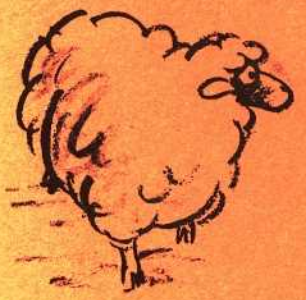
CQ-TV MAGAZINE No. 130

BRITISH AMATEUR TELEVISION CLUB

MAY 1985



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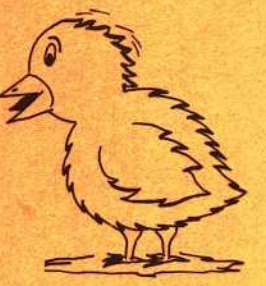

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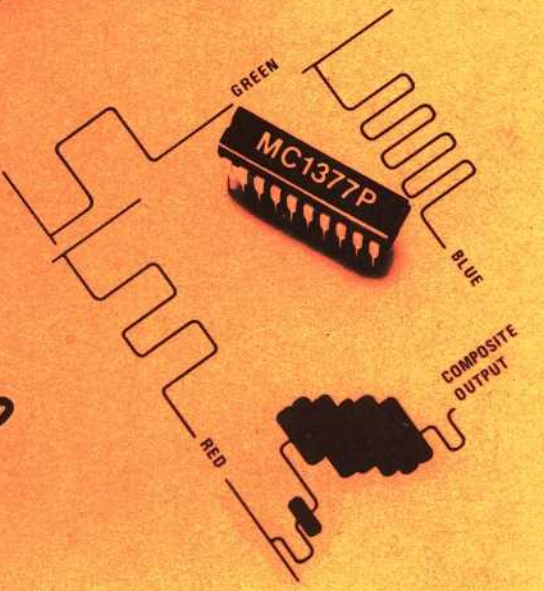

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WHO TO WRITE TO:

CQ-TV Copy and advertisements	J.L.Wood. 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel:0788 69447
Subscriptions and change of address	D.Lawton, 'Grenehurst',Pinewood Road, High Wycombe, HP12 4DD Tel:0494 28899
Membership Enquiries and applications	D.Lawton, 'Grenehurst',Pinewood Road, High Wycombe, HP12 4DD Tel:0494 28899
General Correspondence	T.Brown. 25 Gainsbro Drive, Adel, Leeds, LS16 7PF. Tel: 0532 670115

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MEMBERSHIP

FULL YEAR: £4 or £1 for each remaining quarter of the year. All subscriptions fall due on the first of January.
OVERSEAS MEMBERS are asked to send cheques bearing the name of the bankers London agent. Postage stamps are not acceptable as payment.

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The British Amateur Television Club is affiliated to the Radio Society of Great Britain.

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80 PAGES!

CLOSE FOR PRESS DATE FOR THE AUGUST ISSUE.....20th June 1985

EDITORS POSTBAG

Dear Ed,

I just wanted to send in my renewal and state what a fine publication you have. The quality level as to printing, editing, journalistic skills, and most importantly ATV skills is first rate.
I certainly hope you will have some programs for the Commodore-64 in ATV graphics like the program for the BBC micro in the November issue.*
Please keep up the good work.

John A Jaminet W3HMS-ATV
Pennsylvania, USA.

**Your wish is my command. See 'Software Notebook' in this issue.*
ED.

Dear Ed,

Several months ago I bought a copy of the 'Amateur Television Handbook' from a shop in Leeds. I read it from cover to cover; "smashing". I then bought a second-hand 2/3" Vidicon tube and a set of scan coils and built the mono TV camera described in the book, this works great.
My attention is now turned to amateur TV reception, and as described in the Handbook, I converted a domestic UHF tuner to the 70cm amateur band and I now require an aerial and pre-amp.
I would like to progress further into the field of amateur TV reception and would like if possible to join the BATC and gain the benefit of your experience and knowledge.

Peter Wakefield,
Ponteract, Yorks.

Dear Ed,

Attached is my subscription renewel to the BATC.
Your publication "CQ-TV" is the best I have seen, far better than "A5" which is produced here in the United States; there is absolutely no comparison between the two. As the years go by there has been constant improvement of content and quality and I hope without qualification for your continued success.

George Russell W2SJU
Florida, USA.

Dear Ed,

I'd like to thank G4ENA for his work on the SSTV converter published in the last issue. I think it will encourage more people onto the SSTV frequencies.
I do however think that the BATC might consider re-designing the boards so that all of the mod's can be incorporated onto standard boards, this will mean that the F-to-V converter from G4ENA would also incorporate G3WCY's sync pulse circuits, as a lot of the circuit on the original analogue board is redundant.
Another feature I would like to see is a modification to the G4ENA Transmit Converter (CQ-TV 129) for people who only require a monochrome system. This would simplify the set-up for those with only one memory board.
Finally I should like to mention that we have started a SSTV net involving G4DFU (Notts), G4JCH, G4VCW, myself G6ACL (Leics) and others from Derby and Chesterfield. Anybody who is interested may either contact me or join us on 144.50MHz Monday evenings at 8:30.

A.C.Lewis G6ACL
45 Woodlands Drive, Loughborough,
Leicestershire.

Dear Ed,

I note that whereas on page 28 of CQ-TV128 it was decreed that QRA locators should be used for the 1985 winter cumulatives, page 6 of CQ-TV129 now decrees that Maidenhead locators must be used. May we have clarification on this point? [*see News pages - Ed*]. In any event, to so decree in a publication such as CQ-TV 129 is a little late in the day for the 1985 cumulatives.
May I also complain bitterly about the Summerfun contest rules being given to an overall winner this year. You, G3VZV sir, have spoilt what little pleasure I look forward to each year with the G8DIR stable. I think the rules should have remained the same, but with the extra provision of an overall winner being added. We can't all afford to get on these bands yet.

Yours in perplexity,
D.B.Hall G8VZT

Dear Ed,

SSTV activity in the BATC Winter Cumulative contest was very poor. Having gone to the trouble of getting 2m gear for the occasion, I found the only stations on were the ones that I told of the event.
There is now an SSTV net each monday (2100 local) around 1.960MHz. I hope to establish regular SSTV operation on 160m; 80m being impossible at weekends.
I hope to demonstrate my 'WCY/'ENA colour SSTV system at Crick in May and look forward to other members bringing along their SSTV gear as well.
It was interesting to hear that the Shuttle will be transmitting colour SSTV this year. I hope that they will use 21-second colour, otherwise it will only be for the select few who can afford a fortune for the commercial gear; (the RSGB are going to borrow one!).

Peter Asquith, G4ENA.

Dear Ed,

Thank you for the membership application form herewith completed and returned.
Does anyone know of a hybrid power IC (similar to the MHW710), which will work on 579.25MHz; or details of any other such PA that will deliver around 10 Watts? The unit is needed for our TV repeater down-link. The up-link uses a MHW710 very successfully on 427.26MHz.
I made my first tele-cast last weekend, the first in Western Australia, and had a coverage of 30-miles with good, snow free colour pictures on 427.26MHz.
I look forward to a long and fruitful relationship with the BATC and will keep you informed of our progress here.

Pat Haywood VK6PH.
9 Baudin Way,
Singleton,
Western Australia 6211.

Dear Ed,

Help! I have a parculiar fault on an SSTV pattern generator: When I rub the 4051 with my finger the signal appears on the scope as a clean output, until that time it is distorted with random noise. When "clean" it seems to be OK but will not sync with either of my two monitors (they have been set up with the Grant Dixon unit), although I can clearly see the 1200/1500/2300 patterns.
The pattern appears on my SSTV (chequer/grey-scale) but is not locked, although the 8 shades and the chequer can be seen as a distorted picture.
Anyone had a similar problem or has any advice please?

Tom Telfer GM8JFE,
'Deanview',
Wilton Dean,
Hawick, Roxburghshire.

Dear Ed,

Sometimes I feel I am fighting a losing battle! You were kind enough to publish in CQ-TV 123 my letter pointing out that the pixels of the BBC Microcomputer are not square, and that you must be careful to compensate for this when attempting to plot a circle. Unfortunatly this does not seem to have sunk in, as in number 129 there is another test-card program (this time by G8KZG) which produces an ellipse with which to adjust your monitor aspect ratio! At the risk of boring your readers once again, can I reiterate that the BBC Micro's graphics units are rectangles whose height-to-width ratio is about 1.084 (13:12) when displayed on a properly adjusted picture monitor. When plotting a circle, this should be compensated by making the height of the circle 12/13 of the width, expressed in graphics units. Unfortunately, Peter Delaney's program does not lend itself to a simple alteration because of the technique he has used for plotting the circle; I would therefore caution against the use of the test-card part of his program.

Richard Russell, G4BAU.

Dear Ed,

G4ENA is to be congratulated on his 'SSTV Transmit Converter' for the G3WCY slow/fast unit. The advent of computer derived SSTV monitors such as the G3LIV and Scarab systems still leaves the need for a newly designed, self-contained fast/slow converter incorporating some of the new formats.
Whilst my DL2RZ designed unit has provided excellent service over many years, certain IC's are now difficult, and expensive to obtain. Maybe we can persuade some technical buff to design such a unit, as I am sure it would be welcomed by many members.
Many thanks for a most interesting and well produced magazine.

Dick Hunter G3LUI

NEWS ROUNDUP

THE ELUSIVE ZNA134 TRACED

We are often being asked where one can purchase the ZNA134J single-chip sync generator IC's. Now that it has come up again in CQ-TV129, I will attempt to stave off the flow of letters!
The following suppliers list the IC in current catalogues and advertisements:-
Hi-Tech Components, Gilray Road, Diss, Norfolk. Technomatic Ltd., 17 Burnley Road, London NW10 1ED. Cricklewood Electronics Ltd., 40 Cricklewood Broadway, London NW2 3ET.
Prices vary but most are around £23 plus VAT and postage. Please send a SAE when enquiring from any supplier.

MEMB. SECRETARY GETS HIS 'A'

Membership Secretary Dave Lawton has at last got his amateur 'A' licence. Now known as G0ANO Dave has for many years been G8ANO.
'Course he was shamed into it by his wife, who got there first!!
Congratulations Dave.

LEICESTER REPEATER

FEBRUARY 1985.
After a spell off the air for a re-build prior to a change of location, the Leicester ATV repeater has been temporarily set-up again at its old site in Glenfield. The application for a site change has passed through the RSGB and awaits official sanction.
The new site is on very high ground to the North of the city and it is hoped that good coverage will be achieved when the move is completed.

CUMULATIVE BLUNDER

The rules for this years cumulative contest said that the old QRA locators would be used for the last time in a BATC contest. Unfortunately, on page 6 of the last issue, it was stated that Maidenhead locators should be used from the first of January for all Club contests including the current cumulatives. What it should have said was: EXcluding the current cumulatives.
Sorry for any problems caused. The contest organiser will accept either locator system so no one should have missed out.

WORTHING ENTREPRENEURS

The Worthing ATV repeater group sure know how to fund their project. They have been able to pay for the repeater so far largely from the proceeds of their excellent 'ATV Program' for the Spectrum computer (see advert elsewhere).
Now I see that they are marketing a 24cm aerial kit, based on the design which appeared in CQ-TV127. The aerial has been well tried and tested and looks good value at £10.95p. See their advertisement in the 'Market Place' section at the rear of this issue for further details.

R.S. COMPONENTS SUPPLIER

C.R.Stephens Radio & Television Sales & Service, of High Street, Nutley, Uckfield, Sussex TN22 3NF (Tel: 082 571 - 2831 & 2464) has very kindly offered to order any items from the RS catalogue for club members, and to supply them at cost plus postage. Members wishing to use this facility should preferably have order code numbers from the current catalogue. Enquiries are probably better by telephone as letters take valuable time to administer.

LUTON REPEATER

Operators who have tried to set-up their gear using the ident mode from the Luton ATV repeater, and who have been frustrated by the fact that the signal lasts for only a few seconds each 15 minutes, can take heart.
At the time of writing, a new micro and software are in the final trial stages and, when installed, will put out identification transmissions more frequently. Also the new micro will include pages of other information such as: engineering, news, test patterns etc. Seems like a splendid scheme.

HOME COUNTIES REPEATER

The Home Counties TV group are anxiously awaiting the result of their application for an ATV repeater at High Wycombe in Bucks. The original idea was to site it at Harefield Hospital but, since no decision has yet been made on that, a temporary location at G4CRJ's QTH is to be used.
Aerials will be directional and will beam ESE covering the Thames Valley and South London. Mode will be FM.

PAST PRESIDENT IS NEW HEAD OF IERE

Past President of the BATC Mr.Ray Hills has recently been elected as President of the Institute of Electronic and Radio Engineers. and will take office after the AGM in October.
Mr.Hills, who was elected as Vice President last October and has previously served on the Council from 1968 to 1972 as an ordinary member and as a Vice President from 1976 to 1979, is Assistant Director of Engineering (Operations) with the IBA.
Our heartiest congratulations to Mr.Hills.

BACK ISSUES DILEMMA

You will see from the list of available back issues of CQ-TV that we are out of stock of nearly everything. Despite a steadily increasing print run, we never seem to have enough. The happy problem of course is that we have signed up so many new members recently, that they have snapped up all the back copies.
The best way to find out what was in those past magazines is to purchase an index, any particular articles may then be ordered as photo-copies.

NE564 FM DEMODULATOR - AGAIN!

Another suggestion on the construction of the BATC FM demodulator board has come from G8LES:
There seems to be a preponderance of stray signals, mainly emanating from the PLL, which can get onto the power rail and can cause nasties on the signal. The 'LES fix is to cut the track of all +12v lines wherever they go to an active component. The cut is then bridged with a stopper resistor around 39-ohms in value. Where this significantly alters the total value of a resistor in the + feed, associated resistors may need to be changed to take account of the extra 39-ohms. All the power lines should then idealy be taken to a common point somewhere around the centre of the board.
With all these mods we shall have to re-design the board soon to accommodate them all!

WATCH OUT FOR CHEAP CAMERA CABLE

2000ft of G101 broadcast camera cable has been stolen from Harefield. Some of the cable is in 200ft figure-of-8's and some is on steel drums. Members should enquire carefully if they are offered cheap cable of this type.

MOVE FOR CLUB LIBRARY

The BATC library has moved to new premises and the new address is: Paul Marshall, Fern House, Church Road, Harby, Nr. Newark, Notts. Tel: (Lincoln) 0522 703348.
Borrowers are welcome by appointment. A new library list is being prepared, copies of which will be available shortly.

HOTLINE HICCUP

Members will be aware of problems with the BATC news Hotline service. This has largely been due to equipment malfunction together with other circumstances, however the whole system is soon to be re-sited and a new recording machine is being purchased.
We apologise for the inconvenience to members but look forward to a more complete and regular service in the near future. Details will be announced in CQ-TV as soon as available.

NEW BOOK EDITOR AND A NEW BOOK

Another member has joined the team to work on the preparation of BATC publications.
Tony Marsden G6JAT has been co-opted onto the committee as Book Editor to assist Trevor Brown and the rest of the team with this important but time consuming task. New titles (working) at present under consideration are; SSTV Handbook and The Best of CQ-TV.
A new book is being published around the time you read this entitled: Micro & Television Projects. As its title suggests, this book deals largely with the logic side of TV with particular emphasis on using home computers in the station and studio. An advertisement appears elsewhere in this issue - don't miss the special introductory offer!

CQ-TV COPY

My grateful thanks to all those who are contributing to the magazine. As you can see it is having a great effect as the page count has been steadily rising (and holding) for many issues now. Please keep it coming.
If you have sent material which has not yet appeared in print, please be patient, it will be used as soon as an opportunity arises.
Don't forget that I can take text in most forms on a BBC micro. Wordwise is preferred but I can also accept View files and spooled ASCII dumps (please not as a basic file with line numbers); either on tape or disc (5.25").
The last record issue was supposed to be my biggest, but, well you know how these things grow when you're having fun? This should be the biggest yet though!

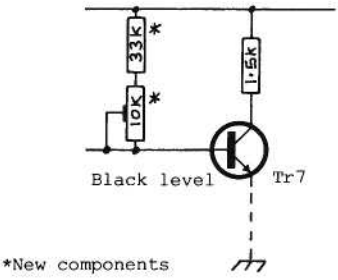
IBA 'TECHNICAL REVIEW'

The IBA publish some very informative books in the IBA "Technical Review" series. Recent titles include: No.21 - 'Compatible Higher-Definition TV and No.22 - 'Light and Colour Principles'.
The books are free and are available on receipt of an A4 size addressed envelope stamped with around 28p (per book weight) from: Engineering Information Service, IBA. Crawley Court, Winchester, Hants. SO21 2QA.

Handbook-2 Notes

A few points have been noted by Brian Dandy G4YPB concerning the mix effects amplifier described on page 38 of the original 'Amateur Television Handbook - Vol 2' and on page 42 of the revised edition:

Fig.1: The emitter load resistors (1k) on both the A and B bank input transistors (tr1 and tr10) should be returned to -12v and not to ground as shown. The correct arrangement is shown at Tr13 - Key Input. Unfortunately this mistake has been perpetuated on the printed circuit board.



Paragraph 2 of 'Circuit Description' suggests that the black level output should be at 0v. This is not so; it will in fact be at approximately +0.65v. A circuit to overcome this problem (by the original author) is shown in the figure.

Also noted: The feedback resistor in the original output amplifier is 2k, whereas the same component in the circuit on page 43 of the 'Revised Handbook - 2' is shown as 3.9k although the text still refers to the '2k' resistor.

TR9's dissipation is quite high. If only one 75-ohm output is required, its emitter load resistor may be increased to 200-ohms. This will halve the dissipation.

A 'SINGLE-CHIP' COLOUR ENCODER

By Brian Wade G8ABD
and John Wood G3YQC

CQ-TV 126 featured details of a new linear LSI circuit which combines RGB and sync signals into composite video in either NTSC or PAL formats. The RGB inputs are a.c. coupled to simplify interfacing with a variety of sources, and 1-volt peak-to-peak signals give full colour saturation. The colour burst reference is internally generated and is gated by the mixed sync input.

Since publication of the article, which was based around a Motorola data sheet, the authors have been experimenting with the device in conjunction with a BATC handbook-1 colour test card and other modules from BATC publications. The circuit presented here is the result, and where appropriate, details of alternative circuitry are also given to enable the unit to be as versatile as possible.

CIRCUIT CONSIDERATIONS

The Motorola data sheet has a fundamental circuit error: Pins 17 and 18 are reversed, making it impossible for the colour subcarrier oscillator to function. The error is not only on the sheet's circuit diagrams, but is perpetuated in the text as well.

The existing chroma bandpass filter arrangement was tried but, largely owing to the non-availability of the correct Toko inductor, was discarded and the simpler system shown was developed instead. It is possible to use the device without a chroma filter (see CQ-TV126 pp43), however, if this is done the luminance delay line circuit should also be discarded. The specified delay of 400nS was found to be too much in our prototypes, causing a small colour registration error on the screen. The value in fact required is around 200nS. We suspect that 400nS was chosen since standard TV luminance delay lines are available with that value. In our tests a standard KT3 delay line was used. Since 200nS delays are probably not generally available, the alternatives could be: (a) To try removing turns from the KT3 line or (b) use high impedance delay cable, neither of which have yet been tried.

Fig.2 KT3 LUMINANCE DELAY LINE

The circuit in Fig.1 requires a standard TTL mixed sync signal into pin 2, however, if a non-TTL signal is to be used, a suitable interface circuit is shown (inset). As you can see the input is now biassed by the 27k pull-up resistor and the negative-going sync pulses are a.c. coupled.

Although Motorola's specification calls for 1.0v p-p RGB input signals, in practice it was found that, although this was so for the Red and Blue inputs, the Green required only around 0.85v, this is the reason for the extra 270-ohm resistor at its input. This peculiarity was found in all three IC's so far tried.

The MC1377 has a composite output level of 2v p-p which is elevated above ground. In order to provide a standard 1v p-p signal into 75-ohms an emitter follower stage is provided; this also serves as a buffer to protect the IC from unwanted signals on its output pin.

Driving the coder from a TTL-generated source (rather a severe test), showed a certain amount of colour patterning on vertical edges (eg. crosshatch, callsign insert etc). This was reduced by the inclusion of a series 4.43MHz trap from pin 8 to ground (shown dotted in Fig.1).

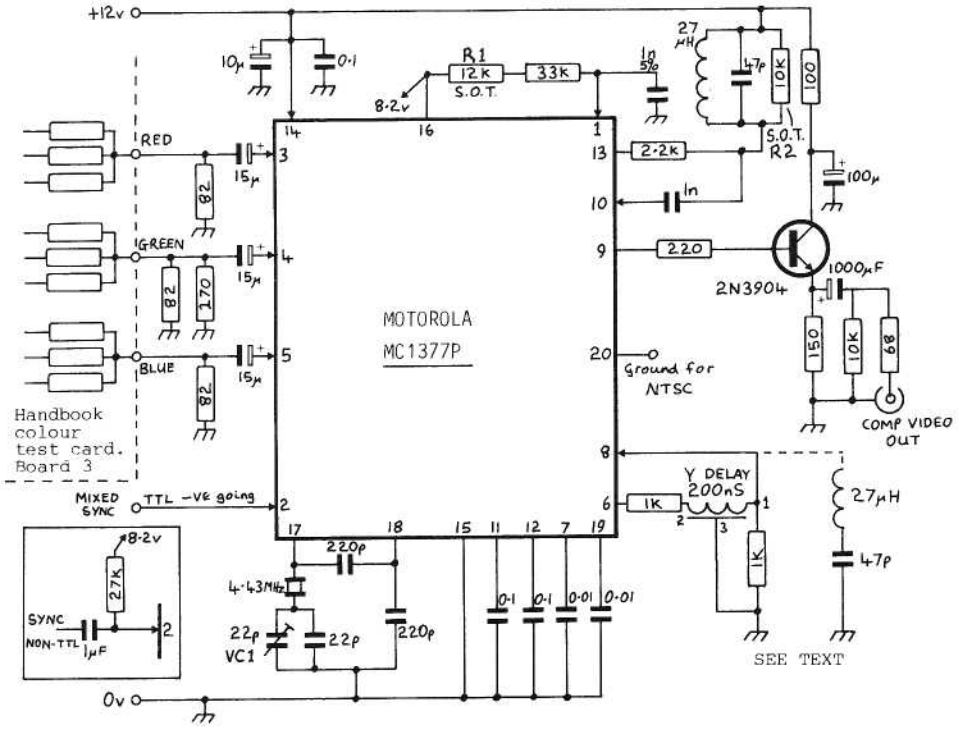


Fig.1 SINGLE CHIP COLOUR ENCODER

CONSTRUCTION

The layout seems to be fairly non-critical and fabrication of the circuit on Vero or stripboard should be quite suitable. Of course a printed circuit board is best and, in fact, one of our members has produced such a board.[3] This unit also includes a ZNA134 single-chip sync pulse generator, but that may be left off if it is not required. Those who do need the SPG as well may purchase the 2.5625MHz crystal from the same source. The board is not designed to plug directly into a BATC standard card rack.

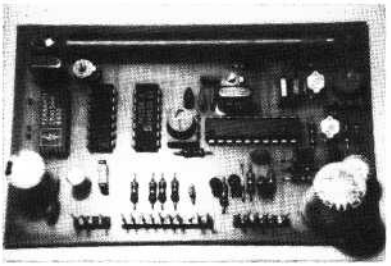
The IC itself is in a 20-pin DIL package and Fig.2 shows the connections for a KT3 delay line.

ADJUSTMENTS

The circuit requires virtually no alignment to get it going, however small adjustments to the following may be performed if necessary:

After allowing a 5-minute warm-up period connect a frequency counter to pin 17 and adjust VC1 for 4.433619MHz (3.579545MHz for NTSC).

For those with access to an oscilloscope, the burst position can be adjusted with R1 and, similarly, the chroma level trimmed by altering R2.



Silverstone Electronics circuit board, measuring 102 x 65mm it also contains a ZNA134 sync generator. Note the miniature crystals.

If, after setting up the coder, an overall colour hue or tint is present (particularly noticable in white and grey areas), the level of the offending R G or B input should be reduced slightly until the hue has gone.

NTSC APPLICATIONS

Those wishing to use the circuit for NTSC standard should note the following:

1) Pin 20 should be connected to ground.
2) The subcarrier crystal frequency should be 3.58MHz.
3) Capacitor values in the chrominance bandpass filter (pin 13) and subcarrier trap (pin 8) will need to be increased for the new frequency.

RESULTS AND OBSERVATIONS

The results from such a relatively simple device were very good and are certainly adequate for all but the most discerning user. There are, however, one or two points which should be mentioned.

1) Subcarrier suppression is poor.

2) Line-to-line twitter on colour bars is very noticeable. An attempt was made to reduce this by phase adjustment at pin 19, but no real improvement could be effected.

3) There is some colour patterning in non-colour parts of the picture.

4) A small registration error is present caused by having to use a 400nS delay line.

If one were to compare this unit with the coder described in BATC Handbook-1, it must be said that the latter is a little better in performance. The main reason for this is that adjustments are provided in order that the various circuit functions may be optimised. Having said that, this little circuit offers a very simple yet practical coder which may be fitted almost anywhere or, as mentioned previously, combined on a single printed circuit board

together with a single-chip master sync pulse generator, and used in the BATC card rack system.

At the time of going to press only two sources for the IC were known to the authors, although it is understood that there are others:

The price is very reasonable at around £3.82p each (plus VAT plus postage). Standard colour TV subcarrier oscillator crystals may be used.

REFERENCES

1. KT3 luminance delay lines and PAL subcarrier crystals are available from: Sendz Components, 63, Bishopsteignton, Shoeburyness, Essex SS3 8AF.

2. The MC1377P is available from: Merlin Electronics, Granada House, Gabriells Hill, Maidstone, Kent ME15 6JP. Tel: 0622 678888. Or: Gothic Crellon Ltd., 380 Bath Road, Slough, Bucks SL1 6JE. (and other branches).

3. A printed circuit board (as illustrated) together with the two crystals is available as a package, price £10 inclusive from: Silverstone Electronics Ltd., High Street, Whittlebury, Towcester, Northants.

PLEASE INCLUDE A SAE WITH ALL ENQUIRIES.

THE GOOD OLD DAYS

Part-2

Following on from part 1 in the last issue, here is the rest of the letter which Mr.D.C.Birkinshaw wrote to Chris Long, in 1972, in answer to to a series of questions posed on the subject of 30-line TV transmissions.

This item is reproduced from Vol.10 No.3 of the NBTV journal and thanks go to Doug Pitt for permission to use the material.

QUESTIONS AND ANSWERS ON THIRTY LINE T.V.

Q. Were any mobile disc cameras available to you?

A. I do not recollect any mobile scanning disc camera. The only other scanning device we had in the control room was a small fixed disc scanner for scanning captions.

Q. The grey scale reproduced by a neon lamp has a discontinuity near its striking voltage. What can be done about this?

A. RECEIVER NEON. This is true, but there was little we could do about it except to give up this system of reception as soon as possible, and go over to lamp/Kerr cell/Mirror drum.

Q. What value of gamma should we settle on for the radiated signal?

A. GAMMA. This is a difficult one, but first I must record my mild astonishment that you are proposing to bother about the gamma at all! This is, of course, a good idea, but I should have thought you would have got some other problems out of the way first. The problem arises because it will be possible to receive on cathode ray tubes, which was not the case in our day. I think you had better choose 0.5 and so favour the electronic receivers. The mechanically received pictures always had an appearance which one would nowadays associate with high overall gamma, so that they are unlikely to suffer. You also gain on signal-to-noise.

Q. In the light of your experience with the 30 line system, what improvements would you suggest for a modern version?

A. IMPROVEMENTS. Some have already come up in the answers to your questions. To my mind, the most outstanding need is to get the picture repetition frequency up, if possible to 25 Hertz. Equal in importance is to receive on a cathode ray tube. Third comes a revision of standards. In proposing this, I am without information on what your working conditions, i.e. your limitations are. In 1932, all standards were chosen to make the most of 13Kcs, as they were then known. You will probably want to get rid of the original aspect ratio of 3:7 (width.height) and substitute something more conventional, such as 4:3. (Incidentally, this will not affect the equaliser; this depends only on the first zero frequency, the highest frequency to be accommodated, and the shape of the aperture).

In short, given cathode ray tube reception, a modern field frequency and a modern aspect ratio, there could be quite a lot in low definition television. You could also experiment with separate sync. generation, perhaps accompanied by a modern picture/sync. ratio of 7:3.

I think that perhaps I have contributed as much as is possible in this answer to your questions. I have not consulted my colleagues, as I know that in answering you as I have done, I could speak for us all, and I know they would agree with what I have said.

PS. We had no multiplier photocells in 1932. If you can get these they will be a great help in signal/noise ratio.

D.C.Birkinshaw.

CIRCUIT NOTEBOOK

No.42

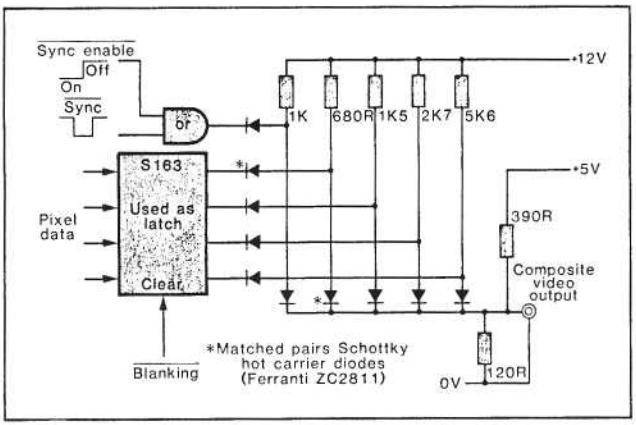
by John Lawrence GW3JGA

With so much digital circuitry in use these days for captions, field stores, scan converters etc a digital to analogue converter capable of operating at video rates is becoming a vital circuit for linking into the analogue video system.

This circuit, by D.J.Fivian appeared in "Design Ideas" in Electronic Product Design, November 1983 and permission to publish this is gratefully acknowledged.

The circuit was designed to give a composite video signal from a 4-bit TTL signal (running at 14 MHz) plus a composite sync signal. The circuit uses preferred resistor values and the 74S163 is used as a synchronous latch to re-synchronise the incoming pixel data. High speed 'hot carrier' diodes are used to switch currents from the top resistors through either the output stage of the latch or the load to 0v. The output d.c. level is positively biased from the +5v rail to ensure reliable diode switching.

The measured full scale settling time is approximately 9uS and the output voltages are 0.43 (sync tip to black) and 1.00 (black to white). This gives a pk-pk composite video voltage of 1.43 which is well within 1v +/-6dB, although intentionally higher than the nominal 1v, to allow long cables to be driven. The ratio of the sync voltage to the total voltages is the recommended 30%. Where the circuit really scores is its small size and its peak power consumption of 1/2 watt.



CHEERING UP THE PYE LYNX

By Steve Cowie G8KUX

The Pye Lynx camera has been popular with ATV'ers for a long time and, no doubt, will be for some time to come. I bought mine from a chap who lived 100 metres from Capital Radio's MF transmitter and he couldn't use it due to breakthrough in the video amplifier.

Upon switch-on the picture was squashed, out of focus and extremely spotty. Since then I have tried various ways to improve the picture quality, the results of which are detailed below:

POWER SUPPLY BOARD

REMEMBER, the low voltage supply is negative with respect to earth!

The selenium rectifier was replaced with a standard sub-miniature bridge rectifier, the mains lock connections being disabled since the internal field oscillator was found to be sufficiently stable without. However, a field mains lock from the ac heater supply could be used if required, as could external locking to a station sync source.

V36 (NKT223) may be replaced by a BC303 or BC143. An equivalent for V35 (NKT301) could not be located so a BD132 was substituted instead. V37 should be replaced by a 13v zener diode in order to compensate for the silicon potential. A 7912 1A 3-terminal voltage regulator could replace the above network but has not been tried yet. Germanium diodes V34 and V37 were changed for 1N4001.

Connected to pin 15 of the PSU board is a 22nF capacitor which controls the blanking period, a change to 10nF reduces the blanking interval to a sensible value. The OC204 can be substituted by a BC212L; the component connected to its base is an early germanium 4.6v zener diode.

TIMEBASE BOARD

Transistor substitutions:-

V17, 18, 21, 22 use BC212L
V19, 20, 23, 26 use BC303

VIDEO BOARD

V1 use 2N3819 (see note 1)
V2 to V7 use AF124
V4 use OC44
V8 use BFY51 or 50
V39, 40, 41 use BC303

Improving vertical definition.

Reduce the values of the two coupling capacitors (25uF) to 8uF between V1, 2 and 3. Replace the 22pF capacitor across the peaking I network with one in the range 80-100pF. Replace the 560pF capacitor in the peaking II circuit with a 750pF. Change the camera output coupling capacitor value to 100uF.

FOCUS BOARD

On the focus board, connect the bottom tag to the securing screw below it (see Fig.1). This improves the earthing which should reduce hum and improve picture stability and contrast. You should find at this point that smearing (low frequency fault) is considerably reduced and over correction is possible by adjusting peaking I and II.

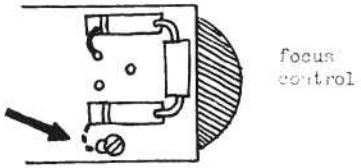


fig 1

High voltage operation was tried with a voltage tripler fed from pin 5 on the PSU board, but was discarded due to hum and distortion problems.

SUMMARY

Hopefully you should now have a good, clean, contrasty and noise-free picture (assuming no other faults) with a resolution of around 400-lines (just!), and with a frame pulse of a sensible length.

Note-1: CQ-TV 87 - Circuit notebook No.18.

Annual NBTV Convention

The NBTVA was founded (as a formal organisation) in April 1975 so this years meeting, on Saturday 27th April, marks the association's first decade.

The meeting, which starts with an exhibition as usual, will be held in a larger room than formerly and on the ground floor near the main entrance of the Trent Polytechnic college.

To reach Clifton College from the M1, follow the A453 from Junction 24. The college is on the left of the road just after a "Clifton Village" sign, about a mile before the Clifton Bridge.

All BATC members are welcome; doors open 10.am.

G4ENA SSTV TRANSMITTER AUXILIARY BOARD

By Peter Asquith G4ENA

This article follows on from the G4ENA SSTV TRANSMIT CONVERTER described in the last issue. Included on this auxiliary board are three separate circuits to extend the facilities already offered by the transmit board. They are:-

1) Cursor.
2) Colour picture snatch.
3) Three video buffers and sync combiner.

1) CURSOR (IC1)

A 4-bit magnitude comparator compares the binary value of the fast-scan and slow-scan counters (IC's 28 and 30) and, when both are equal, the A = B output (pin-6) pulses high. This pulse appears as a bright strip and moves down the screen as the SSTV picture is transmitted. Tr2, controlled by TX/RX, clamps the pulse when receiving as tuning is difficult when it is present. (A cursor is unnecessary on receive). Pin C1 connects to any one input of the video buffers.

2) COLOUR PICTURE SNATCH

This facility allows the separate R,G and B frames of a colour picture to be loaded into memory during the SSTV frame pulse. This frame pulse has to be extended to at least 80mS to ensure three complete frames can be sampled. IC2(b) controls this.

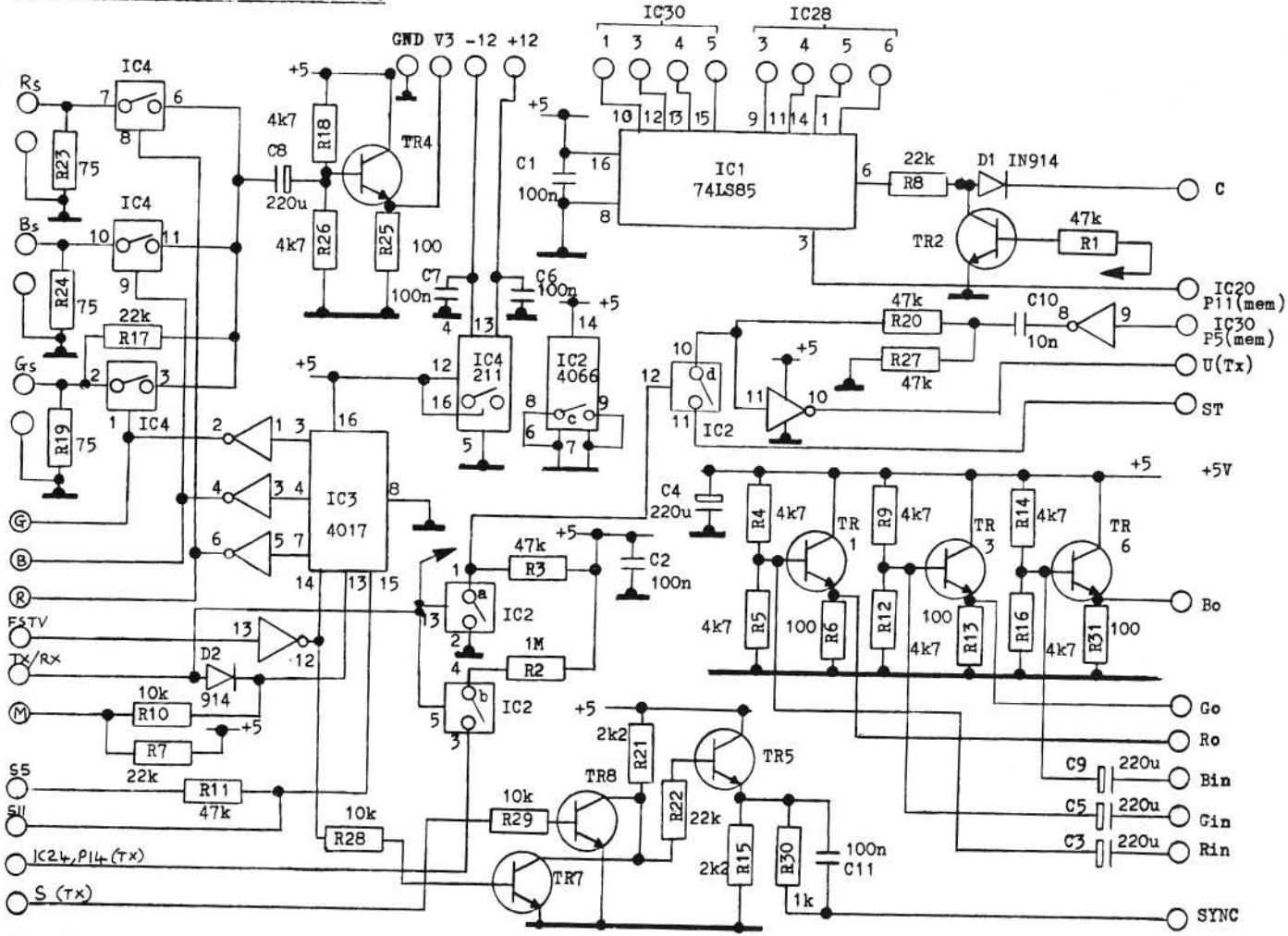
When IC3 is enabled it closes the R,G and B video switches in turn (IC4) and, at the same time, writes the respective video information into memory by electronically operating the write/hold switches (S6 - S8).

S11 is a three-position switch (DPDT, ON-OFF-momentary ON). With S11 in the OFF (centre) position, S5 controls CONTinuous and SNATCH sampling of the fast-scan colour video. CONT allows setting of the contrast and brilliance controls, and SNATCH takes a new picture after the transmission of the existing one in memory.

S11 up-locks the colour picture in memory and SNATCH (step RX) instantly resets the frame, loads the next picture and commences transmission. This is the momentary switch position. Colour snatch is only possible when S9 is set to L.S.C. R17 provides a high impedance DC path to ensure that C8 is correctly charged before RGB sampling takes place.

No extra holes need be drilled in the front panel as the additional switching is achieved by increasing the poles of S5 and S11.

G4ENA COLOUR SNATCH & CURSOR BOARD.

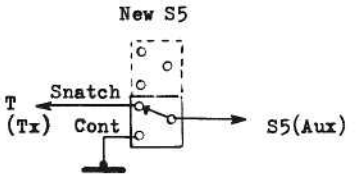


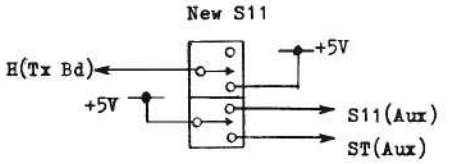
3) VIDEO BUFFERS AND SYNC COMBINER

It will be necessary to drive a colour monitor from the RGB memory outputs. Three buffers, the same as on the memory board, can be used for this purpose. Also mixed syncs are available from TR5.

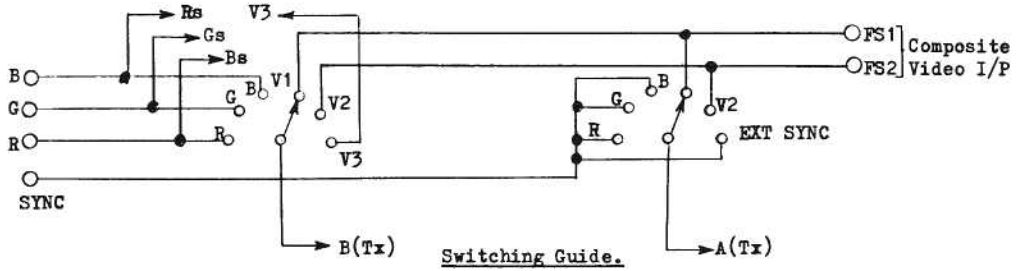
The switching of video signals will vary according to individual requirements but an example is given below for guidance. It caters for two B/W cameras and one RGB source.

Switching.





Centre bias. LOCK up, SNATCH dwn.



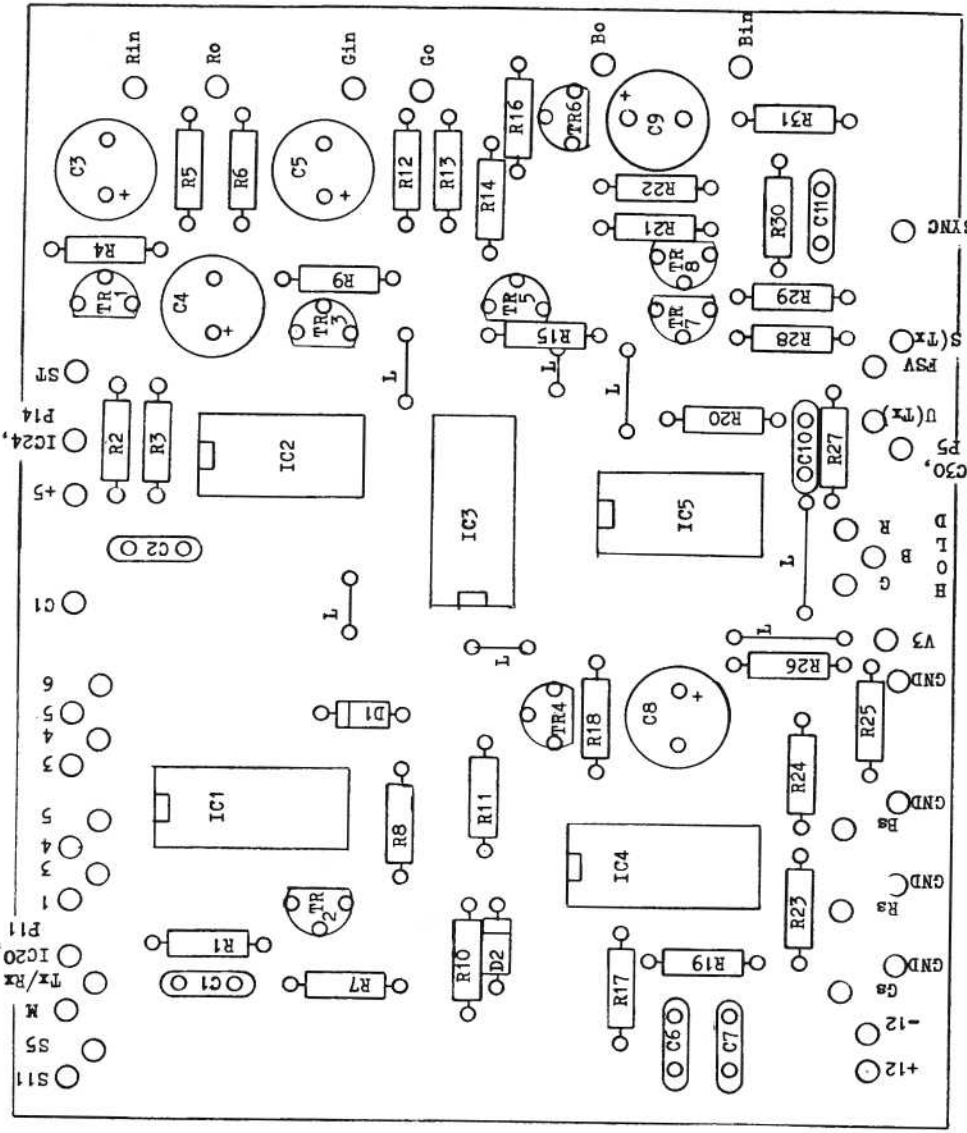
Switching Guide.

PARTS LIST.

Resistors. 5%		Capacitors.		Switches.	
R1,3,11,20,27	47k	C1,2,6,7	100n Z5U	S5	DPDT ON-ON
R2	1M	C3,4,5,8,9	220u 16V Al	S11	DPDT ON-OFF-MOM ON.
R4,5,9,12,14,16,18,26	4k7	C10	10n Ce		
R6,13,25,31	100	Semiconductors.			
R7,8,17,22	22k	D1,2	1N914		
R10,28,29	10k	TR1,2,3,4,5,6,7,8	BC108,BC182etc.		
R15,21	2k2	IC1	74LS85		
R19,23,24	75	IC2	4066B		
R30	1k	IC3	4017B		
		IC4	DG211CJ		
		IC5	4069B		

G,B,R (HOLD)
replace +5V
connections to
S6 to S8.

Fig.2 G4ENA BOARD LAYOUT



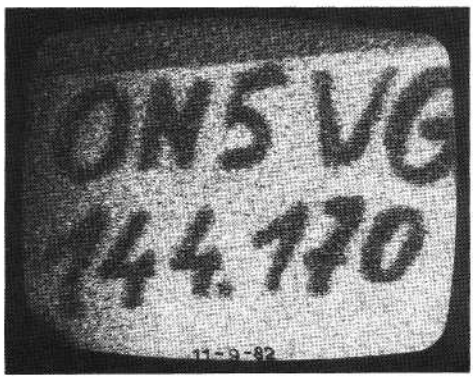
TV ON THE AIR

Andy Emmerson G8PTH

A big thank-you to all of those who sent in their letters with news of activity on the air. For once I have had a whole bunch of slow-scan letters and so you SSTVers have a bit more to read than usual. So without more ado let's dive into the correspondence. Only one 70 cm correspondent this time and this is Shaun O'Sullivan G8VPG in Bristol. Local activity is extremely keen, especially on Sunday and Wednesday evenings from 1830 onwards. Around 20 stations have both transmit and receive facilities in and aound Bristol, among them Len G8UUE, Chris G8GLQ, Roger G4ZQF, Ken G8BVK, Les G3AHB, Andy G6ZKC, Matthew G6OCV, Steve G4ZBL, Sarah his XYL G6RQP, Alan G4WGE and Ian G8XZO. Eyewigging are Viv G1IXE, Brian G4YQR, John G4YQH and Neil G8XYN.

Not far away is the Forest of Dean and several stations there also call into the Bristol net, among these Ray G1EYF in Cinderford, Ray G6TSL in Ross, Pete G8WGO in Monmouth and John G1DIV in Cinderford.

Shaun relates there is some stirring on 24 cm too, even though their repeater GB3UT is not on the air yet. Ian G8XZO and Pete G4JQP hope to have it on the air by mid 1985, however. Shaun can receive on both AM and FM, with the 6W of transmit power to a 1250 MHz Tonna being FM only. All his TV gear is home-built from Wood & Douglas kits, which he finds excellent. Others on the band are Steve G4ZBL (receive only at present), Chris G8GLQ (1.5W of tripled AM to a J-Beam corner reflector plus Fortop downconverter for receive), Roger G4ZQF (CQ Centre converter and 23 element Tonna) and Ian G8XZO (AM, equipment unknown). Shaun says he is convinced that FM is the way ahead on this band but there is a considerable body of opinion in favour of AM locally. It will be interesting, he feels, to see how the activity splits between the two modes in a year or two's time. He is also experimenting with FM-TV on 10 GHz.



News is now coming in of pockets of keen 24 cm activity springing up across the country. Signals through my local 'box', GB3TV, have also been much more plentiful with weather satellite pix, calendar illustrations (!) and a roster of club events often visible. This must be a good thing ...

Down in deepest Dorset John Fell GOAPI (ex G8MCP) has been telling me of the local group. Regular contacts are Mervyn G4BGT (in the same village of Corfe Mullen) and Nick G4WHO in Wimborne. Despite

relatively high power and good aerial arrays John and Nick have difficulty in giving each other good reports, due to an outcrop called Colehill covered with a lot of vegetation. They plan to try and overcome this with a pair of quad loops wired back to back in order to serve as a passive repeater at the obstruction. It will be most interesting to see how this arrangement performs: the technique is very popular in the USA on the higher frequency microwave bands for extending links past places where no power is available for an active relay. They are still looking for sites for the planned New Forest and Solent repeater - high spots spotted so far include Boniface and Chillerton Downs on the Isle of Wight, also Stoney Cross in the New Forest. The band still has its surprises: John has been making tests over the not unobstructed path between himself and Sid G4JU in Southampton. John was able to give Sid a P4 report for a transmitted signal of less than 10mW!

Over in Kent things are buzzing too. Andy Rudd G6MRI in Herne Bay is organising a happy band including G4AYT (Whitstable), G6GHP (Westgate) and G6XYY (Herne Bay). Ron G6GHP is the first with a transmitter but the others are building too. He is putting around 8 watts to a 20 turn helical and is getting P5/Q5 vision and sound results on slope detect at Chris G5AYT's hilltop location. Ron's transmit lineup is Fortop exciter, TRW black brick and Fortop tripler. For receive he has the BATC 70 cm IF converter feeding a dual AM/FM system. He is now contemplating the CQ-TV GaAsFET preamp and separate antennas for tx and rx: this he thinks is cheaper than masthead relay switching. It probably is and what's more it is more reliable and offers the chance of 'look-through' when you work repeaters.

Preferred equipment among the other seaboard stations is Solent Scientific, mainly because it is so economical (and functional!). Several French stations have been sighted under lift conditions and the group is looking for a repeater site, having had some help from the Crawley repeater contingent. In the meantime simplex activity is hotting up and they would welcome contact from over the water in Essex.

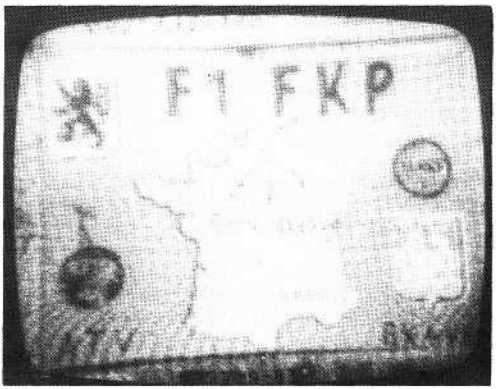
Talking of the Crawley repeater, its originator Jack G4TVC tells me he has had several enquiries about his low-cost construction plans (send SAE to Jack QTHR). There are plans to negotiate a much higher site. While on the subject of moves Mike G8LES says he is hoping to move to a 700 ft a.s.l. site in April. I shall not identify the location yet for fear of tipping off the existing resident and the planning authorities, who might not appreciate Mike's megamast and array. This should make Mike a really good signal, so here's wishing you good luck! Mike says he has found a way of broadbanding the 1250 MHz Tonna antenna, such that it now has a VSWR of no worse than 1.5:1 at

1230 and 1330 MHz. The only problem is that it's a total rebuild job, but probably most worthwhile.

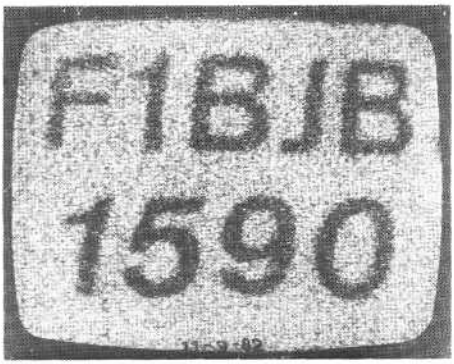
If you saw the radio controlled model helicopter at the last BATC event at Crick you must have also seen its constructor Brian Parkin G1EGD. Even if you didn't, you should have another chance this year. Brian says he has received some quite hairy video from the machine aloft and is now about to try 24cm FM as the rotors are causing interference on the 70cm signals. He is also hoping to swap notes with VK5GO who, as mentioned last time, is trying something very similar.

SSTV rules this time! Top of the pile this time is a letter from James Morecroft G8OOC, who is planning a comeback to SSTV. He is building the G3WCY converter on BATC boards and appreciated the article by G4ENA. James hopes to modify the converter for colour by using a PAL encoder similar to that in Handbook 2 and Elektor (Feb. 83) which uses the LM1886/1889 chip combination. He would be pleased to hear from anyone who has tried this scheme and can be reached on 01- 688 4061 (not QTHR). Off now to Atherton in Manchester, where Dennis Anderson G6YBC writes to say that SSTV is alive and kicking in the North West despite the QRM from a group who regard 144.500 as their local net frequency and refuse to conform to the bandplan (I wonder if they also exercise their right to drive on either side of the road as they please). Dennis and Frank G8NSE have regular skeds with G3CCH and have also worked a whole host of other stations, many of who are using Sinclair Spectrums (a real bargain now!). Dennis uses a SC77 homebrew version of the Robot 400; Frank has three of the latter and helped Dennis get things moving. Dennis closes by asking for new contacts!

Dick G3LUI is no stranger to this column and reports that new stations are calling into the 'Essex Slow Scan Net'. Among these are G4PQP (Cromer), G4RRX (Norwich), G6CZE (Northampton) and G8LWA (near Brentwood). Wednesday nights at 2030 is the time to get in on this act and 144.500 is the frequency. Jeremy G3NOX has recently acquired the latest Robot 1200C which he reports can do almost everything, though he has not yet found the tea-making button! Luckily the 8 second format has been retained, so the rest of us can still see the results, says Dick. With all the new formats such as 12.5, 16, 24, 32, 48 and even 70 second frames appearing on the market contacts on HF should prove interesting if not frustrating when conditions at last improve. Dick finishes by saying how much he enjoyed the last contest, even though conditions were flat and the contact rate slow.



Jeremy has also given me a rundown on the Robot 1200C, which has 64 grey levels and a 256 pixel line capability, also a 4:3 aspect ratio in some modes, producing near fast-scan type results. Come to think of it, many fast-scanners end mostly static test cards ... Anyway,



G2BAR in Bristol is also using one and they both work CT1AKD in Portugal who makes up the threesome. On 20 metres they are sending standard 8 second field sequential RGB colour, with good results. A new Robot system can also send chroma and luminance detail on the same line, with automatic stop/start and error correction. In this mode Robot has finally got rid of the old square format in favour of the 'normal' 4:3 ratio, and the system is capable of robust, almost broadcast quality colour stills, even to ZS6BTD in Johannesburg (a 12,000 mile round trip).

Jeremy's Robot is hitched up to a BBC micro via the RS423 port using software written by G4IJE and himself. Burts of commands sent at 4800 baud enable the user to call up special facilities in the Robot including coloured backgrounds and text overlays, also colour bars. The 72 second composite colour picture format enables the effect of noise to minimised to just a few TV lines, similar to ignition noise on 'normal' TV. Quality is like fast-scan except that there is no interlace. the next project is to write software for parallel port operation, which will open the way to image processing and dynamic noise reduction by subsituting adjacent pixels for disturbed ones. Watch this space!

I know a lot of you have BBC computers and I should like to recommend a suite of programs I bought recently. Called 'Radiocalc' it is one of the best efforts I have seen for working out resonant L/C combinations, attenuator pads and all those other things which cause grief to people with rusty brains. Priced just £2.50 on cassette you can get it from Martin Smith, 45 Stanhope Gardens, Cranbrook, Ilford, Essex, IG1 3LQ.

Any kind souls with a circuit for the Rigonda VL-100? If so please send to Alan Page G6WJJ who is QTHR in Handsworth Wood. Alan has built a skeleton horn antenna (as described in 'Radio & Electronics World' a few months back. Using 2' 6" sides and a delta match, it functions well on 70 cm.

Some late-breaking news courtesy of Ray Hill G6TSL: Mervyn the eyewig (CQ-TV 128) has passed the RAE and is now off to New Zealand to bring back some exotic video recordings. Ray also warns you that the Texas Instruments character generator chip SN74S262 (used in BATC projects) is now obsolete. The last stocks (86 of them) are at Quarndon Electronics in Derby and price is £13.20 plus VAT.
The 70 cm pictures this time are to remind you of the lifts to come this year! All four are seen regularly in the UK: they are F1FKP (Jean-Marie,Lens), F1BJB (Laurent, Amiens), ON5VG (Gilbert, Brugge) and the German repeater DB0TT. All were taken in Holland by Ryn Muntjewerff.

That's it; if you think I'm ignoring your intertests let me have some news for next time and address it to Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH. Or dictate your 60 seconds on 0604-844130 if you're too busy to write!

IN RETROSPECT....

Editor

During the time that I have edited CQ-TV, It has been suggested by a number of members that a regular column be included in which would appear further information regarding articles that have appeared in past issues. Such information could include corrections, modifications, adaptations, applications, in fact anything which may be of interest to readers.

I am grateful to GM8JFE for bringing this suggestion to my attention once again, and I look forward to hearing from anyone who has a contribution to the column. (Address on inside front cover).

AN ALTERNATIVE TO GENLOCK - CQ-TV129

The first item refers to 'An Alternative To Genlock' which appeared on page 58 of the last issue: Looking at the circuit it would appear that the input emitter follower should have a biassing resistor from its base to +12v. Unfortunately, the circuit shown is identical to that in the original American article, however, anyone building the circuit is now warned! In the same article there seems to be a bit of a mix-up with the IC pinning. On the circuit pins 2 and 3 should be reversed.

My thanks to John Goode for pointing these out.

70cm ATV TRANSMITTER - CQ-TV122 and 'TV FOR AMATEURS'

Now to repeat some information which first appeared in CQ-TV125:

Although issue 122 recognised that some members were having difficulty with the oscillator going off on the wrong frequency, and therefore included a possible modification; it seems that some builders are still having trouble.

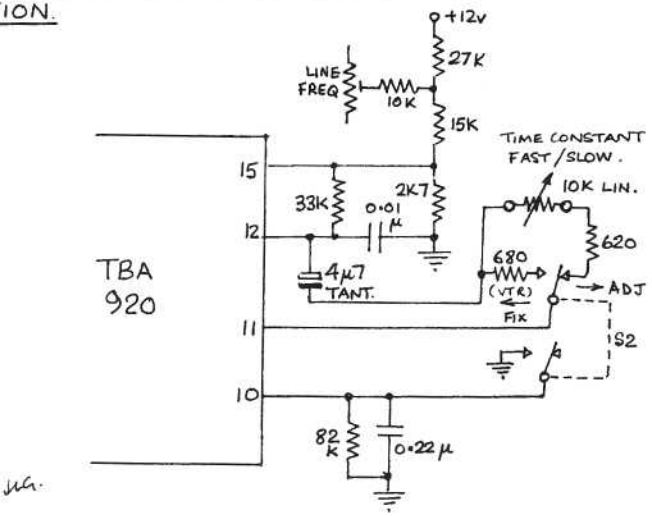
Re-wind L1 with around 10-turns on the former and connect the 5.6pF coupling capacitor to a tap 3-turns from the supply end, instead of directly to the collector of Tr1. This has fixed all problems so far - unless, of course, YOU know different!

SYNC PROCESSOR - CQ-TV129

John Goode, who has some experience with the TBA920 IC, has suggested the following modification to the circuit shown on pages 34 and 35:

The modification concerns an extension to the basic Mullard recommended arrangement that is used in our design. The circuit gives the fixed fast time constant for videotape correction, but the slow time constant can be made variable, from almost as fast as the VCR setting, to the maximum slow setting. Having this variable on the front panel might be useful when trying to "sync-up" to a different signal. The necessary alterations to the circuit are shown on the next page.

MODIFICATION FOR TIME-CONSTANT VARIATION.



A comment from G8ABD regarding the thermal drift problems associated with the TBA920, suggests the use of a better quality 0.01uF capacitor at pin 14 than the ceramic type specified. Dialectrics which have better temperature performance could include polystyrene and polyester. A certain amount of experimentation seems to be called for here.

SSTV TRANSMIT CONVERTER - CQ-TV 129

G4ENA has advised one or two amendments to the SSTV transmitter article as follows:-

1. Cut track on IC26 pin 11 to IC29 pin 13 (memory board).
2. Cut track on IC29b pin 5 to IC30 pin 13 (memory board).
3. Fig.2, VS' is n.c. Connect VS (memory board) to X (TX board).
4. Fig.5, diodes D7 and D8 are shown reversed.
5. R50 s.o.t. is around 20k.

These have been brought to light by new boards being constructed. Any further alterations will be included with the PC boards.

CQ or not CQ?

When calling CQ for TV (or any other mode) contacts, it is good operating practice to announce your location and, less importantly, your approximate beam heading as well. It is a known fact that unless the location is given, many stations will not reply since they either don't want to risk getting into a long QSO with a local or, they fail to realise just how far away a station may be. Observing this simple point should noticably increase the rate of replies to your CQ's.

Good hunting.

IN THE STUDIO

Part 3 - VISION MIXING

By John Goode.

INTRODUCTION

The meaning of the term "vision mixing" has expanded over the years to encompass virtually all methods of combining two (or more) vision sources. Originally, the term was taken to cover cutting, fading and mixing sources; however, as the technology grew, vision mixers came to include facilities for wiping (split-screen), keying, titling, colour-fill, etc. Indeed, the term "vision mixer" is not used so much now, being gradually superseded by the (transatlantic) description, "production switcher".

In addition to the expansion of facilities included in modern vision mixers, there are a whole host of special effects now available (to those with sufficiently large budgets), by courtesy of the digital frame-store. These effects are extremely commonplace in broadcast television these days, but are only possible with modern digital technology. They include image-slide ("push-off"), picture size changes (electronic zoom), posterisation, mosaic effects, image tumble, spin, etc. As these are achieved by digital manipulation of the signal, they fall outside the scope of traditional (analogue) vision mixers, and will not be considered further in this article.

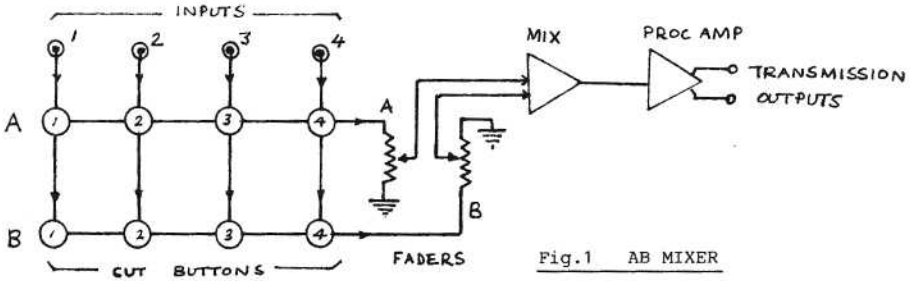


Fig.1 AB MIXER

VISION MIXER MORPHOLOGY.

The fundamental arrangement for cutting, mixing and fading signals is the so-called "AB" Vision Mixer, illustrated diagrammatically in Fig.1. The four inputs are fed to two banks of cut switches, which in turn are fed to two back-to-back faders. The faders are placed so that the positions of their operating knobs physically indicate the active bank of cut switches. Moving the faders together gives a dissolve between the two bank selections.

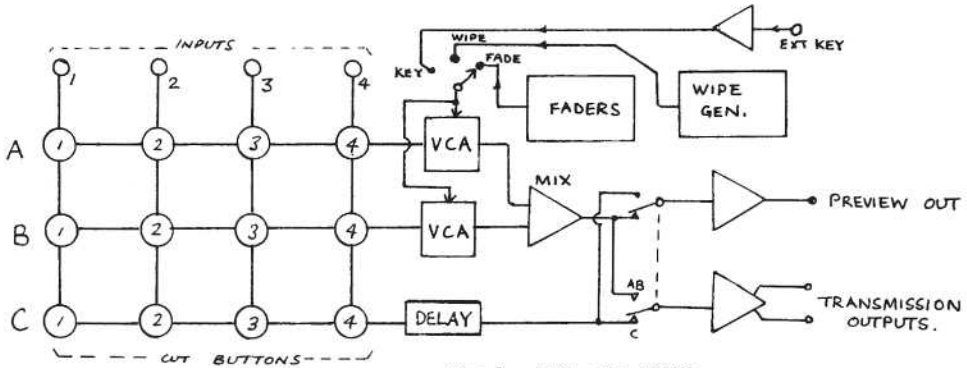


Fig.2 ABC + PV MIXER

Splitting the faders can give either a fade-to-black or a superimposition, depending upon which way they are split.

In Fig.2, this idea has been extended. An extra cut bank has been added, and the faders replaced by voltage-controlled amplifiers (VCAs). These can then be either DC controlled by faders, or, by applying appropriately generated switching waveforms, wipes or keying effects can be produced.

Two outputs are provided, preview and transmission. When simple cutting is required, bank C is selected to transmission, and then the AB banks are free to set up any special effects on preview. When AB is selected to transmission, bank C automatically becomes preview. All switching must occur in the picture vertical-interval, of course. The delay in the bank C path is to equalise chroma phase-shift with the AB path, as explained in CQTV 114, pp 18-24.

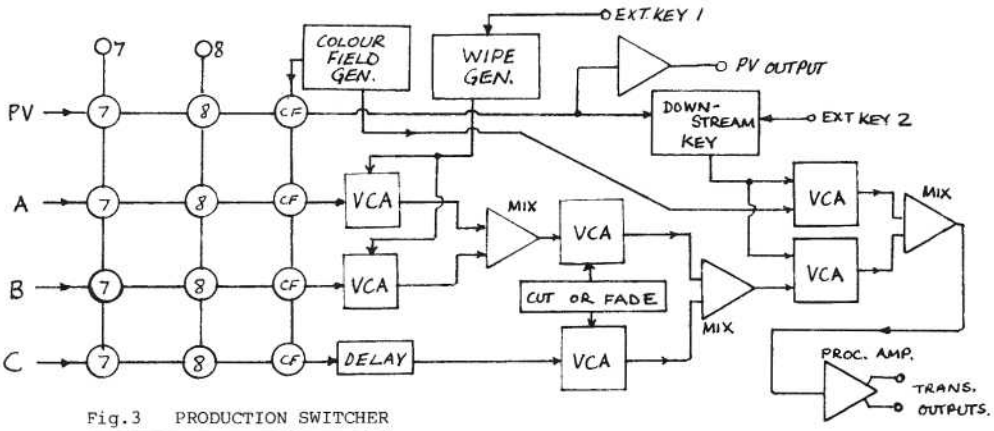


Fig.3 PRODUCTION SWITCHER

Fig.3 is a simplified diagram of an 8-input broadcast production-switcher by Central Dynamics. The input switcher has an additional button on each bank for the output of a built-in colour-field generator. This provides a raster of any colour that can be used as either a background, or as fill colour, for titles or other special effects. The wipe generator has a selection of 16 patterns, soft or hard edge, and this controls the AB VCAs. The effects can be cut or mixed with bank C.

Captions can be added with the Downstream Keyer, sourced from the Preview bank. These captions are filled by the colour field generator, and may be edged or drop-shadowed if so wished. They may be cut or mixed into the transmission output.

Obviously, many other arrangements can be imagined to provide mixers with different facilities. However, they will all be permutations of the following fundamental modules:-

(1) Cut crosspoint & vertical-interval logic;
(2) Voltage-Controlled Amp. (also known as "Effects Amp.");
(3) Processing Amplifier & Video Delay;
(4) Effects Generator;
(5) Colour Field Generator.

Let us look at each of these in turn.

CUT CROSSPOINTS & VERTICAL-INTERVAL LOGIC.

Several designs have been published in CQTV and other BATC publications over the past few years for both V.I. logic and video crosspoints. The general principles of video switching were covered by Jeffrey Borin in CQTV 107 as part of his "Video Column" series. Generally speaking, crosspoints get good isolation by using a combination of series and shunt switching. Layout of PCBs is also critical, "mother-daughter" board arrangements being widely favoured.

Vertical-interval switching and crosspoint designs have been published as follows:- CQTV 104,P.11; CQTV 115,P.24; ATV Handbook, Vol 2,P.31.(A prepared PCB is available for the Handbook design).

Commercial vision mixer manufacturers sometimes use their own special integrated circuits as crosspoints in switching matrices, but as far as I am aware, these are not generally available.

VOLTAGE-CONTROLLED AMPLIFIERS.

There are a number of discreet and integrated circuit designs available for VCAs, although most are designed for use in audio circuits, and therefore operate with a logarithmic law (the ear responds to sound pressure changes in a logarithmic manner). For video fades and effects an accurate linear law is required, and the type of circuit that provides this is known as the "wideband linear multiplier". An example of this is the MC1495 i.c., as used in the video mixer circuit described in the Handbook, Vol. 2.

As will be gathered from the name, this device was designed for use in analogue computing circuits. Basically, there are two input ports (x and y),

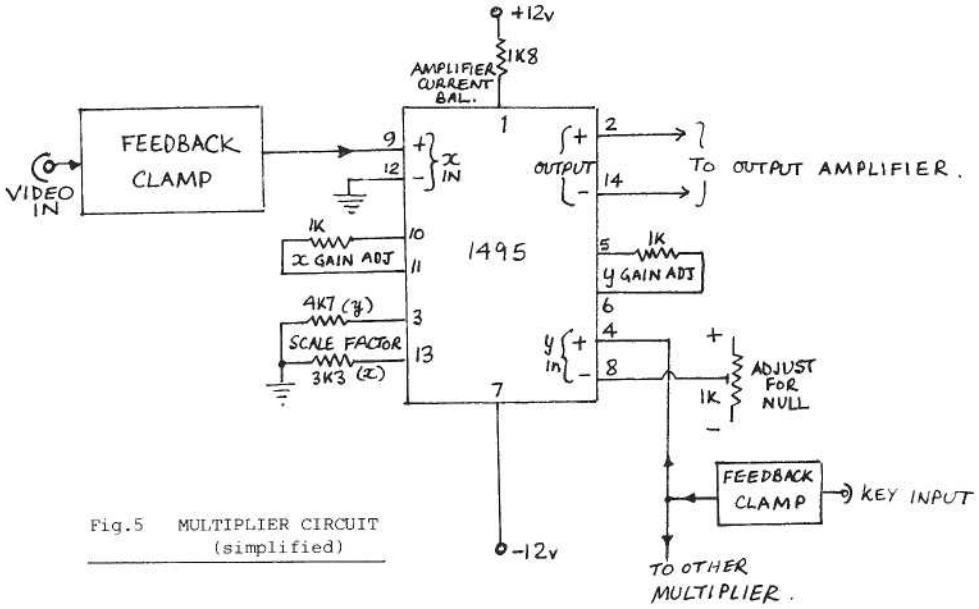


Fig.5 MULTIPLIER CIRCUIT (simplified)

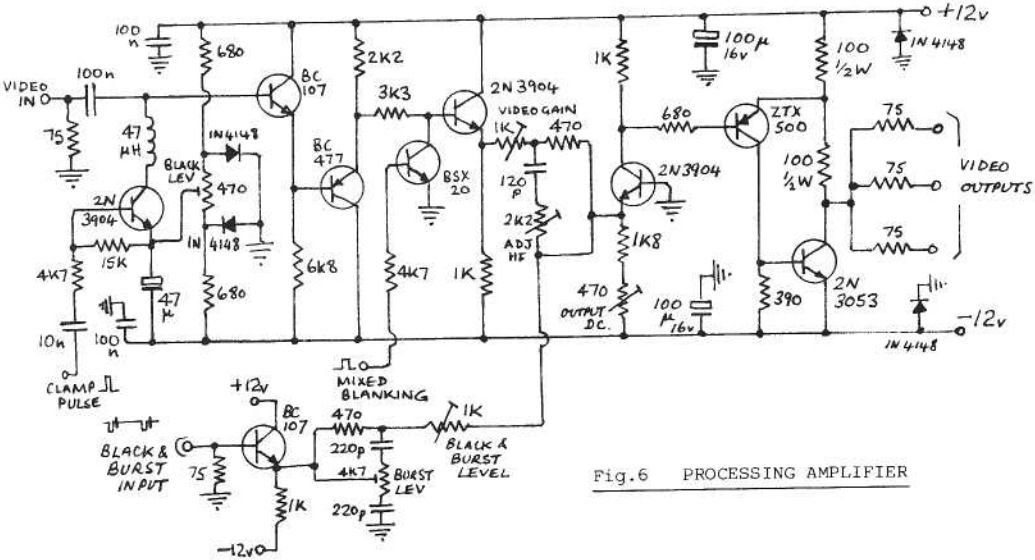


Fig.6 PROCESSING AMPLIFIER

the output signal being the product of the signal values at the inputs, multiplied by a third value known as the "scale factor". The scale factor is determined by external resistors, and in this explanation let us assume it is set to unity. Under these conditions:

$$Vo = Vx.Vy$$

So that if input x is 1 volt, and y is 2 volts, the output will be 2 x 1 = 2 volts. If the input to x is a video signal, and the y input a variable DC, the output will be a video signal whose amplitude can be varied in direct proportion to the DC value on y; i.e., a linear video fader.

There is a snag when using the 1495 for controlling video signals, because it is a "four-quadrant multiplier". This description arises from the convention used for mathematical graphs - see Fig.4. Being a computational device, the 1495 must be able to deal with negative signal voltages as will as positive ones.

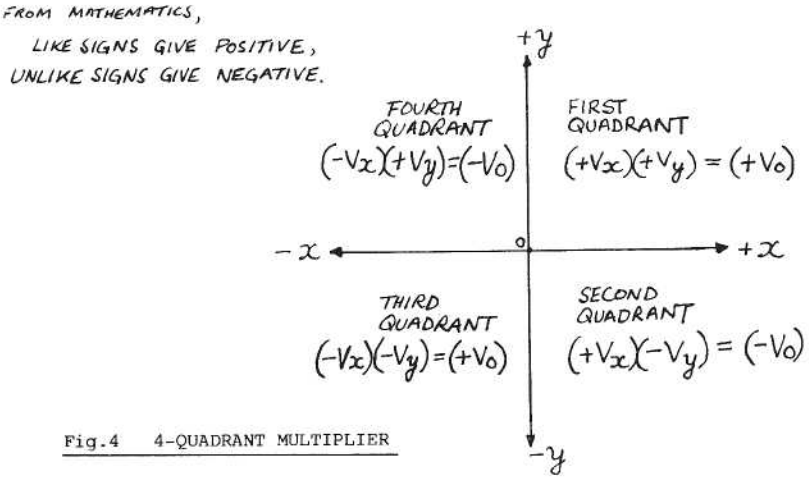


Fig.4 4-QUADRANT MULTIPLIER

Referring to Fig.4, when the video signal is controlled, all operation should occur in quadrant 1, with the video signal and control voltage both positive. However, to get good signal suppression at fade-out, the control signal must reduce very accurately to zero but NOT beyond (to a negative value), or operation will move into quadrant 2, producing a negative output. This can be very confusing during setting-up, and means that the preset controls must be carefully set.

When the control signal has an AC component, as keying and wiping signals do, an accurate clamping circuit must be provided so that "quadrant 2" operation does not inadvertantly occur. A simplified version of part of the Handbook 2 mixer circuit is shown in Fig.5.

PROCESSING AMPLIFIER & VIDEO DELAY

A processing amplifier is illustrated in Fig.6 that blanks the mixed video, and then adds clean syncs and burst from the SPG black & burst generator (as described in Part 1 of this series). This is a simpler system than extracting syncs & burst from one of the input channels, and gives a much cleaner signal during the blanking period.

Adding a "new" black & burst to the mixed signal presupposes that all paths through the mixer have delays equalised to within 5nS or less (5nS = 8 degrees at 4.43MHz), as explained in "Colour Vision Mixing", CQTV 114. To avoid using the strategy of "dummy circuits" to achieve this (as suggested in CQTV 114), a programmable video delay, adjustable in 5nS steps from 5 to 225nS (one cycle of subcarrier) is required.

Fig.7 shows such a circuit, using miniature preferred-value RF inductors (Toko type 7BS) that are readily available from Cirkit Holdings (ex Ambit International), Broxbourne, Herts. The various sections of the delay may be cascaded as required to make up the appropriate value for any particular application.

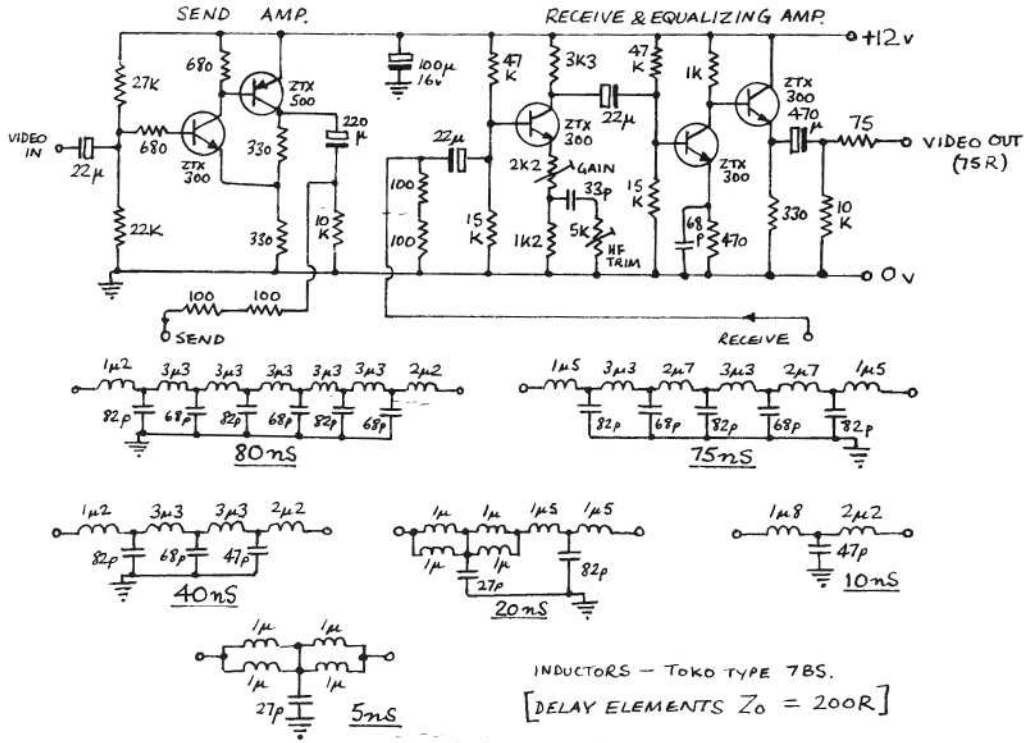


Fig.7 VIDEO (PROGRAMMABLE) DELAY

EFFECTS GENERATION

The standard method of generating the waveforms required for "wipes" (split-screens) is to use a comparator i.c. such as the 710 or LM319, and, by applying ramp or similar waveforms to one input, and a variable "slicing" DC to the other, linearly-varying wipe signals are generated. It is necessary to provide wipe waveforms at both line and field rate, which, when combined in various ways, can give different wipe patterns. See Fig.8.

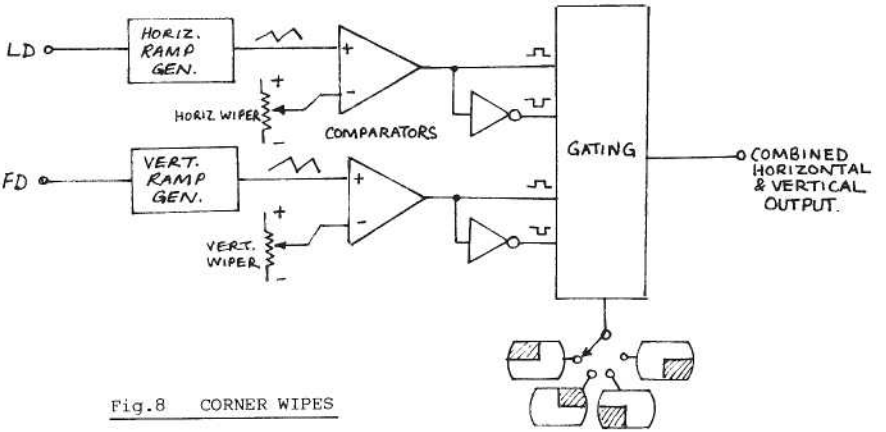


Fig.8 CORNER WIPES

A full circuit for generating the four corner wipes was publshed in CQTV 116, P.37, in the ABC Colour Mixer series. (A simpler version, using monostables instead of ramp generators & comparators, was published in CQTV 112, P.18).

Many different wipe patterns can be generated by applying appropriate waveforms to the comparators' inputs. Some examples are shown in Fig.9.

Fig.10 is a circuit for a triangle generator. It should be possible to produce parabolic waveforms by integration of the ramp output, but I havn't got around to trying this yet. The TTL-compatible outputs from the comparators are fine for normal sharp-edged wipes, but if soft-edged wipes are required it is necessary to "slope" the leading and trailing edges of the wipe waveforms. See Fig. 11.

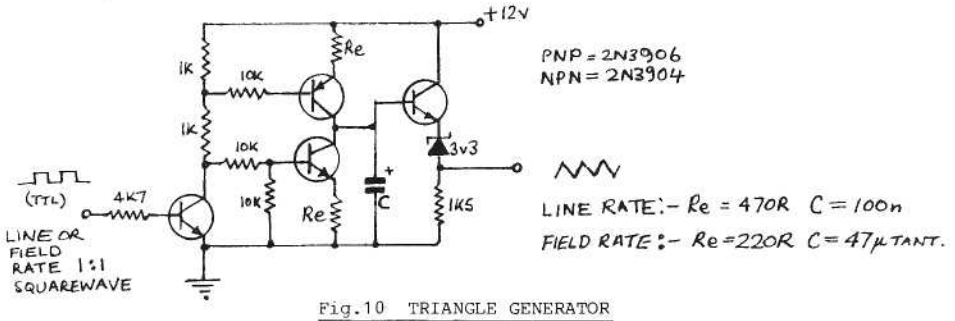


Fig.10 TRIANGLE GENERATOR

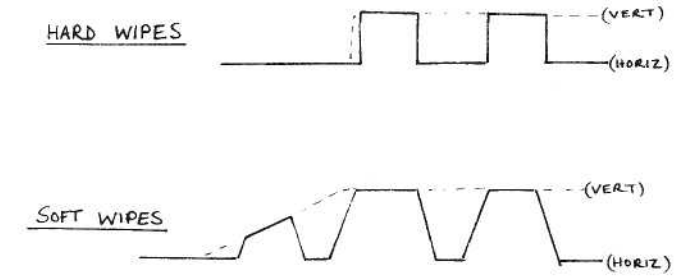


Fig.11

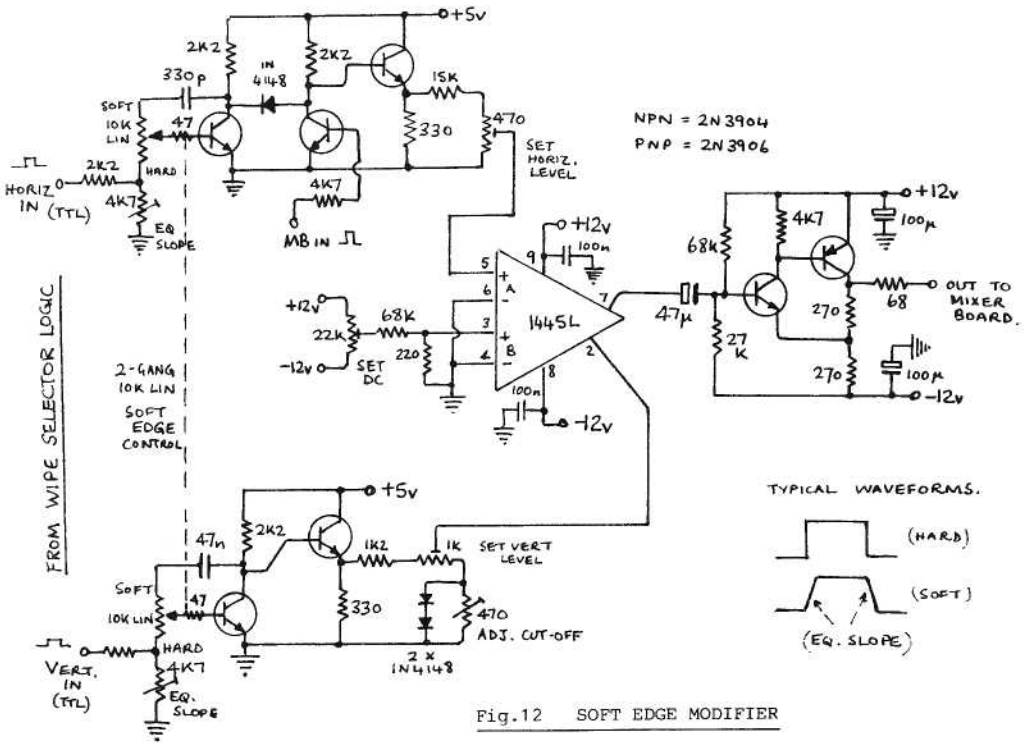


Fig.12 SOFT EDGE MODIFIER

Fig.12 is a circuit for modifying TTL waveforms for soft-edged wipes. The output is adjustable to 0.7 volts p-p, and is suitable for applying to the "key" input of the Handbook 2 mixer board as it is blanked. Note that the pattern selection must precede this circuit, and must NOT combine the vertical and horizontal signals.

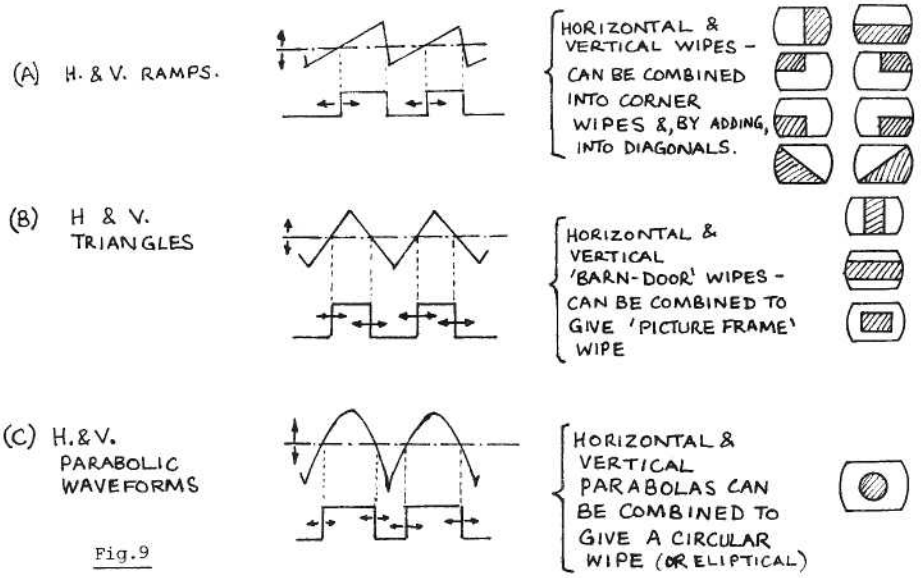


Fig.9

COLOUR FIELD GENERATION (PAL).

This is included in the more comprehensively equipped mixers, and can be used as fill for captions, or background for main titles, etc. It is usually avaible as a source on the input selection.

Because at any one time only a single colour is generated, it is not normal to use a PAL encoder with variable RGB inputs as this is rather complex, and simpler circuitry will suffice.

Nevertheless, any colour generating apparatus must have 3 controls in order to give an infinitely variable range of colours; these may be:-

(1) Red, Green, Blue (encoder method)
(2) Luminance, Hue, Saturation
(3) Luminance, (B-Y), (R-Y). (Y.U.V. method).

With most professional mixers option (2) is favoured, although providing a full range of hues on a single control can require specialised components. Option (3) is simpler to construct using standard component values,

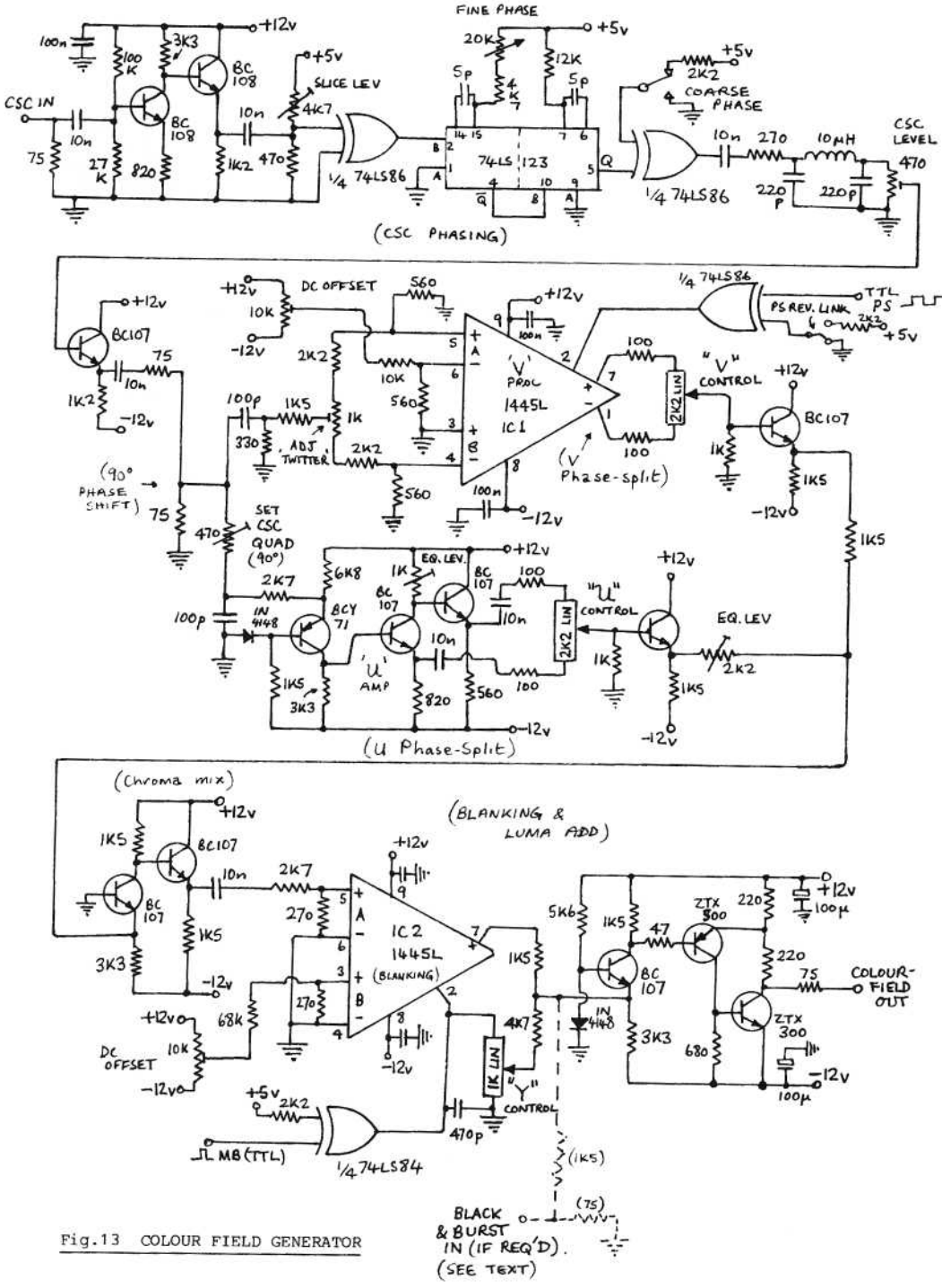


Fig.13 COLOUR FIELD GENERATOR

and a circuit is shown in Fig.13. The principle of operation is to split the incoming subcarrier intc vectors laying on the U (B-Y) and V (R-Y) axes by means of a 90 degree phase-shift. The V subcarrier is then alternated by the PS signal (IC1), and then both U & V are phase-split. This means that they can be made infinitely variable along their respective axes, and the resultant chroma signal can be made to take up any colour vector - see Fig.14.

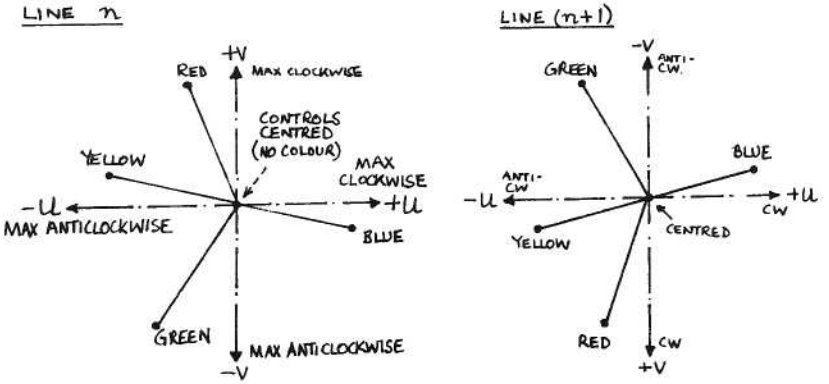


Fig.14 U, V COLOUR GENERATION

The overall phase-shifting circuit at the CSC input allows the colour field to be phase-matched to the mixer's output burst. The circuit is intended for internal use in mixing equipment, so no syncs & burst are added; however, should a stand-alone unit be required, an input for black & burst is shown (dotted) in Fig.13.

Referring to Fig.14, the V control varies the signal between (approximately) red & green; the U control from (approximately) blue to yellow. Using a combination of the two can therefore produce any hue, and, with the addition of the Y (luminance) control, colours of any brightness and saturation can be generated.

In the next article we will have a look at some of the ideas behind, and the promise of, digital television.

INTERNATIONAL ATV CALLING

144.750 MHZ

THE EPIC

Editor

Whilst sorting through some old BATC papers recently I chanced upon a letter from the RSGB to BATC founder Mike Barlow dated 16th December 1949. The letter was on the subject of movie films concerned with amateur radio in general and in particular it commented on a shooting script which had been sent to the RSGB by Mike.

The suggested script was for a two-minute film advertising amateur radio clubs and, following Norrie Macdonalds' series 'Brighten up Your Image', concluded in CQ-TV 127 , I thought some of you more artistic types may like to see it.

For those not familiar with reading a shooting script perhaps I should explain a few terms: MS - medium shot, CU - close-up, MCU - medium close-up, LS - long-shot, disolve - mix or lap disolve.

Suggested running times in seconds are shown against each shot.

SUGGESTED SHOOTING SCRIPT FOR RADIO CLUB ADVERT FILM
Running time 2.1/2-minutes

SHOT	SUBJECT	TIME
SPLASH TITLE:	"DO YOU SUFFER?"	4
MS	Grandad in chair, reading paper and smoking pipe. He frowns, and looks up.	3
CU	He turns and glares out at.....	2
CU	Radio. Hand reaches out and switches off.	2
MS	Grandad settles down, annoyed, bites pipe etc.	4
SPLASH TITLE:	"OR ARE YOU INTERESTED?"	3
MCU	Baby exploring controls of radio.	3
CU	Look of intense concentration on his face.	2
MCU	Rear View.	2
	CUT TO:	
TITLE:	".....when this happens.....?"	4
MCU	Cheerful charlie approaches from R. rubbing hands, looking very pleased with himself.	6
	TRACK AS:	
	He goes up to transmitter, switches on, and sits down.	6
CU	His face, beaming, as he calls CQ into the microphone.	2
MCU	Side, obviously happy, tilts chair back, flicks pennies etc.	3
	QUICK FADE	
	Fade in:	1
TITLE:	"PERHAPS YOU WOULD LIKE TO LEARN MORE ABOUT IT?"	5
	CUT TO:	
TITLE:	"THE CONSTRUCTIONAL SIDE, SAY?"	4
	DISSOLVE TO:	

CU	Workshop door; notice: "workshop - keep out - Genius at work". Door opens.....	3
	CUT TO:	
MS	Man soldering. CUT TO:	2
CU	Man using tank cutter. CUT TO:	3
CU	Man screwing front panel to TV unit.	3
	CUT TO:	
TITLE:	"OR RADIO OPERATING.....?"	4
MS	Operator listening on headset, writing.	3
MCU	Operator using bug key.	2
MCU	Female op. using 'phone. CUT TO:	3
MS	Male op. ditto. Leans back in chair, opens drawer.....	5
MCU	....takes out card index, thumbs through, half pulls out a card.	4
CU	Hand taking card from back of index, Country titles on index divisions.	8
	FADE TO:	
TITLE:	".....OR EXPERIMENTING."	3
LS	Antenna adjusting - man up mast, signals to.....	3
MCU	Man on ground looks at field strength meter, looks up and nods.	4
CU	Man making adjustments to transmitter.	3
TITLE:	"OR JUST WATCHING OTHER PEOPLE WORK!"	5
MS	Man holding up valve lecturing in front of blackboard.	8
MS	Class FADE OUT	5
TITLE:	"ALL THIS AND MORE GOES ON REGULARLY AT YOUR LOCAL RADIO CLUB. YOU CAN TAKE PART IN IT TOO. JOIN YOUR LOCAL AMATEUR RADIO CLUB NOW!"	15
	FADE OUT	
	END	

A SYNC SEPARATOR

By Brian Dandy G4YPB

There have been many circuits, in this magazine and numerous others, which enable a source of TV synchronising pulses to be derived from a composite TV signal. Unfortunately, some published designs do not seem to work as they should for many constructors. The reason is probably that individual circuits are often designed for a specific purpose, and they no doubt work well in those applications, but when tried in other environments they may not always work as one wishes.

This circuit has been specifically designed as a 'general purpose' circuit. It has been built many times, used in a number of applications, and is straightforward to build using readily available components.

CIRCUIT DESCRIPTION

A standard video input signal of 1v p-p is applied to the input. A 75-ohm terminating resistor may be connected between the input socket and ground if required. Tr1 amplifies the incoming video by about twelve times. The resulting signal is DC restored by the diode and applied to a comparator comprising Tr2 and 3. When P1 is set to zero volts, about 4-volts of signal (mostly sync pulses) appears across the common emitter load resistor. The signal is then applied to amplifier Tr4 which, being over driven, produces an output signal swinging close to the power rail voltage.

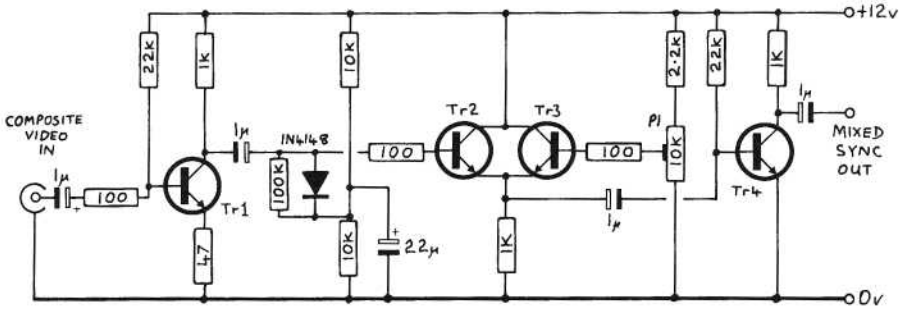
COMPONENTS AND CONSTRUCTION

All transistors may be 2N3904 or similar high frequency switching types. The diode should be a switching type and P1 a carbon pre-set.

Construction may be on Vero board or a custom printed board may be made. The layout is fairly non-critical, although as always, component lead lengths should be kept as short as practical.

Only one adjustment is needed: Set P1 slider to its ground end. Connect a 'scope across the 1k collector resistor of Tr3 and 4 where around 4-volts of sync signal should be present with a small amount of the original video at the bottom of the waveform. Adjust P1 so that the signal is reduced to around one quarter of its original amplitude (about 1v). This adjustment ensures that only clean syncs are available at the output.

The circuit is designed to work into other circuitry however, if a 75-ohm output is required, a simple emitter follower stage may be connected to the output.



SYNC SEPARATOR CIRCUIT DIAGRAM

SOFTWARE NOTEBOOK

3 - Commodore-64

This program by D.A.(Slim) Haines G4IPZ is for the Commodore 64 computer and produces a test card similar in style to the ETP-1 broadcast pattern.

On RUN you are presented with the question "Enter your message for scrolling - max 36 characters". Typing in (say) a callsign or similar message clears the screen, after which the testcard is drawn and the message scrolls from right to left in a centre window.

If you do not wish to type in the listing yourself, G4IPZ has kindly offered to put a copy of it onto either a tape or disc which you should send, TOGETHER WITH RETURN POSTAGE to: 259 Rangefield Road, Bromley, Kent BR1 4QX.

```
1 REM **************************
2 REM **  SIMPLE ETP1-LIKE  **
3 REM **TESTCARD WITH SCROLL**
4 REM **  FOR COMMODORE 64.  **
5 REM ** SLIM HAINES G4IPZ  **
6 REM **        1984        **
7 REM **************************
8 FORI=532B1,1
9 GOSUB500
10 FORI=1024TO2023 POKEI,224:NEXTI:REM SET UP SCREEN
20 FORI=55296TO56295STEP2
30 READA:REM GET DATA FOR COLOURS
40 POKEI,A:POKEI+1,A:REM COLOURS FOR TESTCARD
50 NEXTI
60 GOSUB4000
70 GOTO1000
80 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
90 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
100 DATA0,0,1,0,7,0,7,0,7,0,7,0,7,0,7,0,1,0,0
110 DATA0,0,0,15,15,15,15,15,15,15,15,15,15,15,15,15,15,0,0,0
115 DATA0,0,0,15,15,15,15,15,15,15,15,15,15,15,15,15,15,0,0,0
120 DATA0,0,2,15,15,15,15,7,7,2,2,7,7,15,15,15,15,7,0,0
130 DATA0,0,0,15,1,1,1,1,0,0,0,0,1,1,1,1,15,7,0,0
140 DATA0,0,2,15,1,1,1,1,0,0,0,0,1,1,1,1,15,0,0,0
150 DATA0,0,0,15,0,11,0,11,0,11,0,11,0,11,15,1,0,0
160 DATA0,0,2,15,7,7,3,3,5,5,4,4,2,2,6,6,15,1,0,0
170 DATA0,0,2,15,7,7,3,3,5,5,4,4,2,2,6,6,15,0,0,0
180 DATA0,0,0,15,15,15,15,15,15,15,15,15,15,15,15,15,15,0,0,0
190 DATA0,0,0,15,15,15,15,15,15,15,15,15,15,15,15,15,15,0,0,0
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210 DATA0,0,6,15,11,11,12,12,15,15,15,15,12,12,11,11,15,1,0,0
220 DATA0,0,0,15,0,0,11,11,12,12,15,15,1,1,0,0,15,1,0,0
230 DATA0,0,6,15,0,0,11,11,12,12,15,15,1,1,0,0,15,0,0,0
240 DATA0,0,0,15,15,15,15,15,15,6,6,6,6,15,15,15,15,7,0,0
250 DATA0,0,6,15,15,15,15,15,6,6,6,6,15,15,15,15,7,0,0
260 DATA0,0,0,15,15,15,15,15,15,15,15,15,15,15,15,15,0,0,0
265 DATA0,0,0,15,15,15,15,15,15,15,15,15,15,15,15,15,0,0,0
```

MEMBERS SERVICES

Items from these lists are available to club members only.
This list supercedes all previous ones.

QTY	PRINTED CIRCUIT BOARDS	EACH	P&P	TOTAL
	'Project 100' sync generator (CQ-TV100)	£3.00	0.30	
	TX-9 video/audio in/out (CQ-TV119)	£2.25	0.30	
	FM-TV demodulator (CQ-TV122)	£3.00	0.30	
	Amateur television receiver (HB1)	£1.50	0.30	
	Electronic character generator (HB1)	£3.00	0.30	
	Colour test card (set of 3-double-sided)	£15.00	0.60	
	Horizontal aperture corrector (HB1)	£3.00	0.30	
	PAL colour coder (HB1)	£3.00	0.30	
	Vision switcher matrix (HB2)	£4.00	0.30	
	Vision switcher logic (HB2)	£4.00	0.30	
	Vision mixer (HB2)	£4.00	0.30	
	70cm VSB transmitter-7 boards (HB2)	£15.00	0.40	
	SSTV pattern/sync generator (HB2)	£3.00	0.30	
	Character colourizer,(printed legends HB2)	£5.00	0.30	
	Piggy-back keyboard (HB2)	£2.25	0.30	
	70cm TV transmitter (TVA and CQ-TV122)	£3.00	0.30	
	ATV up-converter (TVA and CQ-TV112)	£2.25	0.30	
	Video filter (TVA and CQ-TV122)	£1.00	0.17	
	SPG, greyscale, char gen (Ham Radio Today)	£4.set	0.60	
	G3WCY SSTV to FSTV converter & reprint (Rad Com)	£10.set	0.60	
	G4ENA modifications for above CQ-TV127 - set of 4	£5.set	0.30	
	Sync processor (CQ-TV129)	£3.00	0.30	
	G8CGK SSTV pattern generator - inc. notes	£3.00	0.30	
	STATIONERY,ACCESSORIES AND COMPONENTS			
	BATC test card - with data sheet	0.50	0.24	
	BATC reporting chart (illustrated)	0.12	0.20	

	BATC lapel badge - diamond - button hole	0.40	0.17	
	BATC lapel badge - round - pin fastening	0.50	0.17	
	BATC callsign* lapel badge-pin fastening *Write callsign CLEARLY. Sent by supplier	£1.50	nil	
	BATC key fob	0.60	0.17	
	BATC equipment stickers - 1" round	0.15	0.17	
	BATC windscreen stickers - 2.5" round	0.10	0.17	
	1" Vidicon scan-coils (low Z focus coils)	£6.00	£1.20	
	1" Vidicon scan-coils (high Z focus coils)	£6.00	£1.20	
	2/3" Vidicon scan-coils	£6.00	0.80	
	Vidicon bases - 1" or 2/3" (state which)	0.50	0.17	
	TV camera lens mounts - 'C' type	£1.00	0.24	
	13.14MHz TV TX crystal (Hbk 2)	£5.00	0,17	
	108.875MHz TV TX crystal (TV for Am)	£7.00	0.17	
	5MHz SPG crystal (P100)	£2.75	0.17	
	TBP28122 PROM. Pre-programed for colour test card circle. (eqt.74S471)	£10.00	0.25	
	2732 EPROM. SSTV program (HB2)	£12.00	0.17	
	4.433618MHz PAL colour subcarrier crystal HC18-U (wire leads),	£2.75	0.17	
		TOTAL		£
		POSTAGE		£
		TOTAL ENCLOSED		£

*HB1 & HB2 = BATC Handbooks.
TVA = TV for Amateurs

CAMERA TUBES & ORDERING INFORMATION

Members requiring EEV Leddicon, EMI 9777 Ebitron, 9728, 9706, 9677 (1" EMI) vidicons or 9831 (2/3" EMI) vidicon should enquire for the latest prices and delivery. ALL enquiries needing a reply should include a SAE or IRC.
OVERSEAS MEMBERS should ask for a quotation of postage costs before ordering.
PUBLICATIONS must be ordered separately from the Publications Department.
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1985 BATC RALLY / SHOW

MAY 5th

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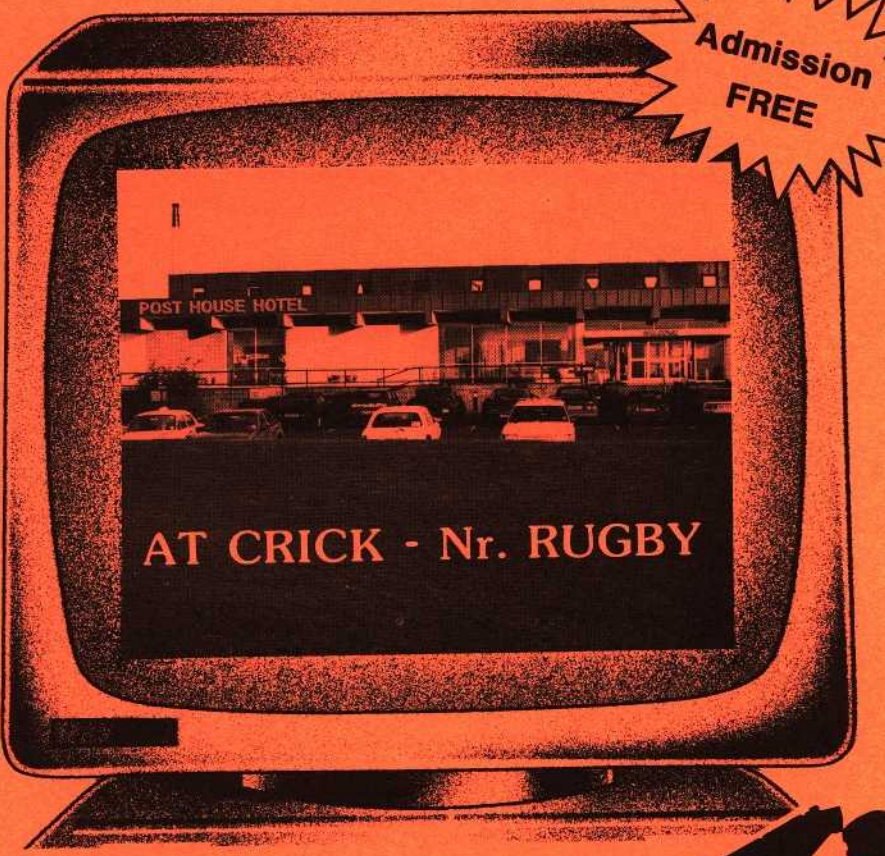
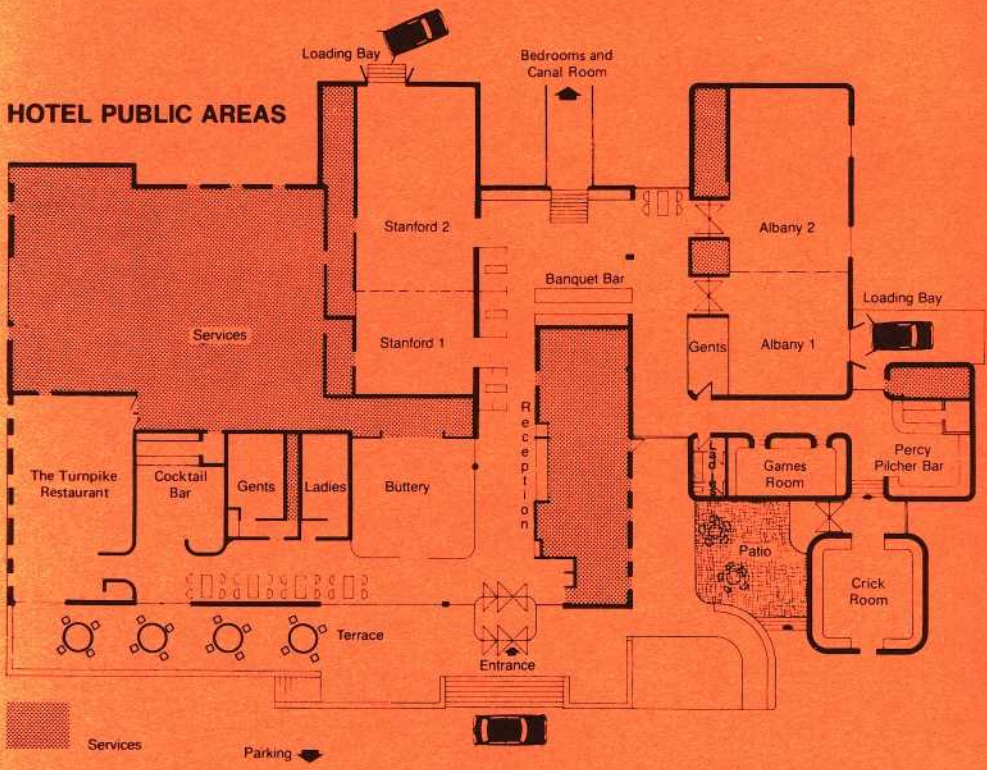


VIDEO

Radio Communications

FLOOR PLAN



The Post House Hotel

There are 96 bedrooms, many of which are family rooms. All have private bathroom, colour TV, radio, telephone, private bar and facilities for making tea and coffee. When it comes to something more substantial than tea and coffee, the Post House offers a wide range of options. The Turnpike Restaurant is a first class venu offering both an excellent menu and wine list. You can enjoy breakfast, as well as grills, salads and snacks, in the bright and airy coffee shop. Full facilities for children are available.

There are two bars, the Cocktail Bar, which opens out onto the terrace and the Percy Pilcher Pub, decorated in the style of a comfortable Edwardian pub.

The BATC has made a special arrangement with the Post House Hotel whereby visitors to the Convention may ask for half-price overnight accommodation. Please mention the BATC Convention when booking.

The Post House Hotel, Crick, Northamptonshire. Tel: 0788 822101

WHAT'S ON.....

DOORS OPEN 10am.

LECTURES

Colour SSTV by John Stace G3CCH - 11am.
Interfacing the Sinclair Spectrum by Trevor Brown G8CJS - 2pm.
ATV Repeaters and microwave topics by Graham Shirville G3VZV - 3pm.
ATV Techniques by Andy Emmerson G8PTH - 4pm.

The above times may be subject to alteration, please check on the day.

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* TRADE STANDS. * COLOUR SSTV. * NBTV. * FSTV. * OUTSIDE BROADCAST UNITS. * MEMBERS EXHIBITS. * BROADCAST EQUIPMENT EXHIBITION. * BRING-AND-BUY. * REPEATER GROUPS. * CLUB SALES. * G4ENA WITH EQUIPMENT FROM RECENT CQ-TV's. * CLUB PROJECTS CLINIC. * PLUS LOTS MORE.

FACILITIES

LUNCH. The Turnpike Restaurant is licenced and has an adjoining cocktail bar. It is advisable to book lunches in advance. Special childrens meals are also available.

For snacks and drinks there is an excellent coffee shop, a buttery bar and of course the Percy Pilcher pub all of which sell food.

Ample car parking facilities are provided which are close to the exhibition areas, and large grounds and gardens surround the hotel where children may play safely and where families may have picnics.

Members staying overnight are invited to a BATC get-together on Saturday evening in the Percy Pilcher bar - wear your badge!

Anyone needing further information on the rally or needing to arrange exhibits may contact Trevor Brown on 0532 670115.

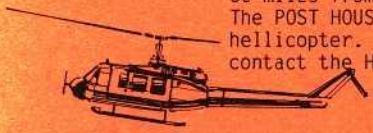
SEE YOU THERE!

How to get there

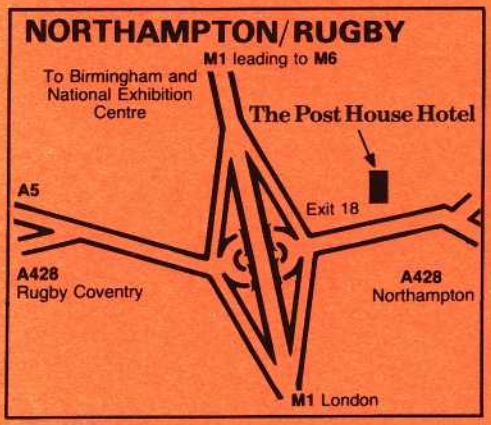
Located in the centre of the Country, the POST HOUSE HOTEL is about 300 yards East of exit 18 of the M1 motorway.
Motorists should leave the motorway at J18 and take the A428 signposted to Crick and Northampton.
Those travelling on the A5 Watling Street will find that it passes very close to the motorway roundabout. If in doubt, follow the M1 motorway signs to the roundabout and then take the second exit, signed A428.

The nearest mainline and Inter-City railway station is 'Rugby Midland' situated in the town itself.
Busses to Crick are infrequent but there is a taxi rank outside the main entrance.

Both the Oxford and Grand Union canals pass close to Rugby and Crick where there are numerous marinas, wharfs and moorings at which to stop. Members using this mode of transport should consult their Waterways guide publications for the necessary information.



The nearest major terminal is Birmingham International Airport. This is situated between Birmingham and Coventry and is around 30-miles from the Convention venue.
The POST HOUSE HOTEL has its own Heliport for those arriving by hellicopter. Members wishing to use this facility should contact the Hotel in advance to make their arrangements.
Tel: 0788 822101



PUBLICATIONS

QTY	PUBLICATION	PRICE EACH	UK P&P	TOTAL inc p&p
_____	The revised AMATEUR TELEVISION HANDBOOK by T.Brown G8CJS (155gm)	£2.00	0.40	_____
_____	TV FOR AMATEURS by J.Wood G3YQC (85gm)	£1.50	0.25	_____
_____	*MICRO & TELEVISION PROJECTS By Trevor Brown G8CJS	£3.00	~~0.50~~	_____
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_____	100,126,128,129,130..... **Please estimate appropriate postage (approx 90gm per copy)	£1.00	**	_____
_____	RE-PRINTS. Photocopies of any article from past issues of CQ-TV are available.	0.20 per sheet	0.20	_____
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```
270 DATA0,0,1,0,5,0,5,0,5,0,0,5,0,5,0,5,0,1,0,0
280 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
290 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
300 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
500 REM** MESSAGE FOR SCROLLING**
505 PRINT"□"
510 PRINT"ENTER YOUR MESSAGE FOR SCROLLING."
520 INPUT"MAX 36 CHARACTERS";A$
530 RETURN
1000 REM** SCROLL ROUTINE **
1005 IFLEN(A$)<12THENGOSUB2000
1007 A$=" "+A$
1010 B$=LEFT$(A$,1):REM TAKES OFF FIRST CHARACTER
1020 A$=RIGHT$(A$,(LEN(A$)-1)):REM TRUNCATE MESSAGE FROM LEFT
1030 A$=A$+B$:REM ADD REMOVED FIRST CHARACTER TO END OF MESSAGE
1040 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■";LEFT$(A$,12)
1045 FORI=1TO200:NEXTI
1050 GOTO1010
2000 REM ** LINE PADDER **
2010 B=12-LEN(A$):REM FILLS OUT THE
2020 P$=""          :REM LINE FOR THE
2030 FOR2=1TOB      :REM DISPLAY IF LESS
2040 P$=P$+" "      :REM THAN 12 CHARS
2050 NEXTZ          :REM IN MESSAGE.
2060 A$=A$+P$
2070 RETURN
4000 REM ** CHROSS HATCH **
4010 FORP=1TO12
4020 READ A,B,C,D
4030 FORG=A TOB STEP2:POKEG,C:POKEG+1,D:NEXTG
4040 NEXTP
4050 AA=239:BB=250
4060 FORI=1TO10:RANDM,B:POKEA,AA:POKEB,BB:NEXTI
4090 RETURN
5000 REM **  CROSSHATCH DATA  **
5010 DATA1150,1177,239,250,1190,1217,239,250
5020 DATA1470,1497,239,250,1510,1537,239,250
5030 DATA1790,1817,239,250,1830,1857,239,250
5040 DATA1230,1237,239,250,1250,1257,239,250
5050 DATA1710,1719,239,250,1728,1737,239,250
5060 DATA1750,1759,239,250,1768,1777,239,250
5070 DATA1270,1271,1296,1297,1310,1311,1336,1337,1350,1351
5080 DATA1376,1377,1390,1391,1416,1417,1430,1431,1456,1457
5090 DATA1550,1551,1576,1577,1590,1591,1616,1617,1630,1631
5100 DATA1656,1657,1670,1671,1696,1697
```

BATC RALLY/SHOW '85

5th May 1985 at CRICK POST HOUSE HOTEL

INTERFACING THE SPECTRUM

By Trevor Brown G8CJS

There is no doubt that the home computer is making an impact on the ATV scene, their own particular brand of video is often to be seen on the airways. Computers however can be more useful in the shack than just video generators; once you learn how to use the inevitable rear socket, which no computer seems complete without, then many control applications become possible.

The Sinclair Spectrum does not have a PIA, VIA, PIO or any other access port to enable the interfacing of external equipment. The rear socket of a Spectrum consists only of the pins normally to be found on its CPU (Z80). This, at first sight, might seem to make interfacing very difficult, but the Z80 was designed with interfacing in mind, and, to this end, has a $\overline{IORQ}$ pin (In/Out ReQuest) which makes things somewhat easier.

The Z80, in common with a lot of other small CPU's, has 8 data lines and 16 address lines; that means it can address 65,536 bytes of memory which is usually made up of ROM and RAM. Because of the IORQ pin, an input/output (I/O) device does not need to use the memory map either directly or via a PIO. This means that memory space is not consumed by extra devices. The $\overline{IORQ}$ pin is normally high and goes low whenever the address bus holds an address for an external peice of equipment. This would seem to imply that there are 65,536 I/O addresses which could be filled with external memory. Unfortunately this is not so, the $\overline{IORQ}$ only signals that A0 to A7 holds a valid I/O address, ie: 255 bytes of external memory could be added, which is not worth the effort as memory goes, but nevertheless this extra I/O map, which is a feature of the Z80, is very useful. The $\overline{IORQ}$ pin signals only that the A0 to A7 address lines hold a valid I/O address, it does not signal whether the data bus wishes to read or write from that address. This information can be obtained from the normal read and write pins of the Z80: $\overline{RD}$ and $\overline{WR}$.

Unfortunately, in the Spectrum, some of these 255 addresses are already used and a few more are reserved for the ZX printer and Microdrive, but A5, A6 and A7 are free. Ignoring the rest of the data bus above A7, we can assume that if all the address lenes are high, then the address bus carries the decimal value 255, if A7 goes low then the decimal value is 255-128 = 127. If the A6 pin goes low, the address in decimal is 255-64 = 191 and, if only the A5 pin is low, then the address is 255-32 = 223. This information can be incorporated into basic commands in the following example: Where the instruction OUT 127,127 will load the 8-bit latch located at I/O address 127 with the decimal number 127. The operation of the 74LS138 can best be seen by looking at its truth table (Fig.1).

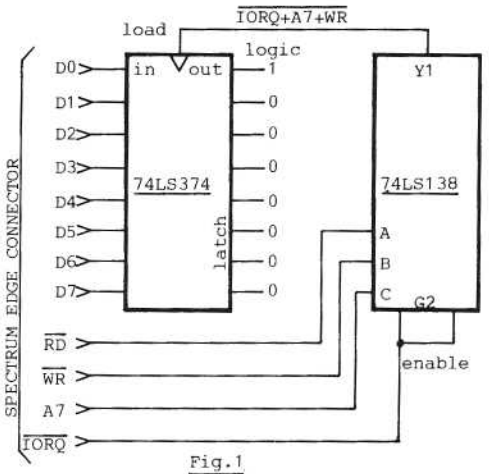


Fig.1

INPUT SELECT			OUTPUTS							
C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	L	H	H	H	H	H	H
L	H	L	H	H	L	H	H	H	H	H
L	H	H	H	H	H	L	H	H	H	H
H	L	L	H	H	H	H	L	H	H	H
H	L	H	H	H	H	H	H	L	H	H
H	H	L	H	H	H	H	H	H	L	H
H	H	H	H	H	H	H	H	H	H	L

H = logic 1
L = logic 0

74LS138 TRUTH TABLE

In the next example the latch is loaded with the decimal value 32 by the Basic command: OUT 191,32. The numbers alongside the latch show how to set each bit by adding up the numbers where a logic-1 is required and ignoring the logic-0's. The data 32 will light the LED.

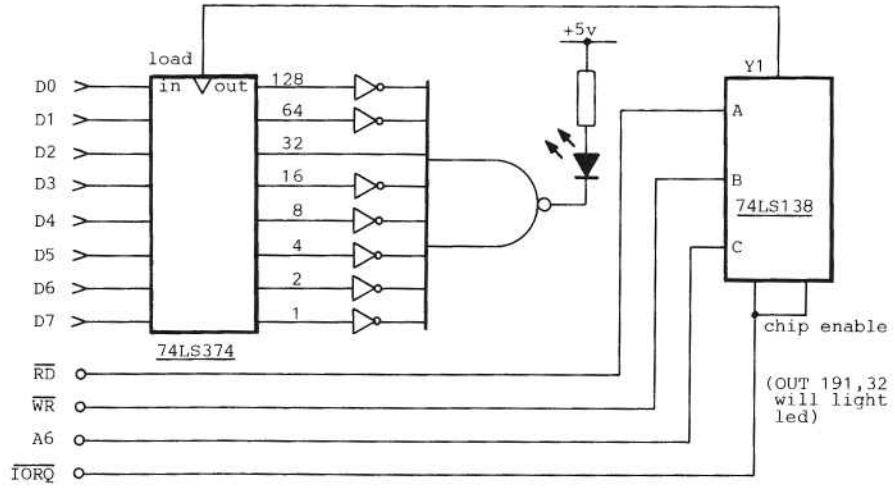


Fig.2

Let's now put this to use. Using the following program and circuit (Fig.3) we can make the computer behave as an ASCII keyboard. The command OUT 127,data will generate the strobe pulse and the data bus will deliver an ASCII word. If you have a character generator, such as the one in Handbook-1, and it is

complete with the piggyback memory in the original Handbook-2, you could try connecting the computer to it as in Fig.3. After running the program the computer should behave as an ASCII keyboard so you can type into the character generator from the computer keyboard.

```
10 PAUSE 0
20 LET A$=INKEY$
30 LET b=CODE A$
40 IF b=0 THEN GO TO 10
50 OUT 127,b
60 PAUSE 10
70 GO TO 10
```

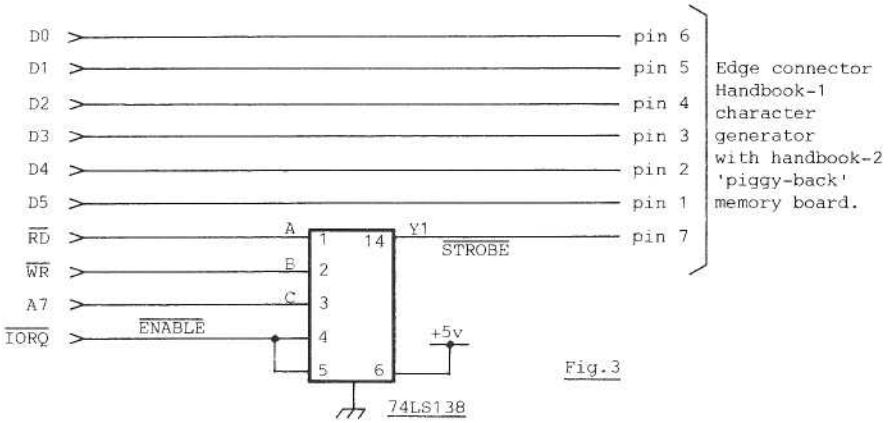


Fig.3

The next stage is to be able to input data. The data is connected to the bus via a tri-state buffer such as the 74LS244. Tri-state IC's are capable of three states: logic-0, logic-1 or open circuit. They should be wired so as to always present an open circuit to the computer, until requested to do otherwise by A7, A6 etc. The read command is IN 127. The sum total of the numbers which are at logic-1 will be put onto the data bus,. This enables a basic instruction thus:-

```
10 PAUSE 10
20 ID IN 127 = 191 THEN GO TO 10
30 BEEP .4,4
40 GO TO 10
```

In the last example I have shown a latch configured for writing to with OUT 127, data and a tri-state buffer to read back the data as IN 127, A further tri-state buffer can be read as IN 191, This enables the data to be read back from the latch and, independent of this, another data word may be read from the input. We do run out of inputs to the 74LS138 and this problem is overcome by dropping the $\overline{RD}$ and assuming that when we are not writing then we must be reading.

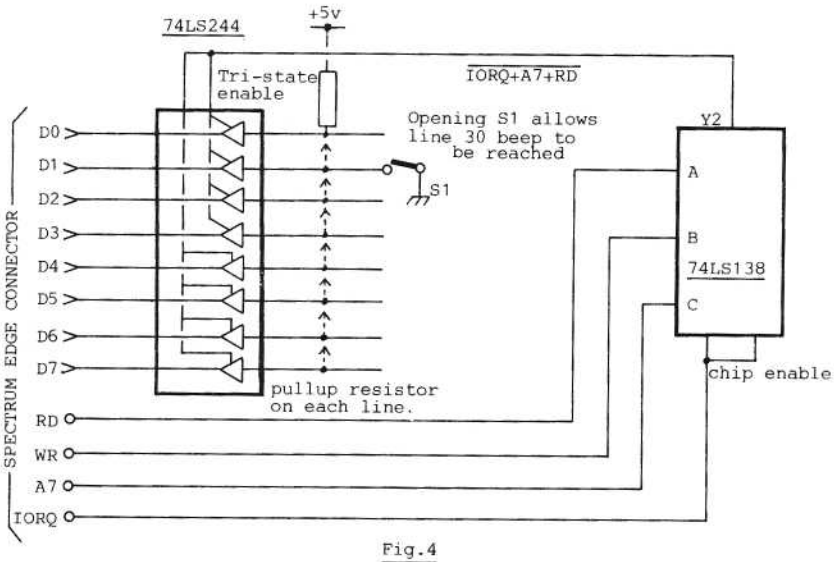


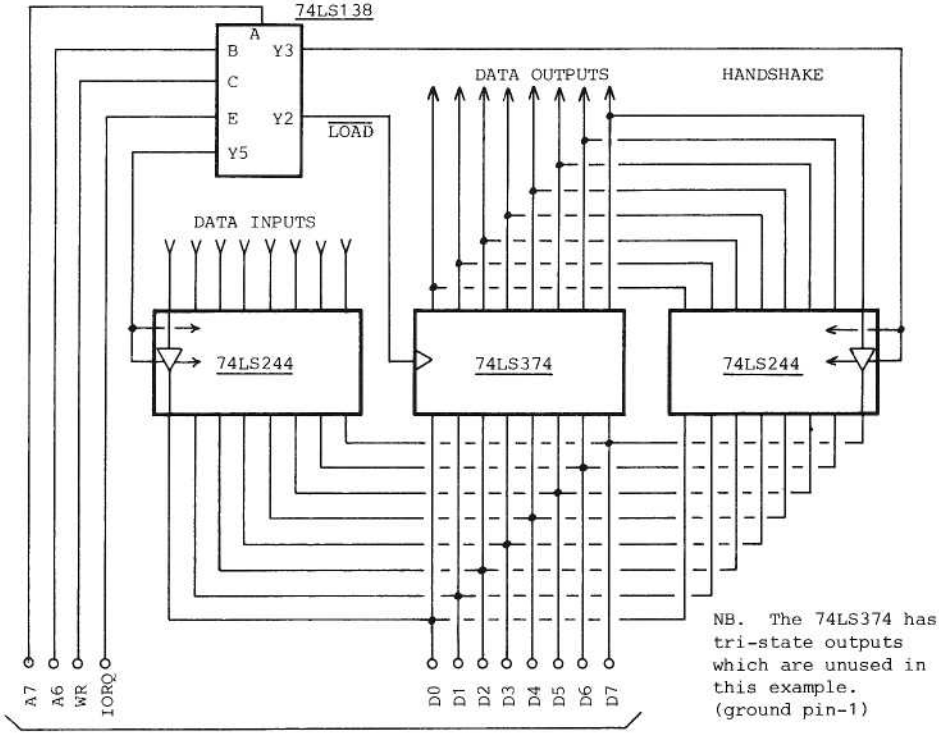
Fig.4

If I/O capacity is needed beyond that described, then one should start thinking in terms of a PIO. Input is not normally a problem as this does not load the data bus, but the output should always be restricted to one LS gate input on the bus.

All the above examples show latches for data output, with the exception of the ASCII keyboard, because the data is only valid for one clock cycle, and usually requires storing until the circuit is ready for it. The same can happen with data input in that it may not be available when the computer wishes to read it, we would then require data latches on the input. The 74LS374 is especially useful here as its outputs are tri-state. These are enabled via pin 1 which, for all our examples so far, has been grounded. This facility enables the latch to be wired with its outputs directly onto the data bus, and a decoded I/O read command used to enable the outputs independently of the inputs and load commands, which would be under external control. It may be necessary at this point, in order to stop the computer reading the same word twice, to include a hardware routine to clear the latch after the computer has read the data, and load it with a word that the program understands as data not ready, until the next input word is loaded.

THE Z80 PIO

Moving on from discrete logic interfaces, we come to custom designed interface chips such as the Z80 PIO and 8255. The Z80 PIO provides two 8-bit ports, the input and outputs of which are under software control. The 8255 provides three 8-bit ports; ports A and B can either be all inputs or all outputs, but the individual ports cannot be split. Port C can be split into four inputs and four outputs or, alternatively, all eight lines can be input or output.



NB. The 74LS374 has tri-state outputs which are unused in this example. (ground pin-1)

Fig.5

Fig.6 shows a Z80 PIO interfaced to the Spectrum and shows the edge connector connections. In addition to the address, data lines and RD, it has connections to the M1, IORQ and INT. There are also two connections for the "interrupt enable input" and "interrupt enable output". These are only of relevance when interrupts are being used.

Fig.6 shows the two ports (PA0---PA7 and PB0---PB7), the ARDY, ASTB, BRDY and BSTB are handshake lines and will not be used in any of the examples here. Before the PIO can be used it must be initialised; to do this we must write the software to send words to its control address, and tell it in which mode it is required to operate and which are input and output lines. The mode can be set as follows:-

D7	D6	D5	D4	D3	D2	D1	D0
M1	M0	x	x	1	1	1	1

x is not used by PIO and can be either logic-1 or 0.

Where mode 0 = byte output with handshaking
mode 1 = byte input with handshaking
mode 2 = byte input/output with handshaking
mode 3 = control mode

We shall be using control mode-3 (255 decimal).
The next word sent to the PIO will set inputs and outputs in the following manner:-

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	0	0	1	1

Where 0 sets that bit to output 1 and sets it to input. In the case of a PIO wired as in our example (Fig.6), both these words would be sent to address 93 to initialise the A port. Address 93 is arrived at from the way the PIO is wired, with A7 as chip enable, A6 as control/data select and A5 as A/B select. This can be seen from the following table:-

SELECTED	BINARY A7----------A0	DECIMAL
Port A data	0 0 0 1 1 1 1 1	31
Port A control	0 1 0 1 1 1 1 1	93
Port B data	0 0 1 1 1 1 1 1	63
Port B control	0 1 1 1 1 1 1 1	127

(NOTE: A0 to A4 should be left at logic-1 so as not to disrupt the normal Spectrum I/O).

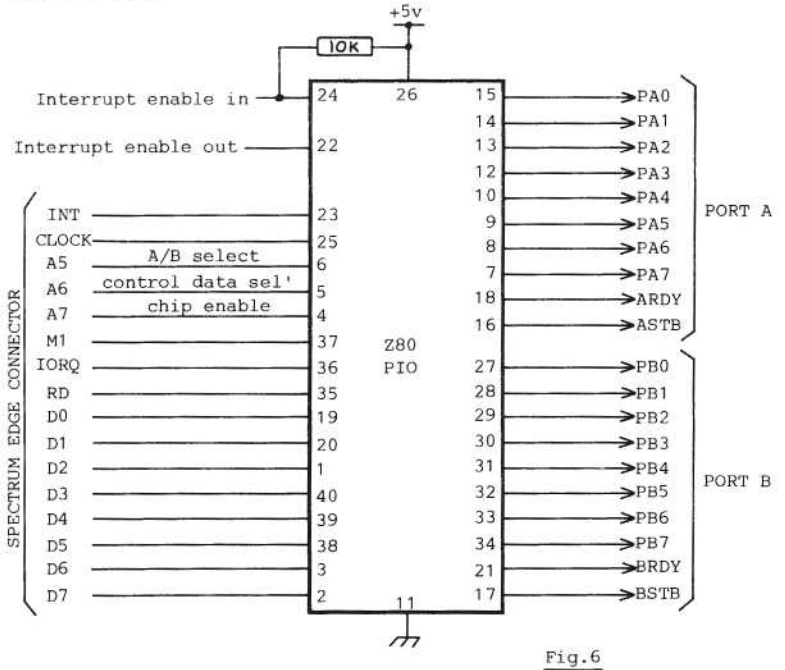


Fig.6

From this table we arrive at a basic program that will initialise Port A and set D0 and D1 as inputs and D2 to D7 as outputs.

```
10 REM port A initialisation
20 LET DA = 31
30 LET CA = 93
40 OUT CA,255
50 out CA,3
```

(NOTE: Line 20 sets the data address to 31, so all that is required is OUT DA,DATA or IN DA,).

The PIO should now be running on the A port. This is OK for input but for output the drive capability is only enough for one LS TTL gate, so if you wish to drive LED's and such like, a TTL buffer is required.

LITERATURE RECEIVED

The Editor acknowledges with thanks the following literature which has arrived at the editorial office during the past few weeks:

NBTV JOURNAL

Volume 10 number 3 was another interesting and informative issue. A slight deviation from strictly NBTV was included entitled "Disc to Drum Without Distortion", by A.J.Quinton.
This interesting magazine has several other articles and pages of news, views, reviews and photo's.

TELERADIO NEWS

Issue 15 of this relative newcomer to the TV ranks contained some most interesting articles on DX-TV topics. These include a farewell to 405-lines, TV in the Far East, DX-TV Guidlines by Ron Ham, Technical topics as well as a good deal of news and information.

RADIO AND ELECTRONICS WORLD.

This magazine continues with its high quality. Andy Emmersons' ATV column as always is bright and informative, moreover it drums up some good trade for the BATC!

AMATEUR RADIO

AMATEUR RADIO magazine is particularly suitable for the not-too-experienced enthusiast. Lots of basic articles and excellent equipment reviews.

A5 AMATEUR TELEVISION MAGAZINE

A5 seems to be in a bit of a rut lately. There are very few constructional articles and the whole thing is littered with advertisements - OK for Stateside readers, but the magazine IS 'International'. The occasional good item does appear though.

CQ ELETTRONICA & COMPUTER

This Italian amateur magazine seems to have a good selection of articles, many though are very basic. As the title suggests, computers feature quite a lot in recent issues - they seem to go a bundle on Sinclair machines.
A reasonable smattering of constructional articles as well as conversions for a seemingly endless supply of war-surplus transceivers makes this journal a good read - for those who speak Italian!

Der TV AMATEUR

Our West German colleagues' ATV magazine continues to be a very workmanlike publication. The articles tend to be rather RF biassed - video seems to be of secondary importance over there. The articles, despite being in German, are obviously well written and, although some of the illustrations leave something to be desired (the original hand-drawn, 'back-of-an-envelope' job is often pasted-up directly), subjects covered and information given is to their credit.
The magazine is very well presented enjoying, as it does, the luxury of being typeset.

SOUTH WEST AERIALS

Their latest catalogue contains a superb range of domestic and DX-TV aerials, amplifiers, converters plus a whole host of accessories and sundries. Also listed is a super little 6" portable colour receiver/monitor- CX-610GB - covering bands I, III and UHF. It has switchable 5.5, 6.0 and 6.5MHz sound spacings and PAL/SECAM options.

HOME COUNTIES NEWSLETTER

The newsletter 'Line Out', produced by the Home Counties ATV group, is a very lively publication. The latest issue contains useful articles, news, information and updates on their proposed ATV repeater. A 'go-ahead' group that is always on the look out for new members: contact G4WGZ.

DIANA HORSLEY - COMPONENTS

This regular list of discount components and bits and pieces would be welcome in most shacks. Special offers abound and a good range of components is stocked. Stocks are obviously ever-changing and there are often some good bargains to be had. The latest lists include oscilloscopes, computer terminals and a second-hand video recorder.
113 Clare Road, Braintree, Essex CM7 7PQ.

IDEAS FOR AN FM-TV TRANSMITTER

By Jan-Martin Noeding LA8AK
and Arnt Loeke LA4WN

This article sets forth some ideas for the design of a 24cm FM ATV transmitter, as devised by LA8AK and LA4WN, the latter being the first Norwegian amateur to have obtained limited permission to operate in the 24cm ATV band. The frequencies which may be used are above 1250MHz, but well below 1296MHz, and transmission must cease if there should be any interference to other primary services. Several successful demonstrations have taken place, a notable example being the use of a mobile transmitter from a van in the middle of a wood to televise participants in a run. The 24cm FM transmissions are free of many problems associated with AM TV, and the signal threshold for good pictures is much lower. Favourable comments have been received even from professional engineers of the Norwegian broadcasting organisation, who were surprised to see that the quality from LA4WN's equipment was better than that which they achieved on occasion!

CIRCUIT NOTES - FM OSCILLATOR AND MODULATOR

For convenience, an oscillator running at 106.7MHz was chosen, although other frequencies could equally well have been used. The oscillator free-runs at the nominal frequency, and is controlled by a varicap diode, which is used for both modulation and AFC. This oscillator is followed by amplification and a times-12 multiplier chain. It is similar to designs used for local oscillators in FM broadcast receivers. The oscillator and its buffer are constructed together in a screened box, and the buffer is constructed so as to achieve maximum isolation.

AFC CIRCUIT

The 106MHz output is down-converted via a 90MHz crystal oscillator to give an IF frequency of 16.7MHz, thus permitting the use of an ordinary FM discriminator i.c. in the AFC loop. It is possible with this circuit to maintain the final output frequency within about 1KHz of its nominal 1280MHz. The signal feed to the AFC circuit is tapped off the output via a capacitive divider in order to minimise leakage from the 90MHz oscillator. This is a simple circuit and should need no further description. If a crystal of a different frequency is used, it is only necessary to change the IF to achieve similar frequency locking. A very simple mixer circuit is used, employing a 40673 dual-gate FET. The output transformer L3 has a low Q, with a 3dB bandwidth of at least 4MHz. Several different i.c's could be used for the FM discriminator - the simpler versions are most likely to work best, as they are being required to operate above their normal operating frequency, and i.c's with fewer long-tailed pairs in their gain stages have a higher maximum frequency. L5 determines the IF centre frequency, and can be used for fine tuning. A long time-constant is used in the AFC filter circuit, primarily to remove video modulation from the AFC loop.

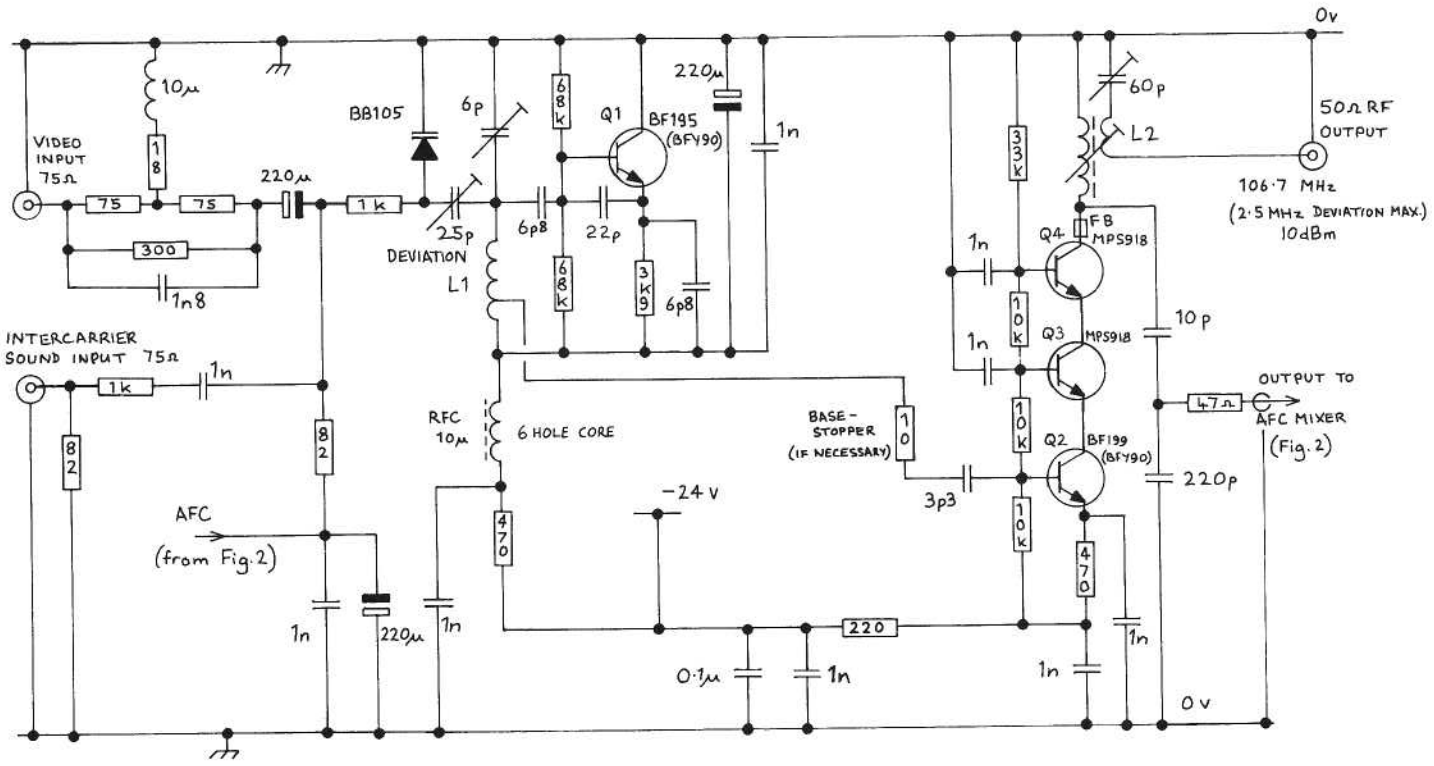


Fig.1 FM OSCILLATOR AND BUFFER

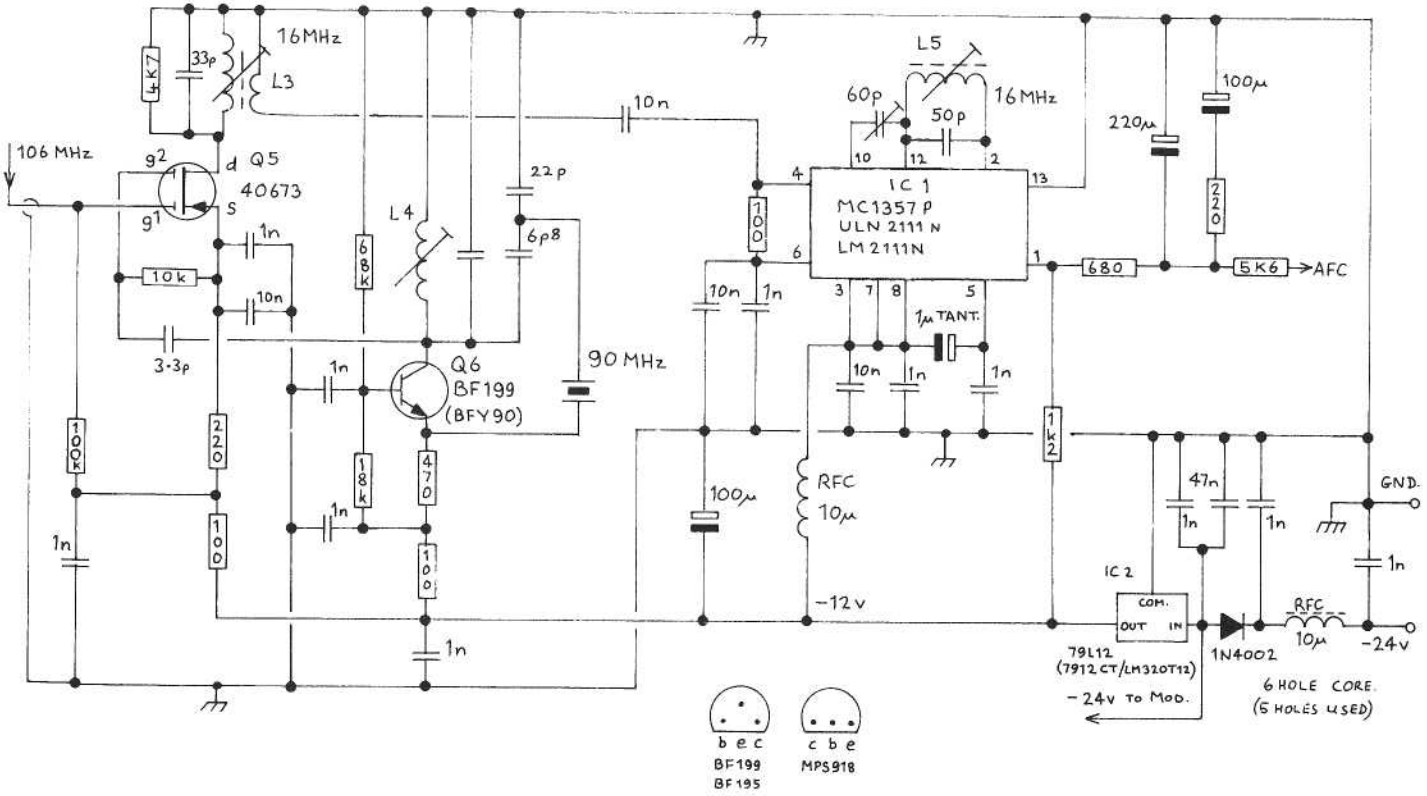


Fig.2 AFC CIRCUIT

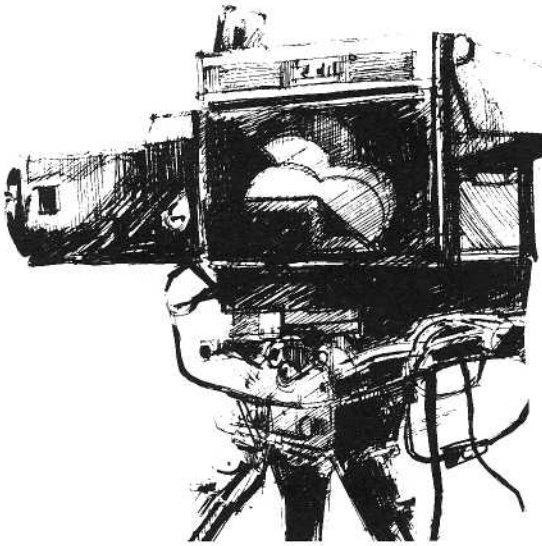
VIDEO MODULATOR

The input video signal modulates the varicap directly, passing only via a pre-emphasis network (CCIR recommendation 405-1). A 1v p-p input will give a deviation of about 30MHz in the final output after multiplication. An input is provided so that an audio signal on a 5.5MHz carrier may be injected.

GENERAL NOTES

It is important that the signal-frequency tuned circuits have sufficient bandwidth to avoid signal distortion, which can cause problems when constructing the multiplier chain. One direct indication of bandwidth limiting is varying output level as modulation varies.

A -24v power supply was used for compatibility with other (surplus) equipment, a -12v regulator providing the supply for the AFC circuitry. Using a 24v supply has several advantages when building transmitting amplifiers, and simplifies the selection of suitable transistors.



ARE YOU ONE OF THOSE TV'ers WITH A ROOM FULL OF TREASURED PIECES OF EX-BROADCAST EQUIPMENT?

IS YOUR ELECTRICITY BILL ENORMOUS?

GOT A HERNIA?

WIFE THREATENING TO LEAVE HOME?

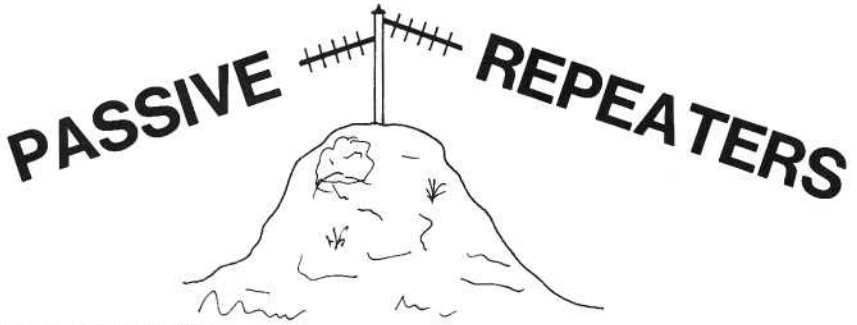
If your answer to any of the above questions is YES, then you should come along to the 1985 ATV rally.

WHY?

There is to be an exhibition of ex-broadcast equipment that has fallen into the hands of us amateurs. Working or not, old or new(ish), restored or not. Bring along your Marconi MkIIIs, your EMI2001s, your Rank Cintel Flying Spots or anything else you care to mention.

If you can bring something, please contact Paul Marshall (G8MJW) on Lincoln 703348 or at Fern House, Church Road, Harby, Newark. Notts., as soon as possible. Power and space easily arranged.

SEE YOU THERE!



By Andy Emmerson G8PTH

In 'TV on the Air' the subject of passive repeaters is raised: this is not something normally described in amateur radio literature, so I asked one of our professional microwave link planners at British Telecom. I found this subject interesting and you may too. Passive repeaters and reflectors are used on microwave links where a conventional repeater station (with signal demodulation, frequency conversion and retransmission) is impossible. They are often used on temporary routes and in isolated spots where no electric power is available.

Passive reflectors are only suited to the higher microwave frequencies and comprise a giant 'billboard' which is used to deflect the signal into another direction. Passive repeaters, on the other hand, comprise two aerials, mounted back to back and connected, so that a signal received on one is retransmitted by the other.

To be effective a passive repeater must be located at an obstruction which blocks a line-of-sight radio path between the two ends of the radio link. It is important that no overshoot from the original transmitter reaches the distant receiver, otherwise this signal may cancel out the retransmitted signal (phase cancellation due to the different path lengths). At lower microwave frequencies, such as 1.3 GHz, phase cancellation becomes more of a problem, though it can be minimised by a change of polarisation (horizontal on the first leg and vertical on the second leg of the route).

It is easy to work out the path loss on a route with a passive repeater. You add up four sets of aerial gain and then subtract the two path losses. The feeder and connector loss in the passive repeater can be ignored. In practice, a 10 km link with two hops and a passive repeater shows the same loss as a 70 km link in one hop - at 6 GHz at least. CQ-TV will be pleased to hear about any experiments.

DX on 24cm

Netherlands

FM simplex frequency - 1275MHz; in areas CL48 (Eindhoven) and DL03 (Aalten) on 1252MHz (planned FM repeater input). AM simplex on 1252.5MHz. Talkback is 144.750MHz, also 145.350MHz (more local).

France

All French stations transmit on 1255MHz and tend to have crystal controlled receive converters on this frequency. Talkback frequency is 144.170MHz +-20kHz, FM or SSB. 144.70MHz is sometimes used around Le Havre, but 144.75MHz less frequently since it is a repeater input frequency.

SSTV IN THE U.K.
HOW IT ALL STARTED

By John Plowman G3AST

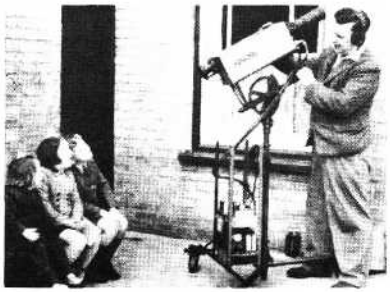
Most of us know the first history of SSTV; how Cop' Macdonald devised the system as a project whilst at college and how it developed into the slow scan we know today. What you may not know is that a similar system had already been developed right here in the UK before Cop' Macdonald's paper was published. Moreover the person concerned was a BATC member.
Here then is the fascinating story of the events in the UK which led up to practical slow scan TV, told by the man himself: John (Pluff) Plowman.

At G3AST, facsimile did not start off as slow-scan at all but merely as a means of saving money!

Shortly after world-war 2, money was short and, being newly married, I found it difficult to support home building, amateur radio AND photography simultaneously. Photographic paper was not only scarce but cripplingly expensive, although 35mm nitrate 'surplus' film stock was abundant. I was therefore in the position to take photographs but was not able to print them.

My researches revealed that Carl Zeiss had done some experimental work to produce a positive image from a negative plate, but their involved semi-silvered mirrors and optical interference techniques were beyond the average handyman.

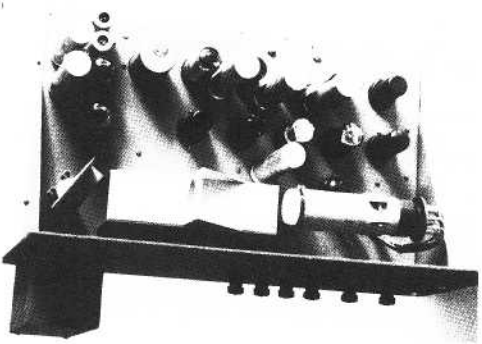
Without too much thought into what was involved, I resolved to make a flying spot scanner, and although I had heard via the 'grape vine' that G2DUS had managed to import a 5527 Iconoscope tube and was "fooling about" trying to produce CCTV pictures, I decided to go it alone rather than pay him a visit.



1. Ivan Howard G2DUS/T with his 5527 camera in 1950. (BATC archive)

My only (limited) experience with pickup from 35mm film was in the cinema world, and my first experiments to ascertain the amount of signal available from a 35mm transparency set up, used a Weston Electric photo cell type 2A - which I still keep as a museum piece. The output from these cells was microscopic and of course hum reared its ugly head in the high-gain amplifier. The value of my PEC load went up and up until, with a 2.2M resistor fed from a 60-volt dry battery and five stages of battery amplification, coupled with a 3-Watt filament light source, I was able to realise a 1-volt difference between peak white and black. The bandwidth of this set up was awful, the amplifier alone falling off at about 10Kc. The significance of this performance, or rather lack of it, for some reason, did not gel sufficiently for it to register that I was on a loser.

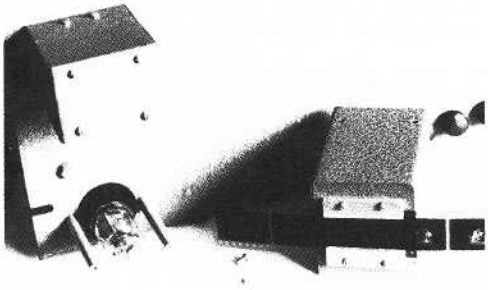
For my flying spot, I pressed into service a GEC4103E4 1.5" flat face monitor tube,, as I had access to an everlasting source of them in more or less servicable condition. Although the tube was overrun at 1200 volts, the output from my crude battery amplifier was vestigial, and another stage of gain was necessary, with all the attendant problems of instability. The "video" output was fed back to the scanning tube grid to produce a constant brightness feedback loop. With this arrangement, and free-running timebases running at a speed where flicker was acceptable, the resolution was such that the difference between a circle and a cross could just be resolved provided these were inked boldly upon a clear piece of film, using indian ink.



2. The start of it all. A prototype Flying Spot Scanner unit for viewing negatives in a positive sense.

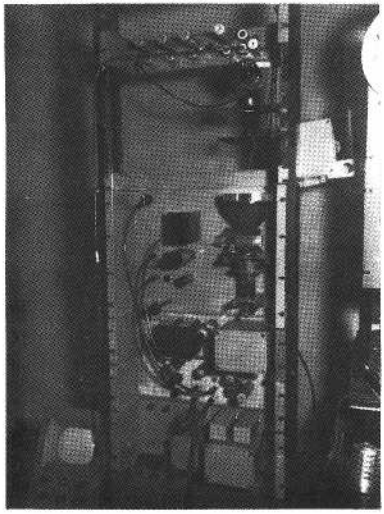
My resolve to take up golf as a hobby was swept away when I heard about the 931A multiplier tube; this surely would solve all my problems. With indecent haste I scrapped my existing rig and produced a neatly folded up version, retaining the 4103E4 tube, but improving the focussing arrangements by mounting the (enlarger) lens on an unduly long sliding mount in order that the various focal lengths could be accomodated. The unit is shown in photographs 2 and 3. The scanning raster is focussed onto the surface of the negative via a lens and the two surface silvered mirrors, the first of which deflects the beam through the front panel, and the second downwards on to the film. The 931A is contained in an almost light tight box underneath the film. Naturally, as the scanning tube is now tucked away, the feedback concept was abandoned and a second tube, a Mullard ECR30 was used to display the picture as a positive. Sweep voltage was common to both and no flyback suppression was used.

There is little doubt at this time that I had no appreciation in technical depth of the relationship between spot size, scanning rates, amplifier bandwidth and the resolution capability of the system. At scanning rates that produced little flicker, the response of the system was inept enough to yield such a poor picture that the arrangement was virtually abandoned, and thoughts turned away towards ham radio, and a super modulation scheme fermenting away in my mind.



3. The scanning beam is reflected twice. and passed through the film to the photomultiplier in the box below.

By 1956 I was aware of useful goodies such as the 5FP7 radar tube, available in considerable quantities for as little as ten shillings (50p) each! The only way to contain my new enthusiasm was to start again with a clean sheet of paper, and I tackled all the old problems with relish. My scanner became a 5FP7 and the viewing tube a VCR517. Both tubes shared the same sweep generators. My main concern initially was picture quality, although I was prepared to retain the 931A, which is particularly noisy, in order to exploit the high output. Photo 4 indicates the use of a more open experimental construction, taken during the development programme. The curious 'lump' hanging pedulously outside the rack is a 900-volt outrigger power supply for the photomultiplier tube! My early video amplifier, using 6AC7/1852 high trans-conductance pentodes was scrapped and replaced with a strip of EF91's - at least I was coming up to date! In order to secure a good bandwidth fairly generous interstage coupling capacitors were required and our old friend hum re-appeared. This was improved tremendously by returning the centre tap of the video amplifier heater supply to a small positive voltage - in this case the cathode (suitably bypassed) of the output stage. One has to remember that the field sweep generator was free-running at about 16 fields per second to avoid flicker, and hum bars wandered up and down the picture in a random manner. The line frequency was almost anything. Amongst all this clutter however, there was the promise of a decent picture.



4. Updating to a 5FP7 scanner yields a somewhat 'Heath Robinson' arrangement but technical improvements were significant.

I think that it was at this point in time that I made two simultaneous decisions. The first was that the after-glow characteristics of the UCR917 were not being fully exploited and secondly, the control grid of the scanning tube was unused. A couple of hours later, I had the answer. Hastily I erected a 20kc multivibrator, using a 6SN7, and capacitively coupled one anode into the brilliance grid of the scanner. Removing the valves from the field scan generator, I watched a single horizontal trace on the scanner. As I reduced the line frequency the dots came crowding in until the gap between adjacent spots was the height of the trace, ie. the spot was now square, and I had a line frequency of 100cps - give or take a bit. A soldering iron in the field sweep generator was required to make a considerable change to circuit constants, for initially, I recall I settled for a field readout time of about two seconds.

I took great delight in removing all my robust coupling capacitors from the video amplifier and replacing them with 1000pFs - now it was a pulse amplifier! The output was modified to work into a Cockroft doubler which, after a small capacitor bypass to eliminate the dotting oscillator grid, was fed to the display tube. My problems were over - no hum bars, no DC restoration problems and no need to work in darkness!

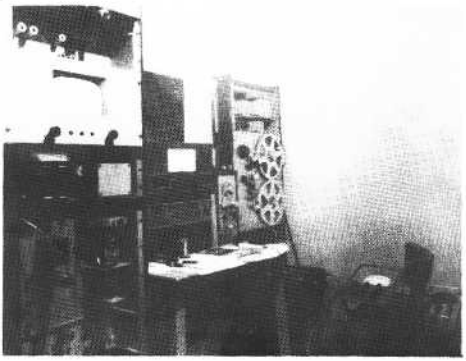
Several weeks were spent playing with my new system, and it was clear that my optics left a deal to be desired. Scanning through 35mm transparencies was only mediocre, reflective scanning from postcards showed promise, but best of all was direct scanning through glass plate negatives laid on the face of the 5FP7 and collecting the light into the 931A via a condensing lens. Success at last.

In parallel with all this activity, I had built myself a tape recorder. Now when I say "built" I don't mean that I had bought a deck and built up the electronics - I had built the lot, deck and all. The experience gained in fine mechanical engineering has stood me in good stead, and although I had to make several attempts, the fifth was beyond reproach - a three-head system, 15 inches/sec and virtually flat to 22kc - what a wonderful opportunity to store my neg's in positive form on tape! Another long think ensued. Tape OK for high frequencies - but how about that low frequency drop? The answer was not long in coming - wide band FM as used for telemetry!

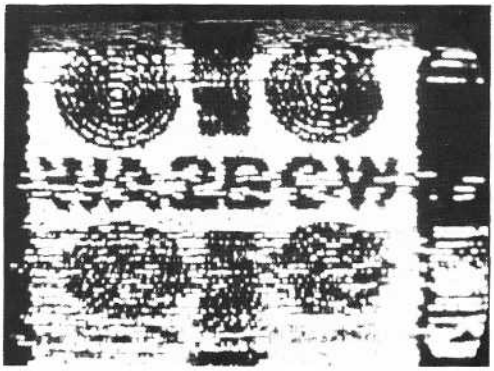
With surprising ease I produced another 6SN7 multivibrator and carried out a series of experiments to ascertain the relationship between the potential of the grid returns and the PRF. The results were remarkable - almost perfect linearity. The output of the Cockroft doubler previously described was merely connected into a cathode follower, and the cathode fed to the grid returns of the 6SN7. A few minutes with 'Waveforms' (McGraw-Hill) sorted out what I had to do with my new FM signal - a storage type counter - often jocularly referred to as the "cup and bucket" counter. I felt at this point that I was on the edge of something really big.

I had been taking 'QST' magazine since 1940 and the very next day the latest issue dropped through my letter box. You can imagine my surprise when I opened it at breakfast to see before me Copthorne Macdonald's paper on Narrow Band Image Transmission. My scrambled eggs shot across the room as I started to read the article - here was a system virtually identical to my own, but with FM replaced by AM. Furthermore, Cop' was already committing pictures to tape, and using a 3¾"/sec tape speed.

That night I did not go into the shack at all but concentrated on a carefully detailed letter describing my activities to date, followed by a request for a sample tape from the USA. The response was electric (!) and a reply came almost by return, indicating Cop's willingness to cooperate in any way possible. A feverish two weeks of activity followed, knocking up line and field sync generators. The tape from Cop' was fitted to a borrowed tape machine and 'playing' into my display only a few days after its arrival. Results were entirely acceptable, the format was square rather than



5. Set-up used for the first trans-atlantic reception of slow-scan TV. Signals were monitored live via the Eddystone S640 receiver. The home-built recorder taped the entire transmission.



6. One of the better snatches of signal photographed off-air in real time. The callsign reads: WA2BCW.

the familiar 4:3 but the controls on my line and field generators were able to lock in to Cop's rather lower frequencies. My lash-up arrangements were formalised in the quickest manner possible, and a portable display unit constructed for use at the ATV convention. The AM sub-carrier was easy to amplify, and the output stage was fed into a 1:1 transformer with a centre tapped secondary and 10kv insulation. This recourse doubled the subcarrier frequency and simplified filtration, whilst allowing the deflector plates to run direct-coupled to the electrostatic tube. Results from this device were most encouraging, as all those who attended the exhibition will recall. Interest in the project was widespread but somewhat superficial with one exception. Mr. Grant Dixon was very interested and became active in slow-scan. From that moment on there developed a friendship which still continues to this day.

Letters were now flying to and fro between Yeovil and Elmira, NY State which was Cop's QTH. In parallel with this, applications were made to the GPO via the good offices of John Clarricoats (RSGB) and John Tanner (BATC). A successfull transatlantic transmission was made live during the afternoon (our time) on December 20th 1959. The whole transmission was recorded on tape with 'on the air' monitoring taking place simultaneously. Of the several hours recorded only a few seconds here and there were anything like solid copy, but overall the experiment was considered a success and was reported in the National press as such on the following day.

7. The same picture taken during a slightly later transmission. (BATC archive)

A booklet on slow scan quickly followed, as did a paper on the subject kindly read to BERU on my behalf by G3NDT.

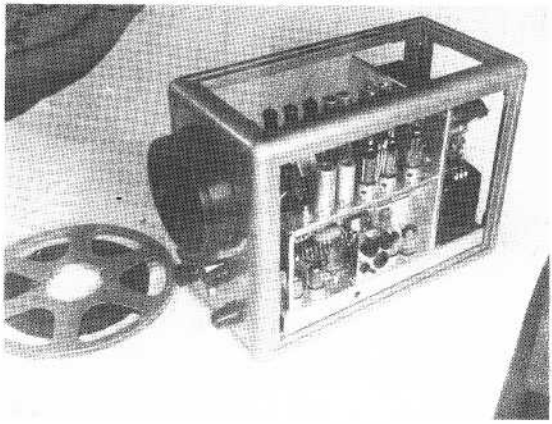
Following this feverish activity, I was gratified to receive the RSGB Courtney Price trophy for the years most outstanding contribution to amateur radio.

Apart from Grant Dixon's eager interest, slow scan did not catch on generally and because of this my interest also flagged from lack of support. It was a further saddening thought to note that interest did not really rise again until slow scan monitors became available commercially. Nevertheless, it is heartening that current standards have widely opted for wide band FM as used in my prototype. With retirement in the offing later this year, it might be

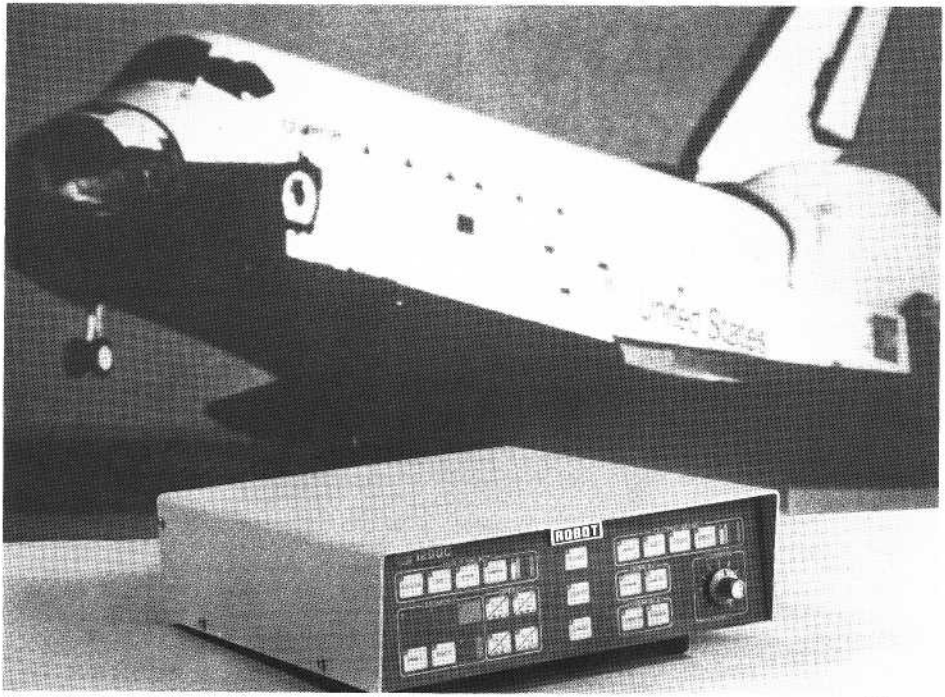
Worthwhile blowing the dust off some rather curious lumps of gear still stored up in the attic!

And the photography?.....Well, now of course, I can afford to buy the paper!

8. Picture from Cop' Macdonald's early tapes using the original 'lashup' rig. This was before the first transatlantic tests. The picture was first seen in CQ-TV41 in 1959.



9. A later 'de-luxe' SSTV monitor built by the author in 1962. (BATC archive)



SPACE-AGE ROBOT

The recent upsurge in SSTV material within these pages has created quite a lot of feedback from readers. A letter from Damien Mannix G3XER, Managing Director of ROBOT (U.K.) Ltd., makes some interesting points and reads as follows:

Grant Dixon's excellent articles on Slow Scan Television in Issues 128 and 129 were read with great interest by us and I am sure many of your readers.

He is of course quite correct that the 128 x 128 Pixel Scan Converter does not use the full potential of the system. In our commercial models we have offered the 256 line horizontal resolution he suggests with 128 lines in as little as 8 seconds using a rather narrower band width than is available to radio amateurs. However, as is obvious from a study of the figures in his paragraph on resolution, this is starting to approach the other extreme and running the system rather faster than it should go.

Returning to amateur slow scan we are delighted that such a distinguished expert as Grant Dixon is obviously in favour of many of the developments we have introduced in our '450C' and '1200C' Colour Scan Converters whilst still retaining compatibility with previous Slow Scan Systems and Standards. He might be surprised to know that we have received our share of criticism for incorporating these developments, particularly the 4:3 aspect ratio, more efficient use of the available band width and our single frame Time Multiplexed Component Colour System which whilst demonstrably more efficient and accurate than any previous colour SSTV transmission mode is admittedly NEW.

We were of course delighted to have the '1200C' chosen for Space Shuttle Mission 51-F though we gather that decision has not pleased everybody.

Needless to say we will continue at least trying to please all of the people all of the time.

Robot (U.K.) Ltd., Building 33, East Midlands Airport, Castle Donnington, Derby DE7 2SA.

CONTEST NEWS

INTERNATIONAL ATV CONTEST 14/15TH SEPTEMBER 1985

Please note the rules are as below and are basically unaltered from last year - the points gained from operation on each bank are not combined. Note also new locators must be used.

SECTION A: TRANSMIT/RECEIVE STATIONS

DATE: 14/15TH SEPTEMBER 1985

TIME: 1800gmt Saturday - 1200gmt Sunday

BANDS: 432, 1260, 10,000MHz

SCORING: 2 points per kilometre for each two-way QSO.
1 point per kilometre for each one-way QSO.

EXCHANGES:

1) Code group consisting of four non-sequential digits individually chosen by each entrant, eg: 1865 or 9732. THIS CODE GROUP MUST BE EXCHANGED ON VIDEO ONLY.

2) Call, new locator, report, serial number starting at 001. This data is to be exchanged via video or, if necessary, by sound.

ENTRIES: Must include log sheets recording all the above information together with your full postal address, locator, code-group used and station details and be mailed not later than 30th September 1985 to: G. Shirville G3VZV. 18 Church End, Milton Bryan, Milton Keynes, Bucks MK17 9HR.

NOTES: Multi-operator stations may only use one callsign. QSO's via repeaters do not count. Please keep ALL video transmissions as brief as possible and QSY from the calling channels when contact has been established.

SECTION B: RECEIVE ONLY STATIONS

The same rules are applied as above. Please note; entrants in section B may not "give" points to those in section A - ie receive only stations may not "advertise" for one way QSO's on 144.75Mhz!

RESULTS
RESULTS

1984 INTERNATIONAL ATV CONTEST

70cm SECTION - A TRANSMIT/RECEIVE STATIONS.

POSITION	CALL	SCORE
1	F3YX	13884
2	F8MM	12811
3	ON7ZI	9958
4	F1FVX/P	7539
5	F1FRE/P	7303
6	ON5ID	6416
7	F1HKT/P	6292
8	PA0ERW	5662
9	PA0SON	5310
10	F6APE	5096
11	DL0PT	5041
12	ON7MB	4941
13	F1ETJ	4818
14	G8MNY/P	4770
15	G4CRJ	4692
16	ON7PN	4575
17	G6CUQ/P	4381
18	G6WOR/P	4332
19	F2FD	4318
20	DJ0OE	4129
21	PE1DEO	4092
22	F1FHL	4085
23	ON5NK	3621
24	F1AGO	3616
25	ON7LT	3582
26	G4NUT	3538
27	G6YLG	3451
28	F1ESA	3443
29	PA0HVB	3249
30	PE1HXD	3244
31	F6FZO/P	3243
32	G5KN/P	3085
33	PA3DIE	2721
34	FIGXY	2702
35	G4RNA	2636
36	ON4KSI	2604
37	F1GKO/P	2491
38	F1GWR	2395
39	G1DDA/P	2337
40	G4EUF	2294
41	DL9YAK	2205
42	F6DBA	2180
43	DL6SL/P	2047
44	PE1BZM	2001
45	PA2ENG	1999
46	G6HCT/P	1947
47	G4RSB/P	1887
48	DL6NBM/P	1867
49	G3SQQ	1749
50	ON4ZE	1723
51	G1COI/P	1701
52	DL3ZAU/P	1684
53	G8UGU/P	1660
54	PA3AOG	1647
55	DL4RBB/P	1605
56	G8BWC	1568
57	FIBJL	1542
58	PE1ITR	1495
59	G6HMS	1463
60	G3YQC	1424
61	ON7NI	1415
62	ON1KEY	1403
63	PA3CQE	1391
64	DL9EH	1374
65	ON1BPJ	1345
66	G4VTD	1343
67	DL0OW	1325
68	DB5IB/P	1261
69	F1GBS	1223
70	F1HOV	1202
71	ON6BM	1196
72	G3SBV	1161
73	F6CBH	1137
74	F1FRG	1102
75	F2AI	1051
76	F1KRJ/P	1014
77	DG7YCX	993
78	G1BTF	981
79	F2IL	956
80	PA0BOJ	948
81	DF6VB	914
82	G8ZQF	906
83	PE1GVS	851
84	G4VBS	837
85	PA3BJC	831
86	G1APD	830
87	G6JFN	797
88	PA2AAD	785
89	PE1APH	780
90	DB1MJ	770
91	PA3CZY	769
92	F1ETW	758
93	G6SKO	754
94	F6ANW	715
95	PE1HLR	705
96	G8XPZ	702

97	DJ9VX/P	699	110	DG5FAV	428
98	PA3CHH	665	111	G4TEP	420
99	G6PKS	654	112	DC6CF	344
100	F6FGE	603	113	G8EUX	288
101	DA4DG	602	114	PE1FYZ	279
102	GM4BVU	581	115	DL3ZAA/P	278
103	PE1BZL	540	116	PA3BPG	185
104	G2BMI	526	117	DK8TE	164
105	PE1HFD	511	118	F1DBN	163
106	DJ4SA	488	119	DD9JV	154
107	ON6AN	472	120	PB0AEP	137
108	DB0CC	448	121	G4LXC	116
109	G8PTH	434	122	DJ4XT	40

70CM SECTION - B RECEIVE ONLY STATIONS

1	F6PZK	3062	13	PA0GBE	650
2	PA3DEA	2115	14	NL8553	633
3	ON4AVN	1385	15	R.Muntjewerff	618
4	NL5184	1301	16	ON5KO	508
5	ONL4220	1240	17	PD0KJJ	371
6	PA3CPF	1205	18	PE1NKO	260
7	NL6996	1127	19	PE1JAM	258
8	PE1JRX	1028	20	NL8722	222
9	DD4DY	946	21	NL8506	211
10	PE1DCD/A	845	22	DE6KLM	141
11	F6BMC	780	23	F1HIO	113
12	PD0MCL	775	24	PD0LID	75

24cm SECTION - A TRANSMIT/RECEIVE STATIONS

1	F8MM	1249	17	PA3AOG	168
2	F3YX	1010	18	G4WGZ/P	145
3	F1FVX/P	782	19	G6HCT/P	139
4	DJ0OE	757	20	PA2AAD	130
5	F2FD	735	21	G4LRT	126
6	G8VBC	602	22	PE1HZR	125
7	G6WOR/P	550	23	G8PTH	111
8	F1ETJ	464	24	DL9EH	110
9	G4CRJ	351	25	G4VTD	110
10	PA3DIE	321	26	PE1GVS	105
11	G3YQC	262	27	G6JFN	98
12	G4EUF	257	28	G4LXC	67
13	F1FRE/P	250	29	PA2ENG	64
14	F6FGE	204	30	G1APD	40
15	G5KN/P	201	31	PA0BOJ	30
16	DC6CF	184	32	PE1APH	30

24cm SECTION - B RECEIVE ONLY STATIONS

1	NL5184	159	
2	PA3BJC	87	
3	F6FZO/P	87	
4	DD4DY	0	(no code groups shown)

WINTER CUMULATIVES 1984/85

Due to the early publication date for CQTV 130 I have not been able to finalise the results but from the early returns it appears that there was plenty of activity - even some on SSTV - a little DX - and at least one masochistic group who ventured onto a hill top for some chilly portable operation. Full results will appear in the next issue.

SUMMERFUN CONTEST 16TH JUNE 1985 (09.00 - 16.00 GMT)

For the first time ever the Contest Rules have produced a storm of protest! so I had better explain the reason behind having it as a multiband contest - ie where a stations score on all 3 bands (including multipliers) is combined for final points.

This is a different system to that used in the International ATV Contest which although also covers 70/23/3cms does not combine the score and which is therefore effectively 3 separate contests. It is however the system that is used in other VHF Contests, viz VHF NFD and was intended to give encouragement to those who possess 23 and 3cm gear to bring it out of the cupboard. It was not intended as a slight to the virility of 70cms operators and one amendment to the rules has been agreed. There will now be prizes for the leading station on each band in addition to one for the overall winner.

MICROWAVE GOODIES

Some lists just received from JVL Electronics describe some most interesting products for the UHF and microwave enthusiast.

A comprehensive range of loopquad aerials covers the 70, 23/24, 13 and 9cm bands in a variety of lengths. Special wideband versions are available for 1.3GHz meeting the demands of ATV'ers and satellite users. Also on offer are Alford Slots for 70, 23, 13, 9, 6 and 3cm which should interest the repeater groups. Aerial combiners are also available.

As well as aerials, JVL offers interdigital filters, narrowband image recovery mixers, 10GHz GaAsFET pre-amps and a transverter/mixer. Plus some other hard-to-get items such as semi-rigid coax, PTFE rod and 10GHz dish feeds. Altogether a very comprehensive list for the microwave man.

JVL Electronics. 26 Fernhurst Close, Hayling Island, Hampshire, PO11 0DT. Tel: 0705 464482.

WANTED

Due to other (BATC) pressures on our present contest manager Graham Shirville, it has become necessary to find someone else to look after BATC contests.

The job is not very time consuming and consists largely of setting dates and rules for club contests and checking and judging entries. A home computer would undoubtably be an asset but of course is not essential.

There is much satisfaction to be gained from administering contest affairs and the (unpaid) job would suit any contest minded active amateur.

If you wish to find out more before deciding, please contact Graham Shirville on 0525 210011 or at 18 Church End, Milton Bryan, Milton Keynes, Bucks MK17 9HR.

On a similar theme, there are often general and specific tasks within the Club which need willing volunteers. Now that the club is getting so large it isbecoming increasingly difficult for committee members to do all the administration and organisational work involved, and there must be many of you who would be willing to take on the odd job or two to help your club. Most tasks may be done from home and would not take up much of your spare time. There would be no need to join the committee or to attend meetings (unless of course you wish to do so).

If you would like your name placed on a circulation list please contact the General Secretary - Trevor Brown G8CJS on 0532 670115; 25 Gainsbro Drive, Adel, Leeds LS16 7PF, stating, if possible, in what fields you may like to assist. As a guide some areas are: Contests, Helping on rally stands etc, copy typing, organisation of events, artwork drawing, answering technical enquiries, local publicity, lectures and talks, video tapes etc. etc.

Please DON'T leave it to the other chap!

(A5 ATV magazine)

THE QUEENSLAND GOLDEN ATV AWARD

This award is introduced to commemorate 50 years of experimental television in Queensland and is for 70 cm contacts made using fast scan, high definition television systems only.

Successful applicants will receive a certificate awarded by the South East Queensland Amateur Television Group, for the accrual of 50 points according to rules.

Award Year: This award shall be available for contacts made between 1 January 1985 and 31 December 1985. No contact points will be considered outside of these dates.

Contacts: A station may be worked once only per day for the purpose of this award. However the same station may be worked many times.
Contacts through repeaters or on other than 70 cm do not count.
To encourage portable activity, one contact among those claimed **must** exceed 50 km.

Sections: This award is available to both transmitting and receiving enthusiasts in any part of the world as follows:-

(a) Transmitting:
For 70 cm pictures transmitted which have been successfully identified by another station; claim five (5) points.
When the transmission path exceeds 50 km, count ten (10) points instead.

(b) Receiving:
For successfully identifying and reporting 70 cm pictures transmitted by another station; claim points as for transmitting.

Applications: Applications for this award should include log details consisting of claimant's call sign, call sign and location of station worked (including distance), date and time, points claimed, and IRC's or $1.00 to assist with tube postage.

A claim form is available from the S.E.Q.A.T.V. Group but is not essential provided details as requested above are provided.

QSL cards are not required, but the application should be checked and signed by another amateur.

Applications should be made to:-

The Awards Manager,
South East Queensland Amateur Television Group,
Post Office Box 3,
Chermside, Qld. 4032, Australia.

SIMPLE GENLOCK UNIT

By B.J.Dandy G4YPB

Having in the shack a couple of ex-surveillance cameras, and having recently built a vision switcher, I needed to find a method of locking the two camera's synchronising circuits together and to enable them to be driven by an external master sync generator. Examination of several popular cameras showed that all that was generally needed was a source of trigger signals at both line and field rates. The system to be described produces suitable pulses of either polarity when driven from a remote source of mixed syncs, or the existing line oscillator. The field train can be superlocked, or with the addition of some extra gating, genlocked, by altering the line count until lock is achieved.

THE BASIC UNIT (Fig.1)

Twice line frequency is generated by a 4046 PLL (IC1) which is set for a minimum frequency, when unlocked, of around 28KHz. The output is divided by 2 in half of a 4013 dual D-type (IC4b) to generate line trigger (LT and $\overline{LT}$). The PLL output is also inverted and fed to a counter (IC5) which divides by 625, the output of which feeds monostable (D) (IC2b) supplying field trigger (FT and $\overline{FT}$) and counter reset.

Incoming mixed syncs are passed through monostable (A) (IC2a) which is timed to block half-line pulses, and compared in the PLL phase comparator with $\overline{LT}$ which is delayed by a front porch circuit built round two NAND Schmitt triggers (IC3c and d). The delay is adjustable to allow the phasing of LT with line drive from the external sync generator. Extra delay may be switched in to compensate for long cables.

The fields can be brought into synchronisation firstly by superlocking. The incoming syncs are also passed through monostable (B) (IC6a) which is set to 3.5uS. When the first equalising pulse has passed, the trailing edge of the monostable drives monostable (C) (IC6b) with a period longer than frame blanking to block the rest of the pulses during that period. The output is further used to reset the counter if it is not at the correct count. When in sync, this pulse occurs 3.5uS after the main reset pulse and therefore has no further effect.

FIELD GENLOCK (Fig.2)

Two additional monostables (E) and (F) are added. (E) is fed from $\overline{FT}$; and (F), with a shorter period, from the incoming reset pulse. The outputs from these are gated together to produce a "correct" or an "incorrect" pulse. The "incorrect" pulse is gated with $\overline{FT}$ and FT to determine in which half of the screen the blanking bar appears, and sets one of two latches in order to modify the line count. If the bar is above centre, a half-line is subtracted from the count and the bar drifts upwards. If the bar is below centre, a half-line is added (by adding two and subtracting one), and the bar drifts

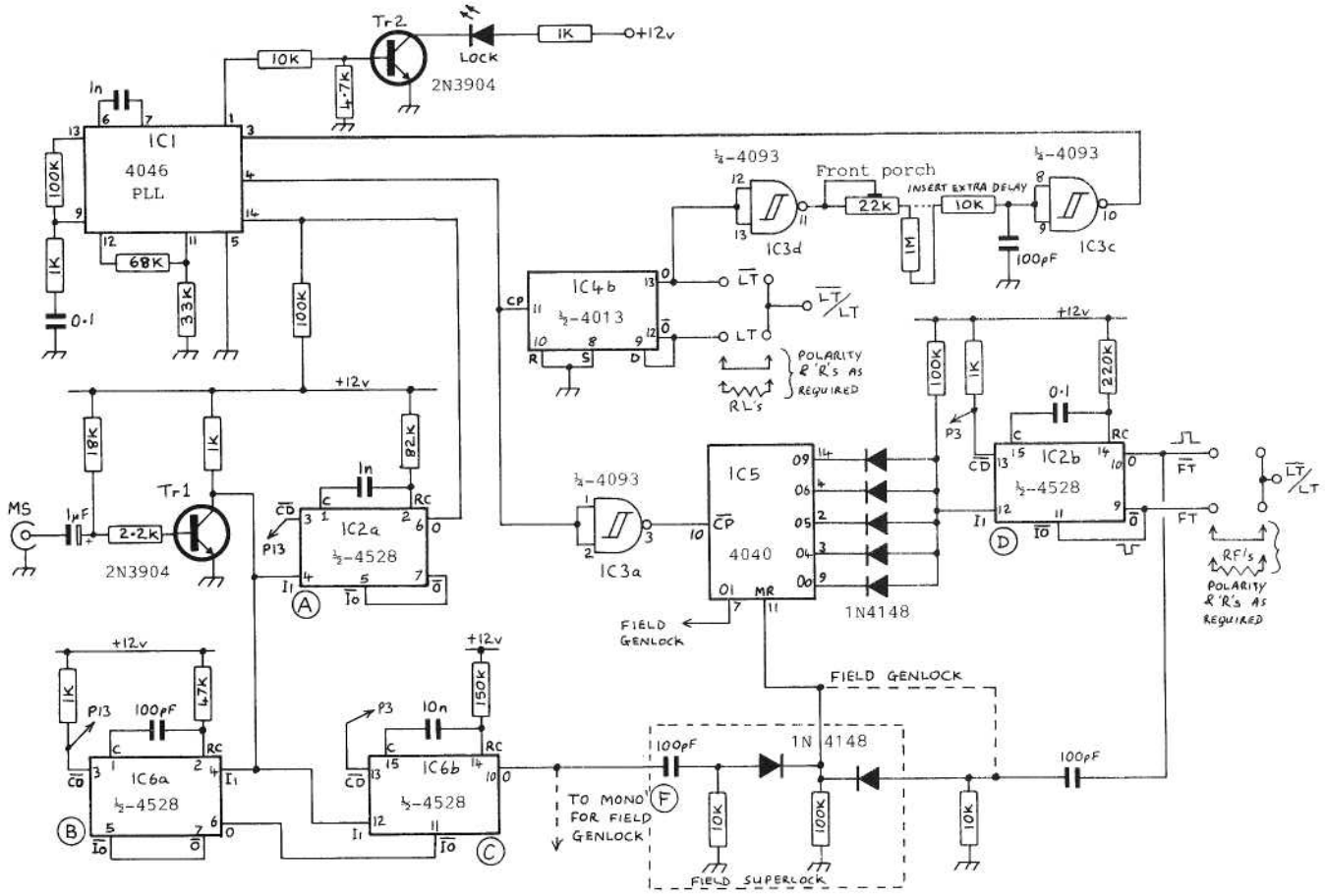


Fig.1 BASIC GENLOCK UNIT WITH FIELD SUPERLOCK

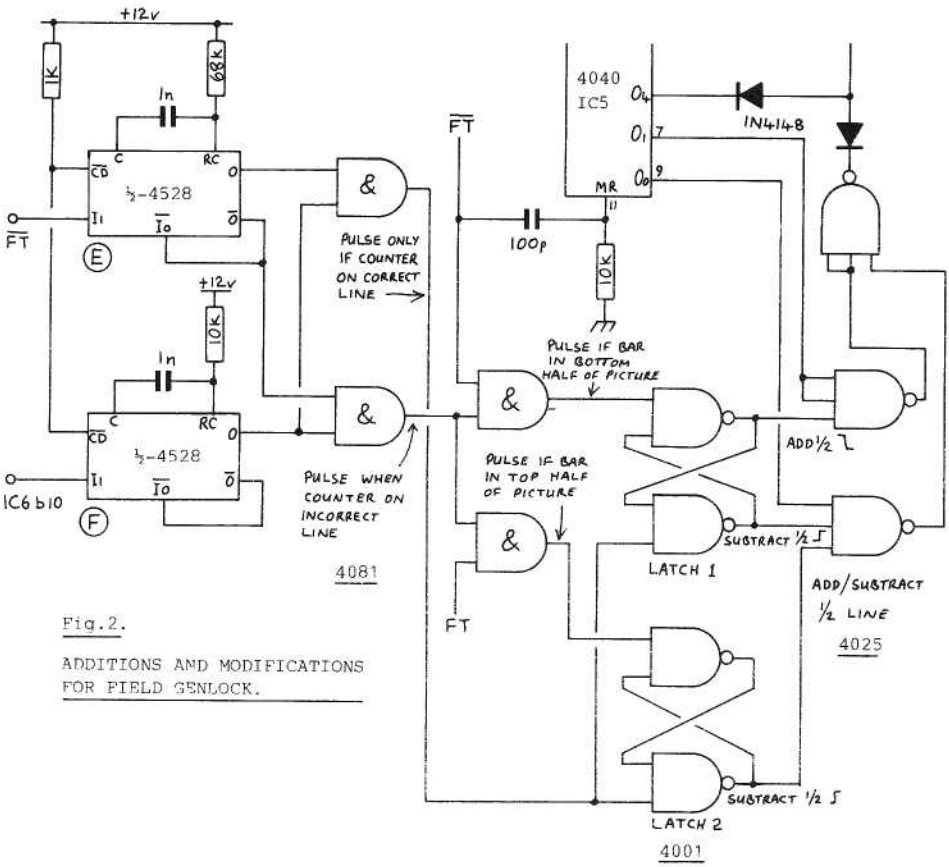


Fig.2.

ADDITIONS AND MODIFICATIONS FOR FIELD GENLOCK.

CONSTRUCTION

Although the layout is probably not too critical, allowing 'Vero board' type construction, a printed circuit board is undoubtably the best way of building this equipment. A full-size print pattern for the basic unit only is shown together with a layout diagram. The board may be double-sided epoxy or glass fibre, the components being mounted on the copper (earth plane) side.

It is good practice to disable all unused inputs on spare IC's, therefore pins 3, 4, 5 and 6 of IC4 and pins 5 and 6 of IC3 should be grounded

Fig.3 shows a method of switching between the internal line oscillator and an external sync source, thus retaining the use of the camera for 'stand alone' purposes.

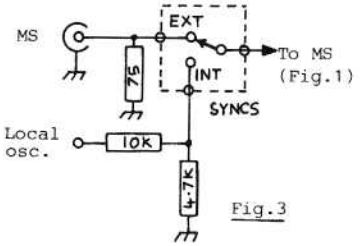


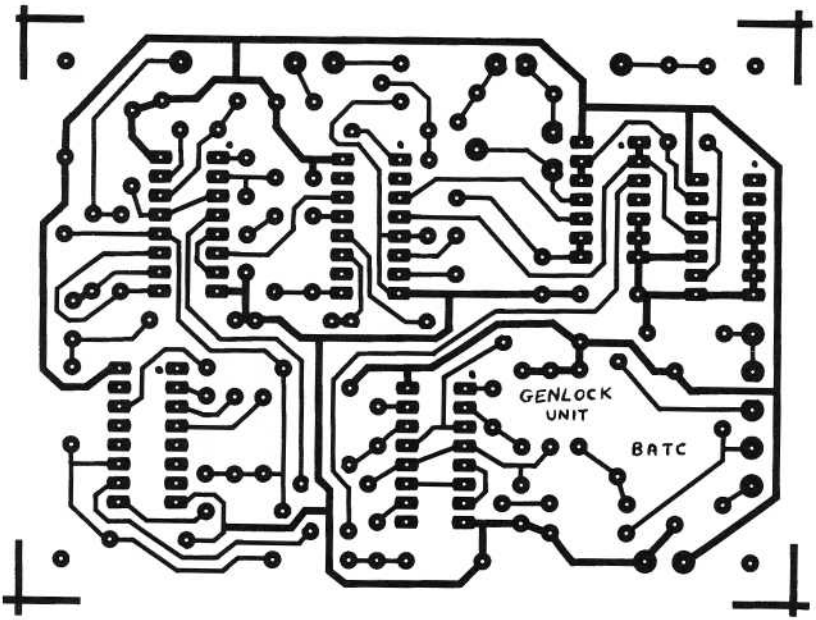
Fig.3

RESULTS

I have built and tested both versions (in prototype form), the full version being at present in use on several different cameras; results are excellent. Whilst it is not practical in these pages to offer advice on specific cameras, the following generalisation may be taken as relevant to the majority of units encountered by amateurs:

Line trigger can usually be fed, via a 10k series resistor, to the base of the transistor previously driven from the mains transformer (mains lock). If in doubt, give me a ring on (Kidderminster) 4265 during the evening or on (Stourbridge) 375525 in the daytime.

It should be noted that, in this article, I have used the convention that LT and FT, like line and field drive, are negative-going, and their inverses $\overline{LT}$ and $\overline{FT}$ positive going.



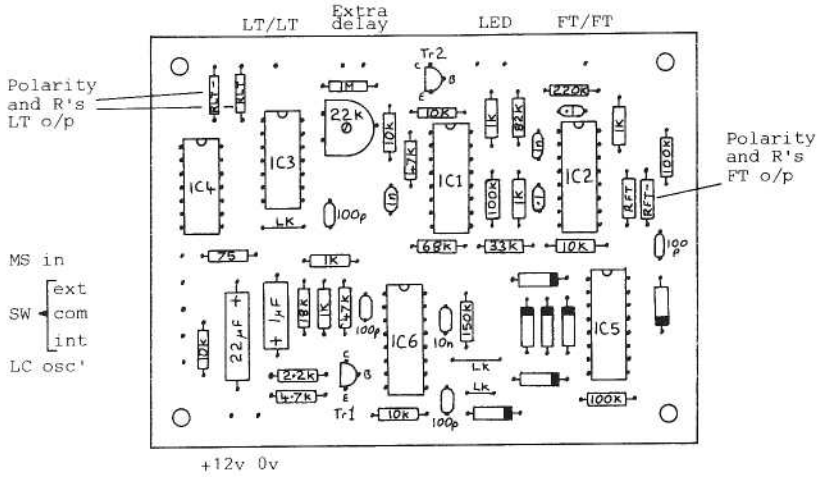


Fig.4 COMPONENT LAYOUT - COMPONENT SIDE

Spectrum BATC Logo

This short program for the Sinclair Spectrum, sent in by Trevor Brown G8CJS, produces the BATC club logo:

```
  5 REM club logo by G8CJS
 10 LET a=22528
 20 FOR c=1 TO 104
 30 READ b
 40 POKE a+b,B
 50 NEXT c
 60 FOR d=22528 TO 23296
 70 IF PEEK d<>B THEN POKE d,48
 80 NEXT d
 90 BORDER 6
100 PAUSE 0
110 DATA 11,14,17,44,46,48,77,78,79,105,106,107,108,
    109,110,111,112,113,114,115,137,147,170,178,203,209,
    236,240,268,272,300,304,332,336,364,368,396,400,417,
    418,419,423,424,428,432,436,437,438,439,440,444,445,
    446,449,452,454,457,460,464,470,475,481,482,483,486,
    489,492,496,502,507,513,516,518,519,520,521,524,528,
    534,539,545,546,547,550,553,557,558,559,566,572,573,
    574,590,619,620,621,622,623,624,625,685,686,687,750
```

HOW HIGH IS LOW?

By Doug B.Pitt.

In the recently published BATC booklet 'Introducing Amateur Television', slow-scan is defined as "a form of low definition TV". Is it? (Slow scanners, please comment). The Narrow Bandwidth Community, unashamedly LOW definition, works mainly with 32 lines (easier for DIY than the old 30 line system) but dabbles in 48, 64 and even 96 lines. This last system, mechanically achieved by J.A.A.Short of Northumberland, represents in his own view, as far as one can decently go within the 'low' category. This opinion is widely shared.

The Baird/BBC 30 line system was, in its own day, just 'television' without any connotations of altitude, but as soon as a higher set of standards was mooted, it became 'low' by comparison. The Selsdon Committee, set up by the Government in late 1934, debated for many months on the suitability of various line numbers and consulted all the European and American specialists of the time. Since a fat contract with the BBC was at stake, all the pioneering TV firms held their breath, hoping for something between 120 and 180 lines. (Note the multiples of Baird's 30).

In early 1935 the report was published and recommended a minimum of 240 lines, which, according to 'Wireless World' "fell like a bombshell on the ears of American radio engineers". At a stroke all competitors were eliminated except EMI and Baird. Within weeks EMI had leapt from 243 lines to 405, judging (correctly) that Baird, tied to mechanisms, could not follow quickly enough.

So 405 lines, thought of as 'ultra high definition' at its inception, became accepted within a few years as just 'high', through simple familiarity.

This sort of subjective judgement has not affected the names of the radio frequency bands over the years. The 'high frequency' band, for instance, represents the same range now as it did half a century ago. The reason is that a sensible system of classification was agreed upon at an early stage in the development of wireless communication. 'High' frequency for example lies between 3MHz and 30MHz, and 'Very High' between 30MHz and 300MHz, and so on, each band increasing by a factor of 10.

For line numbers ten is rather a large ratio but $\sqrt{10}$ would do, so making the steps half-size. Root ten is 3.162 but we can cheat a little and call it 3 exactly. A table can now be constructed as follows:-

Very low definition	10	to	30 lines
Low definition	30	to	100 lines
Medium definition	100	to	300 lines
High definition	300	to	1000 lines
Very high definition	1000	to	3000 lines

et cetera.

This scheme allows the Baird 30 line system to be classified as 'low' definition (just!!), while the 'high' definition category embraces all four main commercial systems, i.e. 405, 525, 625 and 819 lines. Slow scan, at 128 lines, becomes 'medium' definition, so satisfying honour on both sides.

I suggest that the BATC committee should adopt some such classification officially, then stick to it in all future publications.

SSTV STANDARDS

By Andy Emmerson G8PTH

Newcomers to SSTV will be forgiven for any confusion they show at the number of norms used nowadays. To help things along here are the standards published by Wraase, thanks to G3WW for sending them to me.

SSTV/FAX STANDARDS used in the Wraase SC-1 and adopted around the world.

SSTV/FAX modulation	Subcarrier frequencies
Sync	1200 Hz
Black ... white	1500 ... 2300 Hz
Horizontal sync	5 ms
Vertical sync	50 ms

	SSTV 8s	SSTV 16s	SSTV 32s	Colour SSTV	FAX
Scanning lines	128	128	256	256	256
Picture elements (pixels) per line	128	256	256	256	256
Line rate (lines/second)	16	8	8	16	4
Scanning time per frame (seconds)	0.8	16	32	24	64/128
Picture format	1:1	1:1	1:1	1:1	1:1

FAX speeds (lines/minute) 60/120/180/360/240 AM/FM

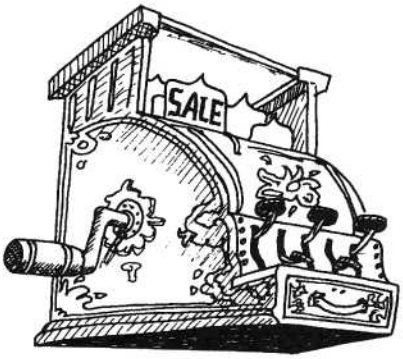
COLOUR SSTV STANDARDS:

Frame sequential colour ... RED, GREEN, BLUE manually switched 1, 2 or 3 frames each dependng on propagation conditions.
Line sequential colour .... RED, GREEN, BLUE lines alternating, synchronised by vertical sync pulse, starting with red and in R-G-B sequence.

The Wraase SC-1 can be modified to have a new colour sync system for the line sequential colour mode. A 1ms long 2300Hz pulse at the beginning of each red line is used to synchronise the colour sequence. Thus even with strong interference the colour will not change during reception of a colour frame. This facility must be switched out when receiving colour from staions not equipped with this system.

The new SC-1 also has a high resolution colour mode in which both memory banks are switched together for 256 lines in colour. Transmission of one single high resolution colour frame takes 48 seconds.

The American Robot system provides 128 pixel x 120 line (12 or 24 seconds) and 256 pixel x 240 (36 or 72 seconds) line displays, with an optional single frame colour system.



MARKET PLACE

ADVERTISING RATES:

Classifieds - 3p per word*
Full page - cover - £20
Full page - inside - £18
Smaller displays - proportional

*Advertisements are placed in this column free of charge to paid-up members. If possible an address label from a recent CQ-TV magazine should accompany your advertisement. Your address will be included unless otherwise requested. All ads should be sent to the Editor at 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel: 0788 69447.

FOR SALE

24cm COLINEAR AERIAL KITS as described in CQ-TV127 are now available from the Worthing and District Video Repeater Group, from R Stephens, 'Toftwood', Mill Lane, High Salvington, Worthing, West Sussex, at an all-inclusive price of £10.95p. please send SAE for further details.

2.5 METRE DIAMETER fibreglass dish with az/el controls, heavy duty stand, works well at 4GHz. £420 ono. Ring Roger Bunney G8ZMM on 0202 738253 (Romsey Hants) for details.

MULTICORE CABLE, 20-way telephone type by STC. New, with grey outer. Cores approximately 1-Amp rating, many uses in the shack. 0.45p per metre, discount negotiable on long lengths (over 100m). Up to 660m available.
K Bailey. 40 Seymour Close, Selly Park, Birmingham B29 7SD,
Tel: 021 472 3688.

SINCLAIR ZX81 MICRO: 16k RAM, good condition, includes PSU, Handbook, 2 ZX magazines, notepad/finance tape. Ideal base for a caption generator. £25 ono.
H Colville G8LKW, 12 Marlborough Road, Smethwick, Birmingham B66 4DW. Tel: 021 420 2649

MEMORY CHIPS, ex-equipment - tested: 2114, 4116 .50p ea. 2118,2148 £1. ea. 4164 £2. ea. Limited number of 4116 and 4164 with side brazed pins etc. Suitable for TV camera experiments at same priccces. Please add 50p postage to total. Many other computer chips available, SAE with enquiry please.
D Hemmingway, 'Ivanhoe', Glen Road, Hindhead, Surrey GU26 6QE.

COMMODORE PET computer, expanded to 32k, PSU fault but working with integral monitor and tape deck. £80. HITACHI GP colour camera, small and light, c/w mains PSU. 'C' mount lens fitting (lens not supplied). £90. SHIBADEN mono camera, can be genlocked. c/w mains PSU, lens and BNC lead (good in low light). £80.
A J Downs. Phone 031 660 4180 (days).

VDU TERMINAL by Control Data Corporation, 15" monitor with anti-glare screen, working OK as dumb terminal, Type No.CC535B. Offers or swap for TV gear. PHILIPS VC60 cassette £4. RIGONDA FIESTA 6" mono TV, working, with copy of service sheet and spare tuner £20. EMI 3119 colour monitor, with circuit, needs new 19" CRT - offers.
Ray Hill G6TSL, 7 Willowbrook, Greytree, Ross-on-Wye, Herefordshire HR9 7JS

RIGONDA & VEGA Russian TV sets available for parts only (no complete ones). Also CRT's, scan coils and panels etc. Please let me know your needs and I will send a price by return.
SAE to: John Brown, G3LPB, 45 Marlborough Avenue, Falmouth, Cornwall TR11 4HS.

AMPEX 1" colour VTR £160. AMPEX B/W VTR £50. MARCONI talkback unit, complete £30. Philips 17" B/W monitors, hybrid £20 each. PYE COLOUR 19" monitors, RGB or composite inputs Offers. ABC TV Video Distribution Amplifiers £15 each. BBC PDA, VDA's £2 each. GPO vision send and receive amplifiers £15 pair. 24v 15A rack mounted power supply £50 or offers. PROFESSIONAL audio jackfields (GPO style) 0.75p per jack. 6-off KD 600-ohm professional faders (West German) £60. MISCELLANEOUS Marconi modules including uni-selector boards. Misc. EMI-201 valve-camera boards. Misc. 2001 remote control panels. TALKBACK panels. Misc. cables for zoom lenses etc. BBC circuit boards with germanium transistors. Offers please. Much other gear of a like nature - please phone and enquire.
Simon Gough Tel: 01 421 3413.

TEKTRONIX 1L30 spectrum analyser plug-in: 975MHz to 10.5GHz. Fits most 500-series Tektronix mainframes. Working, can demonstrate, no manual, offers or swap for interesting 70cm/23cm TV/FM/SSB gear.
Peter Saul G8EUX. 51 Windsor Close, Towcester, Northants. Tel: 0327 51716

* MIDBAND VHF groundplane, professional quality. £1 5.
* 19" RACK CASE, 10.5" usable height, £3. Buyer collects.
* FERRANTI ZNA134 spg chip, brand new, unused and unopened, £20.
* ROLLER tinned PCBs for Elektor 2/70/23cm marker generator (handy gadget!).
I have a small quantity, so first come first served. Don't forget the SAE. Please add a realistic amount for carriage, also ring first to confirm availability or send SAE with letter (in case I have to return your cheque).
Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH. 0604 - 844130.

FOR SALE AT THE BATC RALLY IN MAY:

PYE Silver Lynx camera, as new, handbook £50. ZOOM - 5:1 'C' mount lens for 1" tubes £45. 19" RGB COLOUR monitor, big but working, £30. 4X150 type power amplifier, OK for 70cm £30. 2 x 2C39A UHF amplifier, with PSU in case £40. SONY Rover mono handheld camera, with viewfinder and zoom lens - no data £45. LINK coder, needs attention, circuits £50. VIDEO DA; 4 BBC units in rack unit £10. TV TRANSCEIVER, home brew with built-in monitor 70cm RX, sound and vision transmitter, 3-Watts output £50. 3" IMAGE orthicon tube P807G, believed unused £10. 0-500v variable PSU, metered, 250mA, nice £20. BBC Digital phase shift unit (subcarrier) EP1L/509 £15. All prices O.N.O. Brian Summers, By the side of the outside broadcast van. Tel: 0427 3940 (weekends only).

PRIMARY COLOUR FILTERS for sale. If you would like to experiment with colour slow-scan using a monochrome camera, here's a cheap source of Red, Green and Blue filters. The thin plastic sheet has a reasonably accurate colour response for experimental purposes. As used in theatre lighting. Set of three pieces 100mm square for 50p (any larger size available on request). Please send a suitably-sized S.A.E. to Tony Marsden, G6JAT (QTHR) or 'phone Bournemouth (0202) 766457 (evenings/weekends) for info.

WANTED & FREE

COMPOSITE COLOUR video to RGB and syncs decoder, eg 'Link'. Also wanted CCU 3302E for Panasonic colour camera type WV3300, working or not!
Frank Wood G8NSE, 96 Manchester Road, Astley, Tyldesley, Manchester. Tel: 0942 893884.

HELP! Circuit diagram or any information on ex-services oscilloscope type CT436 made by Hartley Electronics. Nato number 6625-99-914-2606, model HET 2124 (May 1968).
Roger Woods GW8XAN. 20 Heol ap Pryce, Yorkdale Garden Village, Beddan, Ponty pridd, CF38 2SH. Tel:0443 201694

INFORMATION, circuit diagrams, spare parts (especially IC type TCA511) for Inelco Elettronica Professionale camera. D.Anderson G6YBC, 5 Birchfield Avenue, Atherton, Nr. Manchester, Lancs M29 0HR. Tel: (Atherton) 0942 891140.

ANYONE KNOW the Rockwell MM75 Microcomputer chip? I have a quantity! It is used in the Bearcat RX and coin operated machines.
J Brown G3LPB. 45 Marlborough Avenue, Falmouth, Cornwall TR11 4HS.

SERVICE MANUAL, circuits or any information on the JVC GS1500 black and white camera. All expenses paid.
Barry Senior G8YGT. 1 Bedale Close, Coalville, Leicestershire LE6 2BA Tel: 0530 32088.

INFORMATION on Marconi pulse & bar generator type BB00-4108-01. SERVICE and operating information for Ferrograph R-R tape recorder type 713 series-7.
FREE - 6ft 19" rack, modern type, will someone PLEASE collect!
Ray Hill G6TSL, 7 Willowbbrook, Greytree, Ross-on-Wye, Herefordshire HR9 7JS.

SINCLAIR ZX81 bits required such as 16k memory, working or not plus any ad-on units.
John Brown, G3LPB, 45 Marlborough Avenue, Falmouth, Cornwall TR11 4HS.

LOAN for short period: service sheets for Binatone 12" B/W portable TV.
Doug Pitt, Tel: 0602 282896

TO SWAP, BUY OR BORROW, old 35mm slides of testcards, tuning signals, etc. to add to a collection already exceeding 100. I shall be producing a souvenir videotape of several dozen old slide and monoscope generated testcards (and sound idents) during 1985. Keep in touch if interested!
Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH. 0604 - 844130.

405-LINES signal source: Test card generator etc to run vintage TV sets. W.H.Y?
D.R.Higginson G8JET, 28 High Street, Misterton, Doncaster, S.Yorks DN10 4BU. Tel: 0427 890768 (evenings).

EMI "Green Case" SPG, valved, circa 1959/60. BBC UN9/514 "White Module". CANNON A28DIN 41618, 26-pin plug - 6 needed urgently for OB van. SERVO amplifier for U-Matic use with TBC.
Brian Summers. Tel: 0427 3940 (weekends only).

WANTED - CRT type D10-160GH/95474 for Gould 05245A oscilloscope. ALSO ISEP subrack and connectors and MULLARD NXA1020 chip set.
D.C.Saunders. 1 Roberts Close, Wroughton, Swindon SN4 0RS Tel: 0793 813820 (evenings).

SERVICE manual or circuits for Sony mono camera type AVC 34 20 CE wanted.
Dave McQue G4NJU, 6 Laburnum Grove, Bletchley, Milton Keynes, MK2 2JW. Tel: 0908 73277.

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