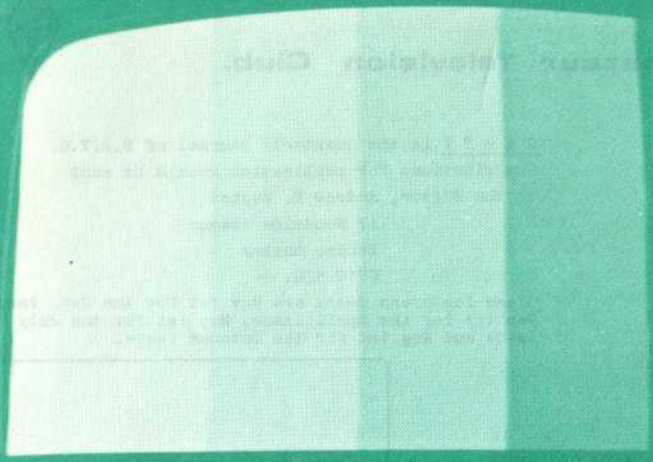

G8CJS

C Q — T V

THE JOURNAL OF THE BRITISH AMATEUR TELEVISION CLUB

No. 103

JULY 1978

The British Amateur Television Club.

C Q - T V is the quarterly journal of B.A.T.C.
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Close for press dates are Nov 1st for the Jan. issue, Feb 1st for the April issue, May 1st for the July issue and Aug 1st for the October issue.

CONTENTS

COVER PHOTO: see page 15

CONVENTION 1978

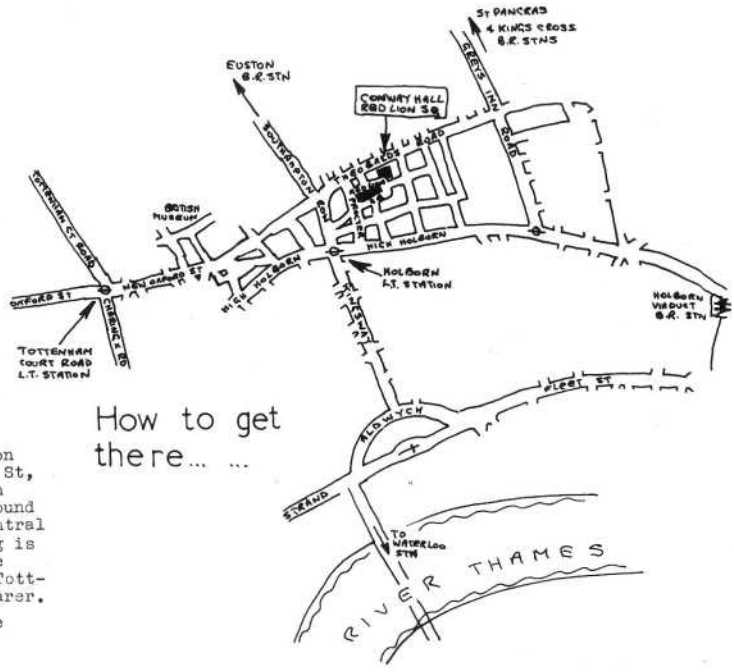
PLACE	CONWAY HALL RED LION SQUARE LONDON W. C. 1.
DATE	SATURDAY SEPTEMBER 9th 1978 NOTE CHANGE OF DATE.
TIME	11am to 5pm

Only fully paid up members of the Club will be allowed to participate in the General Meeting, which will commence at 3 p.m., and finish by about 4 p.m.

If you wish to place a topic on the Agenda, please send it in writing to the Chairman. Notification in this way does not necessarily mean that the item will be included, but every effort will be made to do so. The Agenda will be finalised by mid-August, so please write to the Chairman before then.

continued on next page

*Amateur exhibits
*Professional stands
*Lectures



How to get there... ...

The Conway Hall is in Red Lion Square, which is off Procter St, between Theobalds Rd and High Holborn. The nearest Underground station is HOLBORN on the Central and Picadilly lines. Shopping is very near - Oxford St for the ladies is ten minutes walk; Tottenham Court Road a little nearer.

IF YOU COME BY CAR, there are PARKING METERS.

The provisional agenda is:

1. Apologies for absence
2. Treasurer's Report and adoption of the Accounts for 1976 and 1977
3. Treasurer's Report on the current year to date.
4. Any other business to the retiring Committee
5. Election of Committee members
6. Any other business.

Half the Committee will resign by rotation at the General Meeting. If you wish to nominate a member to serve on the new Committee, please send his name and address, together with the names of proposer and seconder, to the Chairman. Make sure that the member you nominate is willing to stand.

Conway Hall, Red Lion Square.

tv on the air by John Wood G3YQC

Many of you will have seen the feature on amateur television which was shown on both the early evening news and "News at Ten" programmes on the 25th March. It is interesting to note the rather unusual sequence of events leading up to the making of the film. It seems that a local reporter was fiddling around with his TV set one day and surprised to see a strange picture on his screen. Being a sensation-seeking reporter he thought he had stumbled on a pirate TV station so he sketched the picture that he saw. The Home Office assured him that the transmission came from a bona fide local TV "ham" (ugh), anyway, the paper did an article on the station which is owned by Clive Reynolds G8EQZ, which subsequently came to the attention of the ITN team who arranged to make a film of the station. G8EQZ and G8GHH got together and put on the demonstration which was shown.

The first two "C Q - T V" awards have been issued. Number one goes to VK7EM of Penguin, Tasmania, Australia together with the gold seal. This was achieved with just 30 contacts, the shortest distance QSO was over a 384KM path and the longest 550Km! The stations worked were located in Melbourne, Sunbury (Victoria VK3) and Mount Gambia(VK5) all over a sea path. I don't think that we in this country can compete with that, eh!

Certificate number two which was a bronzeaward but has since been updated to a silver goes to one of our most consistantly active members G5KS of Birmingham. Congratulations to both these stations.

G5KS has been knocking up the contacts again. He lays down a very strong signal into Stoke-on-Trent and in fact inadvertantly blocked out a local QSO between G8JMJ and G8BLZ who are not too far apart! The photo's show G5KS's colour pictures as received by G4DYP and photographed off screen over a path length of about 22Km. 23 cm equipment is now under construction and it is hoped that this will be fully operational later this year.

That's it again, please send letters and photos to: TV On The Air, 54 Elkington Road, Yelvertoft, Northampton, NN6 7LU. Tel: (0788)82350.

B.A.T.C. SALES

If anyone is interested in a 50 key-station ASC11 keyboard - MOS encoded, strobed output, on a pcb 12" x 5" at a price of £40 including VAT and post and packing, please contact Grant Dixon of B.A.T.C. Sales who will put you in touch with a possible supplier.

We can work it out.

by J. Brown G3LPB

Being an ex-dance band op., and still with a wide appreciation of all types of music, the recent WINGS effort on Top of the Pops produced the title. Reading Tom G3LMX letter in C Q - T V 101 page 13, he may be thinking on similar lines to myself. In my small efforts re articles in C Q - T V for a while, I have had queries and enquiries from G,GM,GW,HB,DL,F,ZS amongst many, and many are new boys like me and need assistance.

Thinking about this, there is very little written data available and many people do not know what books publish data, and seemingly to quote the Beatles "need help from their friends".

To put this in a different light, and here I apologise to all mentioned "With the numbers of DL2RZ scan convertors about and with all the mods done, could we not form a DL2RZ club and everyone will learn of the mods; I am sure Volker who started it would be the first to give his blessing".

I think the original write-up was in German, and maybe there are some translations that have gone astray? The latest from DL2RZ is his own re-design and uses a different sync circuit, a different "colour" pot setup, and a little bit of diode work.

I understand the boards are designated SSTV 6C and 7 Mark 4. A letter from John G3YCV also tells me Mike W6MXV will supply pc boards for his monitor for about 11 dollars plus postage, also the ICs at about 2 dollars plus postage.

Here I should thank the anonymous sender of the RSGB G3YQC monitor circuits, as I have no connections with the RSGB; I regret having never seen it, so to John G3YQC (who never sent it) my apologies. I have no idea if pc boards are available for this, maybe John G3YQC will tell us.

I also have to say I may have a bit of a howler in the SSTV monitor article SSMI section. I mentioned the resistor 4.7 megs to 12 megs from hot side HT to the base, it should have been from collector to base. This is to introduce feedback to assist in temperature changes should they arise. (Thanks Eric for pointing it out).

Back to where we started again, there are many who would love to ask questions about slow scan, but seemingly are put off by listening on 80 and 20 meters. The operators there with excellent equipment, talk about things like RAMS and PROM, contouring, a storage etc. and most people feel a little silly addressing questions to these. I assure you they are willing to help anyone indeed as are many others. Certainly there are idiots, there always are, but a question is quite easily answered. I feel that B.A.T.C. holds much more information than we imagine.

Only yesterday I watched a home built storage convertor that uses 64 ICs just for storage, and it was very fine indeed. Yes agreed this is not for everybody, the cost alone exceeds many peoples pocket money but the chap that did this most certainly would not belittle anyone that asks any questions. We all get baffled when we start a new venture, remember the time when you first tried to ride a bike?

I feel sure B.A.T.C. holds one answer to this problem and this is maybe to run a scheme of answers to questions from anyone. There are many that specialise in fast scan,

cameras, flying spot scanners, slow scan and all its diversions i.e. keyboards, character generator etc. and these if you know as I do will assist anyone if approached correctly. I wonder if anyone has any ideas about this?

A recent tape from Grant G8CGK tells me there is a new book on the market "All you want to know about Slow Scan" by Dave Ingram (a Foulsham Sams book). This contains some of the answers to ideas old and new.

To Tom LMX I do wish the very best of luck in his request for layouts of pc boards and the possibility of making these available to members. BARTG have done it with their RTTY terminal unit, why not B.A.T.C.?

So don't sit back, listen and ask and I feel sure "We can work it out" together.

LETTERS to the EDITOR.

Dear Sir,

I have recently bought a Hitachi-Shibaden HV 15 CCTV camera (secondhand) and experienced trouble with the sync. etc. On contacting Hitachi they are prepared to supply me with a servicing manual for approaching £5, which I consider somewhat exhorbitant. I wonder therefore, if any member is in possesion of any data concerning this camera and whether I could borrow/copy it, particularly the circuit.

M.J. Bonner G8ALB
2 Byward Avenue,
Feltham, Middx.

.....

Dear Sir,

The BBC is going to close its operation at Alexandra Palace in 1981. It would be a great shame if this historic place, which to many of us is the home of television were allowed to become derelict.

Some of us wish to see Ally Pally become a Television Museum, archives and show place for achievement in television.

A meeting was held on the 8th March 1978 and it was decided that I, as a member of the B.A.T.C., should contact you.

We are hoping that the building will be used as a venue for meetings and conferences by people involved in television and that if possible a permanent DXTV station similar to the radio amateur station in the Science Museum can be set up. The site should be most suitable for amateur television communication and such a station should also be of interest to the general public.

I would greatly appreciate it if you would inform other members of the B.A.T.C. who might be interested in contributing time, old equipment and documents to the museum.

We hope to circulate an information sheet containing full details of all future plans.

C.J. Giles
6 North Dene,
Mill Hill,
London NW7 3AT.

.....

Dear Sir,

With reference to the Club Sales column of C Q - T V, I herewith enquire if you could kindly send me the data sheets of that intensifier vidicon 9777.

For years I have tried to obtain a secondhand light amplifier tube for trials with my underwater camera, which uses a $\frac{2}{3}$" vidicon but the price of such an amplifier tube seems to be equal to the price of a grade A car.

By the way, do you know if the

British Mullard Ltd., occasionally would release some rejected tubes for amateur use? They make the famous XX1240 and XX1241 tubes with channel amplifier plate. It's amplification factor is about 100,000 and can be varied by adjusting one voltage by a potentiometer. Could any member possibly in connection with Mullards ask it's availability for amateur use?

I am an eager scuba diver too, and this is why I am so interested in those tubes. Our country is full of lakes but the underwater visibility is often so bad the muddy waters that the daylight will often penetrate to some 12-15 ft. only. When using lights in the darkness below that level, the backscatter from small particles in the water is so heavy, that it makes the visibility very poor. This is why I'm so interested to test a light amplfier for direct vision and for the camera. I believe that the downward weak daylight would give a better result when using a ligt amplifier or intensifier vidicon.

Should you hear about a rejected XX1240 or equivalent, please inform me if the price should be "of amateur level". Even a tube with plenty of holes or blemishes on the picture would do in the preliminary tests.

Esko Jokinen
Keskuskatu 15
33970 Pirkkala 7
Finland.

B.A.T.C. at A.P.

A Report by Tom Mitchell

Once again B.A.T.C. took a stand at the R.S.G.B. on the 5th and 6th of May. Despite some problems caused by the non-appearance of all the tables which had been booked, the Club was able to put on one of the best displays of working amateur tv equipment I have seen at a public exhibition.

It is almost impossible to give credit to all who took part in setting up and manning the stand, but a special note of thanks must go to two new volunteers, Trevor G4GPQ and Geoffrey Borin who were present on both days. The Committee was represented by Mike Crampton and Tom Mitchell. Others giving their help during the Show were Don Reid, B.A.T.C.'s Chairman, Dave Wilson, Peter Blakeborogh G3PYB, Peter Wright G8GYS and Nigel Walker. The last three provided most of the fast-scan equipment displayed and demonstrated it on a rota basis.

Those whose well-earned credits have been omitted in the above list may blame me - but I had to leave early! My apologies to them.

Trevor was the only member to reply to my appeal in the last issue for help with slow scan equipment. However, with his help, a comprehensive demonstration was put on. Pictures from cassette (or any of the available 625 line sources via the "Frame Snatch" facility) were fed into a ROBOT converter for a side by side comparison between a standard slow scan monitor and the digitally processed fast scan output. The results were most impressive, and must have given a large number of visitors food for thought.

Working 625 items from the Andover Group included Peter Wright's Electronic Test Card (which was mistaken by some passers-by for the Philips unit used by the Broadcasting Authorities!) was shown together with his most impressive "animated" caption. In this, at a flash of a switch, a series of white lines appeared to move through each other, being replaced by his callsign.

Peter Blakeborogh provided a VDU and some static display items, including a low power 70 cm vision Tx. This was used on the Saturday to feed a Sony colour receiver sitting on top of the main (Line fed) colour monitor.

Geoffrey Borin provided two EVR players and an interfield switch. One of the EVR machines was producing PAL video from a test film, and the other one, modified at short notice, produced monochrome pictures from standard 35 mm slides.

Also exhibited were the "project 100" Sync and Pattern boards, together with a prototype of the 25 Hz offset generator.

FOURTH ANNUAL L.D.T.V. CONVENTION CHANGE of TITLE

The fourth Annual Convention of the Low Definition Television Association took place in Nottingham at the College of Education, Clifton, on Saturday the 29th of April. Roughly a quarter of the national membership attended (a record) but the number of casual visitors was down on previous years. There were plenty of exhibits, and as usual, where expertise occasionally failed, enthusiasm abounded. Our LDTV gremlin, the Nipkow Weavil, was present at the meeting and wriggled his was into some of the works during the afternoon. Among the many peices of apparatus was a giant-sized LDTV monitor and a successful solar-cell TV recording.

The Conference proceedings were recorded for the benefit of those who were unable to attend and covered a wide range of subjects, including a review of the provisional standards. A visiting Australian member Gil Miles VK2K1, the first person to broadcast T.V. in that country (Jan 1929) was elected President for the coming year, and the retiring President, Fred Ward G2CVV, was warmly thanked for his efforts on behalf of the association during its first three critical years as a formal organisation.

A change in the title of the association received undivided assent; the term "Low Definition" acquired historically when the first "High Definition" (405 line) broadcasts began in 1937 from Alexadra Palace, was replaced by the term "Narrow Bandwidth", one which more nearly reflects the membership's own thinking in the matter. When LDTV was revived in 1972, its expressed aim was the "achievement of the highest possible quality moving TV pictures within the audio bandwidth, or for practical purpose, the bandwidth of a domestic tape-recorder of modestiest quality". Good pictures were accomplished by 1974, using phot-multipliers; the achievement of equivalent quality pictures using low voltage semiconductor techniques is not yet a fact, but the evidence displayed at the fourth Convention suggests that it will not be long delayed.

SUBSCRIPTIONS

Subscriptions to B.A.T.C. are due on January 1st of each year, and you should by now have paid yours. If you have forgotten please send your £2 to the Treasurer now - his address is on the inside front cover. Your membership will lapse if you do not pay soon, and then you will have to pay an entrance fee to rejoin.

If you know of a person interested in any facet of amateur television and would like to invite them to join B.A.T.C. the Membership Secretary has information leaflets with an application form attached which you may distribute. Please ask him for some, and hand them out, perhaps at your local radio club.

PROJECT 100 PART 4

by Eric Putt and Tom Mitchell G3LMX

A PAL COLOUR PATTERN GENERATOR and SYNC PULSE GENERATOR

No new board this time, however we will be describing Eric's simple but effective system for adding the 25cps offset to the subcarrier to line frequency relationship, as this can be built with as few as eight ICs it hardly merits a board on its own.

We will also consider some possibilities for development of the system, your views would be appreciated. In this context I would like to draw your attention to the Feedback item elsewhere in this issue which contains items extracted from letters sent by members building parts of the system.

However, before starting on the new material, here are a few corrections to previous articles.

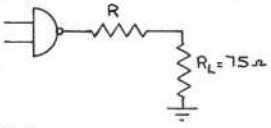
PART 1

Page 14 Pulse output stages

In this section I described the use of the use of the 74128 as a line driver stage. In doing so I assumed that the stage had a 75 ohm output impedance. In fact, the output stages are low impedance capable of driving into either 75 or 70 loads.

The output stage shown in Fig. a was therefore correct and no pads are required to reduce the output volts (With the exception on VAS which is normally a 1 volt square wave).

The output swing is dependant on the +5v rail, while the correct send impedance is achieved with a value of R=75 ohms. The voltage across the load will be closer to 1.8v than the 'correct' 2v. However, measurements with a 5.00v supply indicate that R can be reduced to 43 ohms (0db) or R= 47 ohms (-0.3db) to give two volts pulses at the expense of send impedance.



PART 2

Page 20 Output Stages

a) Due to an oversight the values of L1 and L2 not quoted here or on the circuit diagram
   L1 = 50 uH
   L2 = 68 uH

Values of L1 and L2 are not critical. L1 could be 47 uH and L2 in the range 47 - 100 uH. but in this case change the value of the filter. Capacitors to match, See Fig. 1.

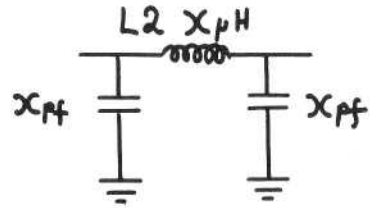


fig. 1

b) In the last paragraph "any high gain PNP" etc.

Page 21 Subcarrier to line frequency lock
In third paragraph line 2
"Feed pin 3 of IC 24 (pin 6 on connector) with waveform 'c' not 'C'

Fig. 2 The text is correct but in Fig. 2 the IC should be marked IC8 and the new lead goes to connector pin 27.

Page 24 List of Semiconductors.
a bracket was ommited IC4,5,6,7 are all 7400.

THE COLOUR LOCKING SYSTEM

In the PAL system the subcarrier to line frequency relationship is given by the formulae

$$F_{sc} = \frac{1135}{4} + \text{line frequency} + 25\text{Hz}.$$

It's the last 25Hz that causes the problems with NTSC which does not have an offset, it is relatively simple to divide down from a stable subcarrier oscillator to 2LF.

In the case of PAL we have to start with a stable crystal oscillator from which we have to produce two outputs, one directly related to the oscillator and the other derived from it and having the same order of stability. See Figs. 2a & 2b.

The system shown in a is probably more common and gives more flexibility in the choice of oscillator frequency.

Five MHz is quite a common choice as the basic oscillator frequency, and may be derived from a stable crystal oscillator or a rubidium source. However, others are also used. In the case of one large broadcasting organisation the oscillator output frequency would have proved quite handy if the UK had adopted a 625 line NTSC system.

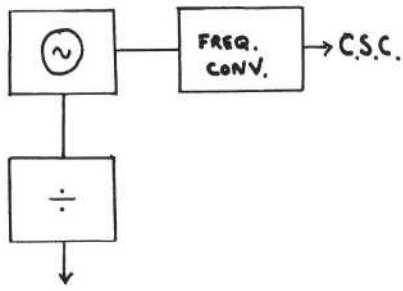


Fig 2(a)

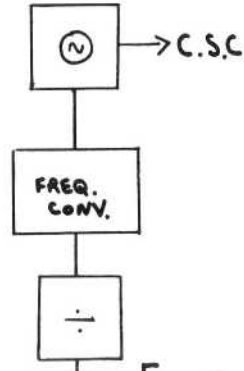


Fig. 2(b)

The heart of any system is the method used to implement the frequency converter block in Fig. 2a or 2b two systems are in general use:

1) Derivation of a number of fractional frequencies from the oscillator and mixing combinations of these to produce the required output.
2) The use of single sideband techniques to add the 25 Hz offset.

Since a pure sine wave is required extra care is required especially in the case of 2 and it is not unusual to find the output being cleared up by means of a phase locked oscillator at the output frequency.

ERIC PUTT'S COLOUR LOCKING SYSTEM

Since this series started Eric Putt has developed an alternative system of remarkable simplicity which is being published in C Q - T V for the PRIVATE USE OF MEMBERS at this stage ALL COMMERCIAL RIGHTS ARE RESERVED.

THEORY

If we first examine the simplified locking system for the pattern board described in the last issue, in this mode we drop the 25 Hz offset.

$$\text{and} \quad F_{sc} = \frac{1135}{4} \text{ LF} = 227 \times \frac{5}{4} \text{ LF}$$

Therefore we could achieve lock by sampling Fsc every 4/5 of a line or at multiples of this period.

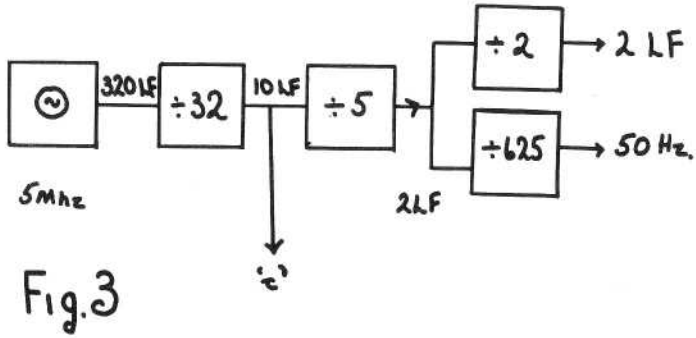


Fig.3

Inspection of the block diagram Fig. 3 indicates that a period of 4/5 line is not directly available. The best that we can do is 'c' at 10LF. However, since there is a further ÷2 in the first half if IC 24 this produces a sampling rate of 5 LF or 1/5 of a line and use of this feed to sample Fsc would require an external ÷4.

In the case of the pattern generator which was deliberately designed not to have any subcarrier feeds around, which could degrade the quadrature by crosstalk, the oscillator output frequency is 4 x Fsc and therefore the minimum samling period containing 277 cycles is 1/5 line and wave form 'c' can be used as the colour locking input to the SPG.

If you want to use this simplified system with an existing subcarrier oscillator all that is required is to provide an external ÷4 between the 'c' output on pin 27 and the colour locking input on pin 6 of the SPG board. Once this has been done the line frequency can be locked either to the pattern board or your subcarrier oscillator by switching 4xFsc or your Fsc to the subcarrier input on pin 3 as required.

NOTE Since pin 3 is fed directly into the D input of a 7474 which is level dependent and not edge triggered a sine wave to TTL conversion stage is not required provided that you have more than about 1½ volts of s/c available. An unterminated s/c distribution RC coupled into pin 3 will be of suitable amplitude.

In either case the subcarrier frequency which can be set to frequency by comparison with the BLO in the domestic colour set while tuned to a broadcast transmission, (or even derived from the BLO but beware of live chassis) takes control of the line frequency, due to the lack of the 25 Hz offset the line frequency will be slightly off nominal.

Video signals without the 25Hz offset will not play back in colour on quad '2 inch' VTR's which utilise the full subcarrier to line relationship but I doubt if this represents a serious problem for most of us.

PROVIDING THE FULL LOCK

If we now consider the implication of adding the 25 Hz offset to the subcarrier frequency Since there are 50 fields per second this means that compared to the simple system we have to add an

extra half cycle to each field.

In theory this should be done by correcting the line frequency at a uniform rate but this is not practical with a sampling system.

Suppose however, that we correct the line frequency by stepping the sampling point at regular intervals throughout the field. In this version we pick 32 steps per field giving an error before correction corresponding to one sixtyfourth of the subcarrier frequency.

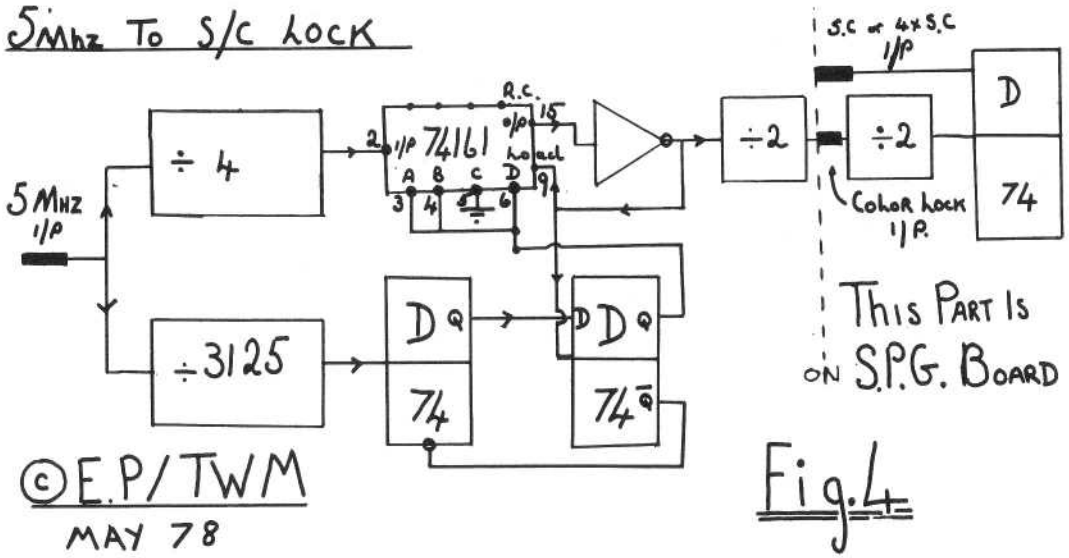
While this step would be noticeable if applied to the subcarrier frequency, applied to the line oscillator feed it produces a step of about 3.5 nanoseconds which is less than the amount of jitter on several broadcast quality systems using more conventional types of locking.

Unfortunately there is more involved than simply moving the sampling point which occurs every 227 cycles of subcarrier by 1/64 as it does not produce the required shift of minus 1/64 of a cycle at subcarrier. The correct shift is determined by tabulating the expression $\frac{227 \times n}{64}$

where n is an integer in the form x + 1/64 where x is the number of full cycles. A value where n = 53 gives the desired result and the desired result is produced by reducing the count by 11 (i.e. from 64 to 53).

A similar analysis where the reference is 4x Fsc gives an added bonus in that a solution also exists requiring a shift of 11/64 ths.

The theory may sound complicated but its translation into practice is remarkably simple, see Fig. 4.



A feed is taken from the five MHz oscillator is fed into two divider chains. The top one having a normal count of 64, to produce sampling at 4/5 line period intervals, contains a presentable counter which is preset to 11 32 times per field by the + 3125 counter and D type.

No details are given on the diagram as to the make-up of the +3125 counter. It is convenient to use the +5 section of 5 x 7490 ICs. In this case as there are no resetting problems three of the +2 sections can be used to make the +2 and +4 stages in the top row.

Fig 5 gives pin connections for 7490. Don't forget to earth at least one each of the Ro and Rq pins.

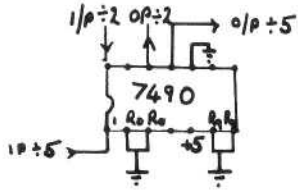


fig 5

THE SYSTEM SO FAR

In the course of these articles we have described a stable full specification, Genlockable SPG and an optional pattern generator capable of producing a PAL colour test waveform without the need for a coder.

Used together (with the simple locking system) they provide a first class tool for TV servicing and a source of test signals for ATV work. With the addition of the full locking system described in this part they produce a full specification PAL signal whose frequency stability will depend on that of the subcarrier source employed.

Due to the expense involved the long term stability of the amateur oscillators may not compare with those from the UK tv networks which frequently employ rubidium oscillators and have a worst case error rate of 1 Hz at subcarrier frequency. The amateur station subcarrier can be set to a very high degree by comparison with or locking to the BLO in the domestic tv set (while tuned to a broadcast colour source).

FUTURE ITEMS

Apart for the probable need for sync separators, burst locked oscillator and subcarrier oscillators, which will depend on individual station requirements only one item has to be designed and published.

When genlocking to a colour source due to the four field colour sequence it is necessary to define the VAS phase as well as the two field sync timing provision has been made via pin 4 of the SPG for a reset input but the electronics to do this is automatically has yet to be developed.

If there is sufficient demand it would seem reasonable to conclude the project with a board containing the 25 Hz offset generator, the VAS reset system together with a BLO and sync seperator if space permits.

As there are problems in producing a BLO whose off lock frequency remains stable and near to the locked frequency when unlocked. The need for a seperate subcarrier oscillator could be eliminated by locking the BLO to the pattern generator when not in the genlock mode.

TWO NEW BOOKS REVIEWED BY ANDREW EMMERSON

"Are you tired of using your tube ATV rig as an auxiliary room heater? Is you rig taking up valuable space that could be better used for storage of your porno magazine collection? Does everyone think your rig looks like a booby prize won at a hamfest raffle? Are you tired of searching through surplus store garbage cans for final amplifier tubes? Have you been afraid to get into amateur television because of the above? If your answer to any or all of the above is yes, then the ATV modified Regency HR-440 is for you...." This is an extract from "Amateur Television in a Nutshell", a new book just published in America. It is edited by Henry B. Ruh (who also produces A5 Magazine) and covers 'everything you need to know to build or operate your own ham TV station'. The style is uninhibited - "No outdated tube stuff, no junk" - and I like it!

The book is well printed, with plenty of clear halftone illustrations, though the diagrams let it down. Contents include What you need, The video signal, Cameras and lenses, Station operation, Receivers and transmitters, Antennas, also directories of operators, TV repeaters and suppliers (in the USA). The only video sources discussed are cameras, nothing about pattern generators and nothing about colour generation or vestigial sideband. Since the 70 cm band is much wider in the States there is probably no great incentive to put out VSB. The transmitter designs, though solid state, don't look as sophisticated as European ones but there is useful info on tuning transmitters and on feeders and connectors.

All told the book is fun to read, quite moderately priced and throws an interesting light on ATV practice across the pond. It doesn't replace B.A.T.C.'s ATV Handbook, but fills in useful information in the gaps. 72pp 11" x 8", price 6 dollars including air mail postage from A5 Magazine, P.O. Box 1347, Bloomington, Indiana, 47401, U.S.A.

"Die Praxis des TV-DXings" (The practice of TV-DXing) is another publication and hails from West Germany, though the author is an East German. ATV and radio is not confined by political boundaries, fortunately. This booklet comprises 42 A4 pages of good quality xerox; there are plenty of diagrams and 65 well reproduced pictures of testcards from all over Europe including one ATV station. The text is in German but if you can read it you will find it makes fascinating reading. The text is concerned in the main with propagation modes and goes into great technical detail, with formulae by the dozen for predicting reception at VHF and UHF frequencies. The writer exposes the old 'line of sight only' myths about UHF propagation and points out that the relative enhancement of UHF under tropo conditions is far greater than for VHF. Now that Russian broadcast band UHF transmissions have been received in Holland perhaps we should review our ideas of the ultimate range of ATV on 70 cm....

So if you can read German get this one - it will cost you 6 IRCs post free from Wilhelm Herbst, Cornelimunsterstr. 2, D5000 Koln 41, Germany. Ask for publication 14.

A CAPTION KEY SYSTEM

By T. Brown G8CJS

The photos illustrate a system of keying captions i.e. callsign, CQ etc., into a test waveform. I think the results look good and is well worth a few eveningsconstruction. All you need is a camera, not even one that will work on external sync. I used a free running Pye Lynx for the pictures here and on the front cover.

There are two quite separate units required as Fig. 1 shows both will work quite independtly of the other. The pattern generator accepts standard 1v pp video from the camera and strips sync from it and uses this as a reference with which to generate its waveforms (provision is made to run off of an S.P.G. instead if required). The output of the pattern generator is 1v pp composite video no processing amplifier is required.

The key generator works by looking at the video output of the camera and where it sees black level the video from the pattern generator is left untouched. Where the camera sees a video level more than black (A LEVEL THAT IS SET BY RU1 KEY LEVEL) it clamps the output of the pattern generator to peak white (as set by RU2).

This system is called an internal key and is the basis of many special effects. Provision is also made on the key generator to feed in an electronic character generator if you have one or are intending building one in the near future. The photo shows the results of this mode (the TTL level needs feeding in via an inverter for the ones in C Q - T V so far).

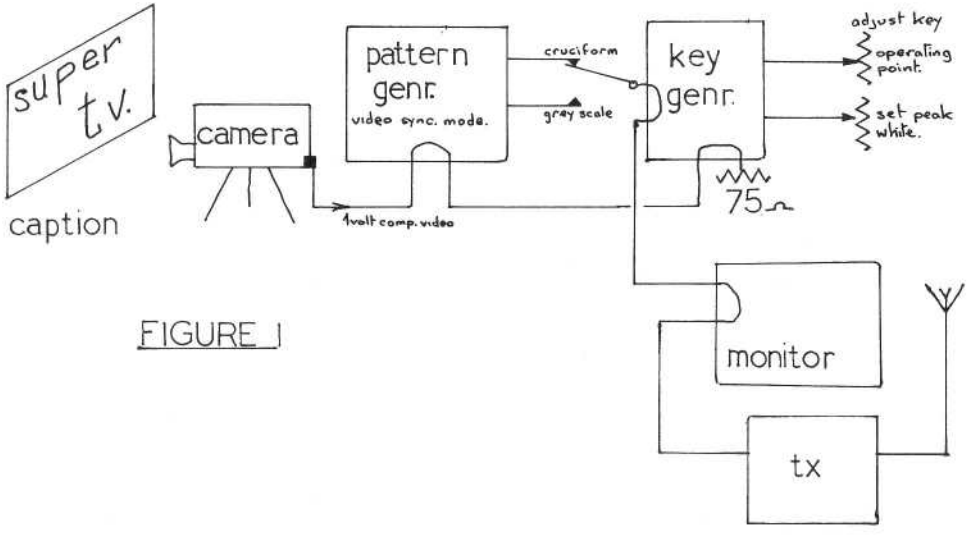
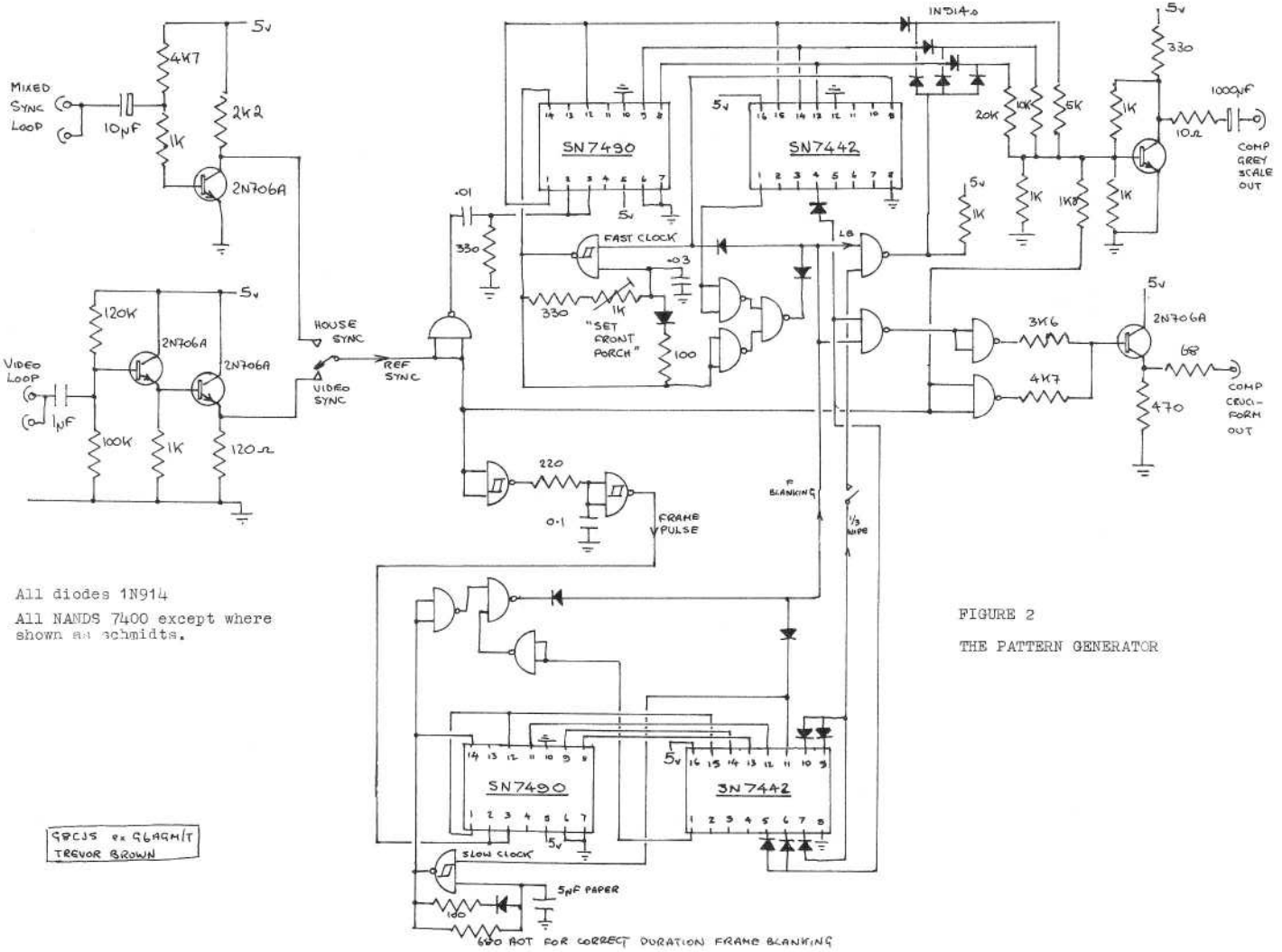


FIGURE 1



All diodes 1N914

All NANDS 7400 except where shown as schmidts.

FIGURE 2

THE PATTERN GENERATOR

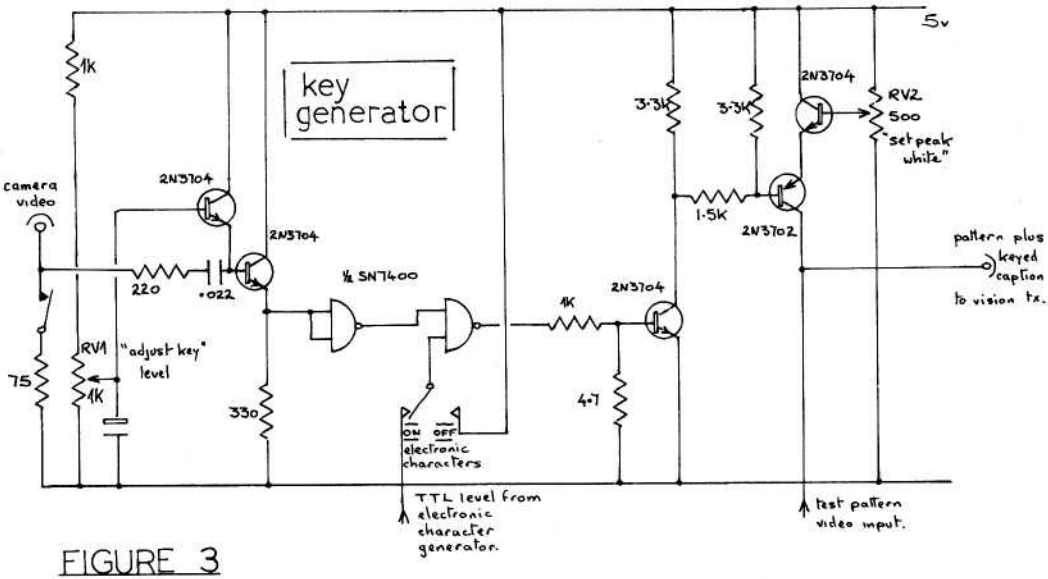
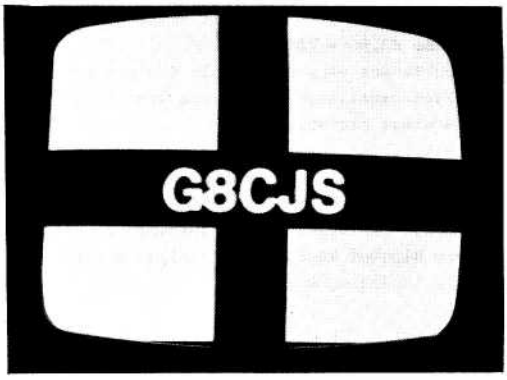
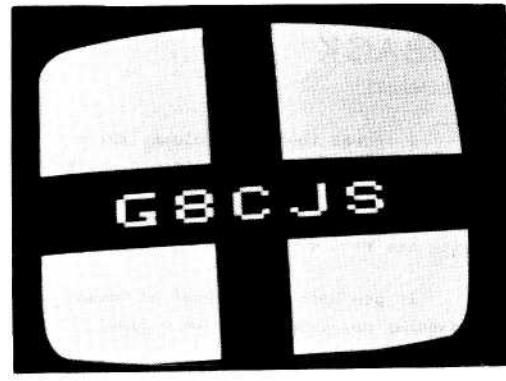


FIGURE 3





When the pattern generator is used in the grey scale mode a third of a field wipe is also available, this makes the bottom third of the picture black and gives a good background on which to key captions.

The pattern generator works by making a 7 x 9 matrix rather like a character generator it has two clocks, a fast one and a slow one. The fast one runs at 5 x line and is used to advance a SN7490 which generates a BCD code which in turn is fed to a SN7442 where this code is converted into a decimal count up to 7. The slow clock runs at frame x 9 and is used to advance a counter

and code converter also.

By matrixing some of the above counts we can make cruciform. By summing up the BCD code out of the fast counter we can make a grey scale. Also the matrix can be used to provide a one third field wipe by a simple diode "and" gate fed from several of the outputs of the slow code converter.

By "anding" several outputs of both code converters and also shortening some of the pulses by "gating" them with clock pulses we can make mixed blanking which is used to process the signals and together with the recovered sync make our outputs composite.

Two points worth noting, there are two adjustable resistors in the generator set front porch and frame blanking duration. It is wise to start with these low in value and increase till correct in particular for the latter or a bad vertical jutter can be obtained if it is too high in value. The other point is captions used for keying must be white letters on a black background and must be good clean lettering and well lighted. I used white Letraset on black card for the two results illustrated.

FEEDBACK

By Tom Mitchell

I regret that this column, which I hoped to make a regular item, did not appear in the last issue, and will have to be rather limited this time due to the pressures of preparing the P100 article and our stand at AP.

If you have any 'hints' of ideas worth passing on, please drop me a line.

For Example

Do you require a UHF modulator for feeding video into an unmodified tv set without having the problem of resonating the oscillator in the UHF band.

There are two quick solutions:

a) Manor Supplies will supply the module used in their Colour Bar and Grille generators. This requires two or three external components for use with 1 volt video, details are supplied with the unit which costs around £3.50 + VAT.
Results are very reasonable for a modualted oscillator but if you want to go one stage better....

b) Elector PCB This requires more work but has a FET oscillator and diode modulator and utilises strip line inductors on the board. The board can be obtained direct from Elector Magazine or various stockists including Marshals.

Do you have a SSB Transverter 70 cms.? If you do you can be transmitting video on 70 cms. for less than an evenings work by building the VISION IF MODULE from the VHF Communications Vision Tx. The pcb DLLLB001 costs about £3 and is available frm stock from their UK agents.

If your transverter IF is 28-30 use a 31.5 MHz crystal in the vision IF unit to give a vision carrier of 435.5.

Most transverters have adequate

bandwidth but a valve unit may have to be repeated. For colour a VSB filter would be required, but with the average mono camera a simple band limiting video filter can be fitted or the carrier frequency lowered by about a MHz.

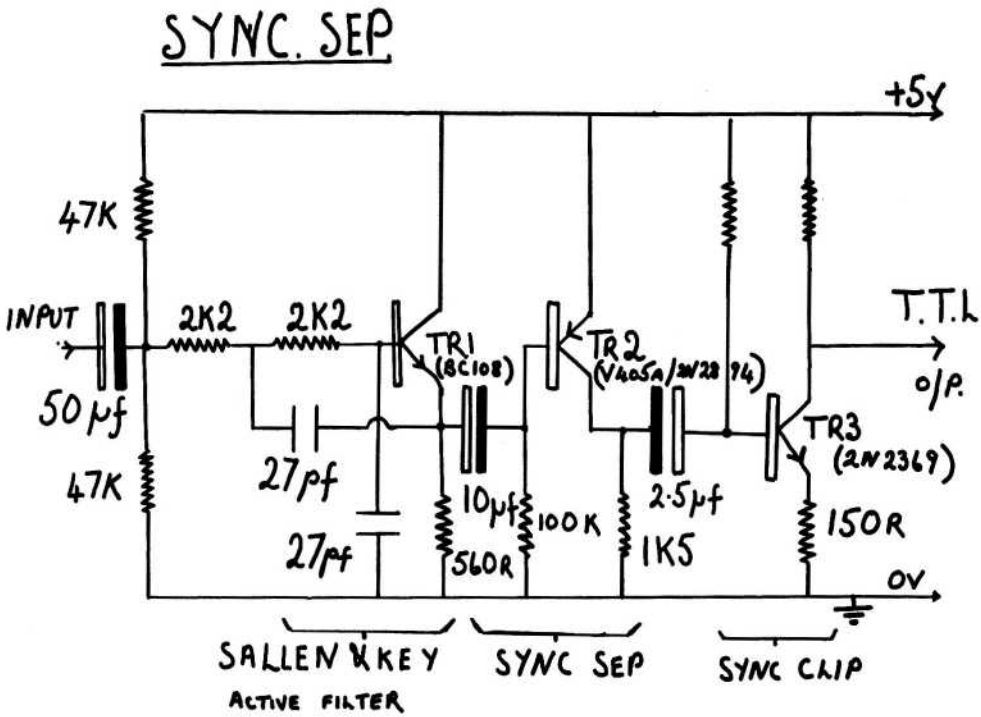
PROJECT 100

The Club has ordered a supply of 4 times subcarrier crystals which should be available by the time you read this.

Various circuits have been sent in. Apologies to Ian Pawson for the errors in reproducing his circuits. I have built and tested both his sync separator and line phase indicator.

If you would like a sketch showing a suitable layout please send me aSAE.

Finally, a new sync separator sent in by Geoffrey Borrin.



EVR PLAYERS

By J. Borin

The EVR players made by Hitachi and recently advertised in C Q - T V (now sold out) are basically flying spot scanners for use with special film. This film is no longer available and the machines are an attractive proposition for conversion to slide or film scanners. A general description of the EVR system and player can be found in Practical Television, September 1970.

SLIDE SCANNING

To make space for the optical assembly all the mechanical parts should be removed, including the solenoids and microswitches. This job requires patience, some allen keys and a good

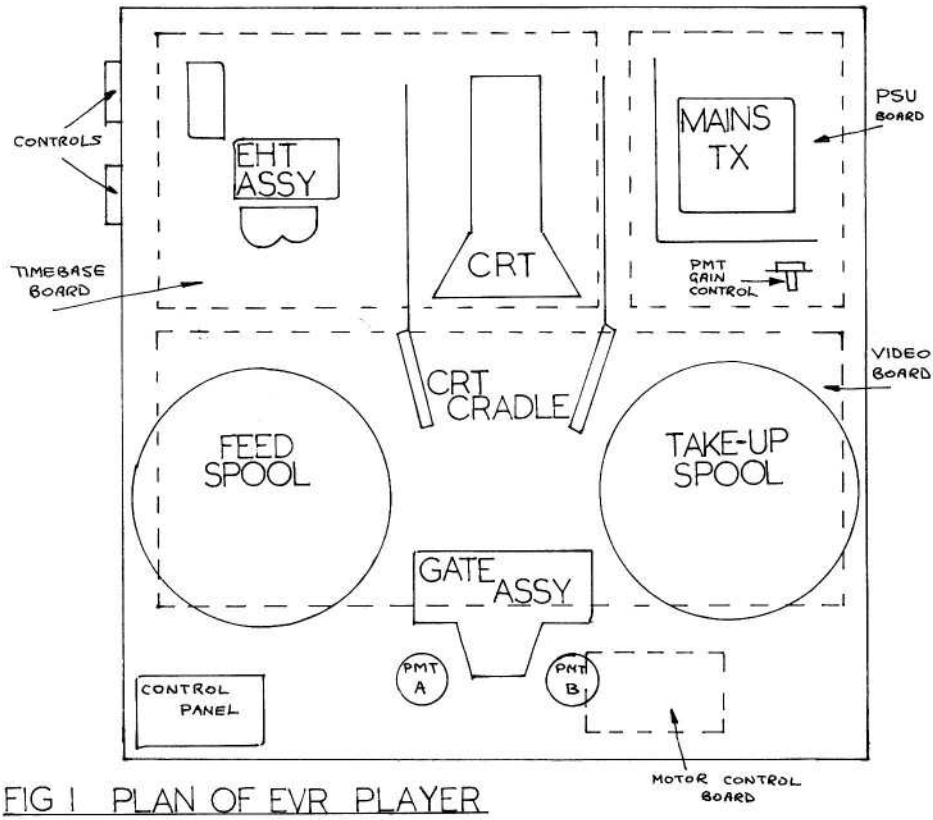


FIG 1 PLAN OF EVR PLAYER

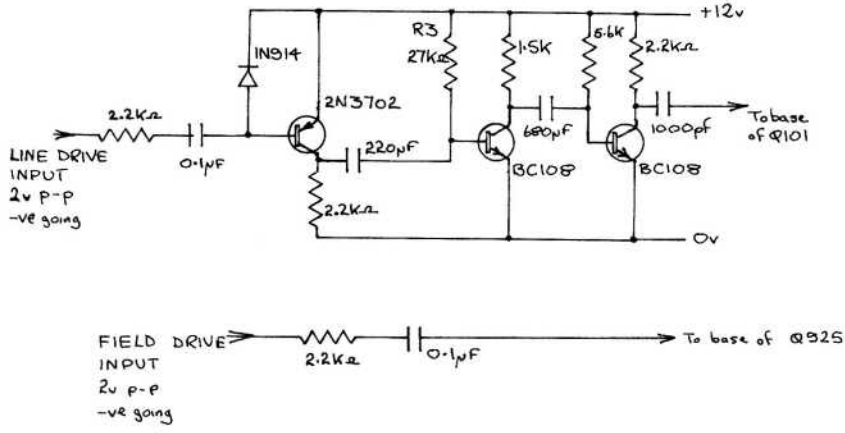


FIG 2 INTERFACE to EXTERNAL DRIVES

Phillips screwdriver. The only wiring that need be preserved on the "mechanics" side of the machine is that running to the photomultiplier assemblies. All other wires from the mechanical/ switch assemblies should be traced back and removed. The optical system required follows straightforward flying spot practice (see CQ - T V 52 for example). Only one photomultiplier is needed, the other should be removed for safety. Please also note the usual warnings about not exposing operating photomultipliers to bright light and remember that up to 750v is present near the photomultipliers.

In order to fit an objective lens it may be necessary to cut away part of the CRT cradle. This can be done with a hacksaw but cut only the minimum necessary and remove the CRT from the cradle and the cradle from the machine before attempting this. It is convenient to rotate the scan coils through 90 degrees to give a normal TV raster. To give correct height scan C206 on the timebase board should be shortened.

SYNCHRONISING TO EXTERNAL PULSES

Fig. 2 shows the circuits needed. For field drives remove C928 on the power supply board and connect the components to the base of Q925 on the same board. For line drives T101 may require careful adjustment to give reliable lock. R3 (27k) may require adjustment to phase the line scan correctly relative to line blanking. + 12v and 15mA is readily available within the machine.

COLOUR

There is no reason why a 2 colour (or 3 colour with an extra photomultilier) scanner should not work. The CRT has some red output and the photomultipliers have some red sensitivity but I have not yet established if this is adequate for colour. The colour processing board in the machine appears of little use as part of a PAL coder.

CINE FILM SCANNING

I have not yet investigated this but mechanical conversion to 8mm does not seem to hard. The existing gate could be redesigned and the sprocket hole detector moved. The major problem would be using a jump scan technique to get a correctly interlaced 25 pictures per second. Flicker can be very difficult to remove using this technique. I would be interested to hear from anyone who successfully converts one of these machines to film scanning.

GENERAL COMMENTS

All the machine's power supplies, except +100v, are derived from the line output stage. There are two mistakes (so far) in the circuit diagram such that +100v appears not to be fed to some circuits where it is needed. The LDR forming part of an automatic brightness control is a nuisance in experiments and can be replaced with a 25K potentiometer.

Finally, I am willing to help members with any problems or queries they may have about the machine if they write to me (SAE please) or telephone me at:

Jeffrey Borin
50 Bonnersfield Lane
Harrow, Middx. HA1 2LE
Tel. 01- 863 2880

MEMORIES for SLOW SCAN

By Grant Dixon G8AEC

Several people have enquired about memories for slow scan to fast scan convertors such as the WB9LVI. The 1404/1K shift registers used in this design are priced at £4.30 each in the last Intel list and 64 are required! A complete redesign would be necessary if one were to use random access memories (RAMs) but the 2102 1K static RAM at about £1.50 would seem to be about the cheapset at the moment. 4K dynamic RAMs would appear to reduce the package count, but there is a problem of refreshing, and so static RAMs are to be preferred. Mostek quote the MK4027/4 4K dynamic RAM at £.45 each, but the price may soon fall with the projected rapid growth of micro-computers on a hobby basis.

In the USA the 1404 shift registers have been available on the surplus market very reasonably, and it might pay intending constructors to make enquiries form friends over there.

A Case for FM Vision on 23cm to 24GHz

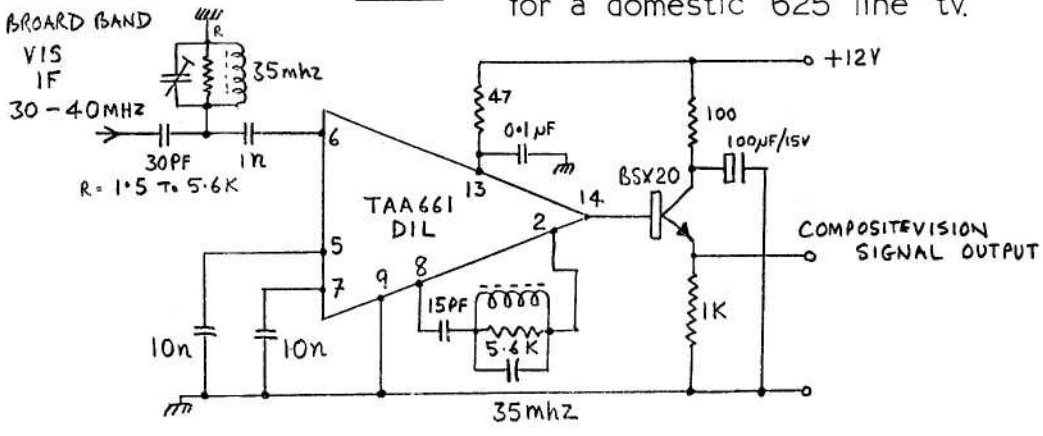
by Peter Johnson G8EIM

I would strongly suggest that FM modulation for vision should be adopted from 23cm upwards; it is extremely simple to transmit FM vision on these bands. It is also very simple to receive it. A modification to any 625 line tv may be made at a cost of either an FM demodulator system or by adding a diode and a few other components to the detector circuits of the tv receiver. See Fig. 1. The other point is that FM vision modulation in terms of GHz Microwave Varactor Diodes and Gunn Oscillators is so simple that any work at these frequencies including 23cm, the cost of making a transmitter is below £10 if battery powered! Receiver converters are also very easy to construct in waveguide terms. A complete vision and sound Tx Rx could be made for as little as £30 for 10 GHz.

A third and final point is this. If ATV repeaters are contemplated, up/down conversion from ATV links, repeater to repeater, it would be much easier if FM vision mod. were used. i.e. if the input is on 23 cm FM vision it may be converted to 10 GHz and transmitted via a link to another site, and transposed back to 23cm and re-transmitted. This way London Area could be linked to Birmingham via Luton and Birmingham could be linked with Manchester - the cost would be very small by comparison to vestical sideband systems!! Has anyone any vestigal sideband systems going on 70cm yet? Let alone 23cm! I've seen vision only, but I've not yet received vision and sound!

FIG 1

FM VISION DEMODULATOR
for a domestic 625 line tv.



Yet a few of us have built the VHF Coms. Vision and Sound Tx with some success, but still we do not use vestigal sound.

Just out of curiosity I've completed a design for a 23 cm FM vision Tx. It consists of two boxes,an FM modulated Gunn Diode in a 23 cm section of waveguide, connected by a diaphram or iris to a tuned cavity on 23 cm. All made from PCBs! The drift is less than 1 MHz/hour. The aerial is a dipole a scaled up version of a dish feeder aerial, directly in the mouth of the waveguide. Total cost of this 15mW FM vision Tx was calculated at £6.50. Excluding PSU. The same cavity may be used for the Rx converter.

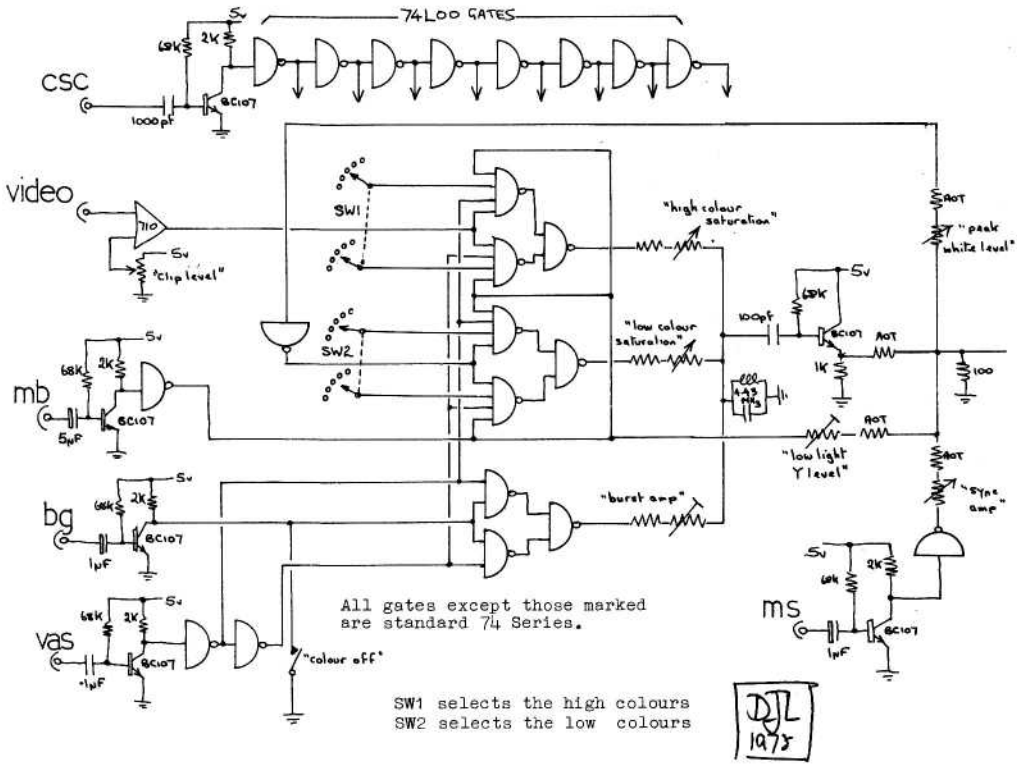
IDEAS for AMATEUR COLOUR

by DAVID LONG G3PTU

Recent letters in C Q - T V about producing amateur colour prompt me to describe a means of producing a PAL signal. This technique is simple to get going and provides results which, in the opinion of many who have seen them, can be quite good. A limitation is that it can be used only for captions and similar two-level material.

The colour subcarrier is fed into a cascade series of eight gates provided by a 74L-series integrated circuit. Each gate introduces a delay of 33 nanoseconds or roughly 45 degrees of phase (or 225 degrees of phase when the gate provides inversion). Selected taps along the chain of gates provide a means of selecting the various phase vectors needed to produce any number of different hues.

As the idea is intended for the PAL system, some vectors will need to alternate on alternate lines; for such vectors the logic taps are switched by a half-line signal (i.e. a "PAL switch).



Similarly, a "burst" is produced by switching two taps alternatively. The incoming black-and-white video signal which is to be colourised is first sampled by 710 op-amp so as to produce a true two-level signal. A switch-bank is then used to select to two hues which are to form the highlights and the lowlights by selecting the appropriate 'delay' taps.

The phase-modulated subcarrier thus produced is filtered and then added to the two-level video signal, together with the phase-modulated burst and syncs.

Ideally, the system is set up by means of a vectorscope or with a receiver usuing a "simple PAL" decoder (i.e. no delay line). However, it is quite possible to use a delay-line type PAL receiver by tackling each of the two hue vectors sepsarately; in this case it will be found that the colour will appear somewhat de-saturated until both vectors are restored. For simplicity, yellow and blue are made to lie along the U axis as these have only one tap each, and should be tackled first.

These brief notes, in conjunction with the circuit schematic, should provide sufficient information to allow readers to duplicate the system.

The LM1889 tv modulator

by Ladislaw Vig

In the last C Q - T V I found a notice about a promising "colour encoder and modulator" at £6.60. I believe if it an IC it must be LM1889 from National Semiconductors. A few months ago I obtained from Germany a TV game kit consisting of LM1889, MM57100 - circuit and MM53114 clock generator and driver. The PCB, coils and a 4.43 MHz quarz were included, so it was no problem to build it together (Price 65 DM).

For a few days I have had fun playing TV tennis, hockey etc., but soon I came on the idea that a part of the circuitry could be used for a better purpose. I had no IC data, so I oscillographed the signals comming to the modulator. Recently I obtained some Data from National Semiconductors, studied it and here are the results:

Although the LM1889 was designed for NTSC use, it can be used for PAL too. The colour TV game I have produces good PAL signal. Subcarrier signal is fed from the output of the internal oscillator through the phase shift network to the inputs of R-Y and B-Y modulators.

One can see that the subcarrier for R-Y is not alternated from one line to another. The PAL signal is obtained by alternating the R-Y signal from line to line. The chroma and video signals must be DC coupled to the mod. inputs and the R-Y amplifier must invert every second line. This is realised in the MM57105 but side circuitry is impractical to build. A better solution in my opinion, is an alternation of the subcarrier in front of pin 1. It can be done by a subcarrier processor e.g. N. Walker's circuit in C Q - T V No. 78.

The use of a split power supply is very practical e.g. +5v, -12v, the DC reference can be set near Ov (for common mode input range) it makes the direct DC coupling to the video and chroma input possible. At the moment I am using TMS3808 IC SPG followed by J. Lawrence's video processing unit C Q - T V No. 68. The colour processor is at the moment only NTSC capable, but I hope to change it soon as described.

The block diagram and description reproduced on the next page comes from the data sheet published by the National Semiconductor Corp., with whom the copyright rests.

DECEMBER 1976

LM1889 TV video modulator

general description

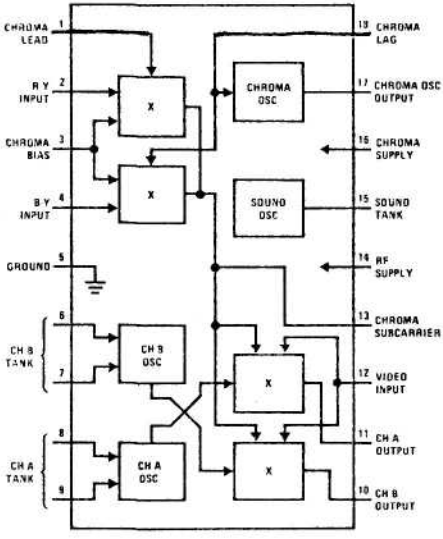
The LM1889 is designed to interface audio, color difference, and luminance signals to the antenna terminals of a TV receiver. It consists of a sound subcarrier oscillator, chroma subcarrier oscillator, quadrature chroma modulators, and RF oscillators and modulators for two low-VHF channels.

The LM1889 allows video information from VTR's, games, test equipment, or similar sources to be displayed on black and white or color TV receivers. When used with the MM57100 and MM53104, a complete TV game is formed.

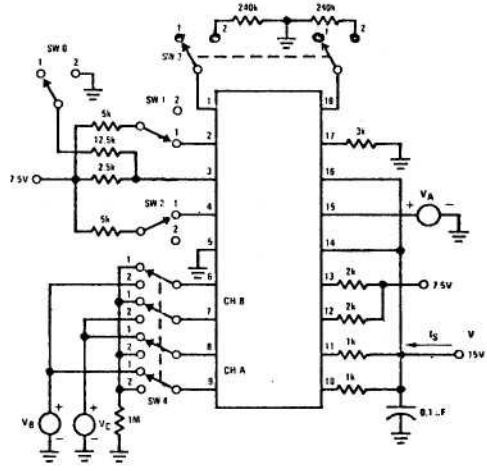
features

- dc channel switching
- 12V to 18V supply operation
- Excellent oscillator stability
- Low intermodulation products
- 5 Vp-p chroma reference signal
- May be used to encode composite video

block diagram



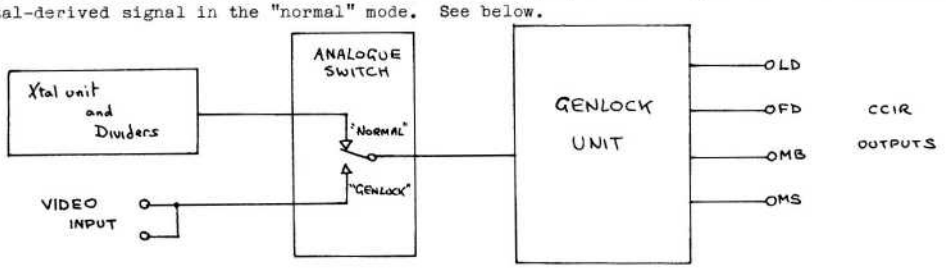
dc test circuit



A Genlock S.P.G. for Helical V.T.R.s

by John Goode

This design was developed for use in an Educational Television Unit, to allow captions and other camera effects to be mixed, wiped or matted into the off-tape video during editing. Other published designs of Genlock SPG's do not seem to be suitable for following the timebase instability generated by ½" V.T.R.'s - usually the genlock circuit is an addition to the basic S.P.G. circuit. It was therefore decided to approach the design in a different way - develop a genlock unit that worked well with an unstable video input, then arrange for it to be locked to a crystal-derived signal in the "normal" mode. See below.



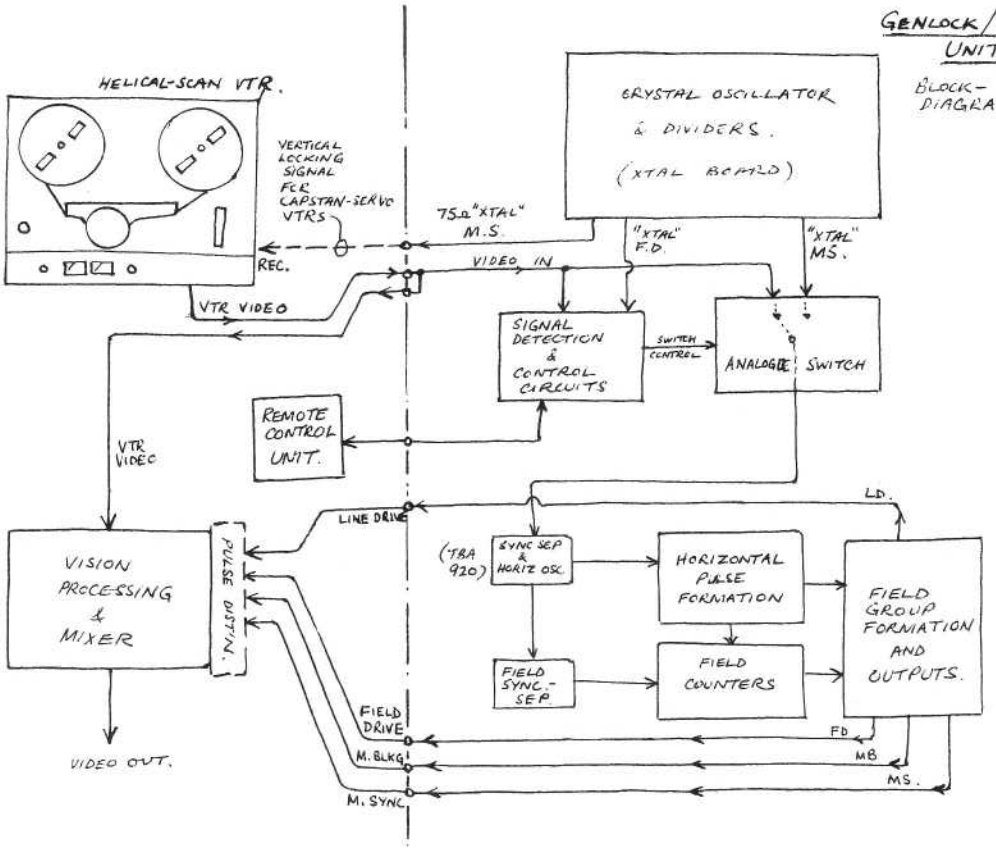
The crystal unit consists of a 1 MHz oscillator with dividers down to line and field frequencies. Line and field pulses are gated together to produce a "simple" mixed-sync signal - i.e. single broad-pulse field sync. This drives the genlock unit in the "normal" mode, which generates output to C.C.I.R. system 1 specification.

The genlock unit is built around the T.B.A. 920 sync. separator and line oscillator I.C. This isaMullard - designed I.C. used in Philips TV receivers, and has facilities for coping with V.C.R. signals- ideal for this particular application. However, a switch is provided to select short or long time constants, as required. Further information on the T.B.A. 920 may be found in the Mullard Technical Handbook, Book 1, Part 7, and also in the National Semiconductors Linear Databook. The output from the I.C. is at line frequency, which must be doubled in order to generate the half-line pulses as required in the field sync groups. There is therefore no high-frequency clock available for generating line pulses digitally - monostables and differentiators must be used, and this means that there are a number of pre-set adjustments to be made in the initial setting-up.

The generation of the field-datum is initiated by a simple integration circuit, which pro-

GENLOCK/SPG UNIT.

BLOCK-DIAGRAM.



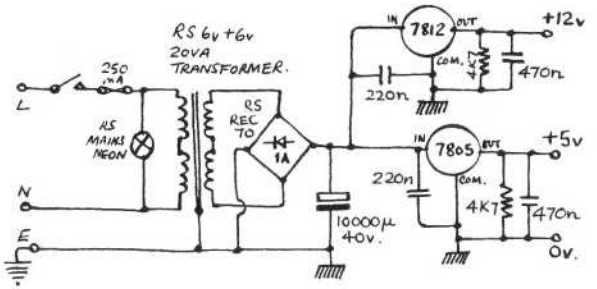
vides a pulse approximately 15 uS after the first broad-pulse. The field-datum is coincident with the first equalizing pulse, and it is necessary to delay the integrated pulse by 310 lines. This is accomplished by an initial 10 line monostable delay, followed by a twice line-frequency "count 600" circuit.

The mixed-syncs field group is generated digitally using twice-line frequency as the clock. There is a changeover switch included in the circuit so that a single broad pulse field sync can be substituted for the full field sync. group when it is necessary to genlock to a random-interlaced signal source.

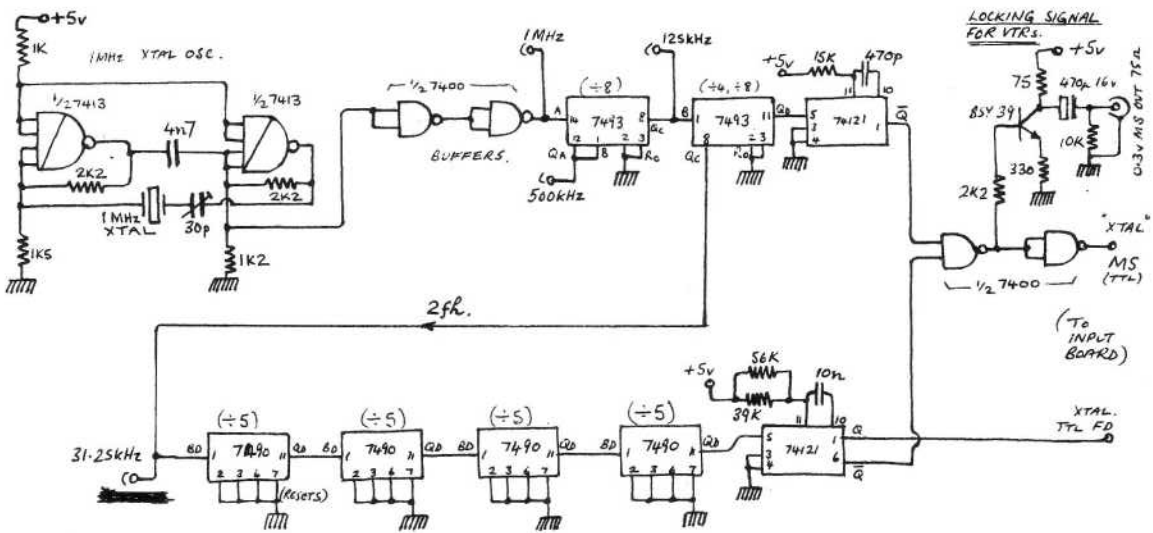
No circuit board layouts are provided, as the prototype is built on I.S.E.P. racking, using 43-way edge connectors - rather expensive for amateur use. The prototype also includes additional pulse-switching, peculiar to the Editing Suite in which it is used.

The input switching uses a C.M.O.S. 4016 analogue switch for selecting the input to the genlock unit. This switch is controlled by a remote operational panel, subject to there being a suitable signal available at the video input. If there is no video input, the genlock mode cannot be selected. Similarly, if the video input fails, the unit automatically reverts to the "normal" mode. When genlocking to a signal from a capstan-servo V.T.R., a locking ("simple") mixed-sync signal is available from the crystal unit which can be fed to the video input of the V.T.R. This will cause the V.T.R. to run in vertical synchronism with this signal. A mode can then be selected on the remote unit whereby genlock will only be achieved when the V.T.R. reaches vertical synchronism. This means there is no frame-roll as the S.P.G. moves to the genlock mode. These circuits all work by detecting the presence of field-sync signals at the video input, and are unaffected by V.T.R. "snow" signals which some open-reel V.T.R.'s exhibit when unmodulated tape plays or when in the "stop" mode.

Power Supply

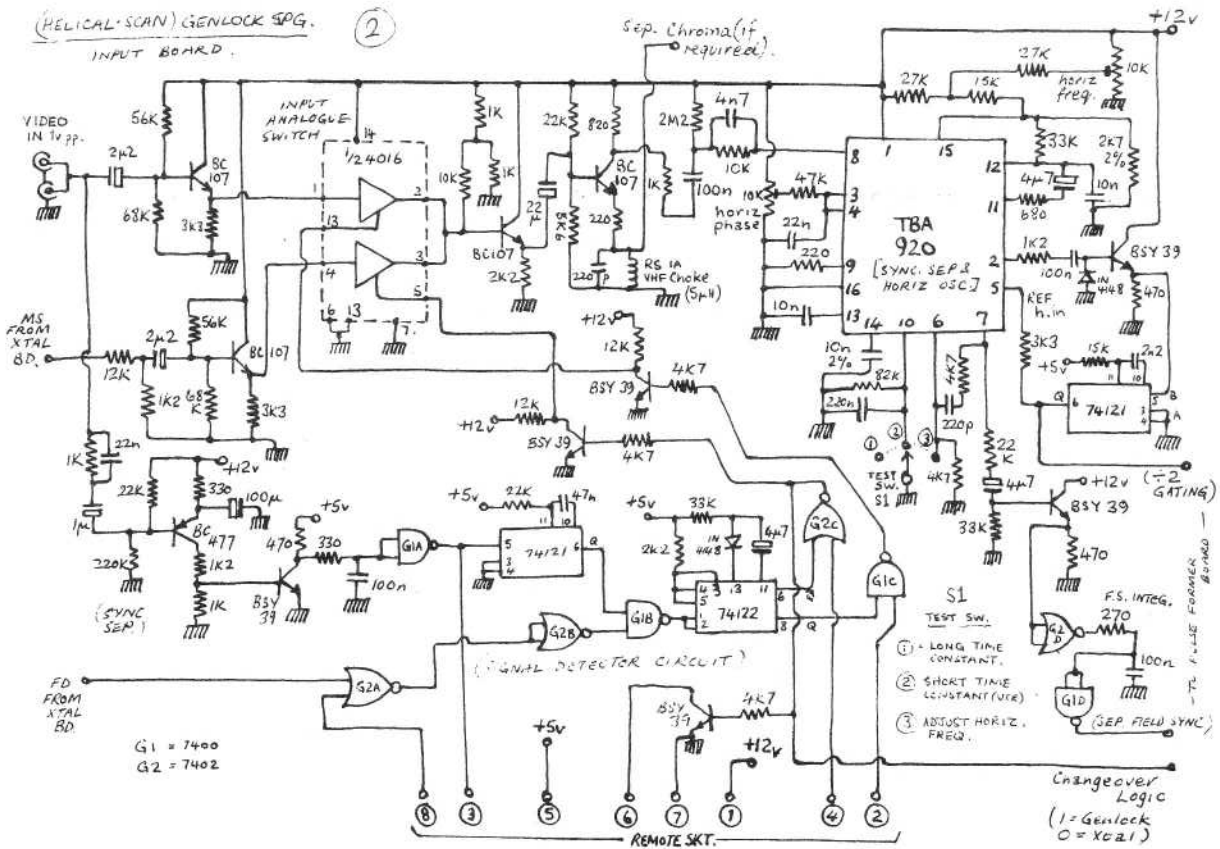


(1)

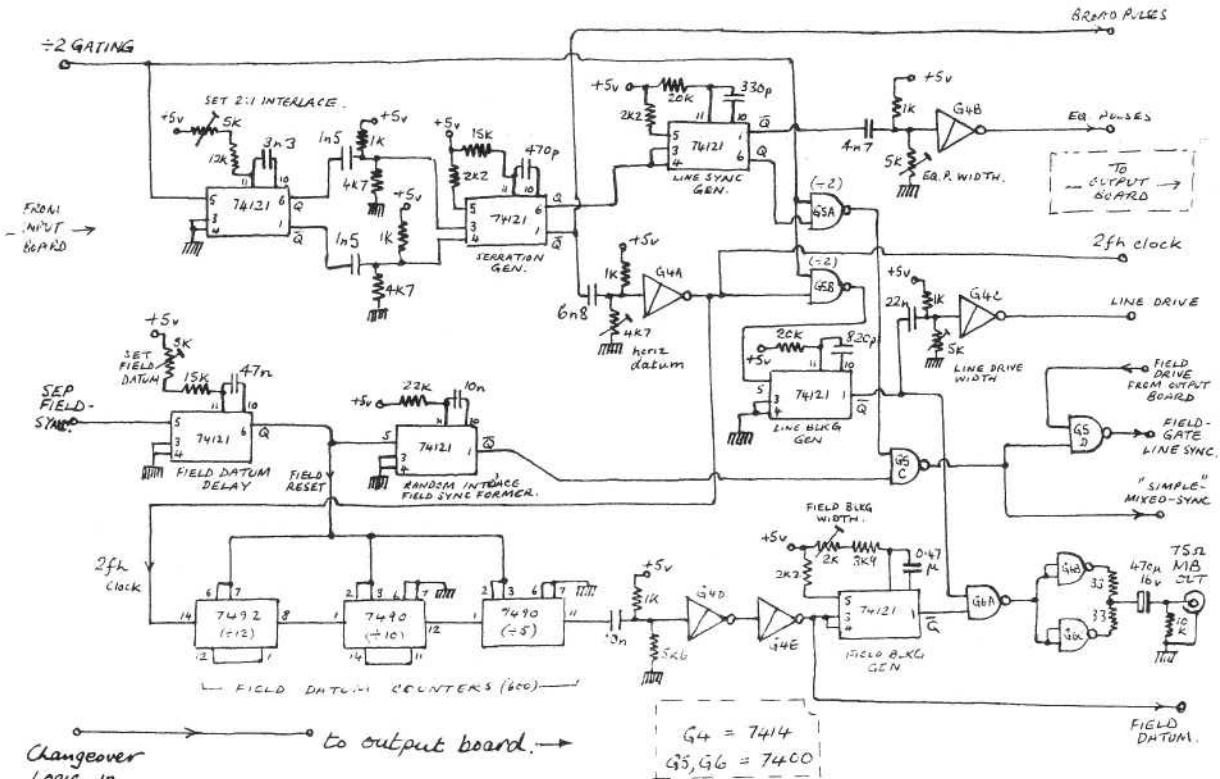


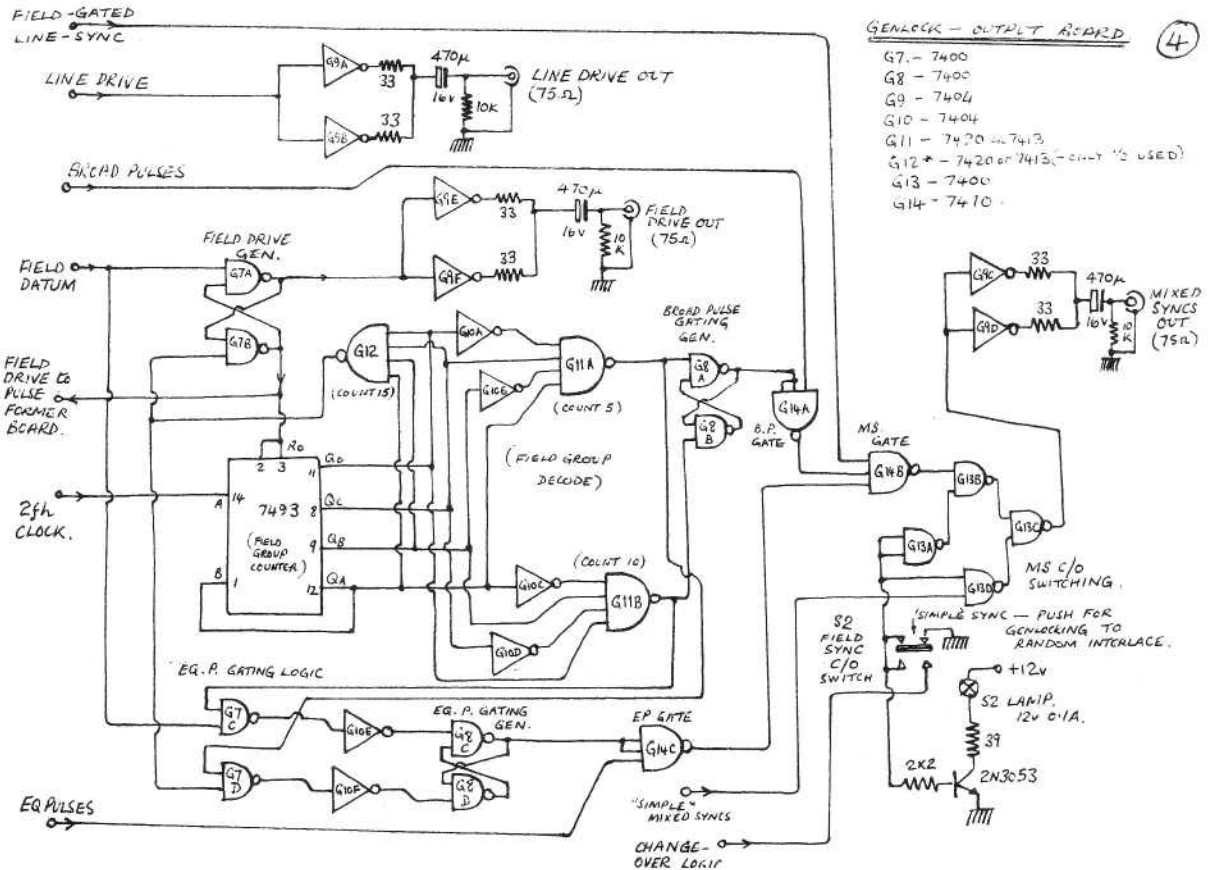
Genlock/SPG System

Crystal oscillator Board.


(HELICAL·SCAN) GENLOCK SPG.
INPUT BOARD.
2
Sep. Chroma (if required).
+12v
VIDEO IN 1v p-p.
INPUT ANALOGUE SWITCH
1/24016
TBA 920
[SYNC. SEP & HORIZ OSC]
horiz freq.
horiz phase
REF h.in
RS 1A VHF Choke (5µH)
MS FROM XTAL BD.
(SYNC SEP)
SIGNAL DETECTOR CIRCUIT
FD FROM XTAL BD.
G1 = 7400
G2 = 7402
TEST SW. S1
S1
TEST SW.
1 = LONG TIME CONSTANT.
2 = SHORT TIME CONSTANT (VCR)
3 = ADJUST HORIZ. FREQ.
(÷2 GATING)
F.S. INTEG.
(SEP FIELD SYNC)
Changeover Logic
(1 = Genlock
0 = Xcal)
REMOTE SKT.
TO PULSE FORMER BOARD

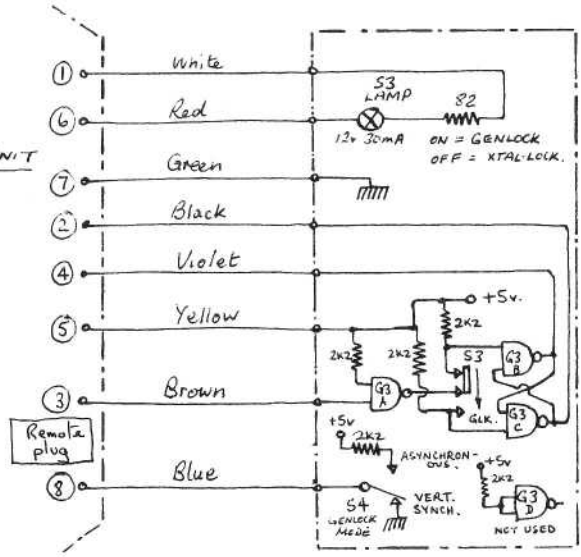
(3) Genlock. (Pulse-former board).




GENLOCK – OUTPUT BOARD
4
G7 – 7400
G8 – 7400
G9 – 7404
G10 – 7404
G11 – 7420 or 7413
G12 – 7420 or 7413 (ONLY ½ USED)
G13 – 7400
G14 – 7410
FIELD-GATED LINE-SYNC
LINE DRIVE
LINE DRIVE OUT (75Ω)
BROAD PULSES
FIELD DRIVE OUT (75Ω)
FIELD DRIVE GEN.
FIELD DATUM
BROAD PULSE GATING GEN.
MIXED SYNCS OUT (75Ω)
FIELD DRIVE to PULSE FORMER BOARD.
(COUNT 15)
(COUNT 5)
(FIELD GROUP DECODE)
M.S. GATE
B.P. GATE
2fh CLOCK.
7493
(FIELD GROUP COUNTER)
(COUNT 10)
M.S. C/O SWITCHING.
'SIMPLE SYNC — PUSH FOR GENLOCKING TO RANDOM INTERLACE.
S2 FIELD SYNC C/O SWITCH
+12v
S2 LAMP. 12v 0·1A.
2N3053
E.P. GATING LOGIC
EQ. P. GATING GEN.
E.P. GATE
EQ PULSES
"SIMPLE" MIXED SYNCS
CHANGE-OVER LOGIC

(5)

REMOTE SWITCHING UNIT



OPERATIONAL PANEL — (TO BE MOUNTED ON MIXING DESK).

SETTING UP

A dual-trace oscilloscope is necessary for setting-up, preferably with delayed-sweep timebase facilities. Before any adjustments are made, allow 10 minutes warm-up.

Check that the outputs of the crystal board are satisfactory - line syncs should be about 5uS, field syncs should be about 160uS. Neither is critical.

Genlock to a BBC or ITV 625-line transmission. Monitor this signal at line rate on ch. Y1 of the 'scope, and trigger from it. Connect the MS output to ch. Y2 of the 'scope. Set the Test Switch to position 3 (adjust horiz. osc.) which "unsynchronises" the oscillator. Adjust the "horiz. frequ." preset to get the line sync output frequency as close to the broadcast signal as is possible. Re-select Test Switch to position 2 (short time-constant - suitable for VCRs).

Observe broadcast syncs and output syncs, and adjust "horiz. phase" so that leading-edges of input and output line syncs are coincident.

Connect 'scope ch. Y2 to LD output. Adjust the "horiz. datum" so that the leading-edge of line sync. Then adjust "line drive width" to 6.5uS.

Reconnect 'scope ch. Y2 to MS output. Trigger from broadcast field-syncs. Adjust timebase so that field-sync is observable - if available use delayed timebase sweep. Adjust "field datum delay" so that start of output field-sync group is coincident with start of broadcast field-sync group - i.e. adjust for coincidence of first equalising pulses, or broad pulses.

Adjust "set 2:1 interlace". This varies the mark/space-ratio of the horizontal multiply-by-2 circuit, and therefore affects the position of alternate equalising and broad pulses in the field group. Adjust so that output pulses are coincident with corresponding broadcast pulses.

Connect 'scope ch. Y2 to MB output. Adjust the timebase to observe the field blanking period, and adjust the "field blanking width" to agree with the broadcast signal. The nominal duration is 25 lines (1.6mS).

A Hand Held 10 GHz Transciever

by Peter Johnson G8EIM

INTRODUCTION

Two units were made in order to prove how much fun could be gained from Microwave Amateur equipment, an introduction to the Club members who perhaps would never bother because it all seems like too much engineering. Well, there is very little precision engineering involved in making this one! Errors of several mm are the order of the day, and it will still work as if it was beautifully engineered! So why not try? It does not cost very much - lots of parts could be obtained from the junk box.

REFERENCES

VHF Engineering Handbook R.S.G.B. and all Radio Communications Publications on Microwaves by Dain Evans.

In the circuit shown the Gunn diode is used as a self-oscillating mixer. The IF is 10.7 MHz. A 70db amp and limiter amplifier det., complete the IF. Audio is obtained via a 1W Amplifier chip, the output is 4 - 16 ohms. No provision for squelch has been made in order to keep cost low, but would be very useful to add as a sophisticated receiver.

Perhaps if the design is popular a pcb could be arranged. The prototypes were done on Veroboard. As the layout of the prototype was terrible, no attempt has been made to provide a layout by the author.

The Gunn oscillator is a cavity type. The iris hole in the diaphram is $\frac{1}{4}$ diameter - this allows about 5Mw of Power to the aerial. This type of cavity oscillator is much more stable than others and is of course very simple.

The inverter circuit is provided to reduce the cost of buying a 12v battery, a 6v 3Ah motorcycle battery cost under £5.00. The inverter circuit cost about £1.25 with help from the spares box. Also the 6v battery is small enough to put in a pocket, in a suitable plastic bag! A shoulder bag would be better.

RANGE

Line of sight up to about 5 miles, but some very interesting results have been achieved providing much greater distances at sea level. So find out!

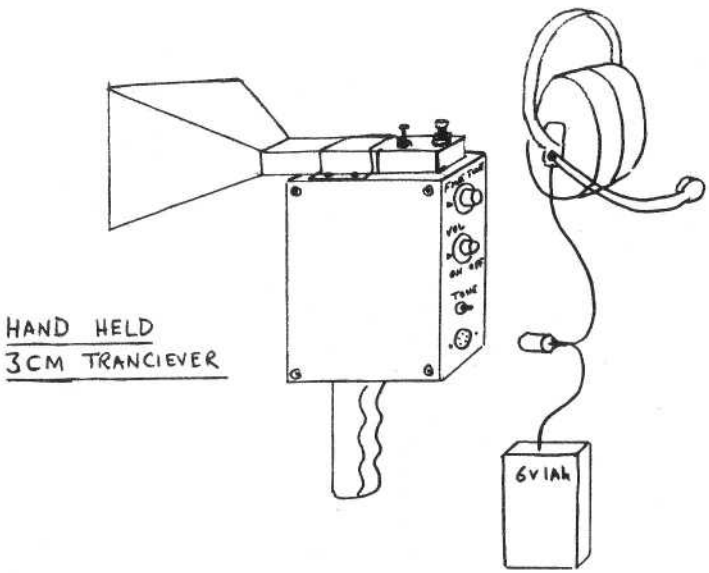
CONSTRUCTION

Make the waveguide oscillator and aerial first. Check that it works before attempting

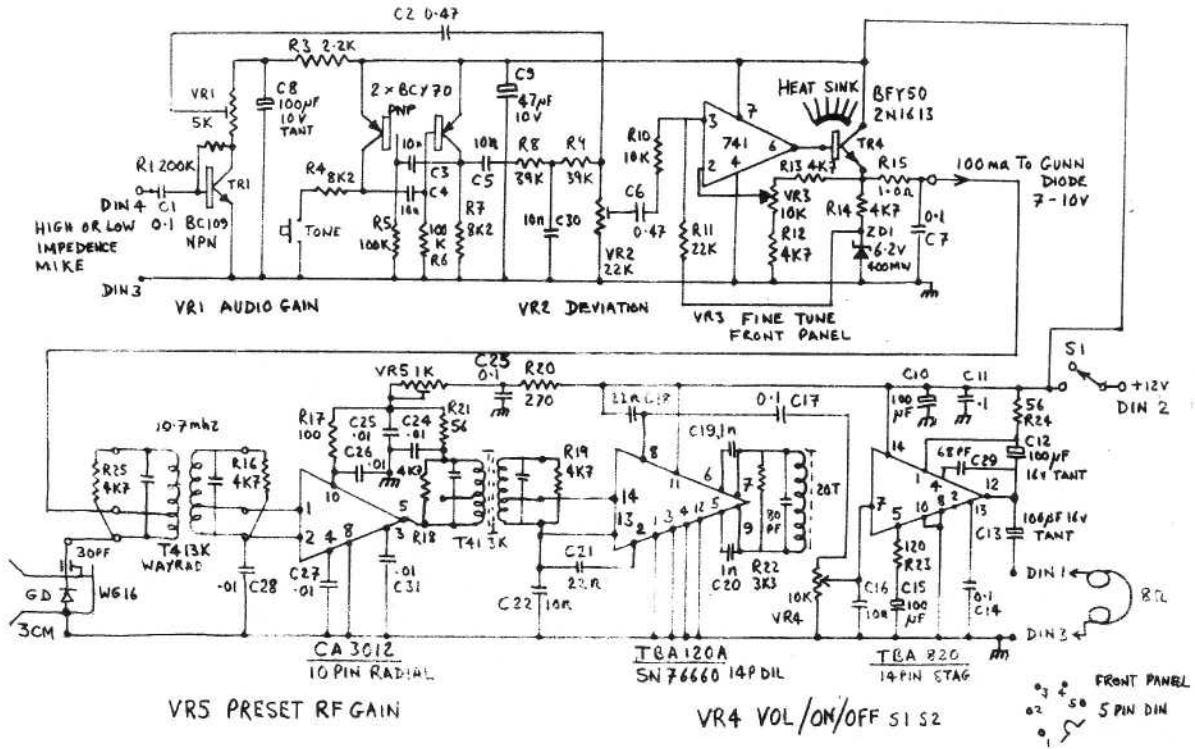
the rest of the circuits.

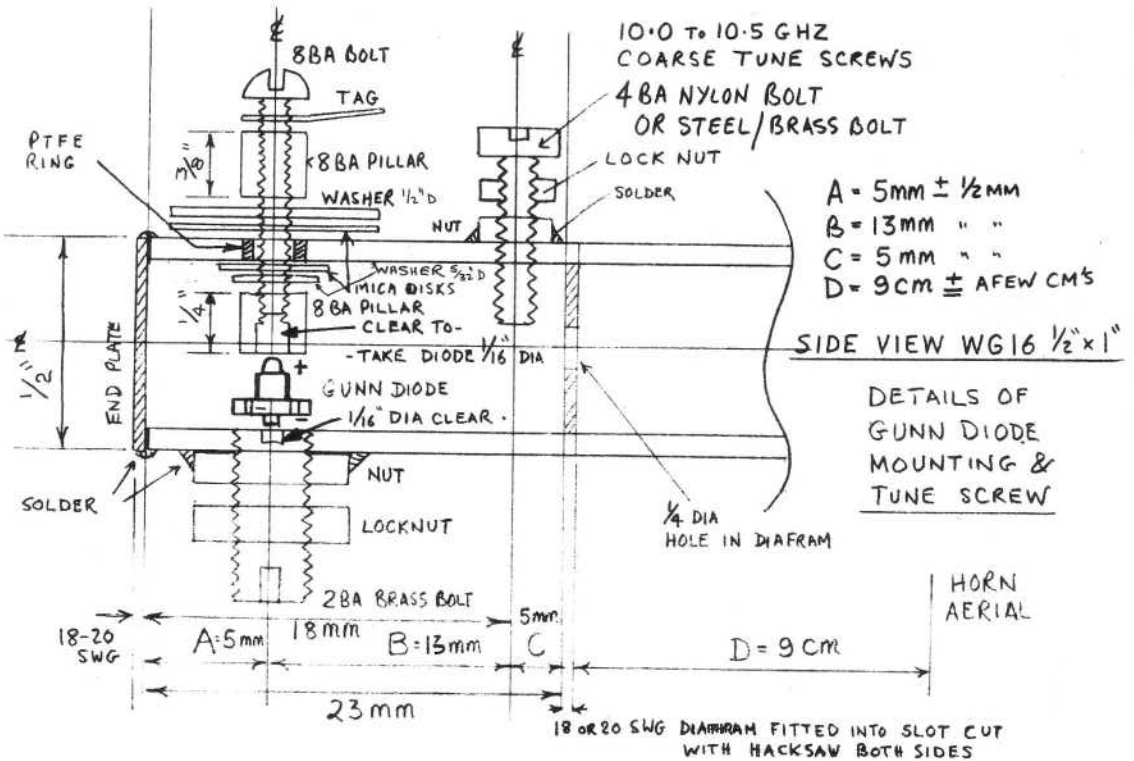
ASSEMBLY OF OSCILLATOR WAVEGUIDE

Mark out centre line equidistant rrom both edges across 1" flat of WG16, square one end with a file. Mark from this end the position of the holes to be drilled as accurately as possible. Drill holes tapering size, then tap as appropriate at the positions where nuts are to be soldered to the WG. Place nut on a dirty steel bolt and screw into tapping until nut is snug (Clean brass nuts). Cut two slots in $\frac{1}{2}$" sides of waveguide at position shown (junior hacksaw) slot diaphram copper or brass piece (tin plate will also do) into slot so that the hole is dead centre of the WG. This should be a tight fit. Fit the horn aerial at far end of WG again this should be a tight fit. Now all the parts other than the Gunn diode should be fitted including mica washers etc. Finally, stand the whole assembly up on the horn aerial fromt so that the WG is vertical. Place the last end piece in position at top (All parts to be soldered must be cleaned properly). The steel bolts should be very rusty or dirty so that solder will not take to them. Finally, if you are satisfied with the position of all the parts use a flame torch to solder each section from top to bottom. Allow time to cool off before moving. When cold, remove steel bolts and check assembly of brass parts and Gunn diode. Do not tighten the Gunn diode until you are sure the diode fits perfectly squarely in the drilled out1/16" end holes. If it is not square it will break when you tighten it! Check that the insulated section of the diode mount is not shorted. A nylon, brass or steel turning screw should be selected to get the oscillator onto the correct frequency. A steel screw brings the frequency down, and brass up so start with the nylon one. If your measurements are accurate it should tune about mid-band 10.250 GHz.



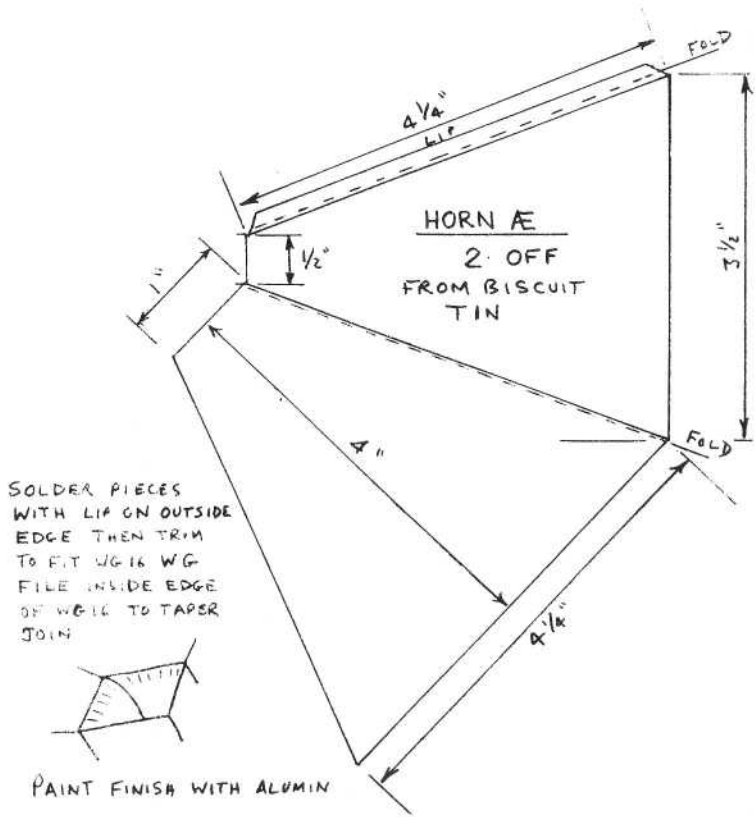
3 CM TRANCIEVER

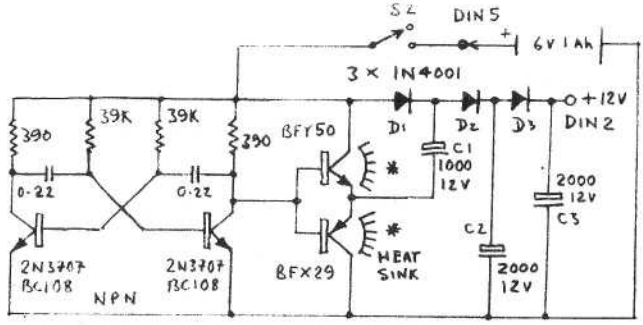



8BA BOLT
TAG
PTFE RING
3/16"
8BA PILLAR
WASHER 1/2"D
NUT
WASHER 5/32"D
MICA DISKS
1/4"
8BA PILLAR
CLEAR TO-
-TAKE DIODE 1/16" DIA
GUNN DIODE
1/16" DIA CLEAR.
1/2"
END PLATE
NUT
SOLDER
LOCKNUT
2BA BRASS BOLT
18-20 SWG
A=5mm
18mm
B=13mm
5mm
C
D=9cm
23mm
10·0 to 10·5 GHZ
COARSE TUNE SCREWS
4BA NYLON BOLT
OR STEEL/BRASS BOLT
LOCK NUT
SOLDER
A = 5mm ± 1/2mm
B = 13mm " "
C = 5mm " "
D = 9cm ± AFEW CM'S
SIDE VIEW WG16 1/2"x1"
DETAILS OF GUNN DIODE MOUNTING & TUNE SCREW
1/4 DIA HOLE IN DIAFRAM
HORN AERIAL
18 OR 20 SWG DIAPHRAM FITTED INTO SLOT CUT WITH HACKSAW BOTH SIDES

In order to check the Gunn diode is oscillating all that is required is a IN25 diode connected to an AVO on the 2.5 v/50uA range as RF detector. A variable PSU 6-10v at 150mA (make sure the polarity is correct) negative to WG, pos to the insulated tag, the Gunn diode must be mounted the correct way round as it will fit either way. Adjust the PSU volts until maximum RF is observed on the probe - this needs quite close coupling in front of the WG horn or even inside it.

Calibration may only be done with a wavemeter or a received known signal. Note: spurious oscillation will occur if a Q.1uF capacitor is not placed on positive connection of Gunn diode to ground. The Gunn diode takes about 100mA at 7 volts. In the circuit shown the Gunn diode is used as a self-oscillating mixer to the IF of 10.7 MHz so the TxRx action duplex when used with a similar TxRx arrangement. The coarse tuning is done be the tuning screw and fine tune covers about ± 10MHz and should be able to take care of any initial drift in frequency during warm-up.





COMPONENTS LIST FOR 3CM HAND HELD TRANSCEIVER

R1	220K	VR1	5K Trimpot horizontal
R3	2K2	VR2	22K Trimpot horizontal
R4,7	8K2	VR5	1K Trimpot horizontal
R5,6	100K	VR3	10K fine tune panel mount
R8,9	39K	VR4	10K Vol/on/off 2 polf"
R10	10K		
R11	22K	C1,7,17,11,23	0.1uF 50v polyester
R18,12,13,14,16,19	4K7	C6,2	0.4uF 50v polyester
R15	1.0 ohms 1W	C3,4,5,16	0.01uF 50v polyester
R20	270 ohms	C10,8,9	100uF TANT 50v polyester
R17	100 ohms	C12,13,15	100uF TANT 50v polyester
R24,21	56 ohms	C18	0.022 50v polyester
R22	3K3	C20,19	1000PF Ceramic Weecons 50v
R23	120 ohms	C21	0.022uF Ceramic Weecons 50v
		C22,24,30,25,26,31,27,28	0.01 Ceramic Weecons 50v
		C29	680PF Ceramic Weecons 50v

HARDWARE

4½" WG16 Brass or Copper WG
DiCast box 3¾" x 4¾" x 2"
Biscuit tin box
Stereo 8 ohm cans
Any Xtal mike glued to wire boom attached to cans
5 pin DIN plug & socket
1 Heatsink spring type

ICs CA3012
TBA 120A or SN76660
TBA 820
741 OP Amp

TRs 1 BC109 one off
TRs 2,3 BCY70 two off
TR4 2N1613

ICs and TRs are all available mail order from Tecknomatic Ltd.,
54 Sandhurst Road,
Kenton, Middx.

VOLTAGE CONVERTOR

2 x 39K	2 BC108 or 2N3707	2 Heat sinks
2 x 390 ohms	1 BFY50	
	1 BFY29	
	2 IN4001	2 x 1000uF 12v
		2 x 0.22uF polyester

* BIRKET GUNN DIODE 15MW

Adverts

ADVERTISING RATES

Back page	£15
Inside page	£12
Half page	£ 6

Small ads 10p per line (free to members of B.A.T.C.)

Advertisements are inserted in C Q - T V on the understanding that advertisers comply with the law and accept responsibility for their wording. They must also undertake to reply to anyone who encloses a stamped addressed envelope with their enquiry.

B.A.T.C. Equipment Registry exists to help members of the Club who have equipment for disposal or who wish to purchase some specific item. Send a list of your "wants" and "disposals" to the address inside the front cover of this issue and during the six months for which your application is valid, the Registry will attempt to put you in touch with someone who will sell you your needs or buy your surplus. A s.a.e. would be appreciated when using this service.

B.A.T.C. possesses a Marconi Sideband Analyser which has been donated to the Club. If anyone wishes to make use of this equipment, could they contact Ian Waters at 39 Stow Road, Stow-cum-Quy, Cambridge. They will need to provide their own transport.

FOR SALE
5FP7 with suitable coils and focus magnet £5
MW13-35 viewfinder tube (2 off) £1 ea
10764 C.P.S.Emitron believed OK Free
All above plus postage at cost.
Trevor Lumb
14 Linton Gardens
Bury St Edmunds
Tel. 0284 4318

WANTED
4m Convertor with low IF, 2-4 MHz region.
L.S.Cook
56 Sunningdale Court
Square Hill
Maidstone
Kent.

ANYONE needing a crt for viewfinder or monitor, or for a scope should contact Clive Oakley on (Orpington) 0689 23930 about 30 types available along with a large quantity of tv gear.

A NUMBER of cameras, monitors and misc. equipment available - ring Brian On Gainsborough 2802 day or 3940 night.

FOR SALE
Diascope for image orthicon camera, ex-BBC and made by Taylor Hobson. Takes 35 mm standard slides; perfect condition. Bulky, so buyer collects. £10
Andrew Emmerson
3 Curtis Way
Faversham
Kent ME13 7RT
Tel. 0795 82 5457

FREE
Pye 3" I.O. camera channel consisting of camera, camera control unit, monitor and power supply in reasonable condition. Large drum of camera cable suitable for above, and other assorted cables.
Two 17" studio monitors which may need attention.
Dozens of 2" video tapes, and a large amount of partially dismantled tv studio equipment including a 4½" IO camera.
All available free to anyone who can collect it from Radio Tayside, Roseberry St., Dundee, Scotland. Please contact the programme controller, Mr P. Blackmore to arrange collection. He is unable to give further details of the equipment however.
NOTE; The CCU may be the wrong one, as there were two complete channels and the CCU I took has a different camera cable socket to that on the camera. I have been able to patch the plug to the socket and get my channel working but if anyone would like to swop CCUs or want further information on the above, please write to me, Peter Egglestone G8KGA, at 4 Bushfield Rd., Albrighton. Wolverhampton WV7 3PD

TELEVISION Equipment wanted; cameras, monitors, mixers, w.h.y.
Ring Brian on Gainsborough 2802 day or 3940 night.

WANTED
CV418 crt. It has the commercial equivalent MX2 and is used in a monitor type 4436. Its a long funny looking tube with its X plates taken out to side caps.
A. Cooper
1 Cottage Crescent
Camelon, Falkirk
Stirlingshire, Scotland
Tel. 0324 23533

WANTED
C912 Monoscope tube, preferably Test Card "C" or "D" but any other acceptable.
Set of three (for col. cam.) 1" or 1¼"
Plumbicon with scan/focus assy. & data.
Set of dichroic mirrors.
Colour monitor, preferably noy too large old round type tube version will do, if possible with spare crt.
Eon Taylor G3YJM
24 Redwood Ave
Leyland
Lancs PR5 1EN

WANTED
5FP7 crt with scan coils for sstv mon.
Mrs B.A.Lambert G4EKX
34 Halley Park
Hailsham
East Sussex BN27 2NW

WANTED
Small (around 10") transistor monitor, 625 line.
Mike Fry G3VXZ
18 Rushington Ave
Maidenhead
Berks.

WANTED
The following components of an EMI Surveyor 1 (known as Surveyor) CCTV camera;
1. Front casting of case, including main chassis tube assy.
2. Mains transformer (T1) for above. (Partridge EMI part no 9A/B 16866)
3. Electrostatic vidicon, EMI 9745 or similar.
G. Sturton
1 East Way
Shirley
Croydon CR0 8AH

WANTED
Fast scan transmitting equipment (625 b & w)
D. Goldshaker G8NHF
41 Peak Hill
London SE26 4LS

WANTED
C-mount lenses for 1" vidicon cameras preferably with both aperture and focus adjustable. Focal length about 1".
B. McGennily G4DBM
70 Cemetry Road
Preston
Lancs PR1 5US

MOBILE ANTENNAS
UP TO 50% CHEAPER THAN OTHER MAKES!
70 MHz 145 MHz 432 MHz
STAINLESS STEEL PROFFESSIONAL TYPE
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AMTEST, 55 VAUXHALL STREET
WORCESTER WR3 8PA

DUE TO GOING QRT, FOR SALE all my station equipment. All in working order.
1 Heathkit Transceiver HW100 £140.00

1 AC Power supply for above £40.00
1 antenna vertical all band 18AVT £60.00
1 Europa transverter £50.00
1 slow scan monitor by W6MXV £60.00
1 slow scan keyboard by G8HBR £60.00
1 slow scan camera as per slow scan handbook, plumbicon tube, separate power supply, working, but needs better alignment. £40.00

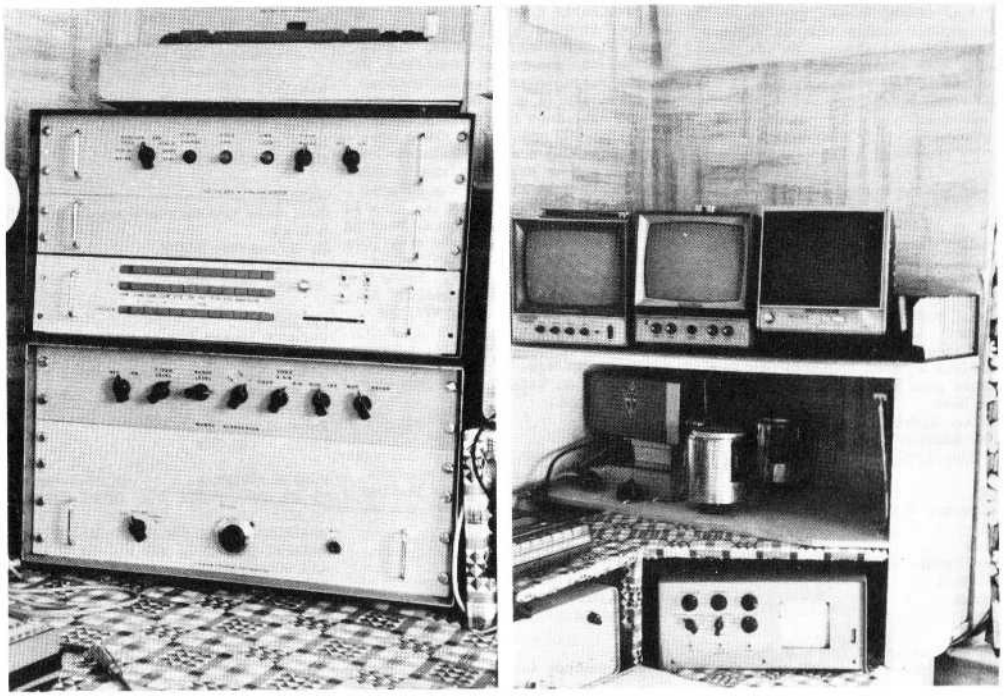
With transceiver free antenna tuning unit and speaker. Please write in the first instance to

Paul Kaminski GM3PIB
5 Tytler Street
Forres
Morayshire 1V36 OEL
Scotland.

A List for your Diary of FUTURE EVENTS

International atv Contest	Sept. 9,10
B.A.T.C. 1978 Convention	Sept. 9
SSTV Activity Weekend	Oct. 7,8
Albatross SSTV Contest	
ARRA Exhibition, Granby Halls, Leics.	Nov. 2,3,4
B.A.T.C. SSTV Contest	Dec. 9,10

We regret that due to unavoidable circumstances Arthur Critchley has had to post-pone further parts of his series on CMOS. It will re-start as soon as possible.



Two photos of Mike G8DLXs shack, showing his fast and slow scan equipment.

CLUB SALES

			PRICE	POST & PACKING
Camera tubes	EEV Leddicon		£82	nil
	⅔" 9777 E.M.I. Ebitron		£28.00	nil
	⅔" 9831 E.M.I.	Amateur grade	£11.00	nil
	1" P849 English Electric	Amateur grade	£12.00	nil
	1" 9677 E.M.I.	Amateur grade	£11.00	nil
	1" 9728 E.M.I.	Amateur grade	£11.00	nil
	4½" 9565 E.M.I. Image Orthicon		£10 for two,	buyer collects
Coils	1" B.A.T.C. coils (limited no of ex-industrial @ £6 + 54p)		£11.50	54p
	⅔" E.M.I. coils		£11.50	54p
Paxolin sockets for 1" or ⅔" vidicons			.32	8p
C mount for lens			.50	10p
Lapel badges			.40	8p
Adhesive badges			.15	8p
B.A.T.C. headed note paper and envelopes (50 sheets)			£1.75	
Reporting charts			.6	8p
EEV Camera chart			£ 1.65	30p
B.A.T.C. Test Card			.50	10p
Film strips of past C Q - T Vs (10 issues per strip)			£ 1.20	10p
Windscreen stickers			.6	8p
C Q - T V SPG printed circuit board ready drilled			£ 3.00	10p
C Q - T V SPG Genlock Unit printed circuit board ready drilled			£ 3.00	10p

Rapidly increasing postal charges have compelled us to quote the above post and packing charges. Will overseas members please ask for a quotation before sending cash. Obviously, for small items such as lapel badges, adhesive emblems, windscreen stickers e.t.c., one can send several items for the same price as one - please try and estimate the right amount. Our thanks go to those members who estimate on the high side and suggest that any balance can be put to Club funds.

Please send your orders to C.G.Dixon (B.A.T.C. Club Sales)
Xyrles Cross
Peterstow
Ross on Wye
Herefordshire.

PROJECT 100 printed circuit boards at £4.00 each are available from Tom Mitchel at 30 Old Farm Close, Hounslow, Middlesex. Suitable Xtals are also stocked, at £2.60. Please order these items direct from Tom Mitchel; however a small stock is held by Club Sales for the benefit of members who wish to order other items at the same time.

PUBLICATIONS

This is a separate department of the Club, do not send orders for publications to Club Sales, send orders to B.A.T.C. Publications
64 Showell Lane
Penn, Wolverhampton
West Midlands.

Slow Scan Television by B.J.Arnold G3RHI published by B.A.T.C. 2nd edition 35p + 8p p&p

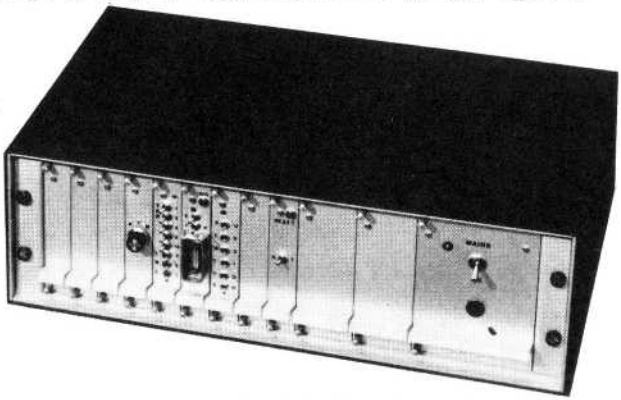
A Guide to Amateur Television published by B.A.T.C. price (post paid) £1.50 to members and £2.00 to non members. Overseas postage rates on request.

Slow Scan Television Handbook sold out

CQ-TV BACK ISSUES. The following issues are at present in stock: Nos. 67, 68, 69, 73, 76, 77, 78, 79, 80, 82, 83, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 & 100. The stocks of some are very low and will soon run out. They are: Nos. 67, 69, 73, 78, 79, 80 and 98. Back issues cost 50p each for Nos. 93 onwards and 25p prior to 93. Return postage allowance would be appreciated. Any article which has appeared in the journal can be supplied in photo-copy form at 5p per sheet. Payment for this service should be in postage stamps. A list of all the main articles which have appeared in CQ-TV giving details of how many sheets are needed to reproduce it is available for 40p (preferably in UK postage stamps) plus a large (9" x 4") s.a.e.

PLEASE NOTE THIS LIST CANCELS ALL OTHERS.

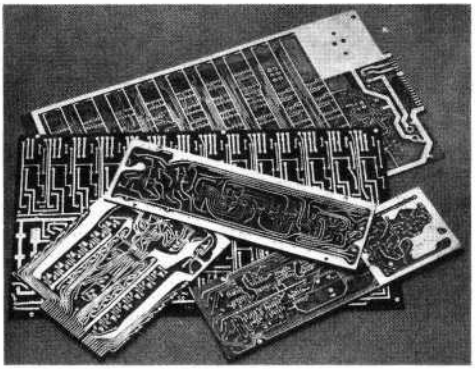
T.V. CHARACTER GENERATOR



The Crofton character generator has been designed to produce upper case alpha, numerics and sundry symbols. The standard keyboard having 60 keys. The equipment will lock to a standard mixed sync source and provide a composite output of 1.4v p-p into 75 ohms.

The standard format provides 3 pages of 16 characters by eight lines. Page select is by simple rotary switch.

This inexpensive instrument will find many applications within the video field for both the professional and semi professional user. Price on application.



The Crofton PCB Service

The Crofton P.C.B. service has been set up to offer a service to both the small and medium sized electronics company.

Being fully aware of the pressures on most engineers today, we have set up a specialist operation capable of producing P.C.B. designs and boards from the most scanty information.

You give us the circuit and we will do the rest. Whether you want high quality or low price commercial boards we can offer you a competitive service. Prototypes can normally be provided within 2—3 days from receipt of artwork.

So next time you're in the market for this type of service just give us a ring.

CROFTON ELECTRONICS LTD

35 Grosvenor Road, Twickenham, Middlesex. Telephone: 01-891 1923