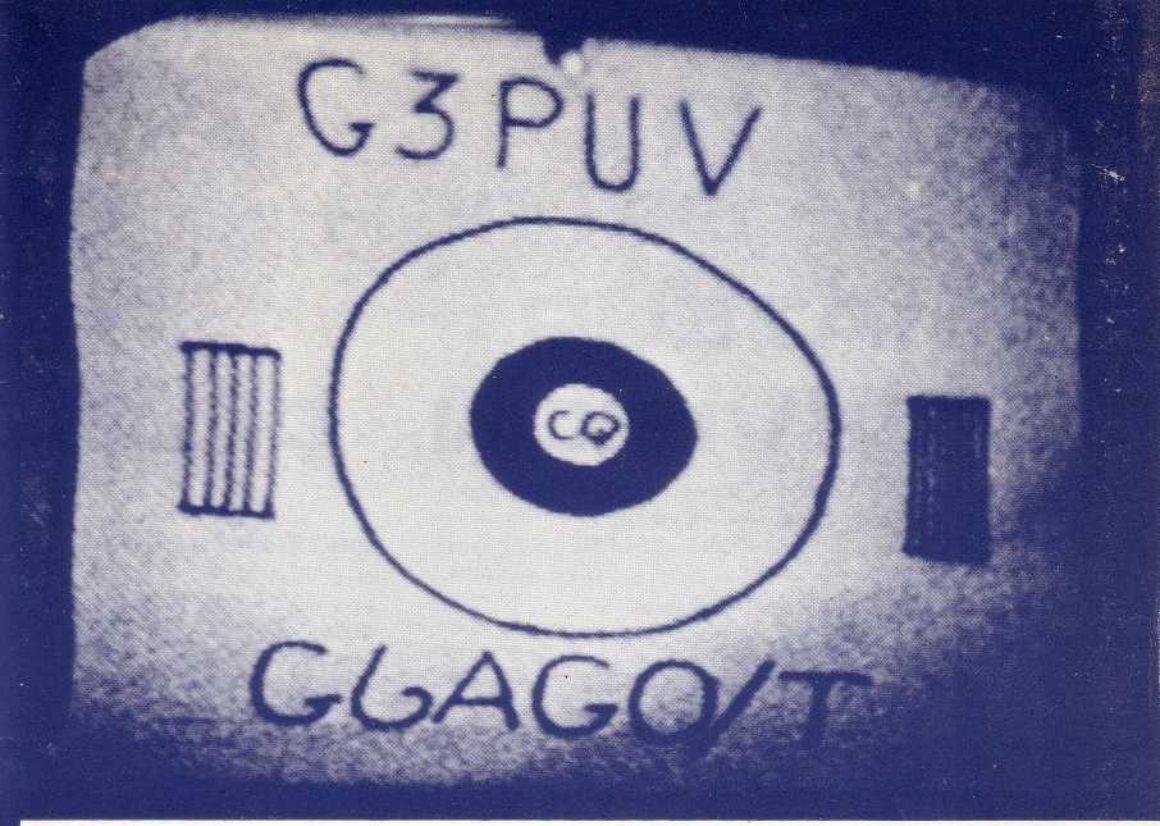

CQ — TV

THE JOURNAL OF

THE BRITISH AMATEUR

TELEVISION CLUB.

NO 93

February 1976

THE BRITISH AMATEUR TELEVISION CLUB

WHO TO WRITE TO

Subscriptions and changes of address should be sent to the Treasurer, and membership enquiries to the Membership Secretary. Please only address your enquiries to the most suitable committee member, enclosing a sae.

THE EDITOR Andrew Hughes, 17 Woodside Avenue, Weston Green, Esher, Surrey, KT10 8JQ

COVER PHOTO G3PUV-G6AGO/T as received by G6KQJ/T

CONTENTS

Letters to the Editor

Dear Sir,

I wonder if any members of B.A.T.C. could help me get some information; I have tried several sources without a reply so far. The first is where the surplus G8 IF strips used in Caleb Bradley's signal strength meter in the December 1974 "Television" can be obtained, the second is can anyone give me information on the remote control system, with circuits, used in the Philips Model 556 tvs. Any costs will ofcourse be covered by me.

I have been a member of the Club for 26 years now but my activity is very low at the moment. I thought when I retired a year ago I would have plenty of time to indulge in this activity, but I think I must have too many interests as the weeks seem to race around! However I do make time to keep up with my reading so I am up with the play. Another digression is of course, the aquiring of a colour television recently. I am impressed with the very high standard of British colour programmes. The set I have is a locally made one using a Philips design.

If anyone can help with my request I'll be very pleased, and for now 73 from New Zealand.

B.E. Graham Goodger ZL2RP
15 Waterworth Avenue,
Napier, New Zealand.

Dear Sir,

I am pretty sure that you have already heard about the German Amateur Television Club, the AGAF, Arbeitsgemeinschaft Amateurunkfernsehen. Right now we have about 500 members spread over the whole globe. About 150 of our Germsn members are fully equipped for Amateur Television on 70 and/or 24 cms. Without an exception we are using CCIR-B-mode for transmissions. There is now another mode coming up, called "SATV", Schmalband ATV, that means narrow-band-ATV, with a bandwidth up to 1 MHz, amplitude modulated, tone in NBFM-mode at the vision carrier. For this mode, a slightly changed "broadband"-equipment can be used. Originally generated "SATV"-signals need much simpler equipment.

With interest, I read the article "ATV and the IARU Warsaw Conference as it affects the British Amateur" In one of the last issues of our national amateur radio magazine "CQ-DL" we also found the new 70 cm band plan as it was compiled at Warsaw and wondered about a mentioned "vestigial sideband system" for us ATVers. Now, Bumdespost officials are only allowing CCIR-B-standard for us and anyway, none of us had the intention to change the standard, that means to rebuild his equipment. So we got in contact with our DARC-VHF-manager DJ1XK and he told us that a certain ON4ZN proposed this

system to the Warsaw Conference participants. As a new, unexperienced VHF-manager, DJ1XK could not prevent this proposed being adopted by the Conference. But he insisted on an additional note for the band-plan, that the German ATV stations can use CCIR-B-standard. Unfortunately, this note was not added until now. But he promised to care for it. Well, our VHF manager was a "greenhorn", but where was the RSGB manager, he should have been very familiar with Amateur Television?

What I mean is that this band-plan, with the vestigial sideband system, will not appeal to the German or British ATVers, naturally also not all the other European ATV stations. I know that not a single DL-ATV man will care for it, because nobody asked the AGAF before, and I think also not the B.A.T.C But how can it happen, that a single man proposes something to affect more than 1000 people without asking them and the representatives of all European Amateur Radio clubs agree to it? This shows the importance of good cooperation between all European Amateur Television Clubs to avoid these things in the future.

A few years ago A.T.A. Belgium, B.A.T.C. and AGAF started their cooperation with an exchange of their magazines and creation of the International Amateur Television Contest. But as shown, this is not enough.

The next thing, we probably could do together, is th find a common European ATV-calling-frequency. AGAF is proposing to use a channel between 144.5 and 145 MHz for all modes. A good reason against this proposal are the different synthesiser-SSB-CW-transceivers, which are all operating below 144.5 MHz. But they all can be adapted to any toher range by changing only one crystal. In Germany, those transceivers are not very popular, so we don't have this problem. Another way is to find a frequency in the range below 144.5 MHz that only can be used for SSB mode for instance, during band-openings, and we then are looking for a national all-mode channel above 144.5 MHz, probably 144.55, 144.65 or 144.75 MHz.

Another problem is the cutting of the 70 cm band that will happen at Genf in 1979 as told to us by a well informed Bundespost-man. The 70 cm band will reach from 432 to 438 MHz then and "broadband" will be impossible. We intend to change to SATV then in Germany. And for "broadband" we will activate the higher bands. The possibility of ATV repeaters gives a new aspect to those bands - impossible? We hope that the first 24 cm ATV repeater can be activ-ate[illegible] year. It is right now being developed at the Technical University of Aachen. A 24 cm/70 cm downlink SATV-repeater will probably be working in a few weeks. Anyway it is sad that we will loose our broadband-possibility in the 70 cm band. There is only very little chance to do anytning against it. But we all should take care with our activity that such things will not happen in the future.

Rudolf Berg DC6VD
President AGAF

EDITORIAL

Now that postal rates are so high, the Editor's postbag seems to have shrunk to negligible proportions. However, one subject which does on occasion arise is the suggestion that this journal runs a series of articles on "the other man's shack". Sounds a fine idea doesn't it? Everyone wants to know how others organise themselves. But do you want others to know how untidy and primitive YOUR shack is? So here is a challenge. Take a few photos, write a short description and send it to me for publication. Polaroids or EN-Prints, we'll correct your grammar and add a few spelling mistakes - and you may become famous!

Books which help us with amateur tv, radio and electronics are hard to find, and expensive too. So the B.A.T.C. Library run by Grant Dixon tries to find suitable literature and lend it to members. A recent addition is the Motorola "CMOS Data Book and Applications Handbook" which is now available for loan. Due to its weight postage charges would be en-

ormous, enquire from Grant first. Two books not in the library but which might appeal if you have any money left after Christmas were suggested by Cyril Chivers who found them useful with some optical experiments he has been involved in. They are "The Opto Electronics Data Book for Design Engineers" published by Texas Instruments Ltd., and "RCA RF/Microwave Devices" published by RCA Ltd. of Sunbury-on-Thames.

How about helping Club finances by signing on some new members? Only by becomming a larger organisation can we accumulate the capital to enlarge this journal and increase the scope of B.A.T.C. activities. So to encourage you to help your Club, we are offering one free B.A.T.C. Test Card to anyone who can sign on two new members between now and the appearance of the next issue. No Green Stamps this time though!

POSTBAG

William H. DeWitt W2DD wrote to us recently announcing his appointment as SSTV Editor of C Q Magazine - his first column appeared last July. He has been trying to get some interest going in a resolution chart for slow scan. When a picture has only 120 lines this is going to require much thought. He tells us Sumner Electronics have announced a scan convertor using CCDs (charge coupled devices) and Robot another one using a storage tube.
In fact he says, most activity in U.S.A. at the moment is concerned with scan conversion, allowing normal monitors to be used. W2DD is interested in hearing about slow scan activity in this country, and now subscribes to C Q - T V to help him.

A.J. Quinton from Thorpe Bay has been working with FAX and image retaining with SSTV (see letters to the Editor C Q - T V 92). He has recently had a spell in hospital, curtailing his experiments, but has had some success with scanning and printing onto paper of colour pictures. The two colour example he has sent us he describes as "full of faults" but we think is very good, so his later three colour attempts must be quite worth seeing - if only this magazine could print colour!

David Taylor GM6SDB/T GM8ARV has just moved to Edinburgh and tells us that he will soon be transmitting amateur tv. He asks if anyone interested in receiving pictures or transmitting could please get in touch with him by telephone or 144MHz FM/SSB, and would like to know if 625 neg mod is standard in the area, or 405 pos mod. His address is 19 Buckstone Court, Fairmilehead, Edinburgh EH10 6UL, and his telephone no. 031 445 2884 (evenings and weekends).

R.V. Mead from Plaistow, writes about his efforts to start a local amateur tv society. He has been helped by Barking Radio Society within which he is forming a tv section; already some B.A.T.C. members have joined and together with the radio club members an established group is in being. Anyone interested is welcome, with or without equipment, to help build a permanent Club. The premises are ideal, a school with a canteen open each evening, and the radio club are offering much help and encouragement. Meetings are on Wednesday evenings at Westbury School, Ripple Road, Barking Essex, and further information can be had from Mr. Mead on 01 511 0966.

Lech Domasik from Lodz, Polsnd, recently wrote reporting on activity in the amateur television field in his country. He has promised to write a full article on this subject soon so just a few details here. Amateurs in Lodz are busy converting some recently acquired Image Orthicon Cameras to transistor operation; they have one channel working, with more to come, and quite a lot of ancillary gear. Changing an old valve I.O. to transistors is quite a project, we would all like to hear about it Lech.

Grant Dixon G8CGK just made our close for press date with a letter about a (contd on page 5)

TV ON THE AIR

By John L. Wood G6AHT/T G3YQC

One of the main talking points this time is of the opening at the end of October; this was certainly one of the best for several years. The major feature was that it extended from 2 m right through to 23 cms.

On the 25th a QSO was in progress between Cyril, G6AFJ/T, Mike, G6NWA/T and myself, while Cyril was receiving Mike's strong video another caption broke in over the top and was so strong that Mike's picture was blotted out. The new caption was from G6ALR/T in Canterbury, Kent, a psth length of 110 miles, and captions were consistantly received for some time, but although captions said "listening 2 m" we didn't know where to call and a QSO failed to materialise despite calls on ssb, surely the best of reasons for a 2 m calling frequency.

Talking of calling frequencies, it seems there are two distinct schools of thought, those who do not use sideband are happy with 144.75 MHz, but there are quite a few who would like to use sideband at the lower end. Some of these have Liner 2s which of course means that they can't tune to 144.75 MHz. These stations are using 144.23 MHz which is also used by SSTV ers. Is there any reason why this frequency shouldn't be a general tv calling frequency? This arrangement of having two calling channels seems to satisfy everyone, but please remember to vacate the calling channel once your QSO has been established.

Information is just coming in that the German atv society needs a 2 m calling frequency, and one of the suggested channels is 144.75 MHz! More of this next time.

I'm sure many people will be glad to hear that G6AFJ/T, G4AHH of Whittlebury, near Towcester is back on 70 cm vision. Cyril has a very good signal from a 4CX250B amplifier and 88 elements at 60 ft. He can often be found on 2 m and 70 cm ssb, and would be glad of any tv contacts.

Some more active tv stations include G6AHF/T, G8EFU, Birmingham, G6NWA/T, G8AEX, Calverton, G6ALR/T, G8GHH, near Canterbury, G6AEC/T, G8CGK, Ross on Wye, F1ZI/T, Reims, and F1AOY, Calais.

Among receiving stations are G8CHK near Northampton and G8EUP near Rugby.

F1ZI/T can be found on 438.50 MHz from Reims, QRA CJ51F.

It is interesting to note that the French 2 m atv calling frequency is 144.17.

It is reported that the Watford chaps have a "tv night" once a week, I would like some information on this one, please.

The postbag could be a bit heavier, so please let me know of any tv activity that might be of interest.

The address for correspondence is;
"TV on the Air"
54, Elkington Road,
Yelvertoft
Northampton.
NN6 7LU.

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continued from page 4

contact on slow scan on December 27th. During an opening on 2 m he contacted F1BYM who alerted F1BYM - the only SSTV amateur in the Bordeaux area, and they exchanged pictures. Not bad for 2 m SSTV!! Grant had good reception of his photo and text, but a subsequent transmission was spoilt by fading. F1BYM reported good reception of Grant's photo, callsign and a photograph of Ross on Wye.

SUBSCRIPTIONS ARE DUE

SUBSCRIPTION INCREASE.

In an earlier issue of C Q - T V you may have read that the financial position of the Club was causing serious concern, but that it was hoped that the General Meeting to be held later this year would give approval for the subscription to be raised from 1st January 1977.

However, events have overtaken us and there was considerable doubt as to whether the Club would still be in existence on 1st January 1977. Your Committee has therefore decided that SUBSCRIPTIONS WILL BE INCREASED TO £2.00 p.a. FROM 1ST JANUARY 1976.

Due to lack of time, as well as the high costs involved it has not been possible to give earlier notification and a lot of members will have already paid the 1976 subscription, especially if paying by Bankers Order. If you are in this position please forward the additional £1.00 now, whilst you remember. The cost of reminders would waste a lot of the extra income we need from the subscriptions. If for any reason you feel you cannot afford the extra and would have to resign, please write and let me know. The Committee can approve a lower rate in special circumstances.

Remember, practically every member is now in arrears. Alter your Bankers Order for the future and send the additional £1.00 NOW.

Alan P. Pratt
Treasurer.

B.A.T.C. GIRO ACCOUNT

As many of you will know, The Club has a Giro account specifically for annual subscriptions. This is numbered 25 612 4000, but would members please note that it should not be used for any other Club departments, Sales, Publications or Equipment Registry. These sections do not have Giro facilities and other means of payment (cheque, money order etc) must be used for them.

STAMPED ADDRESSED ENVELOPES

Many members already enclose stamped addressed envelopes when they write to B.A.T.C. officials and to them we are very grateful. If only everyone would... ... ...

It may seem like shutting the stable door after the horse has flown, but we must try to keep the Club's postal bill down. So when writing please enclose not just your own s.a.e. but also an extra stamp if you think your letter may have to be sent on to anyone else.

INDICATION.

J. BROWN G3LPB

Many of us build and rebuild gear, but in these days of near austerity, the power situation gradually becomes more vital. The ides of this set-up is to not only adorn the gear, but to know at a glance any situation that exists.

Figure 1 shows the "blinkin' light". This is the visual show off, or a replacement warning light. One feature is that it blinks, and is more noticeable when we turn the shack light off, to ensure the gear is switched off.

The rectifier is a IN4002, C is between 0.68 and 2uF to give the period of flash required. The larger the capacitor the slower the flash, and about 1uF at 100v is about the best giving a decent duration of flash. R is chosen to accomodate the neon, and in most cases is from 150 to 220K in value. The neon is a panel type less resistor.

Going to Figure 2 we see the complete set up LP1 shows that MAINS IS AVAILABLE, LP2 shows our "blinkin' light"set up, or MAINS ON and LP3, probably unconventional, shows if the fuse has blown; when the fuse blows, the neon lights.

So we are now visually aware of the power set up.

The neons used were type Q from West Hyde Developments, the resistors were 180K ½w for 240v and 100K for 110v. Most components couldbe used however, nothing is particularly critical.

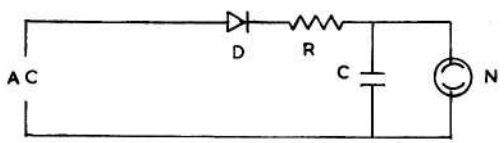


FIGURE 1

D	IN4002
C	·068 – 2µF 100v
R	150 - 220K Ω
N, LP	60v NEON

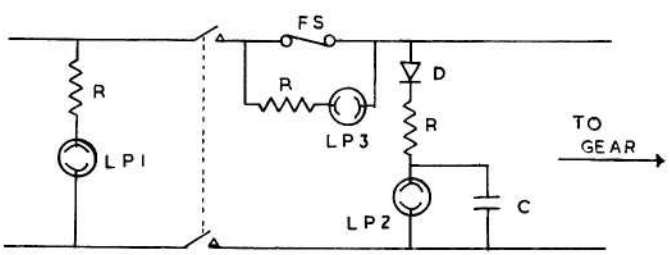


FIGURE 2

Better be safe than lose mains transformers etc!

CIRCUIT NOTEBOOK No 24

J. Lawrence GW6JGA'T

Oscilloscope Calibrator

Several different types of oscilloscopes have been available on the Government Surplus market over the last few years and although they have an 'X' time base and a 'Y' amplifier, they often need modification or accessories to improve their suitability for ATV use.

Where the 'Y' amplifier is not calibrated directly in V/cm (volts per centimetre of deflection) it is essential to have some form of calibration voltage with which to set the 'Y' gain.

The simple calibrator shown in Fig. 1 is suitable for this purpose. It consists of a conventional multivibrator using p.n.p. transistors to provide a positive-going waveform and a disconnect diode D2 to provide a good clean square wave at the collector of Tr2.

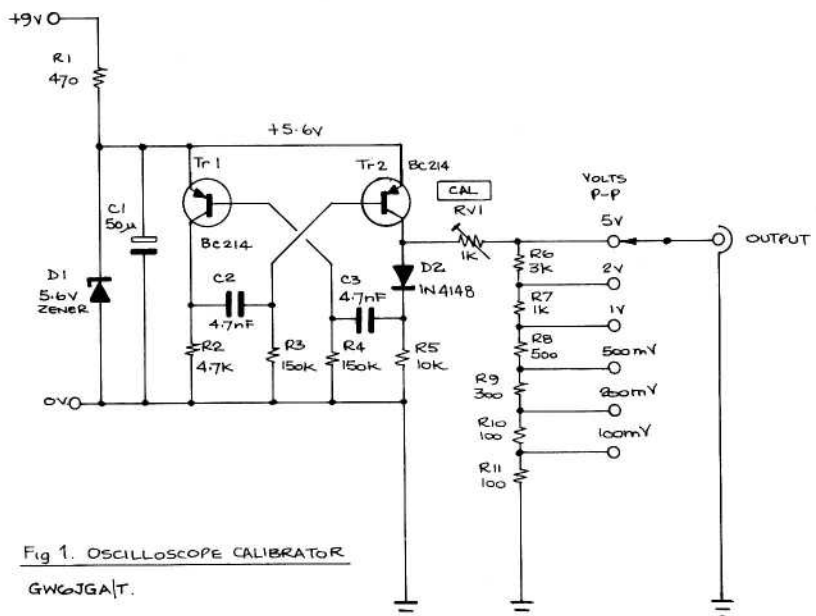


Fig 1. OSCILLOSCOPE CALIBRATOR

GW6JGA/T.

With any calibrator there is the usual problem of its own calibration, but in this circuit it can be easily carried out using a d.c. voltmeter. The base and emitter of Tr1 are temporarily shorted to stop the multivibrator running whilst leaving Tr2 conducting. With the output switch set to 5v and a 20 kohms/volt meter (Avo 8 etc.) connected across the output, RV1 is adjusted to give a reading of 5v on the meter. With the short removed, the output will be a square-wave of amplitude 5v peak-to-peak.

The output voltage at other positions of the switch will depend on the accuracy of the resistors R6 - R11, which ideally should be 1% types. The frequency of oscillation is approximately 1kHz, but it is not accurate enough for calibration of an 'X' time base. A calibrated signal generator or crystal oscillator and divider chain is suitable for this purpose.

Phosphors (again)

To supplement the information on the Cathode Ray Tube Phosphors given in Circuit Notebook No. 23, the table below gives details of the American JEDEC 'P' series of Phosphors and is from the one of the excellent series of Tektronix Circuit Concepts booklets entitled "Cathode Ray Tubes", to whom acknowledgement is made. This booklet is regrettable no longer available.

TYPE	FLUORESCENCE	PHOSPHORESCENCE	RELATIVE LUMINANCE	RELATIVE WRITING SPEED
P1	Yellowish-green		45	35
P2*	Bluish-green	Green	60	70
P3	Greenish-yellow		45	15
P4	White		50	75
P5	Blue		3	15
P6	White		70	25
P7*	Blue-white	Yellow-green	45	95
P8*	Obsolete - Replaced by P7			
P9	JEDEC registration withdrawn			
P10	Dark trace storage - Not luminescent			
P11	Purplish-blue		25	100
P12*	Orange		18	3
P13	Reddish-orange		4	1
P14*	Purplish-blue	Orange	40	60
P15	Bluish-green		15	25
P16	Bluish-purple		0.1	25
P17*	Yellowish-green		30	15
P18	White		18	35
P19*	Orange		25	3
P20	Yellowish-green		85	70
P21*	Orange		25	8
P22	Three-color dot pattern for color television			
P23	White		80	35
P24	Greenish-blue		8	6
P25*	Yellowish-orange		12	4
P26*	Orange		17	3
P27	Reddish-orange		20	7
P28*	Yellowish-green		50	50
P29	Two-color stripe pattern			
P30	Not registered with JEDEC			
P31	Green		100	75
P32*	Blue-green	Yellowish-green	25	15
P33	Orange		20	7
P34	Blue-green	Green	17	15
P35	Blue-white		55	45

C.R.T. PHOSPHORS Relative writing speed and relative luminance

* Phosphors having low level decay lasting over one minute under conditions of low ambient illumination.

SCANNING.

ERIC R. EDWARDS

RANDOM, 2:1 INTERLACED SEQUENTIAL

At first thought, it would appear, with RANDOM scanning, the monitor would be displaying 405 (if switched in 405 mode) lines per picture. This in fact is not so! It is only displaying 202½ lines per picture.

The line timebase is scanning at a frequency of 10,125 Hz. The frame is scanned (vertical) once every 50th of a second. The field frequency is therefore 50 Hz. As one field is scanned, one picture is reproduced. Therefore the picture rate is 50 per second. This is represented in the following formulae for determining the number of lines per frame.

$$\frac{\text{Line freq.}}{\text{Pic. freq.}} = \text{number of lines per frame.}$$

We have our line frequency running at 10,125 Hz and our picutre rate (frequency), as stated above, is 50 per second.
So our formulae now looks like this

$$\frac{10{,}125}{50} = \text{number of lines per frame.}$$

Working out the figures gives us the answer.....

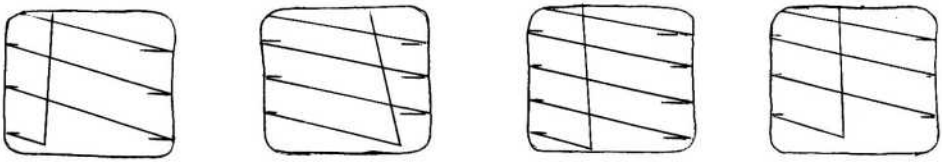
```
50)  10125 (202.5
     100
      125
     100
      250
     250
      000
```

Answer 202½ lines per frame (picture).
As the figures show, 202½ is the number of lines scanned in one frame....Very conclusive!

But we are discussing RANDOM scan.

Now as the line and field are driven from separate oscillators at the transmitter (camera) etc. The line oscillator does not in any way control the field oscillator.

When tne frame (field) has scanned it's last (bottom) line there is no guarantee that the line (horizontal) timebase has finished scanning the bottom line.



The field flyback can occur anywhere along the bottom line as shown in four examples only. It depends how much the line timebase has deflected the spot horizontally.

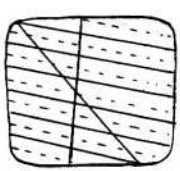
So this means that the start of the second scan is not always in the same place as the first scan. The following scan is not always in the same place as the preceeding scan. Sometimes it is nearly in the same place and at another time it could be in between two of the lines already scanned in the previous frame. The persistance and the rate of frames deceives the eye and it gives the appearance there are 405 (approx) lines per frame.

It is in fact JUMPING in and out of INTERLACE.... It is scanning randomly. Hence the term RANDOM scan.

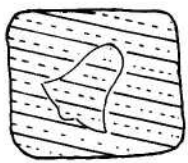
2:1 INTERLACE

Now using the same line and field frequencies, except, this time the field frequency is derived from the line frequency by means of divider circuits (7490) etc. This means that the bottom line field flyback is now CONTROLLED. It flies back from the same place every other frame.

The scanning starts; when the field scan reaches the bottom line (hypothetical), the horizontal generator has scanned half way across (approx.). This is predetermined in the synchronising pulse generator (S.P.G.) by critically timed pulses. The field then flies back to the top of the screen. It now scans vertically (and horizontally) a second time. At the end of it travel it is once again on the bottom line. This time however, it flies back only when the spot has reached the end of the line scanned horizontally. This preciseness is due to acurate timing set out in the sync. pulse generator. Because this two-fold flyback occurs TWO frames are formed. One interleaved with the other.Because it is predetermined (S.P.G.) there is always one field interleaved with the other. This interleaving takes place because of the slope of the lines in the build-up of the raster.



Each frame has 202½ lines and each field duration is 1/50th of a second. But the first set of lines sees only 50% of the complete image.



Continual line sees ½ a picture.
Dotted line sees the other ½ of the picture.

The first scan sees only half of the picture and the second scan sees the other half.

As each field is completed in the 1/50th of a second we are seeing two halves of a picture displayed immediately after each other, although, due to line displacement (line of second scan slightly above line of first scan) they are not exactly the same. So instead of seeing one whole (complete) picture every 1/50th of a second we are only seeing half a picture.

25 complete pictures per second, a compared with 50 complete pictures per second. Due to the persistance of the C.R. tube and our eyes the impression that the two x half pictures are displayed together is a deception.

Using the formulae once again we have:

$$\frac{\text{Line freq.}}{\text{Pic. Freq.}} = \text{No. of lines per picture}$$

Using figures

$$\frac{10125}{25} = \text{number of lines}$$

Answer YES 405

SEQUENTIAL SCANNING

This type of scanning is formed when each line is scanned repeatedly. Critical timing is adopted once again to keep the field frequency in step with the line frequency. There must therefore be an even number of lines eg. 406 as compaired to 405 lines.

To adopt 405 (406) lines the formulae was;

$$\frac{\text{Line freq.}}{\text{Pic. freq.}} = \text{number of lines}$$

As we want the same number of lines in each scan every time, the picture frequency must be the same as the field frequency i.e. 50 pic. per sec.

SO: $\frac{\text{Line freq.}}{50} = 405$

BY transformation

Line freq. = 405 x 50 = 20250 Hz.

With this system of course, the highest resolution is possible as every line is scanned every 1/50th of a second. That means every line, all 405 of them is scanned at every field duration as compaired with every other line scanned as in the interlaced system. There is no fading away of the line because it is modulated, re-modulated every 1/50th of a second. This system cannot be used for transmission because of its high 'fundamental' bandwidth.

Formualae:

$2/3\ 405^2 \times 50$ (assuming aspect ratio)

or 2/3 line freq. x pic. frequency.

Answer 5.5 Mh Bandwidth.

BANDWIDTH

Assume 625 lines

INTERLACE

$$2/3\ 625^2 \times 25 \text{ (assume 4/3 aspect)}$$

$$= 2/3 \times (625) \times 25$$

$$= \frac{2 \times \frac{390625}{625}}{3} \times 25 = 264161 \times 25$$

= 6604025 hz/s or 6.6MHz/s badwidth

Assume 625 Lines

SEQUENTIAL

$$2/3\ 625^2 \times 50 \text{ (assume 4/3 aspect)}$$

$$= 2/3 \times 390625 \times 50$$

$$= \frac{781250}{3} \times 50$$

= 264161 x 50 = 13,208,050 Hz/s or 13 MHz/s bandwidth

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A REPEATER ATV STYLE

by. John L. Wood. G6AHT/T G3YQC

Following the report of the 1975 Warsaw Conference, in which provision is made for atv repeaters, there has emerged some interest in such a project.

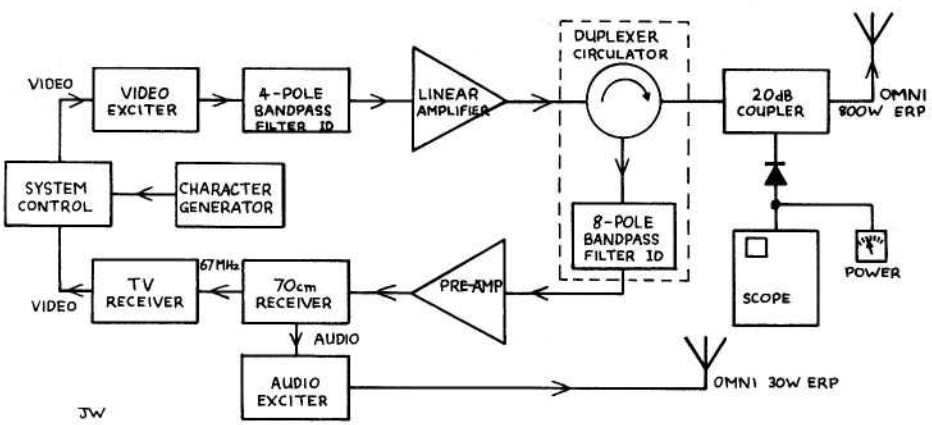
Therefore I would like to describe in principle one such atv repeater which is at present in operation in Alexandria, Virginia in the U.S.A.

The station is WR4AAG which is a 70 cm repeater. Provision is made so that simultaneous sound transmissions at the standard separation of 4.5 MHz (standard in the U.S.A., that is) are included in the repeater, the total bandwidth occupied thus being 8 MHz. It has its own visual identification (ID) character generator, and has an E.R.P. of 800 Watts.

Among the advantages of such a repeater are:

1. It can increase the working range of a station within the service area by up to 100%.
2. A standard tv set can be used, as the sound separation is compatible with commercial equipment.
3. Station can use fixed direction aerials and so make vision nets possible if required.
4. Since the repeater generates a video ID as a receipt for a received signal, it provides a simple test for transmitter operation.

The basic repeater configuration is shewn in the block diagram, which is fairly self-explanatory.



One can see that simultaneous video reception and re-transmission is achieved using a circulator and 8 MHz wide sharp-skirted interdigital filters.

The isolation between the circulator ports is 20 dB, and the received signal then passes through an 8 pole bandpass interdigital filter, the transmit to receive isolation requirements for tv operation being far more stringent than those for narrow band FM repeaters. This is because the amplitude modulated tv signal is easily degraded by low levels of interference.

It can be seen from the block diagram that a separate transmitter and aerial is used for the audio channel.

Reference;
QST October 1975.
Grateful acknowledgements to the Editor of QST magazine for permission to use material from the original article quoted above.

1976

BATC Convention

PLACE LEEDS UNIVERSITY

DATE Saturday SEPTEMBER 18th 1976

TIME 1000 to 1730 approx.

MAKE A NOTE IN YOUR DIARY NOW.

Full details in the next issue of C Q - T V.

Slow Scan News

Following the recent correspondence in C Q - T V on the subject of calling frequencies it is recommended by the B.A.T.C. Committee that 144.23 MHz be used for inter G ssb SSTV working, leaving 144.50 MHz for continental contacts.

It is also suggested that 144. 75 MHz be used for all other atv contacts requiring a 2 m frequency. 144.75 has also been suggested in Germany for setting up uhf tv contacts and for talk-back.

In the report printed in C Q - T V 92 on the B.A.T.C. SSTV Convention an unfortunate error appeared. Quite wrongly we described the SSTV to fast scan convertor shown by Volker Wraase DL2RZ as a WOLMD product when it was, of course, his own design. Volker spent a year of hard work designing the device, which impressed many people in this country, when he demonstrated it at Aston, and we wish to apologise to him for the embarassment our mistake may have caused him.

At this Convention a leaflet entitled "Useful Notes on SSTV by G8CGK" was distributed and one or two minor additions and corrections apply to the last page. If you picked up a copy of this leaflet, you should add the following:

1. Auto sync threshold detector: between the upper diode and the 7.5K resistor a 22uF capacitor should go to earth.
2. The CA4016 (top right of diagram) should be a CD4016.
3. The 5558 is a dual op amp; 1458 is a pin for pin replacement, but one could use two 741s.
4. A permanent focus magnet should be used; the pot labelled "focus" is for fine adjustment.

Anyone who was not at the Convention and would like a copy of the above leaflet should send a foolscap s.a.e. to Grant Dixon G8CGK, whose address is on page 1.

News reached us too late of the 8th RTTY "Flash" Contest organised by cq ellettronica magazine. This is an anual event, and took place this year on the 17th January (1500-2300 GMT) and 25th January (0700-1500 GMT). May we hope that next year the organisers send us the information a little earlier.

Don't forget the 1976 B.A.T.C. Convention coming soon - on September 18th at Leeds University. It won't be a "Slow Scan Only" affair as at Birmingham last year, but that shouldn't stop us showing plenty of SSTV gear. Many people fail to realise that these days the membership of B.A.T.C. has more licenced slow scanners than licenced fast scanners (closed circuit fast scan still holds sway though). So the display of equipment at Leeds should reflect the situation ...

SSTV CONTROL CIRCUITRY

J. Brown G3LPB

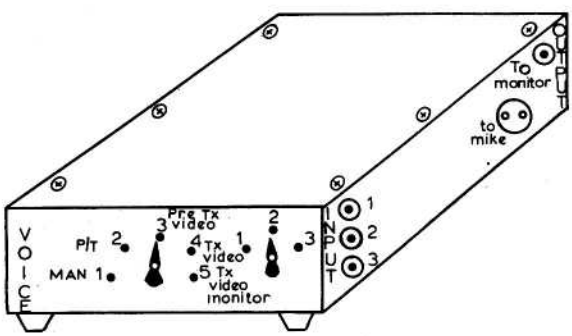
When adding slow scan to a smallish shack already overloaded with other modes including RTTY, thoughts had to be given to simple change over, preferably switched. This would allow quick change over and skeds could be easier kept. The outcome is given here and was a great asset and has proved invaluable. Built in an Eddystone diecast box with a minimum of components, wiring was done using single creened wire (perhaps not necessary). A minimum of external connections allows easy removal for demonstrations etc.

This is how it works.

Position 1 of control switch allows VOICE. Manually controlled i.e. the tx is switched to operate position by the press to talk connection being earthed automatically in this position. This allows us to talk whilst doing something else like finding something etc.

Position 2 is VOICE normal press to talk, here we have to manually press switch to actuate the transmitter and would be for normal SSB use.

Position 3 we call Monitor Video PRE TRANSMIT in this position the monitor is fed from an external source i.e. recorder, camera, FSS etc. These are selected by S2. So we can be listening to the QSO and preparing our tape for reply or finding the position of certain bits which we want to transmit.(videowise) like a closed CCT position



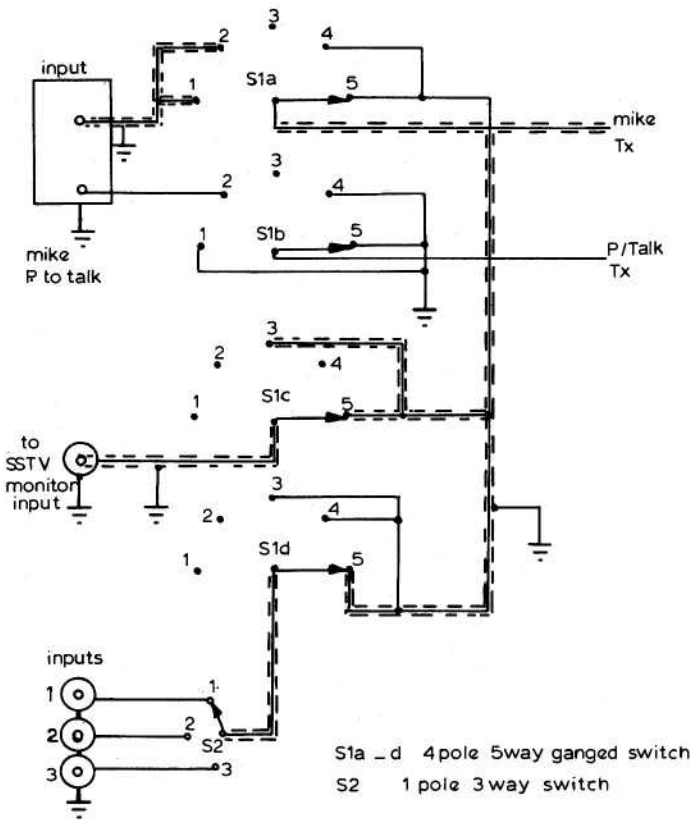
Sprayed Eddystone diecast box with rubber feet

Position 4 allows VIDEO transmission from again the selected source by S2.

Position 5 allows as in Position 4 above PLUS the advantage of being able to monitor our transmission on the monitor. This latter one is a "GOOD HABIT" to use. We can see any defects i.e. RF in the recorder etc. quality of the video etc.

So with a minimum of external connections we can do all the required things with a few added? These external connections are:

1. MIKE INPUT plus P to talk if fitted (if not this circuitry can go to the relay system).
2. EXT inputs from FSS, Camera or recorder (these can be jack plugs or similar)



mike wiring in screened cable

OUTPUTS

1. Th Monitor input
2. To TX mike socket and P/talk if fitted.

In some cases, matching would be needed, this has been catered for in a previous article.

The SLOW SCAN Scene; Winter 1975.

AS VIEWED BY A LF, HF AND VHF BANDS SSTV OPERATOR

The B.A.T.C. first-ever Special SSTV Convention at Birmingham on the 11th October 1975 was the success it deserved to be both socially and technically bringing together for the first time the active sstv operators on the LF/HF bands and those confined to short distance 2m or closed circuit work which surely was "the object of the excercise", was it not?

There, again for the first time, most amateur exhibitors/demonstrators were able to see working, and examine equipment built to the one or two UK and several USA designs actually producing and receiving sstv video, as well as two or three commercial types of similar equipment, all working under proper lighting conditions, so different from the glaring lights at the subsequent Trade Exhibition at Leicester.

Now, by late December, what has happened SSTVwise since "Birmingham" with such equipment and with what countries could sstv signals be currently exchanged both on 2m and the LF/HF bands?

No doubt Volker's own designed DL2RZ Slow to Fast Scan Converter to a normal "frozen" TV picture of 625 lines on 50Hz AC mains, already then in use by several DL sstv stations on all bands, inspired the other six of the now known eight UK amateurs to start building the WB9LV1 similar type digital memory S/F scan converter as featured in March, May and August issues of QST 1975 and already much modified.

Other amateurs have "rebuilt" with improved results, and two have persuaded 'stubborn' monitors to perform properly. During the October VHF/UHF 'lift' conditions 2m video signals were exchanged between G and at least DL, F and ON amateurs, and similar qsos could have been had with several European countries if only they had been equipped for sstv.

Long distance bands 2xsstv qsos have taken place from the UK with CT 1,DL,EA,F,FC,FP8 (sstv keyboard), G, GD,GM (also sstv keyboard), and GW, HA, HB, HM, HR, JA, JY, KP4, OE, OK, ON, PY, SM, SP, SV, TR8, VEs, VP2K, VU2,VX9A, YBØ, ZS, 4X4, 9K2, and 9X5, as well as with hordes of Italian and USA stations, several of the latter now using the new ROBOT 300 s/f and f/s scan converter with a storage tube "freezing" sstv picture. This was the Robot Model which failed to make its promised appearance at Birmingham due to production delays and the necessity to fulfill a prior promise for appearance at the Telcom Exhibition at Geneva, prohibiting the 'promised stop over' in Birmingham, for which the Manufacturers send their apologies to B.A.T.C.

This converter not only furnishes "stop action frame snatch from standard tv camera" but also 128 or 256 lines pictures with four sstv frame times.

By 11th November WB6 20m sstv operators reported that their 256 lines 34 seconds frame video was being received in KH6 Hawaii subject far less to the effects of qrm than their similar 128 lines video. A simple modification to the ROBOT 70s range of SSTV Monitors (the new 70D has it 'built in' - a factory designed mod. kit is available) and to the W6MXV monitor design, is offered by Rolph Van Jindelt WB6JKW, along with his five modification designs to the WØLMD keyboard, and enabled G3WW on 20th November to receive 20m 256 lines 34 seconds frame video on his 70A WB6TOC, record it on a cassette, photograph a frame depicting the easily recognizable head of King George VI on a Canadian Dollar Bill and airmail it to WB6TOC who confirmed it as

transmitted and of good quality despite the qrm. On Thanksgiving Day W1VRK "frame grabbed" pictures from the New York Parade showing on his normal tv set screen and transmitted them through his "300" on 256 lines for sstv viewing on 20m. After "viewing" a 256 lines picture taking 34 seconds to "unfold" a 128 line 7.5 second picture seems almost instant. G3SWW has fitted a simple 256 line modification of his own design to his Spacemark Monitor.

Referring to qrm and its effects on video signals two DL designs have already been published to overcme the too-readily overloading problems of the original DJ6HP design active filter. That by DK 1 BF appeared in "CQ-DL" August 1975 and the other in November 1975 Ham Radio.

The Sumner Electronics Engineering Co. of Tennesse, USA (WB4HCV) suffered a bad fire in October and were creditably reported as discontiuing manufacture of their sstv Keyboard and "available - Sept. 1975" HCV-2CS s/f and f/s scan Converter with 'built-in 9' fast scan display using a digital memory. Happily there has been a change of mind and manufacture will continue.

G3IAD Nevill Jackson continues as the leading European SSTV DX operator with 98 countries worked two-way sstv, and all qsls collected and sent to ARRL for first-outside-USA "Worked All States" SSTV Award. DJØKQ is reported to have 91 countries worked, while W8YEK and W4MS remain on 110 and 100 countries respectively.

Although the ARRL will not as yey issus a DXCC Certificate endorsed for SSTV Operation only, unlike "WAZ" or "WAS" Awards, such recognition will and must come. Already the question of what constitutes a valid2xsstv qso has been raised. Normally, both stations to such a video qso have a monitor in operation and can thus give the required report on the contents of the video signal received for identification purposes there and then. However, at least two Expeditions have only taken a tape recorder, a pre-recorded tape of "CQ SSTV de...." to back up voice "CQ SSTV de..." and signal strengths report etc., and blank tapes to record the video signals (and voice signals) sent by the SSTV stations answering the CQ sstv but no monitor. Thus the expedition can only give a verbal report on the signal strength on the recogniseable sound of the video transmission and must wait until returning to the mainland before running the tape through a monitor for identification purposes and possible confirmation then, and only then, as a 2xsstv qso. This procedure of 'delayed monitoring' is accepted; nonetheless G3IAD used his own monitor on his 1975 GD Expedition.

Must there be a requirement of delayed monitoring if the receiving station, not equipped with a monitor at that time, tapes the video signals transmitted to him and immediately transmits the tape, containing such video signals, back to the originating transmitting station who "sees" these video signals, and the contents thereof on the monitor connected to his receiver (and tapes them as 'proof' of contents) and can thus confirm forthwith whether or not "what he sees is what he sent to the other station?

These notes have been prepared at the express request of the Committee of B.A.T.C. from news and comments gleaned while operating on all bands on which sstv transmissions are 'permitted' in Great Britain and from overseas Magazines devoting adequate space to sstv matters- "CQ Magazine" provides their new SSTV Editor W. DeWitt W2DD with three pages for his "In Focus", while "Worldradio News" similarly provides Dave Ingram K3TWJ, who wrote the SSTV Column for '73' Magazine with up to three pages for his worldwide sstv news items including, in the August 75 issue the first details outside West Germany of DL2RZ's designs. Information by letter will

be welcomed and especially from anyone attending the Dayton Hamvention, Ohio, starting on 23rd April 1976 where demonstrations of 'moving clolour sstv' and goodness knows what else are promised.

With sstv the C U OM at the end of a qso really mean what they stand for.

Richard Thurlow G3WW December 1975

SSTV Analogue/Digital Conversion

by Lewis Elmer G6AGU/T

Before looking at conversion methods let us look at how a tv picture is represented in digital form. The brightness levels produced by a camera vary from black to white with an infinite number of shades of grey in between. In a digital system these varying shades will become discreet levels of brightness and any shades of grey that lie between two particular levels will be assigned the same binary value. This process is known as quantizing. A camera scanning a continuous grey scale with black at one side and white at the other will produce an output whose waveform is a sawtooth. This, when passed through a digital system, will be converted to a staircase waveform with the number of steps determined by the resolution of the system. A digital system of 4 bits resolution, giving 16 brightness levels, produces a reasonable picture for amateur use. For each level of brightness, Table 1 shows the binary value input voltage range, assuming a 3 volt video signal.

Anyone still unfamiliar with binary numbers should note the following:- In a binary number the weights assigned to each successive bit from right to left are in the sequence 1,2,4,8, etc.. To convert a binary number to a decimal, add together the weights for each 1 bit. Thus 12 converted to binary has 1 bits under weights 4 and 8 and 0 under all other weights. Examination of Table 1 should make this clear.

DIGITAL TO ANALOGUE CONVERSION

Figure 2 shows a circuit suitable for use in the slow scan output. The resistance network connected to the digital output gates has its values weighed so that each gate contributes to the output voltage in proportion to its value. The output is about 3 volts peak-to-peak and inverted. The response of this circuit is limited to audio frequequencies but could be improved by a high speed op-amp or a transistor amplifier. The gain can be altered by varying the 560 ohm feedback resistance. TTL output voltages are not usually as precise as required by a D/A converter, even with all the gates on the same chip. It is not a good idea to connect other TTL devices to the gates driving the D/A converter since the extra loading will alter the output voltage.

Figure 3 shows a circuit which gets round some of these limitations. The base of each transistor is held at 2.7 volts by a zener diode and, with a Vbe of 0.7 volts, the emitters will be fixed at 2.0 volts. The emitter currents are therefore defined from this voltage and the values of the emitter resistances. All the collectors are connected together to a common

decimal value	Binary value 8421	voltage range (assuming 3 volt signal)	
0	0000	0.1	black level
1	0001	0.1 to 0.3	
2	0010	0.3 to 0.5	
3	0011	0.5 to 0.7	
4	0100	0.7 to 0.9	
5	0101	0.9 to 1.1	
6	0110	1.1 to 1.3	
7	0111	1.3 to 1.5	
8	1000	1.5 to 1.7	
9	1001	1.7 to 1.9	
10	1010	1.9 to 2.1	
11	1011	2.1 to 2.3	
12	1100	2.3 to 2.5	
13	1101	2.5 to 2.7	
14	1110	2.7 to 2.9	
15	1111	2.9	peak white

TABLE 1

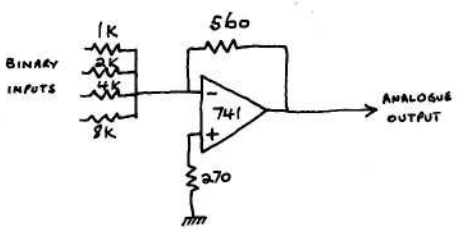


FIGURE 2

load resistance which will carry the sum of all the collector currents. The transistors can be switched on or off by a 7403 or similar gate. Final adjustments to the linearity of a D/A converter can be made under working conditions by connecting high value trimmer resistances in parallel with the network resistances.

ANALOGUE TO DIGITAL CONVERSION

There are a number of different methods in common use each with its own advantages and limitations. Not all are suitable for tv. All work by comparing the input voltage to a reference voltage and using the resulting output to set the digital bistables.

The method known as simultaneous conversion is about the only one fast enough for fast scan tv. The circuit is shown in Figure 4. There is one comparator for each level change.

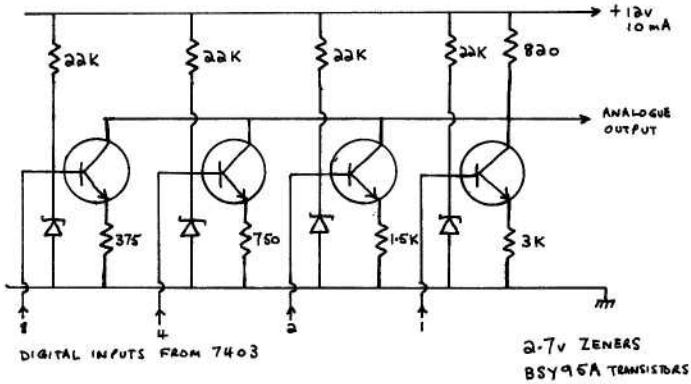


FIGURE 3

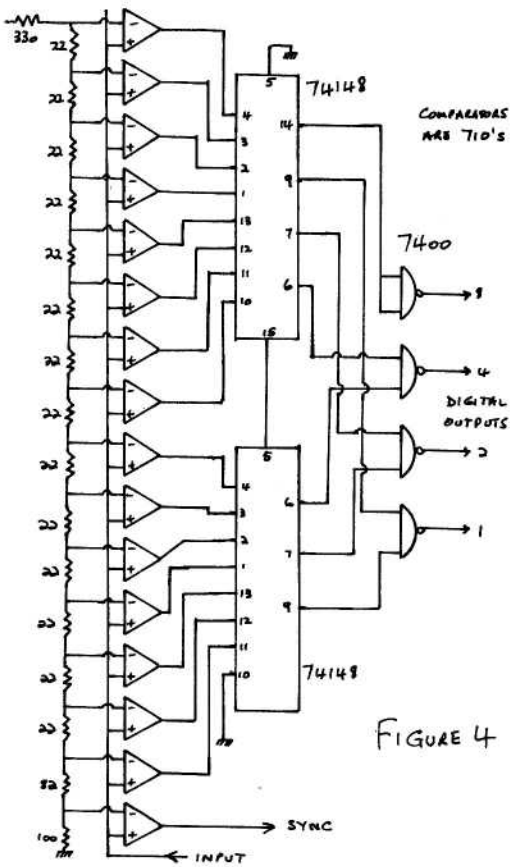


FIGURE 4

The reference voltages are derived from a potential divider across the 5 volt supply. The input signal should be white positive-going and about 3 volts amplitude black to white. All comparators whose reference voltage is less than the instantaneous input voltage will have a low output and the others will have a high output. The 74148 integrated circuits are known as 8 line to 3 line priority encoders. Their function is to give an output whose binary value is that of the highest numbered input line having a low input. Two of these are required to decode 15 input lines, and some extra logic to give a true binary output. The bottom comparator is not used in the A/D convertor, it is used here as a sync separator and can be omitted if not required. Most IC manufacturers are now producing 4 type 710 comparators in one package and these can be used to reduce the package count if required.

The above circuit can also be used to convert a slow scan input as well as a fast scan, but a simpler method, known as the counter method, and shown in Figure 5 can be used here. Only one comparator is used. The reference voltage is obtained from a D/A converter whose input is from 7493 counter. The counter goes through all 16 levels and so the reference voltage for each level is presented sequentially to the comparator. When the reference voltage exceeds the input voltage, the count is latched in the 7475 bistables. This is the required binary output. The clock is running continuously and the binary output must be accepted by the other circuitry before the counter goes from 15 to 0 for the next cycle.

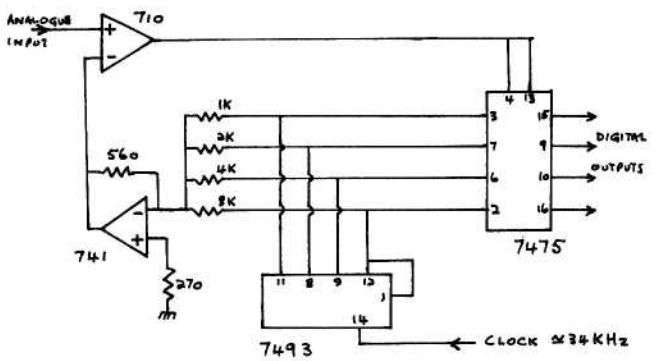


FIGURE 5

6th WORLD SSTV CONTEST.

Sponsored by cq eletronica and 73 Magazine plus World Radio News

The Italian Magazine cq elettronica, the American 73 Magazine and Worldradio News have the pleasure in announcing the 6th Worldwide Slow Scan Television Contest. The purpose of this contest is to promote increased interest in the SSTV mode of operation as used by Radio Amateurs.

RULES

1. Period of contest

   Part 1 15.00 - 22.00 GMT on Feb. 7th 1976 Part 2 07.00 - 14.00 GMT on Feb. 8th 1976

2. Bands

   All authorised frequencies within the 3.5-7.0-14.0-21.0-28.0 MHz bands and via OSCAR

3. Messages

   Messages will consist of: Exchange of pictures which include a)call sign of transmitting station; b) report (RST); c)serial number. The serial number must start at ØØ1 and is increased by one for each successive contact during the period of the Contest and the serial number is irrespective of the Band(s) used. Friendly QSO's between contesting SSTVers in all countries will be permitted this year. However an exchange of SSTV pictures containing the previously stated information is necessary for valid QSO credit.

4. Exchange points and multiplier

   A) Contact score 1 point per contact on the 3.5,7.0,14.0,21.0 MHz bands. 4 points per contact on the 28.0 MHz band and 15 points via OSCAR.
   B) A multiplier of 5 points for each Continent (Max. 30 points) and 2 points for each country (ARRL List) worked can be utilized on each band. In addition to the ARRL List will be considered as separate countries the W call areas WØ to W9 and VE Call areas from VO to VE7. The same Continents and country is only valid once on each band. The same station can only be worked once on each band (Max. 5 contacts) during Contest period.

5. Scoring

   Total exchange points multiplied by the multiplier total.

6. Handicap

   Winners of precedent Contest: less 10% of the total final score.

7. Sections

   a) Entrants transmitting and receiving video.
   b) Entrants receiving video only. For this purpose the same general rules apply and the same station heard is valid once only on each band.
   A separate results table will be made for each of these two classes of entry.

8. Logs

   Logs should contain: Date, Time of contact(GMT), band in use, Call sign, Report(RST) sent and received. Serial numbers sent and received, points, multipliers and final score.
   Although not essential, it would be appreciated if entrants could enclose a cover sheet with a short description of the Station (With photo if possible) together with any comments on the Contest.
   All entrants are kindly requested to report on any serious Contest irregularities e.g. Exchanges in other modes.
   For entrants in the b. Classification it is only necessary to record the message of the station heard.
   Logs must be received by not later than March 25th 1976 in order to qualify.
   Send US Logs to Dave Ingram K4TWJ
   Eastwood Village 604N
   Rt. 11 Box 499
   Birmingham, Ala. 35210

   Out. USA Prof. Franco Fanti
   Via A. Dallolio n. 19
   40139 Bologna, ITALY.

9. Rules of Behaviour and Penalization

   The logs must be compiled in accordance with the Rules listed in (8). The contacts must be made by means of the SSTV mode and it is not permitted to use other mode of transmission either before, during or after the exchange of messsge by Slow Scan Television. During the Contest it is expected that Amateurs will observe the fundamental rules of courtesy and good operating during contacts. Failure to observe any of the above Rules will result in the exclusion of the entry from the final results and any such logs received will be considered as check logs. All logs received become the property of the Edition CD and will not be returned. The decision of the Organizing Committee in any dispute will be final and any subsequent controversy cannot be referred to the Civil Court.

ADVERTS

FOR SALE

Constant voltage transformer 150w 240v, output for input of 190 to 240v ac £3.00 + post.

Variac 200w 0-240v ac £4.00 + post.
14 inch monitor, video 3v, plus uhf tuner in metal case, valve 240v ac 100w £5.00 + post.
Box of electronic bits: relays, valves transistors, capacitors, ICs etc. £2.00 + post.
Two electromagnetic counters, Veeder Root Ltd, 50v ac 0-999999 resettable £2.00 + post.
One radioactivity Geiger counter tube, HT volts around 400. Sent at buyers risk. £1.50 + post.
Oil filled paper capacitors 8uF 250vac; 4uF 1000vdc; 0.5uF 2000v; 0.002uF 25kV
Lots of other gear - send sae for list.

WANTED

Small DE-AC batteries
Video tape recorder, working with spare tapes, or parts and data to enable completion of one.
Colour encoder built and working, or
Three colour modulator ICs type MC1596G etc with data (or equivalent) and one 4.4336 MHz Xtal.
EMI Image Intensifier tube or EMI Image convertor tube; in good working order.
Philips Projection tv parts or complete unit.
Cyril W. Stanners
Rydon House
Rydon Road,
Kingsteignton
S. Devon.

.....

FOR SALE

One Pye Mk. IV Industrial Vidicon Camera, less lens, with control box and power supply unit. Complete with circuit details. Untouched, as bought from G6AMX/T last year for £25. Offers about £15.
H. Burton G2JR
149 Longfellow Road,
Coventry.
Tel; 0203-455021

Advertisements are inserted in C Q - T V on the understanding that advertisers comply with the Trades Descriptions Act and accept responsibility for their own wording. They must also undertake to reply to all who enclose a stamped addressed envelope.

.....

WANTED

A deflection coil set with focussing coil for use with MC13-16. Also a 25kV transformer and rectifier for the same tube.
Gorm Helt-Hansen
Yderholmvez 66
DK 4623 L1
Skensved, Denmark.

.....

FOR SALE

Closed circuit tv cameras and monitors.
Enquire for prices and availability.
M. J. Sparrow
64 Showell Lane
Penn Wolverhampton
Staffs.
Tel: Wombourne (09077) 3037

.....

FOR SALE

3 inch image orthicon camera; turret lens including 2 lens (one manual iris); C.C.U.; drum of camera cable; pan tilt head; parts of dolly. Also colour monitor, working but needs attention, very heay. Inspection and offers invited - cheap.
R.V. Mead Tech(C.E.I.)
123 Prince Regent Lane
Plaistow LONDON E. 13

. . . . . .

FOR SALE

70 cm TX 100w + INC AUDIO/VIDEO MOD £100.
2x26" PHILIPS COLOUR RX £50 EACH
2 m TRANS'UR HEATHKIT £40
CREED 75 T'PRINTER + D'CODER 8 PUNCH TAPE UNIT £100
PYE REMOTE PAN/TILT UNIT £50
ETC ETC WHAT OFFERS?
BOX F1
% Editor, C Q - T V,
(address on page 1)

Club Sales Price List

Camera tubes 1" P849 English Electric Amateur Grade

			Price	Post & Packing
Camera tubes 1" P849	English Electric	Amateur Grade	£11.55	nil
9677	E.M.I.	Amateur Grade	£11.00	nil
9728	E.M.I.	Amateur Grade	£11.00	nil
⅔" 9831	E.M.I.	Amateur Grade	£11.00	nil
4½" Image Orthicons	E.M.I. 9565		£10.00 for two	buyer collects
Coils 1" B.A.T.C. coils			£ 9.00	48p
⅔" E.M.I. coils			£11.00	48p
Paxolin vidicon sockets			.20p	8p
C mount for lens			.50p	10p
Lapel Badges			40p	8p
Adhesive Badges			.15p	8p
Paper and envelopes			£ 1.00	46p
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EEV Camera Chart			£ 1.65	30p
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Film strips of past CQ-TVs			£1.20	10p
Windscreen Stickers			. 6p	8p
CQ-TV SPG printed circuit boards	undrilled £1.75	Drilled £2.75		8p
CQ-TV SPG genlock pc boards	undrilled £1.75	drilled £2.75		8p

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 etc. 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 orders to C.G. Dixon(B.A.T.C. Club Sales)
"Kyrles Cross"
Peterstow,
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