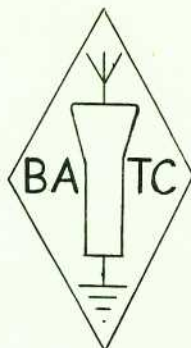




cq-tv 37

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Editor: J. E. Tanner,
16 Norfolk Drive,
Chelmsford.

EDITORIAL

The British Amateur Television Club

THE FOURTH AMATEUR TELEVISION CONVENTION

is to be held from 10.0 a.m. to 7.0 p.m. on

SATURDAY 6th SEPTEMBER 1958

at

THE CONWAY HALL

Red Lion Square, London W.C.1

Working TV Equipment Exhibited by

B.A.T.C. Groups

AMATEUR COLOUR TELEVISION

A.G.M. in the Afternoon

The main subject of interest this edition is the forthcoming convention. The leaflet that was sent out with the last edition is printed here and gives general details. Tickets are now available from committee members, for members 3/6 all day or 2/- after 2pm. Non members 5/- and 2/6. A map is printed on the back of the tickets to show how to get there. Nearest tube station is Holborn. There is parking space in Red Lion Square.

This edition is much later coming out than was originally intended but excuses are that exams took up a large amount of time just as CQ-TV should have been going to press. This delay will be put this edition close to the convention so the next edition will be produced immediately afterwards and will include a report on the convention as well as photographs.

At the time of going to press there is not much news of the Radio Hobbies Exhibition this year but it does appear that the B.A.T.C. will have a much smaller show there than last year. As it is not until the last week in November more details will appear in the next edition.

News arrived recently of a new group starting in Dublin. Bill Stapleton is the chairman of the group and his gear provides a useful nucleus of working gear for the group. When the group is well established and transmitting perhaps the first transmission across the Irish sea will be accomplished.

This is the last CQ-TV before the convention so I would like to remind you to send the question sheets that were sent out with the last edition back to the convention organiser, D.S. Reid, 27 Rose Valley, Brentwood, Essex. If you have lost the sheet just let Don know what you can bring to the convention.

75, and I hope to meet many of you on September 6th.

J. E. Tanner

John Tanner

WHAT'S ALL THIS ABOUT HI-STABS ?

By Don Reid.

Before we start to think about high stability resistors we must know something about noise, which is defined as follows: 'Unwanted energy (or the voltage produced) usually of random character, present in a transmission system, due to any causes'. As well as the familiar hiss from a loudspeaker this definition also includes interference spots on TV tubes, 'grass' on radar screens etc.

The particular type of random noise with which we are concerned at the moment is known as thermal noise. This is produced by the random motion of electrons in any resistor, so that at any moment there are likely to be more moving in one direction than another, this means that there will be a P.D. developed across the resistor. Now although, or rather because, the motion is entirely random it is possible to calculate the value for the R.M.S. noise voltage - this was first done by Nyquist, and although his formula is not precisely exact, it is near enough for all practical purposes.

At room temperature, 17°C, the noise is $V_{\text{eO}} = 126/\text{BR}$ where V is the RMS noise, B is the bandwidth in Mc/s and R ohms is the resistance. As the temperature increases so does the noise.

As an example, the noise from a 1M resistor measured over 1Mc/s bandwidth amounts to 126µV at 17°C.

Now we are almost ready to think about our 'high stab' resistors, for the formula quoted gives only the minimum noise to be expected. A typical resistor consists of a mixture of carbon particles, and some inert material to act as a binder. This leads to other sources of noise due to contact potentials between particles and so on. Normally this does not matter in the least when we are dealing with signals of 1 volt or more, but when the signal is only mV, then obviously it is important to keep the noise down to preserve the signal/noise ratio at a good value. Wire wound resistors are generally better than carbon ones but as they are inductive they should be used with caution in RF and Video circuits.

The most useful resistor is the high stability cracked carbon; this is made by depositing a uniform layer or film of carbon (soot) on to a ceramic rod, and cutting a spiral track round it to give it the required resistance. The word cracked is a chemical term, a reference to the way carbon is obtained and does not imply that the resistors are sold in a broken condition! Besides being less noisy, this type of resistor is less subject to variation in temperature, applied voltage and age as the name implies.

Now, when is it worth using one of these rather expensive components? They are helpful in the first stage of a camera head amplifier, and in the first stages of other low level amplifiers. It is advisable to use high-stabs for both anode and screen loads in these cases, but cathode loads can be normal carbon types since the cathode is a low impedance circuit.

The subject of noise is a most important one and here is a list of references for those who want to read more about it. The articles by 'Cathode Ray' in Wireless World are particularly helpful.

Noise - Cathode Ray, WW, May & June, 1952.

'Heads Tails and Noise' & 'More about noise'

Cathode Ray, W.W. May & June, 1956.

BBC Engineering Vol 2, (Video Amplifiers)

last two chapters.

Vacuum Tube amplifiers M.I.T. The last 3 chapters.

Noise factor. L.A.Moxon, W.W. Dec. 46

& Jan. & May 1947.

T.V. Engineering, Pink, 2nd. Edition, pp. 251-257.

ODDS

EXPERIMENTS are going on using spiralled Yagi arrays, ie the directors and reflectors slowly rotate as you go along the boom; this way you can use many more elements with an increase in gain (and presumably circular polarisation).

Have you tried using saturable magnetic cores for step counters? Each pulse increases the magnetisation of the core until saturation is reached; that next pulse will then come through differently to the rest. Counts of 5 or so have easily been obtained.

Has anyone made a small TV-type slim-Jim mic by mounting one of those surplus deaf-aid mics plus a transistor pre-amp in a length of tube? Got pse? Is your concrete studio floor dusty? Can't afford a proper cement paint? Try a slution of waterglass (NaSiO_3) (egg-preservative), about 50:50 with water. Quick formula: quarter-wave whip aerial length is $2796/f$ inches.

Do you like those suitcase type cases some members are using for their equipment? Messrs Philpotts cabinets offer to make you some 24" x 15" x 8" or so for around £5 depending on quantity and finish. Did you see that simple idea for an "Hours-run" meter? Just a tube of copper sulphate with two leads wired across the HT line. Colour of solution slowly goes, and can be calibrated in hours.

COLOUR

television

AN AFTERTHOUGHT ABOUT COLOUR CAPTION SCANNERS
(see last issue) Jack Terry, G5MFT/T

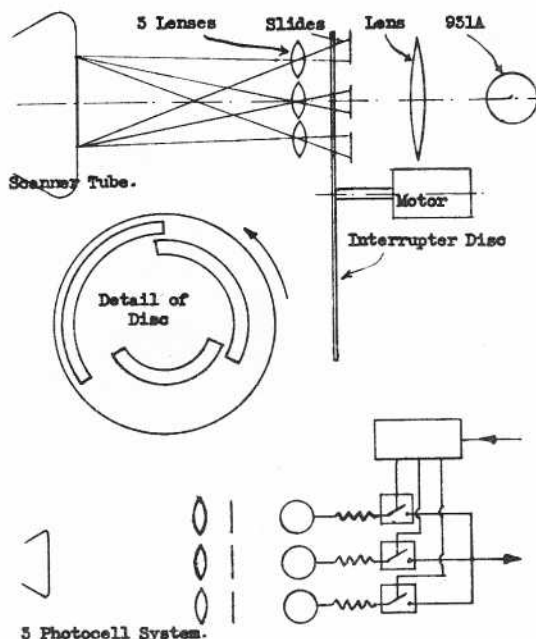
Instead of having 5 rasters on the scanning tube and the consequent reduction of picture quality due to the small raster area on the phosphor per colour primary, a single raster of normal line and field frequencies may be used. The picture or caption slide would consist as before, of 5 pictures one above the other, each frame representing one primary colour in monochrome. 5 lenses, identical in every respect, would be placed between the scanning tube face and the slide so as to scan each slide. Providing the distance between the scanning tube and the lenses is considerably more than the distance between the lenses and the photocell troubles due to distortion of the raster due to parallax should not arise. If only one photocell is available a light interrupter disc can be used to select the light from the correct primary at the right time, the photocell will then receive the three 'colour' signals which may then be amplified and sent to a monitor.

This system enables normal telestills to be used as well as simply prepared captions, the only requirement being that the original picture be photographed three times with a red, blue and green filter in front of the camera in turn. By using the three negatives the picture can be made negative in the colour sense. A panchromatic film is essential when taking the original photograph.

If three photocells are available the mechanical side would be much simpler as the disc would not be necessary, each photocell would be arranged to take the light from its own primary slide, the three outputs would then be amplified and switched in turn at field speed to produce the colour picture, on the other hand this would form a basis for a NTSC colour signal. The switch for selecting each primary in turn could be of the type described in CQ-TV 21, and consists of a gating circuit switched by a ring counter.

With either of these systems no trouble should be encountered with alignment however bad the linearity of the scanning raster. The whole problem of PSS in colour lies in the fact that there are NO photocells of sufficient sensitivity on sale at an 'amateur' price in this country. The 931A is useable between Ultra Violet and Cyan, a blueish green. Red sensitivity is out of the question.

"A Simple Three Channel CRO Beam Switch" Electronic Eng March 58 and "A 3-phase 5 valve multivibrator" same Feb 58 will be of great interest to the colour crew; these ring circuits can be used up to 5 phase normally, or up to 15 phase if more than one tube is used to hold the others off.



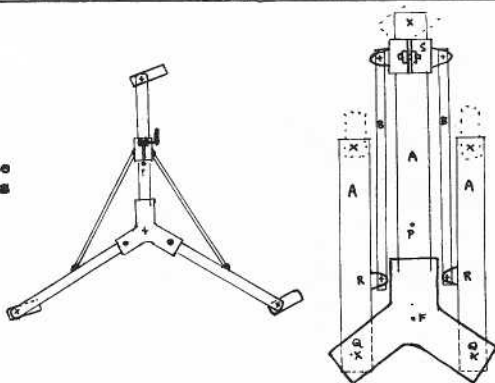
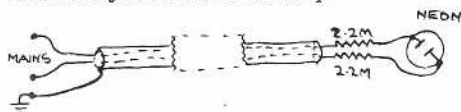
Ivan Howard has done some more work on the colour convertor and hopes to have the circuit in its final state for CQ-TV by the next edition. The Image Orthicon colour camera is under construction but progress is rather slow due to pressure of other work. Ivan is fully equipped for reception of TV in his car and hopes to be /T/M before long. A colour slide scanner is in hand and when the camera as well as the scanner is complete Ivan will have a fine source of colour pictures. For a test pattern Ivan uses a rainbow generator, although the rainbow was more accidental than planned! Recently a Russian signal was picked up at Stotfold and some rapid mods to the Rx enabled a good picture to be resolved. (Roy Martyr saw some BBC pictures in Poland)

IDEAS

Ever want to DC couple two points with a high potential between them? The problem is to lose the DC without attenuating any very low frequency changes. Consider Fig 1, a simple potentiometer chain. Suppose we have a 2 volt variation superimposed on a 2kV line and we want to feed a tube grid with the 2 volts. Allowing some bias of say 10 volts, we have to drop 1990 volts across R_1 , so that R_1 will be 200 times as large as R_2 ; thus the wanted 2 volt variation will also be potted down to $2/200 = .01$ volt. This is not very satisfactory, but the situation will obviously be improved if we make R_1 much smaller than R_2 instead of vice versa. One way of doing this is shown in Fig 2. Here R_1 is replaced by a string of neons in series. Each neon has a resistor across it to ensure proper striking. The total DC resistance of the neons in series will only be a few hundred ohms, so with R_2 at several thousand, the AC signal will not be greatly attenuated. However the expense and bulk of the neons is not a good thing.

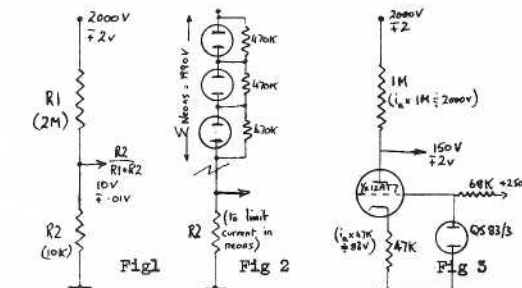
Fig 3 shows a better way, using one neon and half a triode. By giving the triode a very high cathode resistor, the current through it is determined almost entirely by its grid potential - held constant by the neon. Thus changes in anode volts do not affect the anode current, i.e. the tube ("R2") looks like an infinite resistance. Thus R_1 can still be of the order of megohms required to drop the DC volts, but the AC component appears at the anode of the triode virtually unattenuated.

This little gadget for detecting R.F. comes from Peter Burrage. Using a fairly long piece of twin screened LOSSY cable, earth the outer and connect the two inner to a small 'button' type neon via two high value resistors, about 2.2Meg, such that the neon just glows. Hold the cable about a quarter wavelength from the neon at the frequency being used. Holding the neon in a weak RF field will cause the neon to glow brightly. In testing the device, a small G.D.O. on 430 mcs worked very well. To decrease the sensitivity hold nearer the lamp.



The problem of making a camera dolly frequently arises. To be successful it must be rigid and strong, and in this case it usually is bulky and heavy. The drawings show a simple collapsible dolly that can be made from Gascoigne fittings or standard conduits as required. 4" diam castors are suggested; approximately at their points of suspension small clamps are fitted to take the ends of the standard tripod legs. It would be possible to attach a vertical tube at F and mount the camera on this, but the tripod method is much more stable.

Tubes A are 1 1/2" o.d and 23" between mounting centres. Tubes B are 3/4" o.d and 14" long; collar S can be slid along the centre member and can be clamped up tight when it reaches the pin P. The main casting could be replaced by wood or a metal sheet construction; FQ is 2 1/2", FP 8" and QR 6". The centre member is fixed to the main casting, but the outer legs can pivot freely. The dimensions can of course be scaled down for lighter and smaller cameras and tripods, but this size will do very well for the bigger ATV cameras weighing 100lbs or so. Tracking is quite easy, although not as nice as it would be if all wheels steered together of course.



References: "Some Applications of Scanning Techniques" IRE Convention Record 1955 F138-140; "Flying Spot Ultra-Violet TV" Nature June 1956; "A Flying Spot Microscope" JIEE April 1952; "Improved Control Circuit for Regulated Power Supplies" QST Nov 1957; "About Power Supplies" GE Ham News Jan, Feb 1954; "More About Power Supplies" GE Ham News March/April 1954; "The Effect of Capacitance on Power Supply Filter Bounce" QST Sep 1957; "Choke or Capacitor Input?" WW Dec 1957. All these are useful if designing FSUs for TV.

Hobbies and Careers Exhibition, Ross-on-Wye,
April 17-19, 1958.

At this exhibition Grant Dixon organised a stand covering half a room with a display of BATC literature and photos and a demonstration of his own gear. The monitor was in an adjacent room and colour pictures were transmitted over closed circuit. An interesting feature was the use of a tape recorder to give a 10 minute talk on BATC activities in general and the colour exhibit in particular. The reaction of the general public was such that in future shows the duration of the recorded talk will be cut to a bare minimum, say 30 secs to 1 minute, which is the sort of time that the average visitor spent as they passed through the show. Another point which was noticed was that the camera ran rather hot and had to be given a 15 minute cooling off period every 30 or 40 minutes. The camera also proved a bit difficult as to subject in the rather elementary 'studio corner' and demonstrations were confined to well tried colour test cards, including 'Surf', 'Tide', and other colourful packets!

There were few technically interested visitors with the noteworthy exception of two Wolverhampton members, Malcolm Sparrow and Paul Wright, who were most welcome.

C.G.D.

NEWS FLASHES

Birmingham and Midlands have sent 5mc/s definition pictures from their Roving Eye.....

Derek Whitehead has made what is probably the first GW/T contact over 18 miles.....



When Derek Whitehead GWSFDZ/T visited Montreal recently, he paid a visit to Bill Still's place. Here he is (r) with (l-r) Pierre Lebarre, Ziggy Karas, and Bill Still himself. That rack contains a modified Telechrome FSS unit.

LETTER TO THE EDITOR

Dear Sir,

I must protest at the statement in No 35 that the TV Telephone at the RHE was one way only..... Seriously though, I think that some more details would be of interest to those who did not manage to see how this crowd stopper was run.

We had a tall booth, reminiscent of a GPO telephone kiosk, with its open side facing the crowd. In the rear was a 14" monitor with the picture at eye level and on a small shelf a standard GPO phone. Peter Allot built the unisector unit and arranged it to put the picture from Ivan Howard's camera on the screen when TEL was dialled. The BATC operator looked straight into the camera and spoke through the normal handset. The impression gained by the visitor who could see and talk to the operator was that in fact the system was two way. By arranging the position of the operator it was possible to see people going into the booth, this gave the operator a chance to avoid making any misplaced comments about the visitor!

Doing the job this way only ties up one monitor and camera instead of two. With additional cabling and a PSS 'Wrong Number' captions etc could be incorporated.

Another point worthy of mention was the white coats that were worn by BATCs on the stand. This gave a very smart appearance and is a point well worth noting at future shows.

M.B.

EXCHANGE

Mint 56 Range Avo for Mint Weston Exposure Meter or similar. C.H.Banthorpe, Rushden, Lowswood Close, Northwood, Middx.

LOST

A Photograph taken in 1950/51 of a Baird Mirror Drum transmitter and 50 line transmitter. Also on the photo are three people. This picture is urgently wanted and if the whereabouts of it can be traced please contact John Tanner.

THE NEXT EDITION will be a little late coming out in order to put a report on the convention in. Items of interest in the next edition include more circuits for the Vidicon/Staticon and an article giving full details of a Corner Reflector aerial for 70cms as well as all the usual items. Also it is hoped to have the circuits of a NTSC to field sequential colour converter.....

REMEMBER that it often helps to avoid confusion if you put a covering note in with tape recordings. State name, address and speed.

A VIDICON SCAN UNIT

CQ-TV

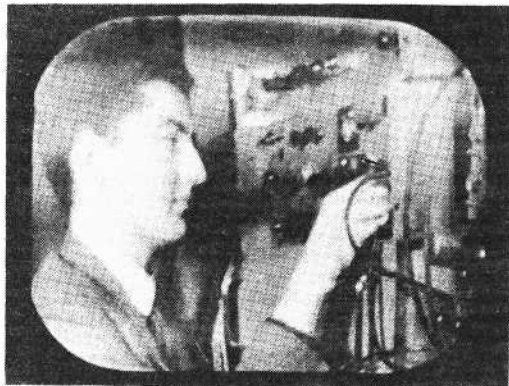
By John Tanner

In the last edition two video amplifiers were described for the Vidicon/Staticon type tube. This article describes the timebases. The circuits described here have been built and do work. The linearity is good on both line and field and there is more than enough scanning power. It is suggested that these circuits would provide a good basis to build a working camera and then, at a later date they could be improved and refinements added. The unit requires line and field drives although there is no apparent reason why mixed syncs should not be used. The line timebase is driven, ie, it requires the line sync pulses to be present to produce scans. The field is an ECL80 used in a blocking oscillator circuit that was taken from 'Unit constructed TV receivers' by Bradley. This is an extremely good circuit for the job as it requires the minimum of operational attention. The field blanking for the Vidicon is taken from the anode of the field output valve and although this system works it is not the best by any means. It serves as a simple dodge until the rest of the equipment is running. Line blanking is taken direct from the scanning coils, this means that if the line scans are reversed the line blanking will change to line brightup and DC levels will wander. The whole problem of blanking is due for further thought but the systems shown here will work. The scans can be fed up the camera cable and over 50 yards have been used with very little trouble. The line output transformer is rather a problem but a standard transformer without EHT windings has been used successfully. If available the Mullard Ferroxcube pot cores form an excellent basis for a home made transformer. Again with the field, a standard item has been used.

The timebases may be built in the camera unit but great care is necessary to prevent the line scans breaking into the video amplifier, in any case it is difficult to prevent a small trace of line scan appearing at the extreme left of the picture. No special precautions are necessary in the construction although it is preferable to run the timebases from a separate HT line from the video amplifier, if this is not possible then the two lines should be well isolated from each other. It is advisable to check that scans are present before running the vidicon and one system for this is to put an MW6-2 projection tube through the coils and observe the scans on the face; an MW6-2 will give a brilliant picture for direct viewing on a very low EHT. Four or five kV is ample (can be taken from the domestic receiver for this job). The brilliant picture obtainable from these tubes would suggest their use as viewfinder tubes but care would be necessary to prevent the focussing field from upsetting the Vidicon. For either of these uses an old low emission tube would serve well for direct viewing, and with about 6 kV the definition obtainable is perfectly good for the viewfinder. The use of tubes like the 3BP1 is not recommended as the

intensity of light is very poor and for use at shows or in a bright light the picture is very difficult to see, also the definition is not good enough to set the focus, especially as quite often the picture will be viewed on a 17 or 21" monitor, at the Radio Hobbies Exhibition last year E.M.I. showed our pictures on a 24" direct view set! If the camera is the same size as the original one that this article describes then it is not practicable to have a viewfinder, the camera is 5"x8"x4" and the lens an f 5.5, 2cm. A larger aperture would help for low light level work but lenses are expensive!

These circuits have been tested on HT volts from 200 to 250 and no trouble was encountered at either extreme, as the circuits work with 200 volts it would be desirable to keep the voltage down to extend the life of the components.



PHOTOGRAPH taken from the screen of a 12" monitor showing the picture produced by the camera described here. Optical focus was slightly out, focus is best on extreme right. Lighting on subject: 100 watt lamp in silvered reflector at 6 feet and 60 watt fill in light. (Table lamp) System: 200 line, 50 field sequential scanning.

OUR FRONT COVER

Bill Still VE2AZT of Montreal with his self-contained vidicon camera. The viewfinder is a 5FP4, and the vidicon yoke can be seen underneath the tube base. The sync generator and power supply are built into the SOR522 case below. The unit just plugs into the mains, and gives out a modulated RF signal or plain video. The camera case carries the lens turret assembly. PhotoMB.

WHAT THE OTHER CHAP IS DOING

News from the West.

'Pluff' Plowman has moved into his new QTH in Yeovil and that means that he is now well placed for VHF, being on a local high spot commanding a clear RF view for almost 360°. Activity will commence as soon as the household chores are settled. In the interim, A. Stacey, (in order to short cut the disastrous effects of the fire at the HQ of Yeovil and district group) is modifying a Murphy pattern generator to use in conjunction with 5AST's bootstrap modulator and 70 cm rig. The first tests will be a fixed pattern or scanner by a joint effort between Stacey and Plowman at 5AST's QTH, towards G4OZ, Doug, at Sherborne a few miles away. The 5527 has not, as yet, been utilised but Pluff has attended to the optical side by the purchase of a 55mm wide angle lens, and also a 90mm telephoto. The first radiation will use a 20 element array consisting of four 5 element Yagis on 70 cm, but the plan is the construction of a stack of four 60° corner antennas. 5AST is constructing a 12 element stack with mesh reflector for two and hopes to reach the London crew and most of his old cronies in the home counties by the end of the year.

From Dover comes news of Graham Hill who is busy constructing the basic gear for his station, he has completed the sync generator and now is waiting for exams to be over before continuing with power supplies and a FSS. Graham plans to visit the Chelmsford group later on in the year.

Mike Sendecky, Toronto, has a fair amount of testgear and has recently completed a scope. Being still at school finance is a problem but Mike has hopes. He is anxious to meet other Toronto people interested in building amateur TV gear.

Len Harper, who is in the tobacco industry, has been boning up on the fundamentals with the aid of some of the BATC tapes. Chester Beachell is finishing off his HiFi recording gear, John Lowe is looking for space before getting down to construction. Bob Rylands just bought a new car, and Ed Harper is counting his shekels with an anxious eye on a vidicon camera. Mike Barlow has been playing with a new counter chain for the BATCSG, but as explained elsewhere the genlock provided courtesy of the CBO has reduced the need for this. A very poor CRO borrowed from work is proving unsatisfactory, and MB is cursing that he was unable to bring the BATC CRO with him from the UK. Probable outlet will be to buy a Heathkit scope and incorporate Bill Still's mods for giving it a wide bandwidth. The transmitter has been fired up into a dummy load, but Mike wants to build a 16 ele stack before putting up an outside array so as to compare G and VE results more accurately.

Brian Partridge, Chelmsford, has built an improved effects mixer and now is busy rebuilding the Image Orthicon camera to make it an improved version both electrically and mechanically, Peter Allott is helping with the mechanical side. Congratulations to Peter Allott, Peter Burrage, Brian Partridge and Jeremy Royle on their engagements. Peter Allott will be going to New Zealand sometime near Christmas.

The Cambridge group have put on a show since the last edition and so has Grant Dixon, reports appear elsewhere. The SW Essex group have been thinking about the forthcoming Dagenham Town Show and Jim Brett has been working hard with GSKOK's help to get his sync generator finished in time. Martin Lilley has an Image Orthicon and is busy planning a camera to build round it. Martin has a fine lens turret but no lenses! (in bright light the I.Orthicon can be run with a pinhole!)

No news from the S. London group since before last Christmas although the news has been passed on that the 5527 has been giving pictures. Mike Cox has now completed his 5527 camera and is getting some FB pictures, Mike might have some colour telecine at the convention if time permits.

Bill Stapleton, Dublin, has been running a radio and TV servicing course and now has the beginnings of an active group there.

Montreal has been enlivened by a visit from Derek Whitehead GWSFDZ/T who took 15 days leave from the RAF and dropped in! He couldn't stay long but brought some useful ideas on vidicon cameras - he managed to buy a yoke from Marconis, too. John Plowman 5AST was only a few miles over the border for several weeks but didn't get up to Montreal. Our next visitors will be Mr and Mrs G2WJ in July. Bill Still has moved his house and shack, but has found time to finish off the vidicon camera, which he demonstrated to a club at Plattsburg. As far as we know this is a first - a Canadian TV demonstration to the Americans! Len Harper now has a most imposing array of Heathkits (very useful and relatively cheap here), and John Lowe has been making video amplifiers. Mike Barlow has gone all closed circuit-ish (who mentioned Morse Test?) and has now produced a Mark IV V-S-B mixer using 5 tubes, and a mark II test pattern generator. The Sync Generator has been modified for triggered operation from the counter, but the latter is not yet working.

In Hamilton, Nigel Nathan has finished off his scope, and a trolley for same, has a regulated power unit going, and is trying a transistorised EHT unit for the 951A in the FSS. He would also like information on transistor counters as he wants to build all the SG into the camera housing (5" image Orth). Mike Sendecky (Toronto) has a scope and Sig Generator built. Wilson Allen K9YTO (Shelbyville, Ind) is building a Bill Still scanner, and complains of the use of pfd for mmfd and stations for vidicons!

BATCs sending tapes round the world are reminded that it is necessary to fill in a customs declaration form to avoid having to pay duty. 'Personal tape recording' should be sufficient to avoid any difficulties. Inland tapes in the U.K.; the cost of a small message tape is 4s-4d, and there is far more room for messages than on 4½d worth of letter!

