehensive technical description is supplied with each kit, together with detailed assembly instructions, test procedure and circuit diagram. Test equipment requirements are as follows:

1) Oscilloscope, 2) Multimeter, 3) 30 to 50 MHz signal source.

Details of a simple FET Colpits oscillator signal source are enclosed with each kit. This can be tuned to the required frequency by listening to the harmonics on a domestic VHF FM radio.

## SPECIFICATION:

| | | |
|---|---|---|
| 1 | IF INPUT IMPEDANCE | 50 OHMS |
| 2 | IF INPUT FREQ | 40 MHZ |
| 3 | IF 3DB BANDWIDTH | 16 MHZ |
| 4 | IF SENSITIVITY | 50 uV PD |
| 5 | IF AGC DYNAMIC RANGE | 60 dB |
| 6 | AFC OUTPUT (IF +/-7MHZ) | 2V +/-0.5V |
| 7 | VIDEO 3dB BANDWIDTH | 12 MHZ |
| 8 | VIDEO S/N RATIO | 70 dB |
| 9 | VIDEO OUTPUT LEVEL | 1V PK/PK |
| 10 | VIDEO OUTPUT IMPEDANCE | 75 OHMS |
| 11 | AUDIO SUB CARRIER RECEIVER | 6 MHZ |
| 12 | AUDIO OUTPUT INTO 8 OHM SPEAKER | 1 WATT |
| 13 | AUDIO S/N RATIO | 60 dB TYP |
| 14 | AUDIO DISTORTION | <5% |
| 15 | POWER SUPPLY REQUIREMENT | 12V DC (0.5A) |



**FEATURES:**

6 MHZ AUDIO SUBCARRIER DEMODULATOR

VIDEO SIGNAL INVERT SWITCH

STANDARD CCIR VIDEO DE-EMPHASIS

AUTOMATIC FREQUENCY CONTROL OUTPUT FOR TUNER

EURO CARD SIZE PCB 160 X 100 MM

KIT..... £79.95 EXC VAT
BUILT AND TESTED ASSEMBLY..... £99.95 EXC VAT
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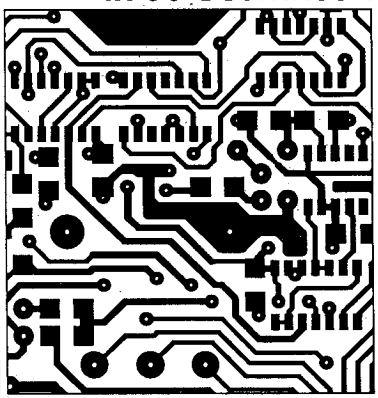

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- Not copy protected.

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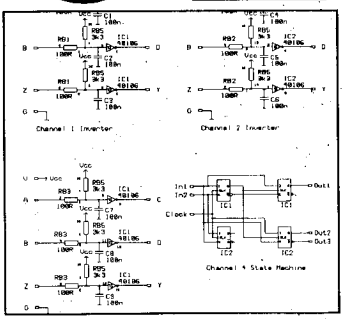

**Standard Library includes over 400 Symbols. Additional Libraries available.**

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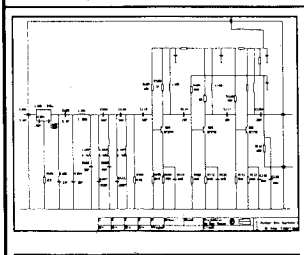

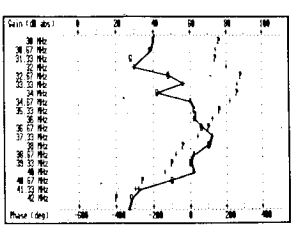

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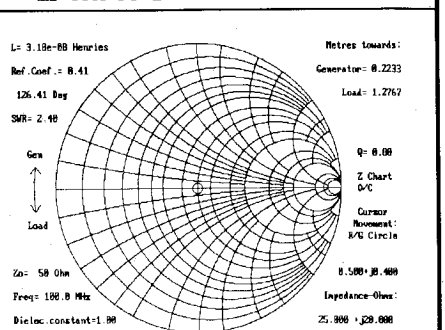


**Z-MATCH II** takes the drudgery out of RF matching problems and includes many more features than the standard Smith Chart.

Provides solutions to matching problems using transmission line transformers, stubs, discrete components etc.etc..

Supplied with comprehensive user instructions including many worked examples.

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