CQ·TV

78

MAY 1972

THE BRITISH AMATEUR TELEVISION CLUB

Committee Members and Club Officers

PRESIDENT
R.S. Roberts G6NR

CHAIRMAN
Malcolm Sparrow G6KQJ/T
64, Showell Lane
Penn, Wolverhampton,
Staffordshire.
Tel. Wombourne 3037

GENERAL SECRETARY
Joe J. Rose G6STO/T
Pinchbeck Farmhouse,
Mill Lane,
Sturton-by-Stow,
Lincolnshire.
Tel. Stow 356

MEMBERSHIP SECRETARY
Nicholas Salmon
"Cobbolds"
Magdalen Laver,
Nr. Ongar,
Essex. CM5 0EE
Tel. Moreton 309

TREASURER
Alan Pratt,
10, Grammar School Road,
Brigg,
Lincolnshire.
Tel. Brigg 3014

EDITOR C Q - T V
Andrew Hughes,
93, Fleetside,
West Molesey,
Surrey. KT8 ONQ
Tel. 01-979 9983

SALES & LIBRARY
Grant Dixon G6AEC/T
"Kyrles Cross",
Peterstow,
Ross-on-Wye,
Herefordshire.
Tel. Ross-on-Wye 2715

MAILING LIST
Lewis Elmer G6AGU/T
6, Atterbury Close,
West Haddon,
Rugby,
Warwickshire.
Tel. West Haddon 324

EQUIPMENT REGISTRY
Alan Watson,
"Somerby View"
Bigby,
Barnetby,
Lincolnshire.
Tel. Searby 287

Cyril Chivers
Mortimer Street,
Trowbridge,
Wiltshire.
Tel. Trowbridge 2848

Cyril Hayward G6AFJ/T
Marina Cottage,
Watford Locks,
Watford,
Rugby,
Warwickshire.
Tel. Daventry 3974

John Lawrence G6JGA/T
40, Aberconway Road,
Prestatyn,
Flintshire.
Tel. Prestatyn 3255

Ian Lever G8CPJ
65, Dynes Road,
Kemsing,
Sevenoaks,
Kent.
Tel. 01-830 2945

Gordon Sharpley G6LEE/T
52, Ullswater Road,
Flixton,
Urmston,
Lancashire.
Tel. Urmston 8031

Ian Waters G6KKD/T
39, Stow Road,
Stow-Cum-Quy,
Cambridge.
Tel. Bottisham 477

C Q - T V is pub-
lished quarterly by
the British Amateur
Television Club and is
posted free to all mem-
bers. Single copies
are available from the
Editor at 25p each;
back numbers are also
available to members at
a reduced price of 15p.

Overseas members
may have their copy of
C Q - T V sent by air-
mail, for a surcharge
depending on their coun-
try. Details are avail-
able from the Treasurer.

Members wishing to
have material published
in C Q - T V should
send the manuscript and
drawings to the Editor;
articles are invited
on all subjects of in-
terest to amateurs and
should be of about
1500 words; larger art-
icles should be divided
into convenient Parts
for publication in
consecutive issues of
the journal.

COVER PHOTO   1970 Convention at Cambridge

EDITORIAL

CONTENTS

This year's Convention will be held in London after the very successful previous one in Cambridge, and it is to be hoped that as many of you as possible will be able to attend. Full details are on apge 5, so please read them and note the date September 16th in your diary NOW. See you all there.

We welcome this month our new Hon. President, Bob Roberts G6NR, from the Northern Polytechnic. Our retiring President, Ivan James G5IJ, who has just been appointed scientific advisor to EMI's Central Research Laboratory on television systems, has now completed his very successful term of office and has added his name to our long list of distinguished Past Presidents. We must offer our especial gratitude to Ivan for all he has done for the Club since 1968, and hope that he will look back with pleasure on the years which saw CAT-70, and the waging (usually successfully) of the 70cm fight.

Bob Roberts who takes over from Ivan has arrived just in time for the 1972 Convention (see page 5) where we hope as many of you as possible will be able to meet him. He has written this letter to members introducing himself to you all.

Dear Members,
Your Editor has given me a difficult task; I have to introduce myself to you! Some of you will know me, but for the others, here goes;

I have held a transmitting license since 1927(and, of course, am a member of RAOTA), and my immediate bands of interest are 2 metres and 70cms.

By profession, I am Deputy Head of the Department of Electronics and Telecommunications Engineering at the Polytechnic of North London, (formerly the Northern Polytechnic). Television engineering has been a particular interest of mine, dating from the 30 line days. I pioneered the first-ever courses in this country on colour television engineering, as long as fifteen years ago. Many different professional training courses have been operated over the years, and the work continues. I have written the occasional article for the technical press, and I have given many specialist lectures on telecommunications topics. I am a member of the IERE and the RTS, and am a member of many other committees concerned with the profession.

I must take this opportunity of expressing

my pleasure at being invited to be your President. I have watched the growth of the B.A.T.C. since its inception, with great interest. The Club members have a unique enthusiasm for their hobby, and the Club has enjoyed a succession of very worthy Presidents. I hope, most sincerely, that my term of office will be in the tradition of my predecessors, and that the Club will go forward from the strength that they and the members have founded.

Bob Roberts. G6NR
(FIERE, Sen MIEEE)

B.A.T.C. EQUIPMENT REGISTER

Just one year ago BATC started the Equipment Registry as a Club service designed to help co-ordinate the exchange of surplus equipment between members themselves and manufacturers etc. Since then many members have found the service to be extremely useful, both for second-hand cheap gear, and for those out of the ordinary items, and it is proposed to continue the Registry for as long as it appears to be necessary.

For the benefit of new members, or those who have not used the Registry before, this is how it works. A filing system is held by BATC, cross-referenced between two sections - "Wants" and "Surplus". Into the "Wants" section go details from the forms which members have filled in and into the "Surplus" section go similar details of all the equipment known to be available, either from members, or from manufacturers, tv companies etc. When a requirement matches an availability, the members are put in touch with each other and left to sort out the purchases themselves. Every effort is made to ensure that contacts are only made where the price asked equals the price offered and for this reason we ask you specially to fill in the "price" column in the form. If you're not sure, put e.g. "approx. £1", or give a range e.g. £25 to £35. But don't leave us in the dark, unless you want to get fed up with us for offering you a £55 camera when you only wanted a £10 one!

Where manufacturers surplus equipment is concerned, BATC may occasionally undertake to store equipment for a short time, but the Club will NOT pay carriage. Members will be expected to reimburse BATC for any costs incurred, although these will be kept to a minimum. It would also be appreciated if a stamped addressed envelope were included with each form, or at least a 2½p. stamp. The postage costs for the Registry over the last year have been phenomenal!

As soon as you have obtained the equipment you wanted, or sold your surplus gear, do please inform the Registry so that you can be removed from the file. Otherwise the system will slowly grind to a halt, and you will become annoyed with the letters which continue to flow in. Help us to help you.

Don't worry if your request seems to be for the most unlikely piece of gear; it may still be possible to find it. Perhaps from a Company, or from the fantastic hoards that some amateurs have stored away somewhere, thinking that no one will ever want their "rubbish".

This service is for surplus equipment, not for new; the Club has always operated a Club Sales section and continues to do so for new gear. Yokes, lens mounts, tubes, badges etc. are all available and are advertised in every issue of this magazine by Grant Dixon, the Club Sales Officer. Please continue to use this non-profit making service.

We shall be pleased to hear your criticsms of the new system, which we hope will fill a gap and help benefit amateur tv enthusiasts everywhere. Send your comments and suggsetions for improvements to the address below, together with your completed forms.

> BATC Equpment Registry,
> A.R. Watson Esq.,
> "Somerby View",
> Bigby,
> BARNETBY,
> Lincs.

Telephone messages can be taken in the evenings if you wish for an estimate, or any enquiries you may have. The number is Searby 287 (065-262-287 on the STD system).

B.A.T.C. EQUIPMENT REGISTER

MEMBER'S REQUIREMENTS

Name _____ Address _____

Call Sign _____ _____

Tel. No _____ _____

Please insert the following requirements in the Club Equipment Register:-

Maximum price I am prepared to pay.

MEMBER'S SURPLUS EQUIPMENT

Name _____ Address _____

Call Sign _____ _____

Tel. No _____ _____

Please insert the following equipment, which is surplus to my requirements, in the Club Equipment Registry:-

Price required

Give details of Model No., Make, size and weight.

PLEASE INCLUDE A S.A.E.

PLEASE INCLUDE A S.A.E.

1972 BATC CONVENTION

This year's Convention is once more to be held in London, with the help of the I.T.A. who have allowed B.A.T.C. to use their headquarters in Knightsbridge. Here are the details:

PLACE   I.T.A., 70, Brompton Road, London.

DATE   Saturday 16th September, 1972.

TIME   1030 - 1830

P R O G R A M M E

1030   Opening of Convention.

1030 - 1800   Exhibition of Members Equipment.

1300 - 1500   Reading of members papers.

1500 - 1700   B.A.T.C. Annual General Meeting.

1830   Close of Convention Proceedings.

1930   Convention Dinner.

Please read the programme, and if you wish to exhibit or read a paper, or use the car park fill in the form opposite, as all the details we ask are very important - we must know in advance the space which your exhibits will require or someone will be disappointed, for instance.

Priority for the car park spaces will be given to exhibitors, and we must ask for a small payment by those using this facility. As spaces are limited, early booking is advisable; any overbookings will have their fee returned promptly.

The deadline for acceptance of completed Registration Forms is August 12th 1972; this is so that final arrangements for the Convention can be made in good time; if you intend to make use of the details on the form, please complete it now and post it off.

Send your completed forms to:

> Don Reid,
> 58 Weald Road,
> Brentwood,
> Essex.

Whilst at the Convention you will be able to place orders with Club Sales, for those items listed on page 38 of this magazine, and also pay your subscriptions direct to the Treasurer, if due. All B.A.T.C. officials will be present at some time during the day, and will be ready to answer your queries and take your suggestions for running the Club. Have you any new ideas for B.A.T.C.? Bring them with you when you come to London on September 16th.

Some equipment on display at a previous Convention

1972
B.A.T.C. CONVENTION
REGISTRATION FORM

NAME   CALL SIGN

ADDRESS

I would like to bring the following equipment for display:
Description of Equipment

Approximate Table Size Required

Approximate Power Required
(13A sockets only)

I would like to read the following paper on amateur tv.
Title of paper

Approximate Duration

I would like space for my car in the I.T.A.
car park:
Registration no. of car

Make of car

Approximate time of arrival

Please Note: it is necessary to make a charge
of 50p for the use of the car park, as the num-
ber of places available is restricted. Please
enclose a cheque or postal order made payable
to "The British Amateur Television Club" with
this form if you wish to reserve car parking
space.

I would like to attend the Convention Dinner:
No. of tickets required

Signed   Date

Complete those sections of interest to yourself,
and enter "not applicable" in the remaining sec-
tions. Then send the completed form to
D.S. Reid Esq.,
58, Weald Road,
BRENTWOOD,
Essex.

It is not necessary to complete a Registration
Form to attend the Convention; only do so if
you need to inform the organisers of the details
thereon. All members are invited to attend
without notice.

Any members who have Resolutions they may
wish to put to the Annual General Meeting must
send them in writing beforehand to the Club
Honorary Chairman (see page 1 for his address).
These Resolutions will then, if necessary, be
placed on the Agenda for discussion, and voting.
Please note that no Resolutions can be accepted
during the Meeting; only those accepted as
above are admissable.

It is hoped to organise a B.A.T.C. dinner
after the Convention as in previous years. If
you are interested in attending please inform
Don Reid within the next two weeks so that he
can decide whether or not this function can go
ahead; as you will appreciate, a minimum num-
ber of members is required to make the dinner
worthwhile. If you could then indicate on the
Registration Form how many tickets you require
Full details about time and venue will be sent
to you.

CLUB CONSTITUTION

Further to the article on the Club Consti-
tution published in C Q - T V 77 another point
which has emerged is that item 9 of the Consti-
tution states that:

"General Meetings of the Club shall be held at
the Convention which shall be organised from
time to time by the Committee, at intervals of
not more than two years".

As the last General Meeting of the Club
was held at Cambridge on 26th July, 1970 it
follows that if this paragraph is to be strictly
adhered to then this years General Meeting
should take place also in July this year or
even earlier.

INTEGRATED   PART 8.
CIRCUITS

A.CRITCHLEY Dip El; C Eng; MIERE.

Shift Registers

Basic System

The shift register was mentioned in passing in this series in CQ-TV 73 page 14 but no details were given.   Basically, a shift register consists of a chain of bistables with inputs and outputs connected and with commoned clock pulse inputs.   Figure 1 shows a typical shift register composed of D-type bistables, but any sort of bistable may be used.   This is then a shift-right register.

Fig. 1 Basic Shift Register
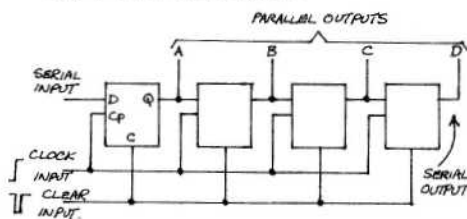
There are several types available in the TTL range and they have various features such as 4 bits, 5 bits, 8 bits, etc., or shift left instead of, or as well as, shift right, parallel loading, etc., etc.   Table 1 shows features of many of those in the range.

Shift registers are used mainly in two ways. Firstly as a means of delaying pulses by fixed increments, and secondly as a temporary store of digital information. The first application is the one commonly used for TV purposes, whereas the second one is mainly for computers or calculators and will not be described here.

Some shift register ICs will now be described and ways in which they can be used will be given.

Table 1 Features and facilities of various TTL shift registers

Type	No. Pins	No. Bits	Input	Output	Shift	Clear Input	Preset Enable	Clock	Mode
7491	14	8	Ser. 2 off	Ser.Q & $\bar{Q}$	Right	No	No	Pos.	No
7494	14	4	Ser. Par (2)	Ser.Q Par.	Right	Pos.	(2)	Pos	No
7495	14	4	Ser. & Par.	Ser.Q & Par.	Right	No	With Mode	Pos (2)	Yes
7496	16	5	Ser. & Par.	Ser.Q & Par.	Right	Neg	Yes	Pos	No
74164	14	8	Ser (2)	Ser.Q & Par.	Right	Neg	No	Pos	No
74165	16	8	Ser. & Par.	Ser.Q & $\bar{Q}$	Right	Neg?	With Load	Neg (2)	Yes
74166	16	8	Ser. & Par.	Ser.Q	Right	Neg.	No	Pos (2)	Yes
74194	16	4	Ser.(2) & Par.	Ser.Q & Par.	Left & Right	Yes	No	Pos.	Yes
74195	16	4	Ser. & Par.	Ser.Q & $\bar{Q}$, Par	Right	Yes	No	Pos	Yes
74198	24	8	Ser (2) & Par.	Ser.Q & Par.	Left & Right	Neg.	No	Pos	Yes
74199	24	8	Ser. & Par.	Ser.Q & Par.	Right	Neg.	No	Pos	Yes

Ser.= Serial, Par.= Parallel, Pos. = Positive, Neg.= Negative

7491 (7491AN)

Delaying of pulses is the only use for this type as it has no access to the various bistable outputs except for the last one — the serial output this is known as. There are 8 bistables which can hold 8 bits of information. (A bit is one state at any one time, either 1 or 0). The 7491 is thus the simplest shift register available. Figure 2 depicts the internal circuitry in block form and figure 3 the waveforms for a typical application in which a pulse is delayed by 8 clock pulses.

Fig. 2   7491 (AN)

SERIAL INPUTS

+5V PIN 5
0V PIN 10
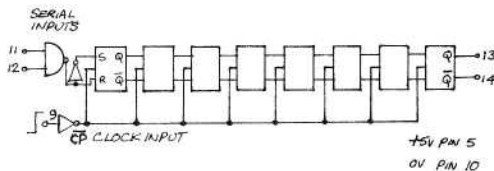
Fig. 3   Waveforms for 7491
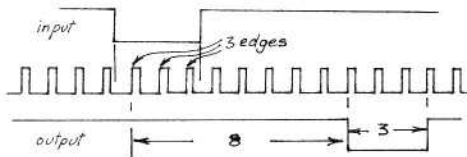
It will be seen that the input pulse straddles three clock pulses (only the positive-going edges perform the clocking). The output pulse will thus be exactly 3 clock pulses in duration with a delay of 8 clock pulse periods. Obviously, if the frequency of the clock is varied then the delay will also vary. The width of the output pulse will also become more accurate as the period decreases.

Ring Counter or Recirculating Store

The 7491 can be used as an 8-bit ring counter if the output is connected to the input. The free input can be used to insert a pulse train. Unfortunately, the contents of the register can only be cleared by feeding in 8 successive 0s or by opening the loop. See figures 4 and 5.

Fig. 4   Ring Counter
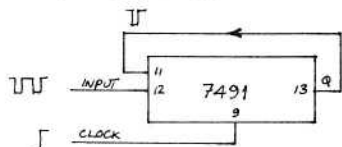
Fig. 5   Re-circulating Store
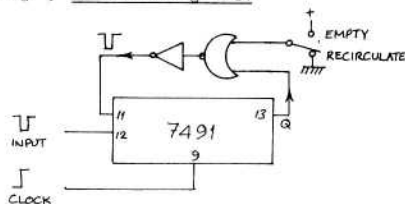
Fig. 6   Waveforms for Re-circulating Store
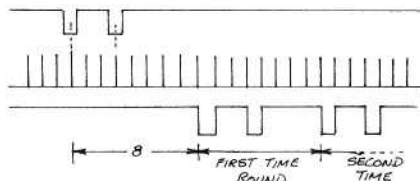
Twisted Ring or Johnson Counter

Another use for the shift register is to make a divide-by-sixteen counter. To do this an invertor is included in the feedback loop, or the Q-output used. Figure 7 shows the system.

Fig. 7   Twisted-Ring Counter and its waveforms

n STAGES
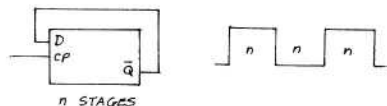
The 7491 is of no use if more, or less, bits of delay are required and so the next logical development is a shift register with each bistable output available. This type has parallel outputs.

74164

The system for this device is basically the same as for the 7491 but there is a common clear input as well which sets ALL bistables to Q-low. The 8 outputs enable the register to be used as a delay-line with tapping points and figure 8 shows this.
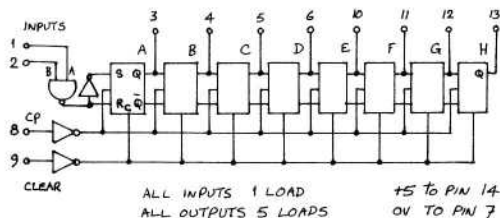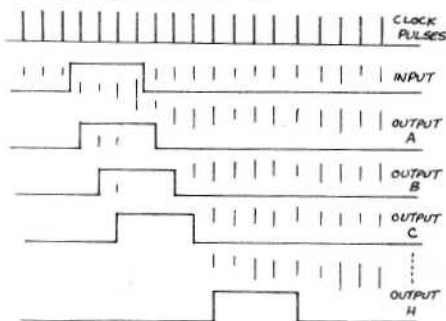
Fig. 8   74164

ALL INPUTS 1 LOAD
ALL OUTPUTS 5 LOADS
+5 to PIN 14
0V TO PIN 7

Fig. 9 Waveforms of 74164

There is no $\overline{Q}$-output in the 74164 so for a twisted-ring counter an invertor is necessary. If the last output is used there will be an 8-period delay before the waveform goes high no matter where the feedback connection is. The count is 2n whereas the count of a ripple chain of bistable would be 2^n. The count can be changed to 2n − 1 by the use of a 2-input gate to derive the feedback information. This operates by detecting the start of the n'th period to produce a high for the input bistable one period sooner than it would normally have come. This shortens the count by 1. The counter is synchronous. See figure 12.

Fig. 10 Twisted-Ring Counter using Shift Register.
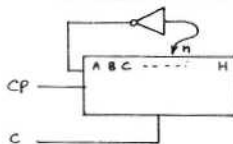
Fig.11 Waveforms for Fig. 10
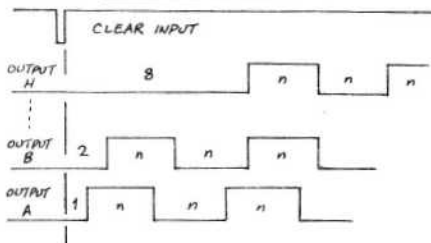
There is another sort of counter that can be made from a shift register and this is known as a linear shift register generator counter. This will be described later on in the article.

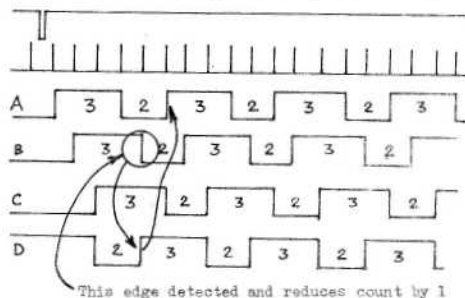Fig. 12 Count of Five using Twisted-Ring Counter.

$$2n-1 = 2.3 -1 = 5$$
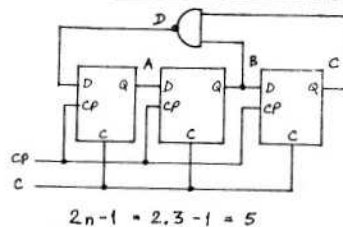
Fig. 13 Waveforms for Counter of Fig. 12

This edge detected and reduces count by 1

Pulse Generation

For television purposes perhaps the main use of the shift register is in Sync Pulse Generators as a source of line pulse edge-timings.

In this application the register is cleared at the twice-line rate and then clocked by, say, 10 MHz pulses to provide increments of 100 ns. The appropriate timings can then be simply obtained by tapping along the register outputs.
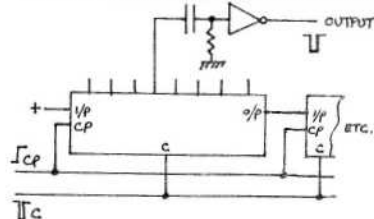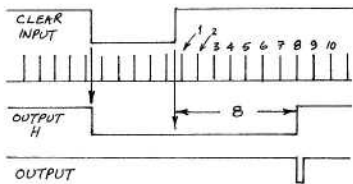
Fig. 14 74164 as a Tapped Delay Line

Fig. 15   Waveforms of Fig. 14

There are two methods of generating the pulses which run along the register.   Firstly, using trailing edges.   The pulses are all of different durations which makes the following circuitry more complicated because edge detectors are necessary.   The second way is to generate a single pulse which is more elegant. The following circuitry can then contain R-S bistables. Figures 14 to 17 show the systems.

Figure 18 shows how the latter system can be used in an SPG.   The output pulses are all of the same width.

Fig. 16   Unit Width Pulses using 74164
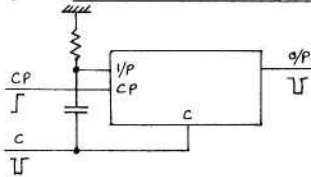
Fig. 17   Waveforms of Fig. 16
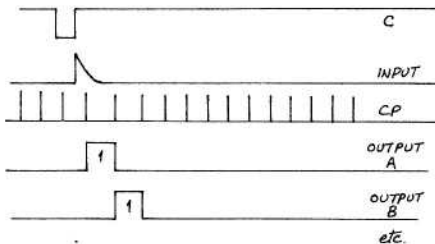
Whilst this method is precise, it is also expensive and it is possible to cut down on the number of bits required by careful choice of the increments between the pulses.   This, of course, modifies the oscillator frequency and the divider chain count.

The choice of suitable increments is a subject on its own and will not be discussed here.   However, it is possible to meet the timing specification for 625 monochrome pulses with only fifteen bits and the 625 colour pulses with twenty.

Fig. 18   Basis of an SPG using Tapped Delay Line.

TO GATING CIRCUITS
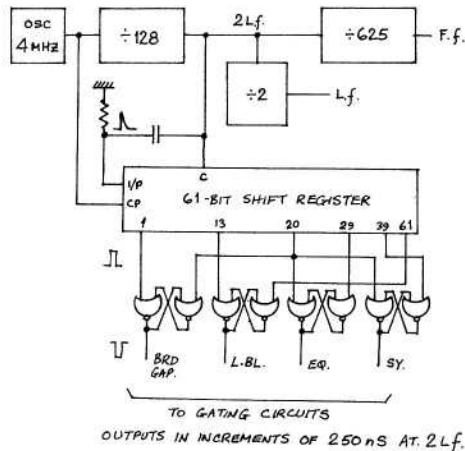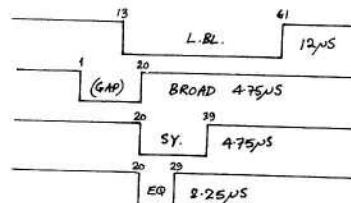
OUTPUTS IN INCREMENTS OF 250 nS AT. $2Lf$.

Fig. 19   Waveforms produced by circuit of Fig. 18

The advantage of such a shift-register timed SPG is of course that there are no controls and nothing to vary.

Linear Shift Register Generator Counters

Shift registers can be used to make a maximum length counter.   This is a counter of $2^n - 1$ and for a four-bit counter would be fifteen.
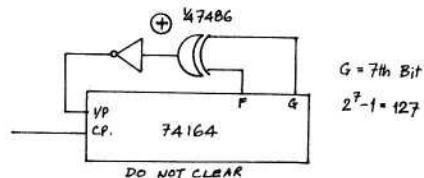
Fig. 20   Linear Shift Register Generator Counter.

$G = 7th \ Bit$

$2^7 - 1 = 127$

DO NOT CLEAR

Figure 20 shows an example of how a maximum count is obtained — this one being 127.

The feedback is obtained via an Exclusive-OR gate 7486 with an invertor. The condition when F and G are both zero gives zero output from the 7486 and this is the state not included in the count of 127. The waveform is shown in figure 21 and is really rather dreadful.

Fig. 21   Waveform of Fig. 20
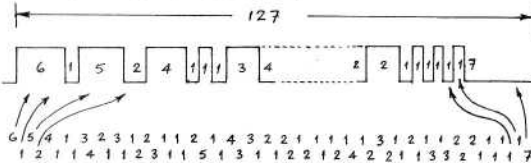
This is all very well, but what is really wanted is an output of only one pulse in every 127. Fortunately, this is easily done by decoding the shift register outputs with a seven-input NAND-gate as in figure 22.

Fig. 22   Obtaining a Single Pulse - 1
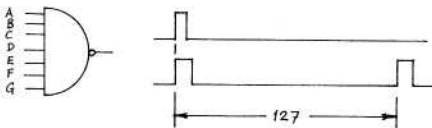
However, even this does not give quite the right output as the pulse obtained is the first of the 127. What is really wanted is the last and this can be got by substituting the Exclusive-OR output for the last shift register stage.

Fig. 23   Obtaining a Single Pulse - 2
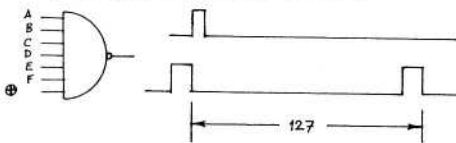
There is also a non-maximum length counter in which some of the count states are omitted to make any count less than 2^n-1. This is a complicated business and the reader is advised to refer to suitable textbooks or the manufacturers' literature (e.g the application note at the end of this article).

This fairly well describes the uses of the shift registers 7491 and 74164 but the principles apply to other shift registers. Two more common useful ones are now briefly described.

7495

This is a four-bit shift register which is more suited to arithmetical uses than to TV work. It has a right shift only but does have parallel loading inputs.

To use the 7495 as a shift register the mode input must be made low.
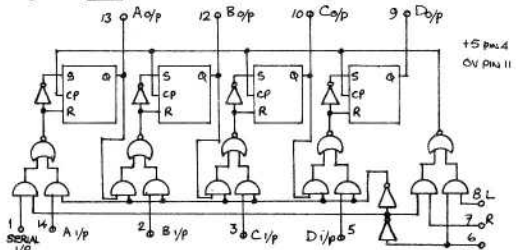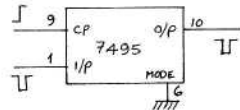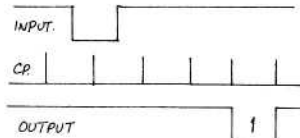
Fig. 24   7495

Fig. 25   Using 7495

Fig. 26   Waveforms of Fig. 25

7496

This is a five-bit shift register with parallel inputs and outputs. It has sixteen pins. Figure 27 shows the basic details.
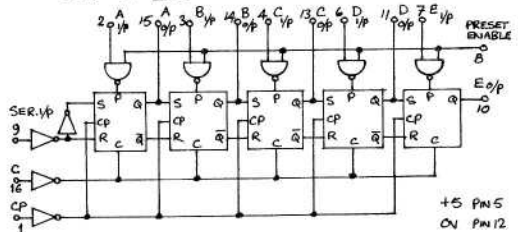
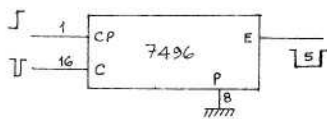Fig. 27   7496

Fig. 28   Using 7496 - 1
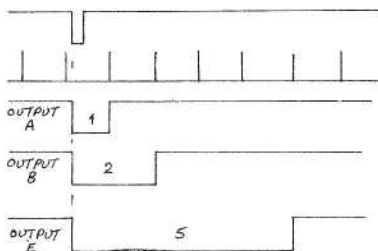

Fig. 29   Waveforms of Fig. 28

Figure 28 shows how the 7496 may be used to obtain pulses of up to five clock-pulse periods in duration (plus the time to clear).   If single width pulses are required then the arrangement of figure 30 should be used. Note the overlapping of the input and clock pulses — the output is of the same polarity as the input at the time of clocking.

Fig. 30   Using 7496 - 2
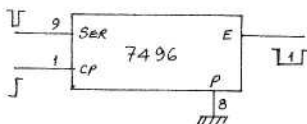
Fig. 31   Waveforms of Fig. 30
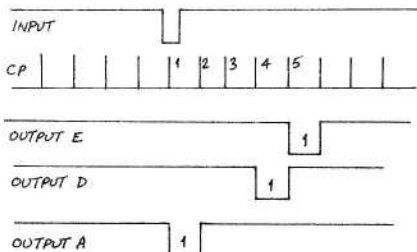
MEMORIES

Description

A memory consists of an array of bistables such that any bistable ouput can be obtained by addressing that bistable by means of a unique code.   For example, the 7481 is a sixteen-bit memory with the sixteen bistables arranged in a four-by-four matrix so that two, two-bit codes are needed to address one bistable. Two, two-bit codes are the same as a four-bit code which

Fig. 32   Using the 7481/84 Memory

Fig. 33   Four-bit Counter for Addressing 7481/84

Fig. 34   Address Waveforms

has sixteen possible combinations of four variables.
The two sides of the matrix are X and Y. Thus to get
at a particular bistable - say, the third in the X-
direction and the second in the Y-direction - then the
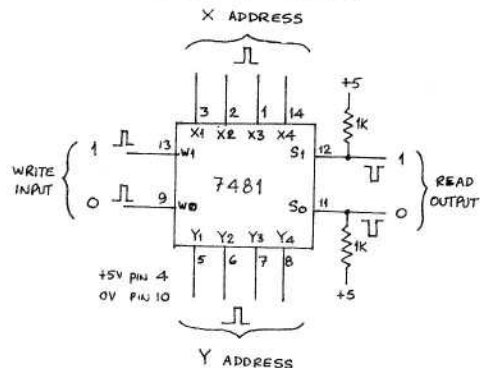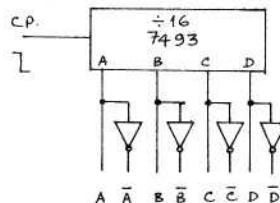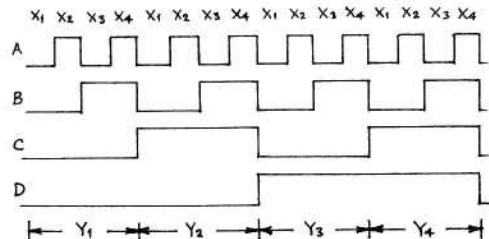address code is 3X, 2Y, or AQ, BQ for the X and CQ, $\overline{DQ}$
for the Y, from a four-bit counter. See figures 33
and 34.

Only one of the sixteen bistables can be addressed
at any one time and at that time the Q-output of the
bistable can be read out. The bistable can also be
written into, which means that it can be made either
Q-high or Q-low at will. No other bistable is affected
during this process.
So the memory consists of sixteen independant
bistables which can store sixteen bits (i.e. 1 or 0).
Due to the way in which the 7481 is made, the
writing input also appears at the reading output but
inverted. So one cannot read whilst writing.

The 7484 also has this problem and differs from
the 7481 only in that it has two extra pins which allow
for two-input writing inputs.
The outputs from the bistables appear on two
separate rails for the Q and $\overline{Q}$ outputs and these are
respectively the 1 and 0 outputs. They are of open-
collector type so that several memories can be wired-
OR connected together to obtain a much bigger memory.
The addressing code is correspondingly bigger.

Using the 7481/84

The address inputs of the four-by-four matrix are
available as four X and four Y inputs so that a 1 (high)
to one X together with a 1 to one Y input will select
one bistable. To perform this selection from a four-
bit counter needs two 7402 NOR-gates. Note that the
loading of each input is 8. See figure 35.

Fig. 35 Addressing the 7481/84 Memory
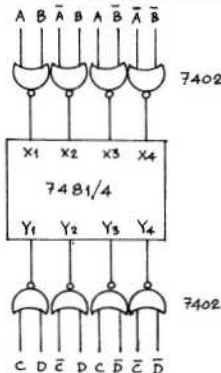
Whatever state the selected bistable is in will
become apparent at the read-outputs such that the 1-
output will go low if the bistable Q-output is high.
The 0-output will remain high. If the Q-output is

low then the 1-output will remain high and the 0 output
will go low. Thus the output is negative-going on
one of the two rails.

Fig. 36 Reading Waveforms of 7481/84
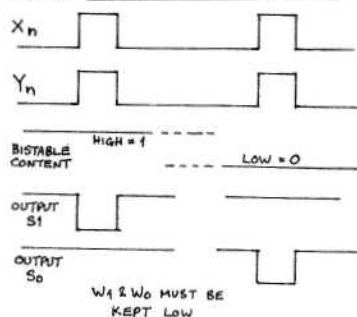
The input writing requires a high input to one, or
other, of the two inputs such that a 1 to the write-1
input makes Q high. (it appears at the output 1 as a
low during the writing time which stays as a low when
the writing input is removed).

Fig. 37 Writing Waveforms of 7481/84

S1 & S0 APPEAR WHILST WRITING, SO CANNOT
READ WHILST WRITING.
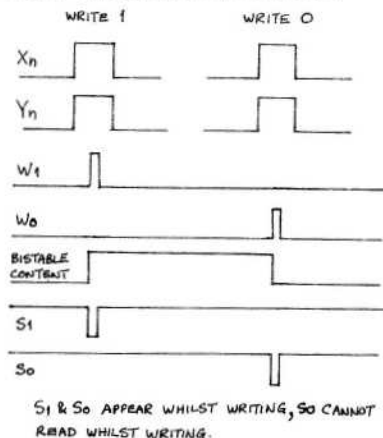
Thus it is possible to select all sixteen of the
bistables and load them with 1's and 0's so that a
pulse train is generated when the four-bit counter is
is made to count through its sequence.

The memory can also be used to store sixteen events
in a synchronous manner, for example, a waveform can be
divided into sixteen parts timewise and the memory
addresses clocked in order, thus memorising the original
waveform. However this is a tricky business.

The 7481/4 is an IC which is very useful but, some-how, its usefulness does not seem to extend to television applications. Its functions can be done more easily by other means.

For a typical application the reader is referred to the Wireless World for May 1971 p256 – Memory for Karnaugh Map Display by Brian Crank.

More on Monostables

Firstly, here is a quick method of working out the delay period, or the capacitor value required, for the 74121 monostable. If the timing resistor is made 15 KΩ (to pin 11) then the value of C in hundreds of pF gives the delay period in microseconds; i.e. :- 1 µs for every 100 pF with 15 KΩ.

The second item shows a simple way to make a dual period, switchable monostable from basic gates. The three-input gate has two time-constants feeding two, two-input gates. These two are controlled by a two-way switch so that only one gate can feed back a pulse to the input gate at a time. The output of the unused gate is high and so does not stop the other half from doing so. The principle can be extended as fig.37 shows but for more than two gates invertors are required and the maximum numbers of time-constants should be limited to about five because of the shunting effects of the time-constants on the first gate.

Note that as with all such simple monostables the input trigger pulse should be shorter than the desired pulse if a clean trailing-edge is wanted. If it is longer then the monostable will still work but the trailing-edge will be as shown in figure 40. The reason for this is that the feedback action is prevented from causing a snap action because the input is still low when the feedback occurs.

Fig. 40 <u>Monostable Waveform showing poor shape.</u>

References

Wireless World May 1971 p256 – Memory for Karnaugh Map Display, Brian Crank.

Texas Application Note CA102 – TTL Integrated Circuits, Counters and Shift Registers.

Acknowledgement

Next Issue

The next part of this series will describe coders and decoders and their uses. Linear IC's will also be introduced.

Fig. 38 <u>Switchable Simple Monostable – 2 choices</u>

Fig. 39 <u>Switching Simple Monostable – more than 2 choices</u>

AN I.C. CHARACTER GENERATOR

Martin   Allard G6AEM'T

The unit described was inspired by the excellent design in C Q - T V 74, but works on a slightly more complex principle, avoiding the use of shift- registers. The advantage is that with the exception of a small amount of MSI, the I.C.s used are simple gates, and this has meant that a version carrying a longer message, and producing better formed characters can be made at an even lower cost. The principle employed is that of a three dimensional matrix, in which all the characters are generated continuously, but are later selected in sequence by a multiplexer I.C. The array of dots from which the characters are formed has the dimensions 9 x 12, as used by the ITA, and the legibility is thus very good. The letters do not have a "computerised" appearance. A two-input NOR gate is required for each dot position, but the number needed will be considerably less than 108, since many elements are not used in any character. The basic capacity of the unit is 15 characters, and the prototype carries the message "G6AEM/T COLOUR", but by extending the diode matrix, and cascading the output counter and multiplexer, a fixed message of any length could be generated.

Before commencing construction of the unit, the positions and number of NOR gates required must be determined. This is achieved by first drawing a 9 x 12 pattern of squares, and then marking in the squares needed for each character, as shown. It can be seen that the caption "G6AEM/T COLOUR" used 70 out of 108 possible squares. It is suggested that the columns of squares are numbered, and the rows given letters, to facilitate the wiring of the gates. Then, since each gate output corresponds to a column in the diode matrix, a map can be drawn of the diode positions necessary for each character. Thus the letter G would be formed from; A3, A4, A5, A6, A7, B2, B8, C1, C9, D1, D9, E1, F1, G1, G6, G7, G8, G9, H1, H9, J1, J9, K1, K9, L2, L8, M3, M4, M5, M6, M7.

Appearance of characters
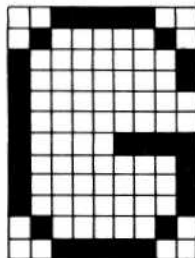
Example of Map

	G	6	A	E	M
A1				X	X
A2				X	
A3	X	X	X	X	
A4	X	X	X	X	
A5	X	X	X	X	
A6	X	X	X	X	
A7	X	X	X	X	
A8				X	
A9				X	X
B1				X	X
B2	X	X	X		X
B5					
B8	X	X	X		X
B9					X

	1	2	3	4	5	6	7	8	9
A			X	X	X	X	X		
B		X						X	
C	X								X
D	X								X
E	X								
F	X								
G	X					X	X	X	X
H	X								X
J	X								X
K	X								X
L		X						X	
M			X	X	X	X	X		
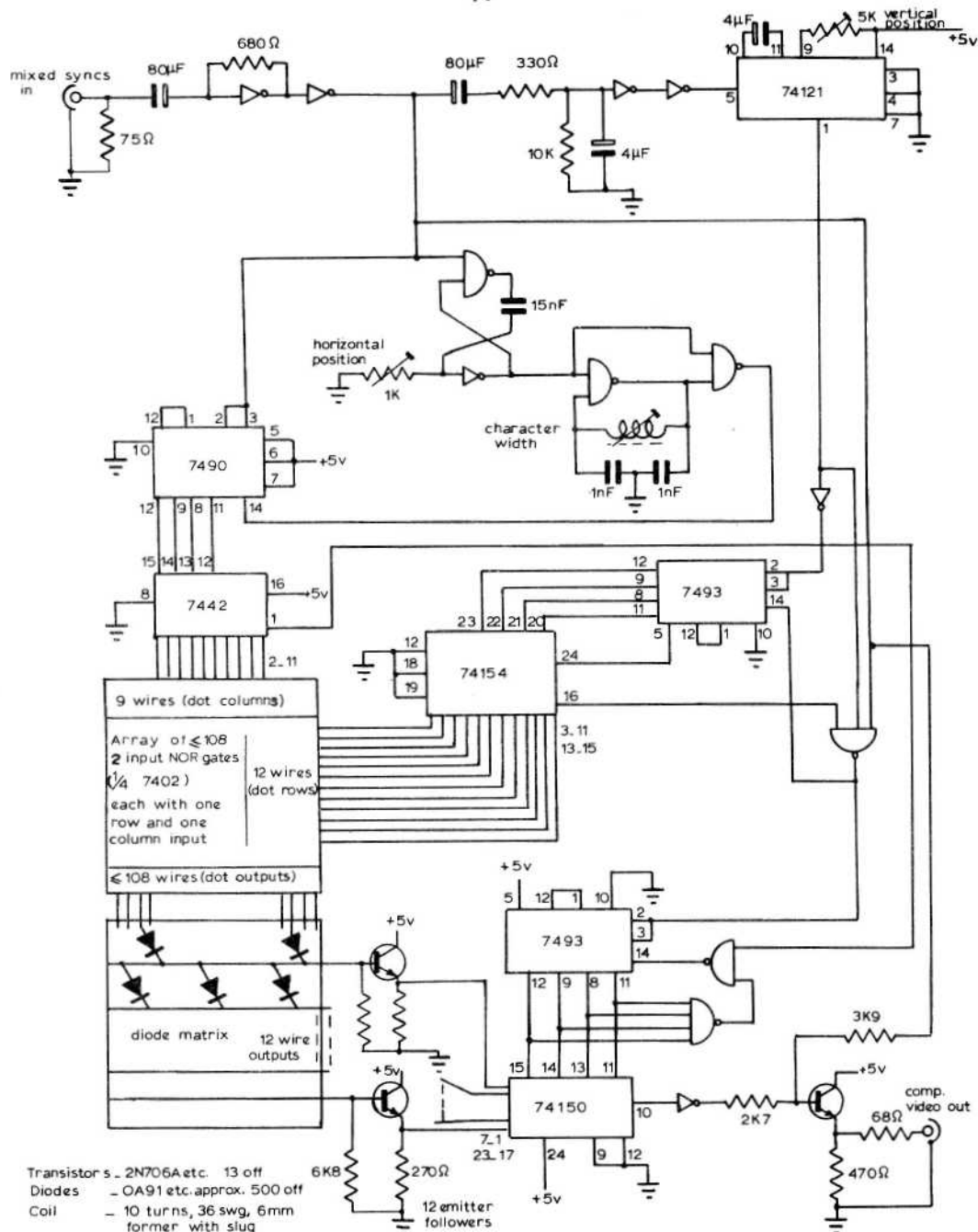
Generation of gating waveform for caption inlay
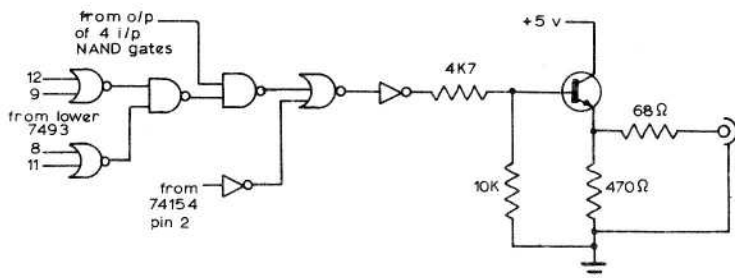
Delayed line syncs are used to gate an HF oscillator, which clocks a decade counter. The output is decoded to give the horizontal dot positions. A line counter which is gated by a vertical delay feeds another decoder which provides the vertcal dot positions. The characters could be made taller by introducing a further counter in the clock pulse feed to this stage, reset in the same way. The use of a 74121 is recommended for the vertical delay, it is difficult otherwise to position the caption stably near the bottom of the raster. The output from the NOR gates is a pattern of dots, one in each character position; rows of germanium diodes carry in their positioning the pattern of dots used in each character required; and the output from each row of diodes is a line of one character repeated.

These character outputs are buffered by emitter followers, and then selected in sequence by a data selector I.C. The counter which runs this multiplexer is clocked at the end of each character, and cleared by line syncs and the vertical delay. It stops counting at the 16th position, and stays cleared when the caption is completed. By omitting the gating to this counter, a continuous background of the message can be produced.

The entire circuit is built on a piece of veroboard 4ins. by 8ins. A circuit was added to provide gating pulses during the caption scan, to allow it to be inlaid on another vision source. This makes used of the spare gates that are available.

Apart from dry joints in the diode matrix, (there are rather a lot of diodes) no difficulties were experienced with the two units built so far. A programmable version is planned, and I would like to get in touch with any reader who has experience of using core stores.

The Royal Television Society has just appointed as a Fellow, John Ware Dipl. Arch (UCL), C. Eng., FRIBA, MIERE, G6RSA/T, and as you all know, 'RSA/T is a past Chairman of B.A.T.C. His /T station is very well known, and many members have built the modulator published in C Q - T V which was developed jointly by 'RSA/T and 'OUO/T. Congratulations John. Another well known B.A.T.C. member, John Tanner G6NDT/T has been nominated for election to the Council of the Royal Television Society, and John is not well known just because of his professional work, but because for

a very long time he was the editor of this journal, C Q - T V. Many more will know him as one-time Secretary of B.A.T.C., and we all wish him the very best of luck in the R.T.Soc.

We must apologise to G6AGJ/T, Mr. L. Saunders, for an unfortunate printing error in the last few issues of C Q - T V, whereby his callsign was wrongly attributed to Cyril Hayward in the list of committee members on page 1. Cyril is correctly G6AFJ/T, and we regret any inconvenience caused by this mistake to the real G6AGJ/T.

THE EDITOR.

Ideas for Amateur Part 2 Colour

Nigel Walker
G6ADK'T

It has been decided to alter the order of appearance of these articles as I am sure many of you would prefer some circuits instead of a lot of talk. Last time, a general outline of what is required to generate a colour signal was given, together with the block diagram of a PAL coder. The actual circuit of the coder will now be described. The different stages of the coder have been split up into several parts each of which can be tested separately. Before starting work on the coder it would be worthwhile making up a colour bar generator so as to provide a test signal for alignment.

LUMINANCE MATRIX and O/P STAGE.(Fig.1)

The luminance signal (Y) is produced by resistively adding appropriate levels of R,G and B, syncs are also added in this matrix to produce a composite signal. This is now fed through a delay line - this is done to equalise the delay of the luminance and chrominance signals. The latter suffer a delay due to their bandwidth restriction. The delay line used was a colour receiver decoder type, this gives rise to slight ringing on the waveform but it was not found to be noticeable on a picture monitor. Better results can be obtained using Johnson - Mathey type delay lines (in which case the terminations should be 510) but the additional expense did not seem worthwhile. Following the delay line is an output amplifier consisting of a feedback triple.

COLOUR DIFFERENCE MATRICES.(Figs.2&3)

These circuits actually produce -(R-Y) and -(B-Y) which are later inverted. The A.O.T.s for white balance are adjusted so that there is no level change between the black and white bars. The burst is

produced by adding correct proportions of burst gate to the colour difference signals.

CHROMINANCE FILTERS.(Fig.4)

Two of these are required, one for (R-Y) and one for (B-Y), these are identical so only one is shown. The input circuit uses a feedback pair to provide a high impedance to the matrices, and a low output impedance for driving the filters. The filters used give a Gaussion response with a -3dB point of 1.3 MHz, this approximates to the broadcast specification for chrominance response. The output circuitry consists of another feedback pair arranged as an invertor.

CHROMINANCE MODULATORS.(Fig.5)

Again, the circuits for (R-Y) and (B-Y) are identical. On the input is a clamp. This operates during the sync period, but causes no ill effects as the signal is blanked and non-composite. The actual modulator uses a Motorola integrated circuit. This has a differential input, so the levels are arranged so that there is no potential difference between the two input terminals at 'black level'(this is actually the point where there isn't any colour information i.e. during the blanking, and the black and white bars). The 'carrier balance' control gives a slight adjustment to this potential and is adjusted to give minimum subcarrier output from the modulator in the absence of a colour signal.
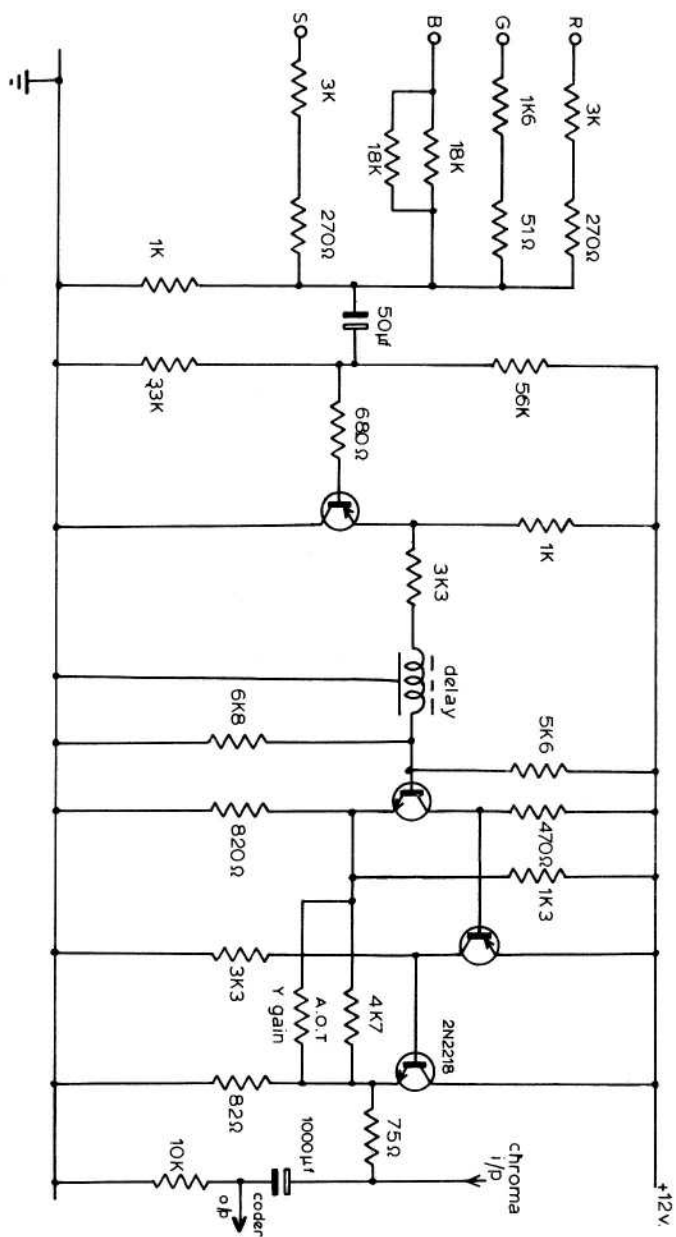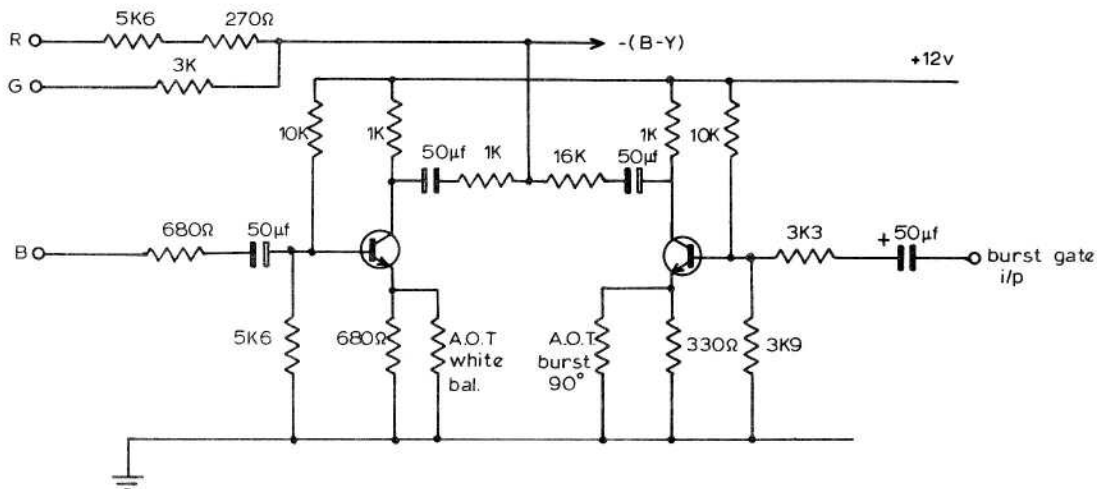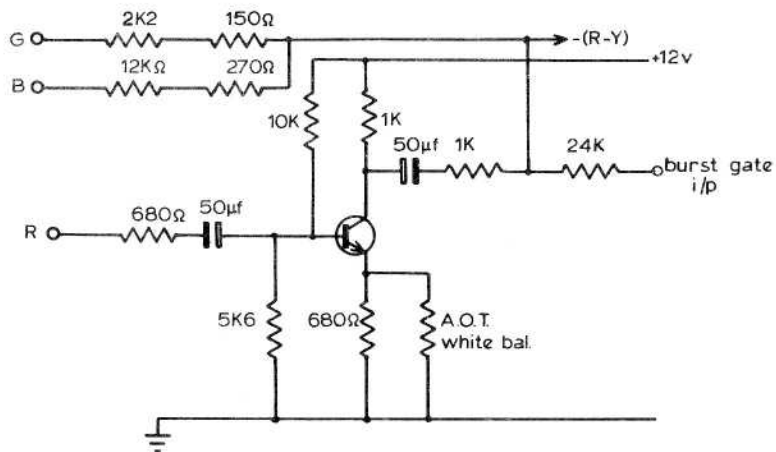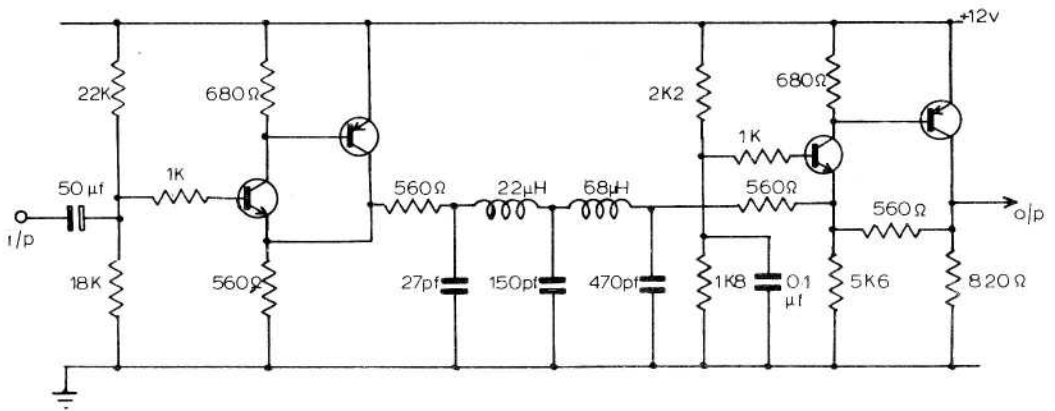
FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4

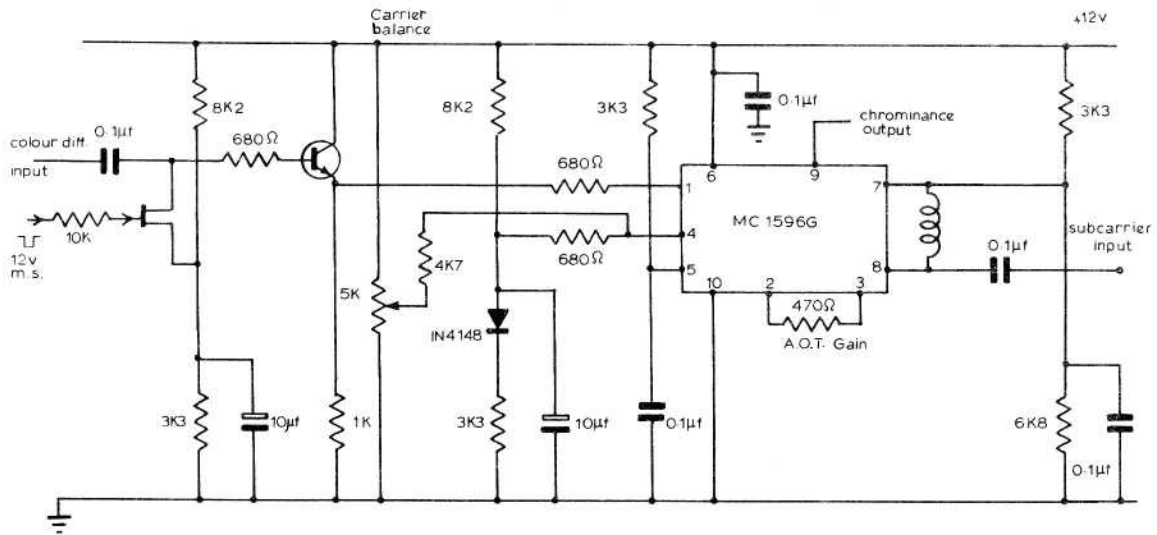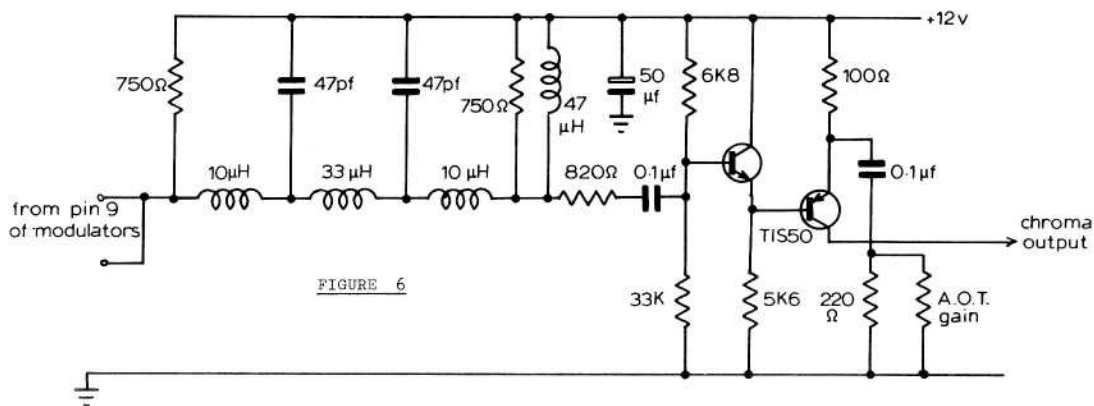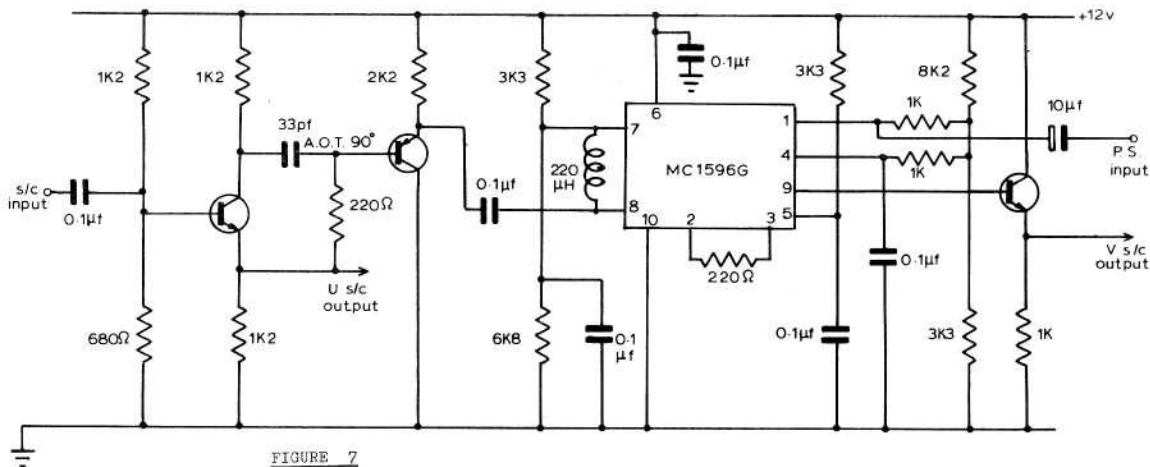FIGURE 5

FIGURE 6

FIGURE 7

CHROMINANCE OUTPUT FILTER. (Fig.6)

This is used mainly to remove the 8.86MHz content from
the output of the modulators. This then feeds an output
amplifier which is then combined with the luminance
signal to provide a complete composite waveform.

SUBCARRIER PROCESSOR. (Fig.7)

The first stage produces two feeds of subcarrier with
a 90° phase difference. One of these feeds is taken
straight to the (B-Y) modulator (for the 'u') and the
other is shifted through 180° on altrnate lines by
feeding it into a modulator which has PAL switch as
its other input, this then drives the (R-Y) modulator
(for 'v').

GENERAL.

That completes the description of the circuitry
involved; unless marked otherwise, all npn transistors
are BC183L and the pnp are BC213L.

THE CQ·TV SPG

A TRIPLE STANDARD MONOCHROME SPG using TTL.

by A. W. Critchley Dip El, C Eng, MIERE.

<u>FURTHER NOTES.</u>

At the time of going to print some 45 printed circuit boards for the SPG have been sent to BATC members - including some in Australia, South Africa, Germany and Sweden. Due to this unexpectedly high demand a lot of time has been spent on writing letters and packing parcels, etc., and as a result the Genlock board to go with the SPG has not yet been finished in time to sort out any problems that may have arisen in its use. It is hoped to have it ready by the time this magazine is published; so, for any members that may be wondering what has happened to the boards, don't worry, you will get them soon.

So far, there have been no comebacks on the SPG circuitry apart from one or two minor problems due to faulty IC's. Whether, or not, this is due to nobody having finished building or being baffled is not known.

Meanwhile, a few notes may be of interest.
1. In the section on the original Genlocking system in CQ-TV 77 p6 it was suggested that a 10 KΩ resistor be changed to 4.7 KΩ in order to improve the control range. Perhaps an 8.2 KΩ resistor may be better.

2. Also in the same section, the 3.6 KΩ resistor may need to be reduced to 2.7 KΩ.

3. In the Mainslock circuit in CQ-TV 77 p7 the collector load resistor of T2 should be decreased to about 1 KΩ so that the following invertor receives sufficient drive.

4. The Sync Separator may need to have its 5-volt feed separately decoupled to minimise the possibility of supply rail spikes getting into the syncs.

5. The Genlock circuitry and the SPG should ideally have separate 5-volt supplies, but one can be used for

both provided that the leads are run separately from the supply terminals. This helps to preserve the low impedance of the rails.

6. In one particular SPG the master oscillator seems to be especially susceptible to supply ripple - even though there is only some 15 mV of it. Quite why this should be is not clear but the use of a flywheel sync monitor makes it very apparent. The cure is of course to improve the smoothing by larger capacitors or a better regulator, or even by shortening the leads and using thicker wire.

7. It has been noticed, on this same SPG, that when it is free-running with the genlock bistable operating at one half of line frequency, that alternate lines are slightly displaced. This effect may be reduced by increasing the 2.2 µF filter capacitor to some 22 µF. However, this will decrease the frequency pull-in range and increase the time taken to settle after locking.

8. This same SPG also displayed the same displacement problem to a lesser extent when the d.c. feed from the bistable to the master oscillator was disconnected. It could only be due to having a common supply rail and improving the regulation should cure the effect. On connecting the external video the effect completely disappears.

This all goes to show that it sometimes does not pay to try to use the absolute minimum number of components in a circuit - in this case IC's. Multiple packages are not always the best answer. This is especially so in the case of the master oscillator which suffers from phase-modulation by the field-rate pulse present in the other half of the package. For amateur use, though, the increased cost for a minimal improvement is not always justified. There is a furthur problem associated with multiple packaging in that it is much more difficult to make a tidy printed circuit layout due to all the links

and cross-overs required. This is one reason for the delay in producing the Genlock board. A double-sided board would ease matters considerably but would cost about twice as much.

One or two people have asked about ISEP parts to go with the SPG system. These are available from ITT (STC) Electronics Services Ltd. of Harlow, Essex. They are rather expensive though, and the Author only used them because they were to hand in the form of scrap at the time. It is not essential to use any of these parts of course because the boards have been designed so that any 0.1" pitch edge-connector can be used (the diagram in CQ-TV 76 p21 does not show this - it is a modification included in the revised layout). The only problem with using such a connector is that the board connection is made via the roller-tinning surface and is not, therefore, a very good connection. The extra expense of gold-plating was not thought to be justified; but it is possible. The alternative envisaged form of connection is to use

pins and wires - when installing the board in a box, for instance. Certain of the ISEP parts are available only in boxes of 100 - the author may be able to assist where only a few such parts are required.

A matching board to provide some six separate feeds of each pulse will be designed when the Genlock board is finished. This will remove the necessity to loop the pulse feeds from unit to unit in the installation. This then means that each unit can be designed to have a 75 Ω input without having two input sockets. One advantage is that 75 Ω termination plugs are no longer required - they always get lost anyway.- and the always present problem of a twice-amplitude signal is eliminated.

If anybody has any queries or criticisms of the SPG and its systems the author would be pleased to hear from them at : 70, Sussex Rd., Ickenham, Uxbridge, Middx., England.

# A Slow Scan Pulse Generator   Ake Backman

This is a sync pulse generator for slow scanners with 50Hz mains which could be very useful when transmitting SSTV to 60Hz areas. You may have heard that when using a 16⅔Hz line frequency, which you get when locking the horizontal oscillator to 50Hz mains, the fellows in U.S.A. will get sloping bars on their screens. This is due to the difference between the mains frequencies.

This generator which solves the problem, consists of Texas Instruments I.C.s. The frequency of the oscillator SN74121 is set to 1800Hz by the 20 ohm trim-pot. The oscillator is followed by dividers - one ÷ 10 (SN7490) and the next ÷12 (SN7492). The pulse width is set by the 22kΩ trim-pots to 5ms and 30ms respectively. The SN7440 gates are used to obtain sufficient drive power on the various outputs. With this generator one will obtain ex-

actly 15Hz and 1/8Hz waveforms and what is more, the frame pulse will be there after exactly 120 scanning lines.

The switch in the SN7420 wiring is an option for those using flying spot scanners. With the switch in the 'STOP' position the oscillator will stop and the level at output 5 will go positive. That means that at STOP a long sync pulse will be obtained. During this time the transmitting station can change picture in the scanner. (CAUTION! Do not use this method with a camera unless the switch is paralleled with some means of cutting off the vidicon. In a sampling type camera for instance the 15Hz frame frequency scanning will also stop and there are risks of damaging the target).

Irrespective of when the switch is put in the 'STOP' position the picture under trans-

Current consumption ~185 mA
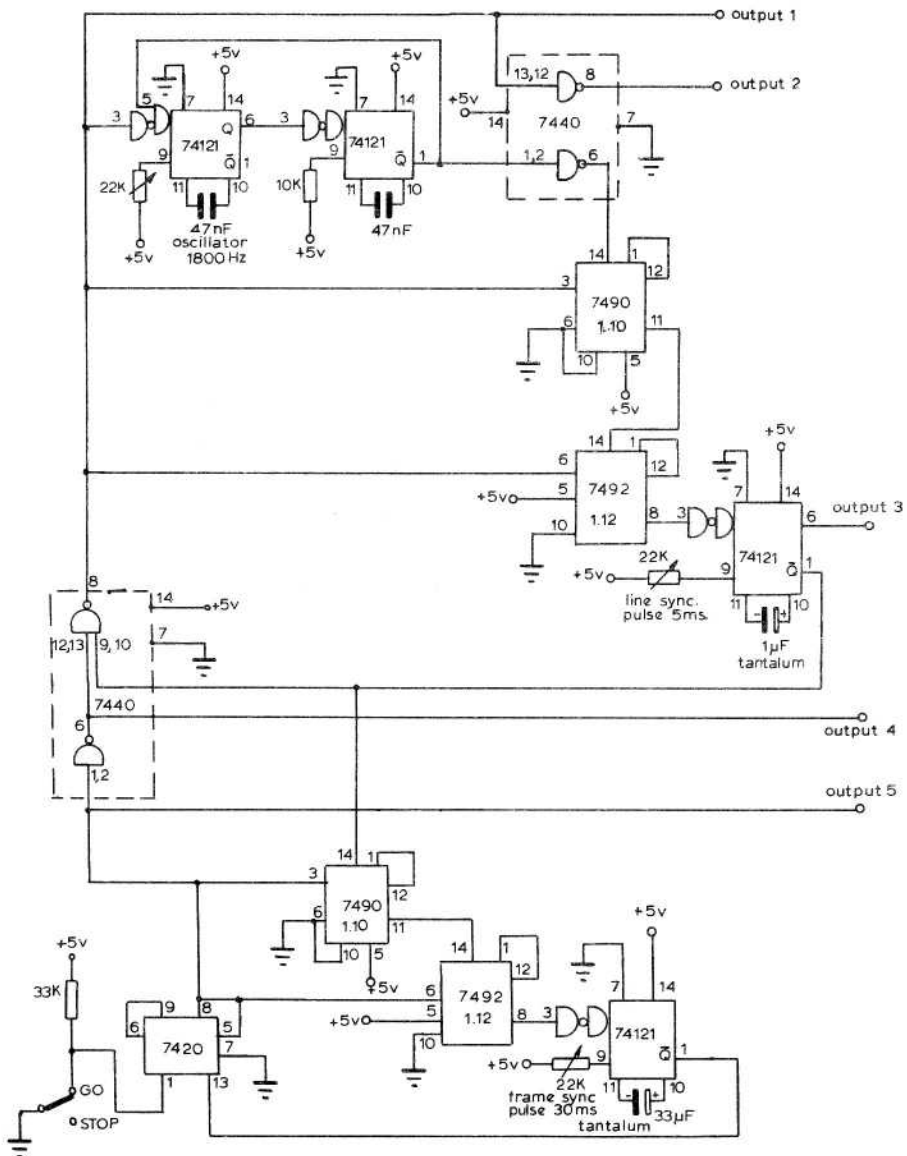
mission will be completed up to the next frame
pulse, after which the sync generator stops in
the start position. The output waveforms are
as follows:

o/p 1 all sync pulses

o/p 2 as above but inverted

o/p 3 line pulses only

o/p 4 frame pulses only

o/p 5 as above but inverted


AN RF MODULATOR

by   D. J. Long   G6ACH'T

A COMPACT UNIT TO FEED DOMESTIC TELEVISION SETS

This unit, which works on System 1, was developed in response to an enquiry by a local tv dealer. It is simple to build, using an old tobacco tin, and gives a good performance. The prototype, tuned to ch. 41, was measured to give 98% pulse to bar ratio and 1dB difference between luminance and chrominance gain.

The case is made up as in the diagram, the only critical measurement being L1. Belling-

Lee rf sockets were used, as recommended for amateur tv use. The varnish should be removed from the bottom of the lid, to ensure good electrical contact between it and the box. This is very important, as otherwise the unit will radiate badly. The screen is a small piece of tinplate, soldered ALL ROUND, with two holes for the feed-through capacitors. A nut is also soldered to the screen to take a short bolt to hold the lid on.
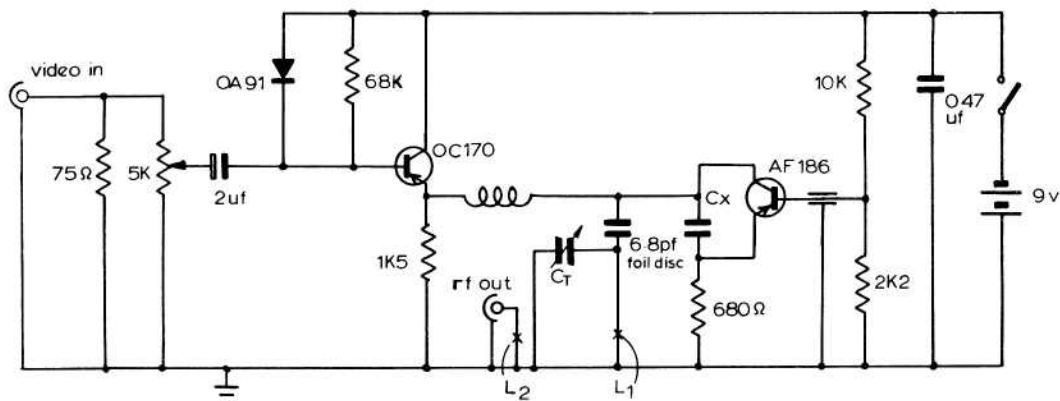
In the components list below, the first two items were taken from an old UHF tuner.

CT   5pf tubular trimmer
Foil disc   6.8pf
CX   is formed by connecting the transistor case to the collector lead.
R.F.C   4 turns 36 s.w.g. on a $\frac{1}{4}$ ins. former
L1   5cm. 14 s.w.g.
L2   is a link as short as possible.

A small piece of Veroboard can be used for the rest of the components.

With an input of one volt peak to peak adjust the gain control for no clipping of peak white.
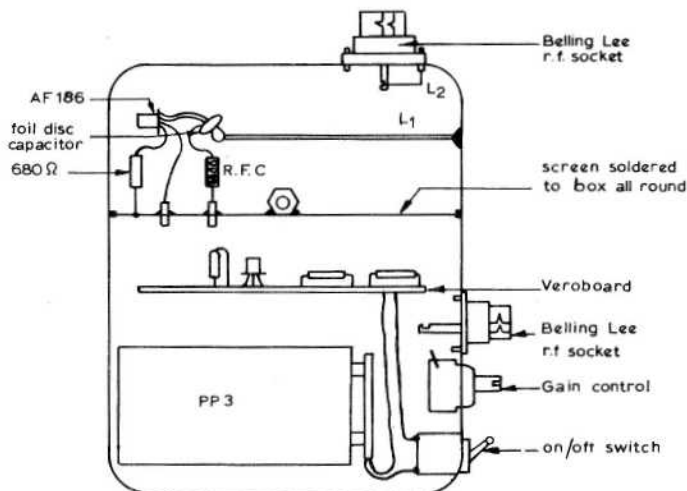
continued from page 7

Your Committee have decided that it would be best to hold this years Convention and General Meeting after the main holiday season is over and the date of September 16th has been chosen as previous Conventions organised in this month have been well supported. Accordingly it is proposed that the wording of item 9 of the Constitution should be amended to read as follows:

"General Meetings of the Club shall be held bi-annually at one of the Conventions which shall be organised from time to time by the Committee, at intervals of not more than three years".

This amendment will be put to members present at the next General Meeting and if carried will be incorporated into the Club Constitution.

Any member who does not have a full copy of the Club Constitution may obtain one by sending a stamped addressed envelope to the Club Chairman (address on page 1), together with any comments or further ideas which they may have.

CIRCUIT

J. Lawrence GW6JGA'T

NOTEBOOK No 10

Here is a useful timebase generator circuit using two operational amplifiers. The op amplifiers are the 741 type integrated circuits which do not require any external compensation components.

The circuit operates from +12 volts and -12 volts supply rails, but could be made to operate from other voltages in the range 5 to 15 volts.

The first op amplifier has its non-inverting input connected to earth and has a capacitor connected between the inverting input and the output forming the circuit of an integrator. The second is used as a regenerative level detector (Schmitt Trigger). The circuit is shown in Figure 1. Pin numbers are for the 8 pin dual-in-line package.

Circuit Operation

Assume point (c) is at -11 volts, negative current will flow through R1 and RV1 causing the inverting input (pin2) to become negative. The output (pin 6) will then move positive so that the positive current through C1 equals the negative current, thus returning the inverting input to near zero volts.

This continuous current through C1 charges C1 at a linear rate and the output at (b) is a linear positive going ramp. The rate in volts/second is equal to

$$\frac{I_{ua}}{C1_{uF}} \quad \text{where I is} \quad \frac{V(c)}{RV1 + R1}$$

The second op amplifier has its inverting input connected to earth and its non inverting input connected through R4 to its output. This produces positive feedback and the circuit is similar to a Schmitt Trigger with very large hysteresis.

If the output (c) is at -11 volts, R4 will maintain this saturated condition until a positive voltage at (b) is sufficient to cause the non-inverting input (pin 3) to become positive. This occurs when the voltage at (b) exceeds about +5 volts. The output then flips rapidly to +11 volts and remains in this condition until the opposite polarity conditions apply, that is when the voltage at (b) exceeds -5 volts.

The +11 volts now applied to RV1 and R1 causes a negative going ramp at the output (b), moving from +5 volts to -5 volts. However, in this case, D1 is forward biassed and R2 is effectively in parallel with RV1 and R1, giving a much faster ramp (the flyback), than in the previous direction.

The flyback time t2 is determined by the parallel combination of RV1 +R1 and R2.

A sawtooth output is available from (b) and a squarewave from (c), the latter may be used for blanking purposes. The circuit operation may be synchronised with an external signal by feeding this into the inverting input of the second op amplifier. The termination of the forward scan is defined by the
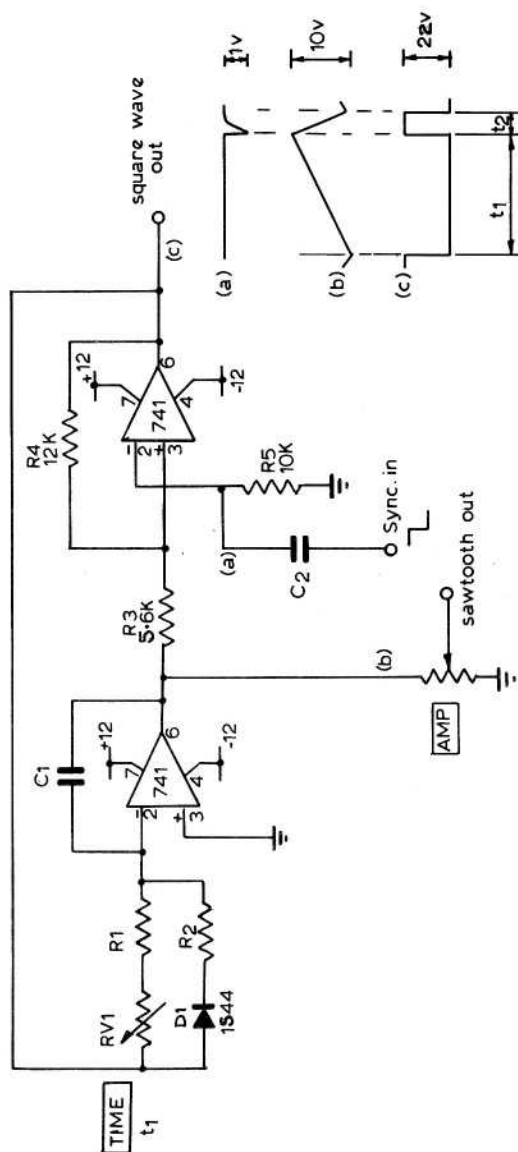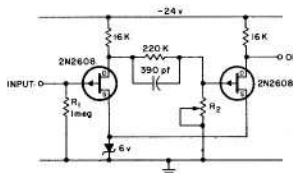
FIGURE 1

Performance of Figure 1

Use	Scan	Flyback	*C1	RV1	R1	R2	C2
S.S. Field	7.1 S	100 mS	10uF	500k	560k	10k	0.1uF
S.S. Line	59 mS	1 mS	0.1uF	500k	560k	10k	0.1uF
TV Field	19 mS	1 mS	0.1uF	250k	100k	10k	0.01uF

*C1 Polyester type, not electrolytic.   0.01uF

SCHMITT TRIGGER

Typical Characteristics at 25°C:

Output Voltage Swing: -6 to -24 v
Turn-On or Turn-Off Time: 200 to 500 nsec
Trigger Level with R2 = 82K:
    5. 40 to 5. 50 v   ON
    5. 35 to 5. 45 v   OFF
    (level adjustable with R2)
Hysteresis: 2 to 5 mv

Fig. 2.

negative-going edge of the sync. signal.

The sawtooth output has excellent linearity and being D.C. coupled the circuit is ideal for slow scan applications. It can also be used as a field scan generator in standard TV scanning but due to the limited frequency response of the 741 (slewing rate 0.5V/uS.) the circuit is not suitable as it stands for 405-625 system line time base speeds. However, op amplifiers with a better frequency response may be suitable in this application.

For other interesting applications of op amplifiers see Ref. 1.

With the wide range of digital and linear integrated circuits dominating the ATV field, it is probably a good thing to look at some different devices and see how they may be used in ATV circuits.

Siliconix Ltd. specialise in Field Effect Transistors and have quite a number of Application Tips and Reports. Here is a circuit from their Application Tip "FET Circuit Ideas, Switching", (see Fig. 2).

FET Schmitt Trigger

This is a useful Schmitt Trigger circuit which has a very high input impedance, limited only by the input resistor R1. The other feature is the very small hysteresis of the circuit, typically 5mV, due to the use of a zener diode in the source circuit. This also has the effect of making the circuit less critical to device parameters and matched FETs are not essential. The input resistor R1 should be chosen so that there is no serious level shift due to gate current at elevated temperatures. The circuit could be useful in a video level detector in a video inlay processing unit.

FET Video Amplifier

Here is a circuit from the Siliconix Application Tip "FET Cascode Circuits reduce Feedback Capacitance".

The wideband cascode circuit shown in Fig. 3 has a bandwidth of about 25MHz for an output capacitive loading of about 3pF and this can be extended to about 47MHz by the use of a suitable peaking coil in series with the drain load res-

The Amateur
tv Licence.

A Report on some recent changes by Malcolm Sparrow.

Those members of B.A.T.C. who attended our last Convention held at Cambridge may recall that we were addressed by a representative of the Ministry of Posts and Telecommunications on some of the problems of administering Amateur Radio and Television Transmitting Licences.

Following this address, B.A.T.C. was invited to submit any comments or suggestions which we may have on the current A.T.V. Licence, and so after due consultation and deliberation by your committee a re-written A.T.V. Licence was submitted to the Ministry for their perusal.

B.A.T.C. representatives were then invited to attend the Ministry where our proposals were discussed in greater detail, and as a result of this meeting, and subsequent correspondence, a summary of the points is given below.

Holders of current A.T.V. Licences may now with immediate effect consider their Licences to be amended to allow the following details.

GENERAL CALL   CQTV

A General Call CQTV may be transmitted by radio telephony by an amateur tv station with the object of establishing contact with another amateur tv transmitting station. (Under the present wording of the Licence this was not permissable).

SOUND ACCOMPANYING VISUAL IMAGES

Visual images consisting of live subjects may be transmitted. These images may by accompanied by speech transmissions relating solely to technical matters connected with the sending and receiving of the visual images,

by another licensed amateur or holder of an Amateur Radio Certificate. Such transmissions should only be made in the presence of and under the direct supervision of the amateur television licensee, who must ensure that his station log is signed by the other person with his full name and that the call sign of the station which he is licensed to use or, if there is no such station, the number of his Amateur Radio Certificate, is shown in the log.

INTERCOMMUNICATION BETWEEN AMATEUR TELEVISION AND SOUND STATIONS

Transmissions consisting of visual images may only be exchanged specifically between amateur television stations. But such transmissions may be received under the authority of a Broadcast Television Receiving Licence; and a person who so receives such a transmission may, if he holds an Amateur Sound Licence, contact the amateur television station concerned by radio telephony to discuss technical matters connected with the sending and receiving of the visual images - Clause 1(b) of the Sound Licence and cluases 1(1)(b)(ii) and (iv) of the Television Licence are relevant. Such radiotelephone contacts ought to be made in the band being used for the amateur television transmission.

The Ministry have also said that the whole question of crossband working is under review, but that amateur television stations will probably be allowed to continue to make crossband contacts provided that the lowest frequency band used by the other station for this purpose is 144 - 146MHz.

LOG ENTRIES, SINUSOIDAL TEST TONES AND THE STANDARD FREQUENCY SERVICE.

The time of close-down of the station has

now been agreed as being the time of cessation of the last transmission from the station. Holders of Amateur Television Licences are also now authorised to transmit sinusoidal test tones and to receive transmissions in the Standard Frequency Service.

PORTABLE OPERATION

Whilst the Ministry were not prepared to amend the Television Licence they have agreed to accept (by telephone on 01-928 7583/7588/ 7594 or telegram if appropriate) notifications of intent of portable television usage at week-ends at previously agreed sites provided that they are received at the Ministry not later than 4pm on the Thursday immediately preceeding the relevant week-end. The sites which have so far been cleared for such use are Dunstable Downs Car Park and the Great Orme, Llandudno. Any other sites for portable amateur television operation would have to be cleared by the Ministry prior to the occasion for which approximately 21 days should be allowed.

RELAYING OF A.T.V. SIGNALS

The question of relaying of A.T.V. signals was discussed with the Ministry and they confirmed that they would continue to consider individual applications for permission, each one being considered in the light of local conditions.

B.A.T.C. also suggested the use of higher power, and other amendments to which the Ministry were not able to agree, but on the whole a much better understanding of our joint problems has resulted from these negotiations. Should any member still have any further queries with regard to the Licence and its interpretation, I would be pleased to supply copies of the authorising letters received from the Ministry or give advice on any matters not mentioned above (see page 1 for my address).

The R.S.G.B. has been kept fully informed during these negotiations and I am happy to announce that agreement has been reached to relocate the 70cm band beacon stations at the lower edge of the band in the very near future.

I would also add that following the comments made at last years London VHF Convention, with regard to the 70cm frequency allocation, B.A.T.C. has made known its views to both the R.S.G.B. and the Ministry of Posts and Telecommunications, and it now remains to be seen what action the Ministry will decide to take
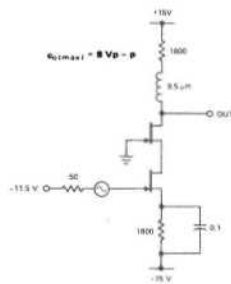
Malcolm Sparrow
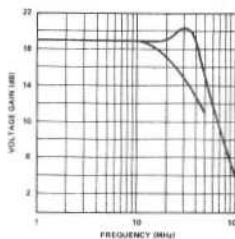Hon. Chairman B.A.T.C.

Fig. 3 Wideband Cascode Amplifier

Fig. 4

istor. The frequency response graph shows the normal and extended response curves. With adjustment to the component values (useful gen in the Application Tip) the circuit could have uses in video monitors etc.

References

1. "Applications Guide for op amplifiers" AN20. National Semiconductor Corp. Free of charge from Farnell Electronic Components Ltd., Leeds.
2. "FET Circuit Ideas, Switching". Application Tip. Siliconix Ltd.
   Items 2 and 3 free of charge from Siliconix Ltd., Saunders Way, Sketty, Swansea, South Wales.

POSTBAG

Don Reid from Brentwood, Essex, familiar to most of us as a late committee member (he resigned after his marathon effort in organising CAT-70, as his own professional work had to come first) has now rejoined the committee, and sends his best wishes to everyone. Don is going to show us how its done (again!) and organise this year's convention, details of which you will find on page 5. Thanks very much indeed, Don.

Rudi Berg DC6VD from A.G.A.F. Germany writes suggesting an ATV contest with members of B.A.T.C., A.G.A.F. and the Belgian A.T.A. competing, and wants to know if anyone is interested. Summer of this year at a convenient weekend, maybe Saturday 1600-2400 and Sunday 1300-1900 C.E.T., using 70cm and possibly 1250MHz is Rudi's outline for the contest, but of course a lot more organising is required before anyone can go on the air. German amateurs for instance are limited to trasmitting CCIR Standard B only, and multistandard receivers would be required. If anyone in UK has any ideas on this contest, could they drop a line to the Editor C Q - T V (address on page 1) to say whether they would compete or help organise the British end.

John K. Wood K611S of 17576 Pinedale Avenue, Fontana, California 92335 who has recently joined B.A.T.C. is very keen on the SSTV mode of transmission, and he points out that in U.S.A. SSTV is really frowing fast, especially in the metropolitan areas, and he is therefore comiling a bibliography of SSTV and ATV articles and references. This will be about 10 tb and references. This will be about 10 to 15 pages long and will be available for a small charge soon; free to Clubs and Libraries. In addition he is able to supply in limited qhantity copies of articles which have appeared in some U.S. publications. Any members who need anything in this line should drop John a note. On the subject of his own SSTV work, apparently on the West Coast EL2BC comes in on 20 metres just like closed circuit pictures, and 10 metres is just as good for short skip and the odd DX.

J.C. Germain GM6ADU/T of Balerno, Midlothian, sent us this photograph of his camera and monitor some time ago, but we have never had time to print it. Sorry OM, but here it is at last. 'ADU/T uses a transmitter with a QQUO3/20 tri-

pler producing 7 watts rf negative modulation, and the camera shown is battery or mains operation.

IN THE NEXT CQ-TV

More ideas for amateur colour

More news on the Convention

All the regular articles again

News of amateur tv activities

LETTERS TO THE EDITOR.

Dear Sir,
          In the article on the Multiburst Gen-
erator in C Q - T V 77 by G6ACH/T he mentions
that it has brought to light some interesting
facts about his equipment - including his
scope.

          I'll bet it has! If you do a spot of
Fourier Analysis on the fundamental ampli-
tude of a square wave you should find that,
when the squarewave is filtered to remove har-
monics (as in a video amplifier etc. because
of bandwidth limitations), the fundamental
amplitude is $4/\pi$ x the original. In other
words the bars are enhanced, at high frequency
ranges such as 5MHz but NOT at lower ranges
where the harmonics are within the passband.
Hence the typical response is one of rising
amplitudes with frequencies from 1 to $4/\pi$.

          If you tweak the amplifier for a "flat"
response using this unit then the video response
actually drops from 1 to $\pi/4$ in amplitude - with
some arbitary shape.

          The older test cards, such as Test Card C,
suffered from this defect too, and gave an
apparently sharper set of 3MHz bars.

          Sine-wave bars are the answer as in Test
Card F, but are much more difficult to produce.

          In conclusion, therefore, beware of the
pitfall - the difference is significant. Your
gear may be alright after all!

A.W. Critchley,
Ruislip,
Middx.

(G6ACH/T comments: these observations are cor-
rect, but as Mr. Critchley points out, generat-
ing the sine waves is another matter! I have
tried using the generator through various filt-
ers - using a G.P.O. 5.5MHz filter the enhance-
ment is some 1.5dB - so these comments should
certainly be born in mind).

ADVERTS

THE BRITISH AMATEUR TELEVISION CLUB

LIST OF MEMBERS ADDRESSES

Many of you who were members a few years
ago will possess a Club Membership booklet giv-
ing the names and addresses of all members of
B.A.T.C. This was very useful in finding out
who lived in your area and could then be avail-
able for reception/transmission tests, or any
other Club activity.

However, this booklet is now very out of
date, as the membership has changed, also the
addresses! The cost of producing such a book-
let is high, and as it only remains valid for
a very short time, is really a waste of money.
So the Club Treasurer has compiled from his
card index, a list of members and their address-
es on a geographical basis. By this means he
can locate any member by his map reference and
very quickly locate your "nearest B.A.T.C.
neighbour".

If you want to know the names and addresses
of B.A.T.C. members within, say, a five mile
radius of your home, write to:

A. Pratt
10 Grammar School Road,
Brigg,
Lincolnshire.

Club Sales Price List

Camera Tubes	English Electric	P849	Amateur grade	£10. 50
	E.M.I.	9677	Amateur grade	£10. 00
		9728	Amateur grade	£10. 00
	(integral mesh) 10667		Amateur grade	£ 8. 00
	4½ inch Image Orthicon 9564 or 9565			
	(older "sticky" type)			£10. 00
	ex-studio vidicons as available			£ 5. 00

Vidicon Deflection and Focus Coil Assembly — £ 7. 50
Vidicon sockets (paxolin) — . 17p
Vidicon sockets (moulded) — . 25p
"C" Mount in Aluminium for use with cine lenses — . 50p
Lapel badges — . 20p
Lapel badges (with call-sign - to order only) — . 30p
Adhesive emblems (for decorating gear with Club badge) — . 08p
Windscreen stickers — . 06p
B.A.T.C. Reporting Chart (A visual scale of video noise) — . 06p
B.A.T.C. Notepaper and envelopes (100 sheets) — . 75p
Filmstrips of C Q - T V. 10 copies on each film.
(Please state which decade you require i.e. 31-40, 41-50 etc.) — £1. 00

Please send cash with order to:

B.A.T.C. Club Sales
"Kyrles Cross",
Peterstow,
Ross-on-Wye,
Herefordshire.

Printed Circuit Boards for the C Q - T V SPG

SPG Board   £1. 75
Genlock Board   £1. 75

Please send cash with order to:

    A.W. Critchley Esq.,
    70, Sussex Road,
    Ickenham,
    Uxbridge, Middx.

    P L E A S E   N O T E   T H I S   L I S T   C A N C E L S   A L L   O T H E R S

J O I N   B . A . T . C .   A N D   R E A D   C Q - T V   R E G U L A R L Y

The Membership Secretary will send you an application form on request - ask for some for your friends too.

For an annual subscription of only £1.00 you receive this journal quarterly, can buy cost-price amateur tv gear from Club Sales, and at the same time belong to an internationally known British association dedicated to the cause of amateur tv.

So why not join now?