cq-tv 53

THE JOURNAL OF THE

BRITISH

AMATEUR TELEVISION CLUB.

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CQ-TV, Journal of the British Amateur Television Club.
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EXPLANATION OF THE DISAPPEARANCE OF THE PREVIOUS HON. SECRETARY.

Astute readers will have noticed that not only have we recently acquired a new Editor and a new Treasurer, but also a new Hon. Sec.

As I had held the post of Hon. Sec. for about six years from 1957 to 1963, I feel a word or two of explanation might be in order.

It is fairly simple really - I was offered a post with the TV Station here in Freetown, Sierra Leone (the country is in West Africa, for those of you whose geography is shaky - it became independent in 1961, and is in the Commonwealth). It took some while to sort out a number of details before I could be quite certain that I would be coming out, and for that reason, I could only give advance warning to members of the committee.

However, plans were well laid, and John Tanner has very ably taken over the secretarial work. Overseas members can rest assured that there haven't been any disagreements, and that B.A.T.C. policy remains exactly the same - to promote the cause of amateur television throughout the world.

I don't know of very much amateur TV activity in Africa at present; I am the only B.A.T.C. member in Sierra Leone, though there are about 10 licensed radio amateurs in the country. We have a few members in Nigeria, Ghana, Southern Rhodesia and South Africa, but probably not more than about 15 of us in the whole of the Continent! However, there are about a dozen countries in Africa with professional TV services, and so there is a chance of growth of B.A.T.C. membership.

If all members in Africa would write to me with their news (send to Don Reid, Sierra Leone Television, Private Mail Bag, Freetown, Sierra Leone.) I would be most happy to send in some notes for a future edition of CQ-TV.

I will close by sending 73 to all friends in the UK, and look forward to meeting you again in due course.

Don Reid

CONVENTION 1964

Place: I.T.A. Conference Suite
Knightsbridge.
(Near Knightsbridge tube station)

Time: 10 am to 6 pm

Date: Saturday 12th September 1964.

Programme: Informal gathering in the morning and display of equipment.
2 pm AGM followed by lectures as described in the recent newsletter.

More details if required from the Hon Sec.

CQ-TV's 41 - 50 are now available on 35mm microfilm, the film costs 10/-.
All enquiries should be made direct to Grant Dixon, Kyrle's Cross, Peterstow, Ross-on-Wye, Herefordshire.

BADGES.

Club badges measuring 4" x 2" suitable for fixing to equipment etc., can be made available if sufficient members are interested. The badges are on adhesive backed 0.020" Alum. Sheet. Anyone interested please write to the club.

Front cover picture shows John Lawrence (GW3JGA/T) with his 14" Frame Sequential Colour Monitor during a lecture to the Dept. of Electronic Engineering. Bangor. Details of this equipment together with a colour bar generator are to be given in a future edition of CQ-TV.

THE PLUMBICON.

By C.G. Dixon.

The following notes are based on an article in the French magazine "Télévision" of December 1963.

The Plumbicon is a new type of photoconductive camera tube which offers greater sensitivity and better resolution than the standard Vidicon tube. It appears that the physical size of the tube is different from that of the standard Vidicon and special scan coils must be used, although an electrostatic version of the tube has been produced.

The main difference lies in the structure of the photosensitive layer, which, in the normal Vidicon, consists o f a thin film of either selenium or antimony trisulphide. The Plumbicon has a triple layer which in effect constitutes an n-i-p junction. The layer nearest the antimony dioxide signal plate is a thin layer of n-type semiconductor and this is followed by a much thicker layer of intrinsic (very pure) lead oxide which has a very high resistivity. On top of this is some doped lead oxide which makes a final very thin layer of p-type material. Apparently about 10% of copper oxide is added to the base material and the presence of this determines the spectral responce.

The tube has a maximum responge at about 5000Å (green blue) and this falls off to zero at about 6400Å (red), but can be extendedto 7500Å in the infrared region if required. The normal Vidicon has a maximum at about 4500Å (violet) which falls off more gradually to about 7000Å (red). The human eye has its peak of response at about 5500Å (yellow green) and it would appear as if the Plumbicon approaches the spectral responge of the eye rather more nearly than the Vidicon. Continued col 2.

The photoconductive layer is about 10 to 20 microns thick and the individual crystals vary in size from about 0.1 to 1.0microns. As the target diameter is 2cm, with a 625 line picture the line-to-line spacing is of the order 20 microns. Clearly, the grain size is not going to be the limiting factor for resolution. One of the limiting factors is the thickness of the photoconductive layer in which diffusion occurs. As the tube sensitivity increases with the thickness a compromise has to be made between the claims of sensitivity and resolution.

For light from a tungsten lamp at 2780°K, a sensitivity of 300μA/Lumen with a photocurrent of 1μA is quoted. The tube has a gamma of 0.8 to 1.0. A Plumbicon will give 0.35μA of photocurrent for a faceplate illumination of 0.7 foot-candles. For comparison, an RCA 6326 Vidicon requires 20 foot-candles for a similar photocurrent; and a figure of 1 foot-candle for a current of 0.2μA is claimed for a Pye 936. The most interesting feature of the tubes performance is the very low dark current, 0.005μA. This enables the tube to give a good black level, which is very important for colour TV.

HT SUPPLY FOR TRANSISTORISED CAMERAS.

By C.G. Dixon.

As the interest in transistorised equipment is growing there will arise a demand for a fully portable Vidicon camera which will work off batteries.* Such a camera would be useful for Field Days where mains are not available. The chief reason for using a mains transformer with a Vidicon camera are; 1) to supply the positive and negative HT rails.

Continued on back cover

USEFUL HINT. by G2AFD.

The Impedance of unknown co-axial cable can easily be found using a grid-dip oscillator and a capacity bridge.

From basic equations and some Algebra which we will skip it can be shown that

$$Z_o = \frac{1}{FC}$$

where Z_o = Characteristic impedance in ohms
F = Frequency in cycles/second at which the cable is one wavelength long.
C = Capacitance between inner and outer in Farads.

For ohms, Mc/s and pF this becomes:

$$Z_o = \frac{10^6}{FC}$$

If we take a piece of cable a few feet long open circuited at both ends, and hold the inner of one end about $\frac{1}{4}$in from the live coil terminal of a G.D.O. resonance can be detected at frequencies at which the cable is electrically $\frac{1}{2}$, 1, $1\frac{1}{2}$ etc wavelengths long. It merely remains to measure the inner to outer capacitance of this length of cable on a capacity bridge. Then substituting the value of C and the frequency of full wave resonance in the equation; Z_o can be calculated.

TRANSISTORISED VIDICON CAMERA.

By Deryck Aldridge.

This article describes largely by the use of self expanatory diagrams the writers efforts to produce a transistorised Vidicon camera. Results so far with the writers experimental camera have been very promising and well worth the effort. The great advantage is of course in the saving of weight, size and power consumption. The whole unit runs from a 10v Nickel Iron (NIFE) battery, and consumes less than one amp, most of which goes to feed the tube heater. HT for the Vidicon tube could be obtained by means of a DC converter, but the writer chose the simpler and perfectly satisfactory method of using 90v HT batteries (B126). These should last for years at the low current drawn.*

SCAN AND FOCUS COILS

These were wound as described in CQ-TV 33 except for the focus coil, which uses 6 pies of 400 turns each of 30 swg enamelled copper wire. The focus current is 100mA. and this is controlled by a 30 ohm pot. from the 10v DC supply. A meter is used to check the current drawn but the only variation noticed so far has been due to falling battery voltage on discharge.

Line and field scan coils were used unmodified, but an increase of about 50% in the number of turns on the line scan coils may be found beneficial.

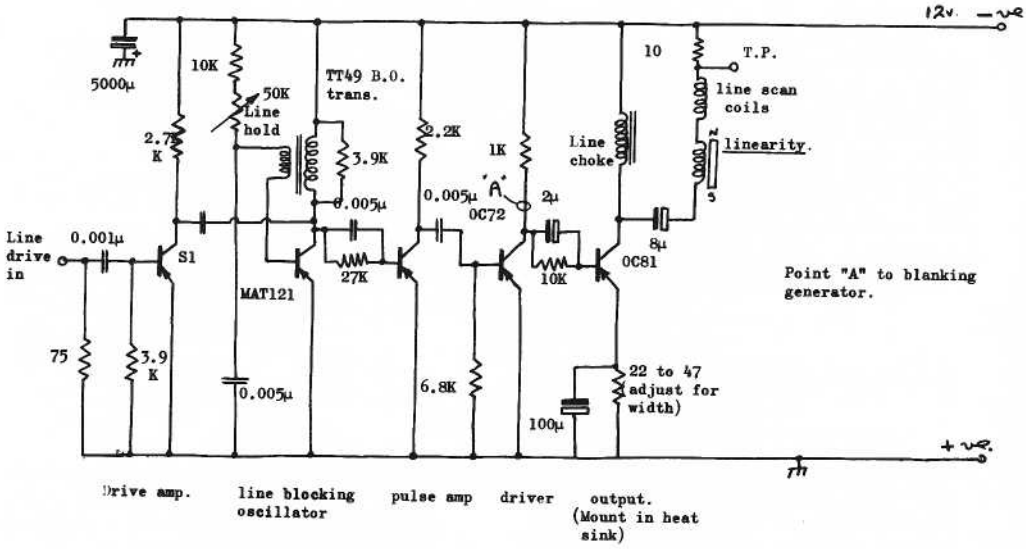


FIG. 1. LINE SCAN GENERATOR.

LINE SCAN STAGE.

The circuit of the line scan stage is shown in Fig. 1.

Blocking oscillators are used both in this and the field scan generator as they were found to be simple and reliable in action. The blocking oscillator transformer is an interstage type of 4.5 : 1 ratio. (Repanco type TT49)

The transistor type MAT121 was used as it was available, this applies to most of the transistors employed in these circuits and it should be quite possible to use other types with equal success.

For line scan use the output transistor must be made to draw current during the scanning stroke and to be cut off during flyback. A pulse, the width of flyback time, from the blocking oscillator causes the output stage to be cut off during flyback, hence one condition of the scanning process is met. During the forward stroke of the scan the output transistor is turned on thus causing current to flow in the scan coils which, being largely inductive cause a sawtooth of current to flow in them.

The line choke is the full primary winding of a valve type line output transformer. Several have been tried and all have been found to work. The EHT overwind is discarded. The linearity control is important and again a valve type was used. This is the type which employs a small bar magnet affecting the saturation of an associated coil. Correct polarity should be observed in connecting. The linearity of the scan can be checked with a scope across the 10 ohm resistor. Very good linearity is produced by the writers circuit. Scan amplitude in the line scan circuit is sufficient hence the reason why an increase in the number of turns on the line scan coils has been suggested. The emitter resistor can be reduced to increase scan amplitude but beware of over driving the output transistor.

FIELD SCAN STAGE.

The circuit of the field scan stage is shown in Fig. 2.

A blocking oscillator is used as before. It is possible to generate a sawtooth across an emitter load in a blocking oscillator, but the circuit shown was found to give a much more reliable result and to give a larger output. The sawtooth output from the integrating circuit is then amplified and fed to the output stage where it causes a sawtooth of current to flow inthe largely resistive field scan coils. The double OC81 output stage is used to avoid the need for an output choke. It works well and gives very adequate scan amplitude - so much so that it may be

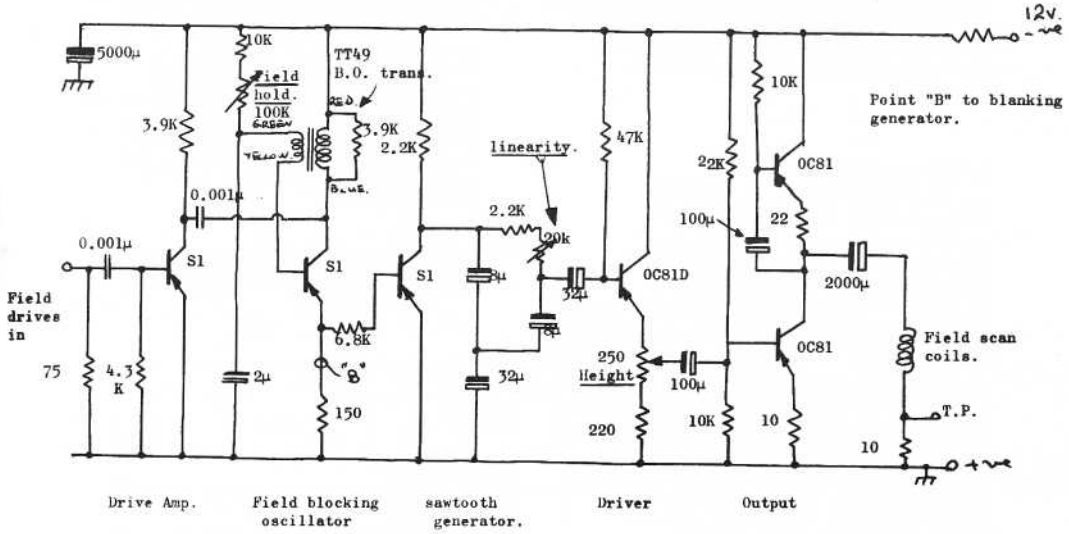


FIG. 2. FIELD SCAN GENERATOR.

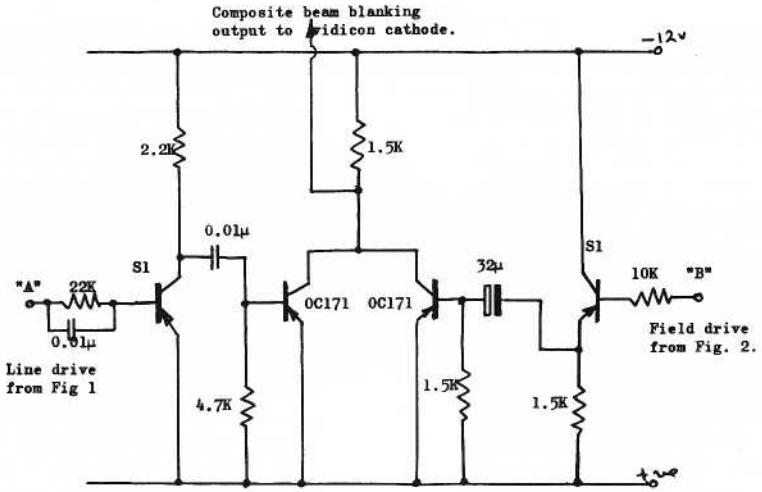


FIG. 3. COMPOSITE BLANKING GENERATOR - TO FEED VIDICON CATHODE.

possible to use a resistive load in place of the upper OC81. This has not been tried however.

A series feed resistor in the HT to to the whole field scan generator is used to decouple the generator from line scan pulses.

BLANKING GENERATOR.

As shown in Fig. 3. This unit feeds 10v pulses of mixed blanking to the Vidicon tube cathode. Due to the method of signal generation in the Vidicon this is sufficient to blank the tube, but if grid 1 blanking is used 30v negative going pulses would be required. Therefore with a 10-12v supply cathode blanking is the obvious choice.

VIDEO AMPLIFIER.

The video amplifier, the circuit of which is shown in Fig. 4., is quite straightforward using using emitter compensation. No difficulty was experienced in getting the unit to work, it should however, be built into a screened box using the shortest possible lead to the Vidicon target connector. The target load resistor used was initially 47K and later 220K without much apparent difference.

The ZT22 output stage was devised to use this transistor as it was available. An ordinary emitter follower stage with a PNP transistor should do just as well.

Bandwidth is about 2½Mc/s (as seen on the monitor).

One last general note, diode damping across the blocking oscillator transformers and line output choke is theoretically desirable and may be used if preferred. The circuit, however, works as drawn but may be subject to long term deterioration of transistors in these critical places.

*See article on HT supply for transistorised camera in this edition of CQ-TV. Ed.

FOR SALE. G.E.C. 1693K Monoscope tube, producing Test Card "C".
E.M.I. 10667 linch vidicon tube in very good condition.
For details of the above two items please drop a line to the club.

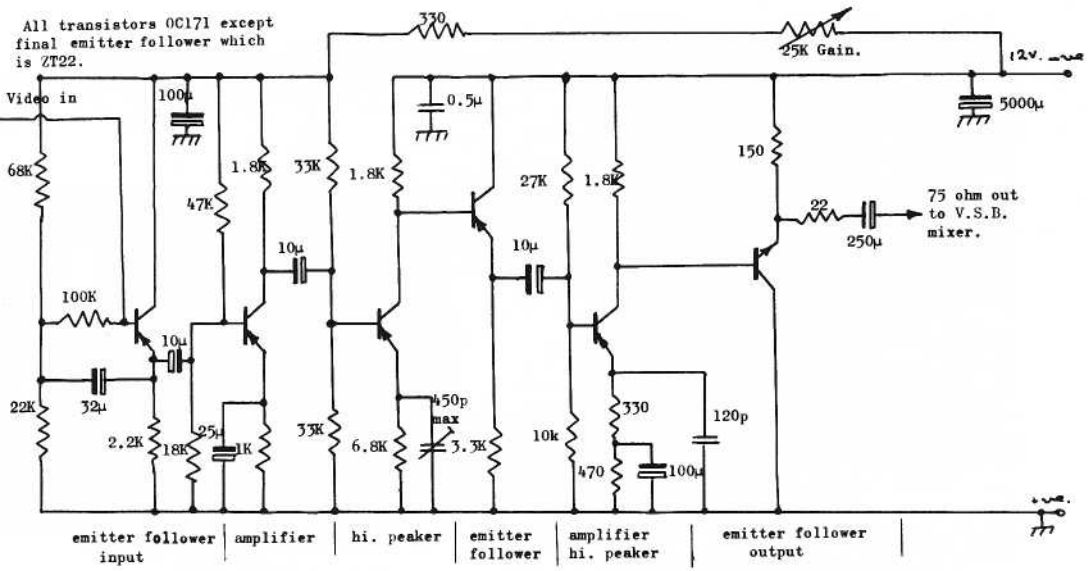


FIG. 4. VIDEO AMPLIFIER.

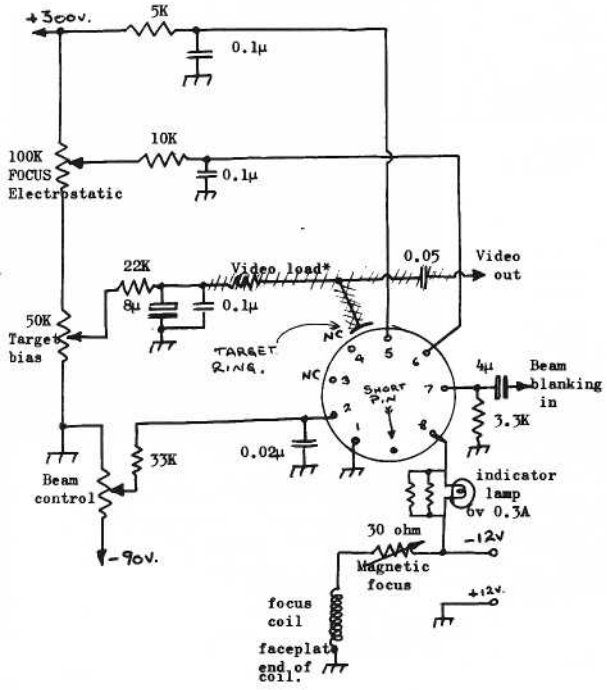


FIG. 5. CONNECTIONS TO VIDICON TUBE AND FOCUS COIL.

* Video load: from 56K to 560K.

All wiring marked //////// together with video load and 0.05µ capacitor are situated inside the video amp screening box.

Lead marked XXXXX is a very short lead between video amp and target connector.

BLACK & WHITE GENERATOR.

By Mike Cox.

The uses of such a generator are described in CQ-TV 51 (Television Test Waveforms & their Applications), but a brief explanation of the facilities may not be out of place. It was originally built to provide an output consisting of a peak white signal with syncronising to modulate a R.F. signal to feed a television receiver for use as a flying-spot scanner. The output was to be 1volt into 75 ohms.

The original circuit comprised S6, the output stage, and the two clippers S4 and S5, with preset controls to set the picture and sync levels in the output signal. Blanking and sync signals are fed in at standard level, and the input impedance is high compared with 75 ohms.

By connecting a transistor S3 in parallel with S4, it is possible to make it bottom and thus short circuit the blanking fed to the output stage, leaving only the sync pulses in the output. The control for this may be arranged by means of a heavy forward bias for the base of S3, and by switching this bias on and off the output may be either black or white; this control may, if need be, exercised at some remote point.

If we connect a low frequency square wave generator to the base of S3, then the output will be switched between black and white at the frequency of the square wave generator. This type of test signal is a very powerful test of the low-frequency response of television equipment, and the D.C. response of clamps, D.C. restorers and keyed agc systems. It can also show up any sync or picture crushing. The L.F. response of television equipment is usually specified in terms of the percentage tilt on a 50 c/s square wave, and the generator is ideally suited to provide the signal for assessing this too.

A low frequency "bump" or square wave signal with a period of 0.5 to 1 second is used for D.C. measurements and testing sync separators.

Transistors S1 and S2 are conected as the now familiar White multivibrator (see CQ-TV 48, "A Transistorised Pulse and waveform Generator") arranged to operate at about 1 c/s and 50 c/s in positions 3 and 4 of SW1. In position 4, the field drive is fed to the base of S2 via a small capacitor so as to lock the square wave accurately to the system field rate. Locking is controlled by the control marked "frequency" in the collector of S2.

The unit has proved very reliable over a few months use; it is built into the same box as the transistor synchronising pulse generator, sawtooth and grating generator and runs from the common 4.5v + 4.5v supply, current drain is about 25-30mA from the positive rail and about 3mA from the negative, but as there can be some large variations in current dr ain, especially when on slow bump or 50 c/s square wave, it is essential to use low impedance power supplies, i.e. a new battery!

The photographs show the actual unit, the output waveform when switched to 50 c/s square wave and the same waveform passed through a piece of equipment with a poor L.F. response.

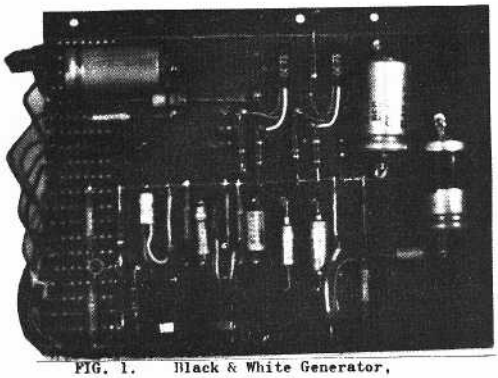


FIG. 1. Black & White Generator, circuit board.

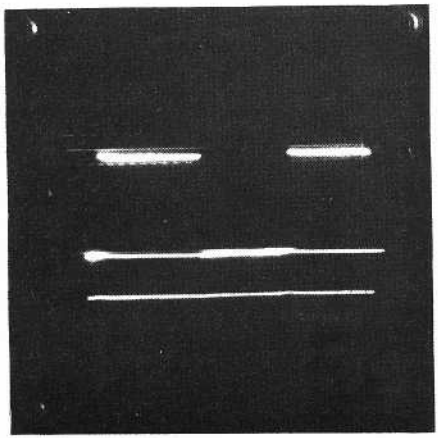


FIG. 2. 50 c/s square wave output.

USEFUL REFERENCE.

"Measurement Techniques for Television Broadcasting" Weaver and Shelly, Journal of the Television Society, Vol. 9 No. 12, October-December 1961.

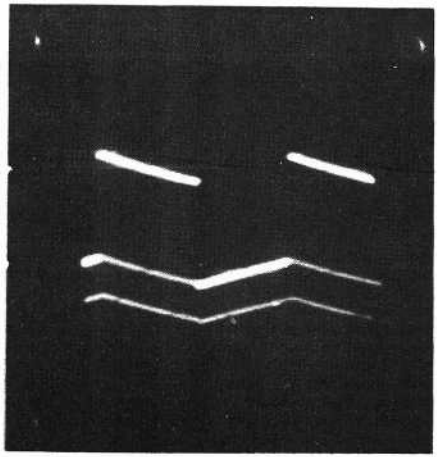
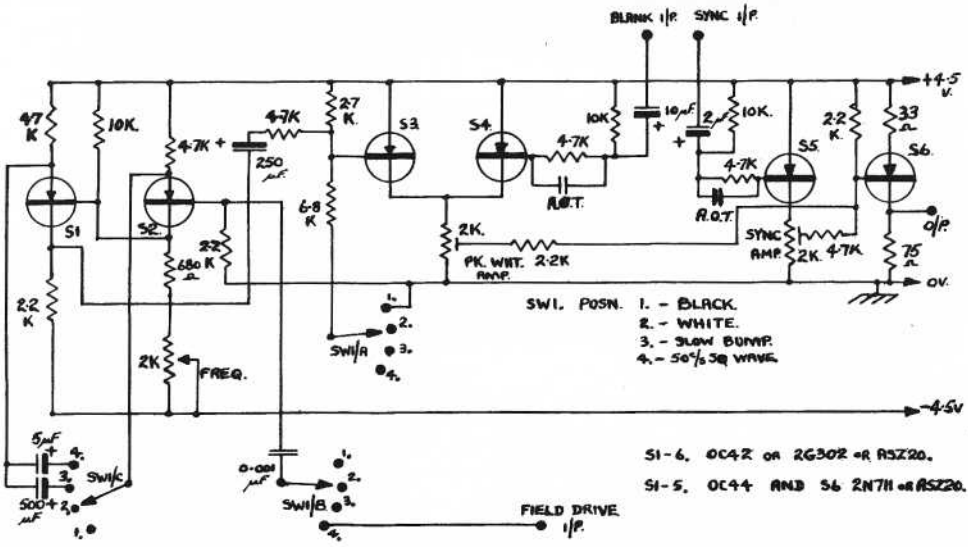


FIG. 3. 50c/s square wave output from equipment with poor L.F. response. i.e. 20% tilt. (normal specification 1 or 2%)



CAN YOU HELP?

Mr. P.L.Hanley, of 46, Heathcote Avenue, Hatfield, Herts., urgently requires circuit diagrams of a transistorised oscilloscope. All replies answered and expenses reimbursed.

oooooOooooo

Mr. M.S.Box, of 9, Connaught Road, Weymouth, requires a copy of J.A. Plowman's booklet SlowScan TV, which is now out of print.

oooooOooooo

In connection with the Club Convention to be held later this year photographs of amateur television equipment or activities are urgently required. All photos should be of a reasonable size or else the negatives should be sent stating whether or not they should be returned.
Colour slides are also most welcome.

WHAT THE OTHER CHAP IS DOING.

By Dave Mann G30UO/T

First we have news from Lancashire where P.T. Lambert of Failsworth reports that he has a F.S.S. working using a 931A and a MW13/35, and has also started work on a transistorised vidicon camera. G3LJO/T's (Poulton-le-Fylde) latest report says that he has nowhad a two way contact (TV) with G3EKP on 70cm. They have regular Skeds on 430.0Mc/s at 9p.m. on Wednesday and 10 p.m. on Saturday or at other times by request. Still in the north D. Boniface of Ripon Yorks. is building a receiver to receive 70cm TV signals and he would like to hear from any locals who can transmit a picture to him. From Lincoln J.J. Rare reports that he is now licenced as G3STO/T and that he is working in conjunction with G30SB also of Lincoln.

Turning now to Worcester, J. Bryne G2AFD Malvern is building a parametric amplifier for 70cm to improve the S/N ratio of the ATV signals from the Birmingham area. In conjunction with G3MTI he will soon be transmitting S.S.T.V. on 2 meters and would like to hear from anyone else who is willing to cooperate over the air on this project. From Wales, R. Ashten reports from Llangedmar Cardigan that he is building a S.F.G. and has a vidicon camera working. He hopes to take out an ATV licence and operate on 70cm. J. Davies GW3KZE of Llandovery Carmathen is building a vidicon camera and F.S.S. using a 3FP7 and he hopes to transmit on 70cm soon, as does D. Coe G3SLV/T who will operate from Bristol University, with an aerial 100 ft above ground. His transmitter uses a DET24 p.a. with a 4X150A to be added later. Tests are planned with G5FT/T at Bristol Technical College and G3RES/T. B. Brookes also of Bristol is completing a 70cm converter and 16 element aerial array.

Dave Jones G3LYF/T Devon, has recently moved house. He now lives at the top of a hill and has a clear R.F. view in all directions. We look forward to hearing you on 70cm one day Dave. Another interesting letter from Devon arrived from M. Jones G5ZT of Plymouth who was one of the first to transmit amateur television on 70cm He says that local interest in ATV is on the increase and he intends to start transmitting television on 70cm again in the near future. Work has started on a vidicon camera and he plans to try some TV tests from a portable site 1850 ft A.S.L., this summer. At the time of going to press the first test transmissions had taken place.

M.C. Jesse of Gosport Hants. would like to hear from any other member in his area. He is going to take the RAE in the near future to obtain a licence for ATV.

From the London area one of our new members G30UF of Ealing is building equipment to receive ATV on 70cm. He is equipped for 2m transmission and hopes to add a 70cm stage to his Tx. Laurance Woolf of Wimbledon sends some details of his station. He transmits on 70cm with a QQV02/6 feeding a 4 over 4 slot which is 300ft A.S.L.. His receiver uses a 2N1742 pre-amp into a modified Phillips tuner. Pictures have been received from G3GDR/T, G30PB/T, and G30UO/T. Items planned are a QQV03-20A p.a. stage and a F.S.S. Most of Laurance's time is spent at Sheffield University and he would like to hear from any other members in the area. Still in London John Tanner G3NDT/T recently gave an over the air lecture on ATV to the Radio Society of Harrow, simultaneous sound and vision was used at the standard 3.5Mc/s spacing. Good results were obtained at the receiving end where an audience of over 50 saw the programme on two 23" inch receivers kindly loaned by a local television dealer. Three cameras were used one of which was used for telecine, the film material was of a past Panorama programme on ATV. Mike Day of Deptford London is now licenced as G3SZL/T and R. Trevith is licenced as G3SSE/T. We hope that we will be hearing you both on 70cm in the near future. Another newly licenced member is A. Trice G3SXX/T of Dover. His equipment consists of a 5FP7 F.S.S. and a CV53 p.a. in the Tx. which feeds a 6 over 6 aerial. Still in the east S.A. Floyd G3KXQ/T has completed a transistorised vidicon camera which he hopes to use for transmitting ATV on 70cm. He has also built a 2N1742 transistor pre-amp.

Now some news from East Anglia. There was a report in these pages some time ago of an ATV relay transmission from Cambridgeshire to Herts. Pictures originating from G3KKD/T at Ely were relayed by G3NOX/T to G2WJ/T and on to G3GDR/T. Recently this link has been opened up again with G3GDR/T also relaying the pictures into and over London, Where amongst others G30PB/T has received them. The total path length being 127 miles to G30PB/T. Improvements continue to be made to this link and tests normaly take place from 6 pm. onwards on Saturdays.

News now from Holland where PAØCOB in the Hague sends some more details of his ATV equipment. His Tx uses a QQV06-40A pa screen grid modulated using an ECC88 amp, EL36 amp, and EL36 cathode follower. He transmits on 625 lines using negative mod. The vision source is a vidicon camera which will resolve 5Mc/s. Regular sound contacts are had on 2m with ON4RT. PAØCOB is also on 23cm and has contacted G3LTF and will no doubt contact G3NOX/T when propogation conditions are suitable. W. Van Marck ON4RT, has a 5527 iconoscope working on 625 lines, although the iconoscope is giving good results he is to build a vidicon camera also. He hopes to transmitt ATV on 70cm when the Belgian Post Office grant a licence.

EI4Q of Dublin reports that he is building the vidicon camera described in CQ-TV 47, and Mike Cox's SPG. He expects to be transmitting on 70cm by the time this appears and will use a QQV03-20A pa feeding an 8 Over 8 aerial.

From France Rene Monteil F8UM has a vidicon camera and a 931A F.S.S. working on 819 lines. The vidicon uses an E88CC, 6AM6 and a 6U8 in the video amp. ECL82 line o/p and ECL82 field o/p.

Picture received by G3PEI/T/A at Stradishall Suffolk from G3NOX/T. Sunday June 9th 1963.

From the Falkland Islands we hear that D. Bridgen VP8GB/T is building the 7 valve camera to be able to test ATV on 70cm. He will be the first television station of any kind in or near the Falkland Islands.

Last but not least, from the USA George Francis W9MSX is building a new vidicon camera using Mike Barlows SPG and processing amp. It should be working as soon as some L.F. instability in the video amp is cured.

Thats all for this edition, please send reports for the next edition , together with replies to readers queries to the Hon Sec or Editor.

G30U0/T

Continued from page 2

2) to provide a 50 cycle lock. Now that Mike Cox's excellent pulse generator described in CQ-TV 48 takes care of the latter point by the use of a stable crystal oscillator, the circuit below will provide the necessary HT.

The circuit, which is reproduced by courtesy of MULLARDS LTD, Educational Department, is basically an oscillator using two power transistor which are very much under-run and hence need no heat sinks. The transformer is a Ferroxcube [illegible] core from a line output transformer wound to the following specification:-

Base	windings	2	turns	each	24 swg.
Collector	"	9	"	"	"
Secondary winding		580	"		36 "

The transistors are OC35 or OC28. The bridge recifier diodes are OA211 or other diodes which have a fairly high P.J.V. The current required from the output is very small and a potential divider draining 1 or 2 mA is adequate. The required supplies can then be taken from the potential divider chain. As the circuit delivers about 400v, a suitable point on the divider chain may be earthed and one thus obtains +300v for the Vidicon anode and -100v for the grid supply.