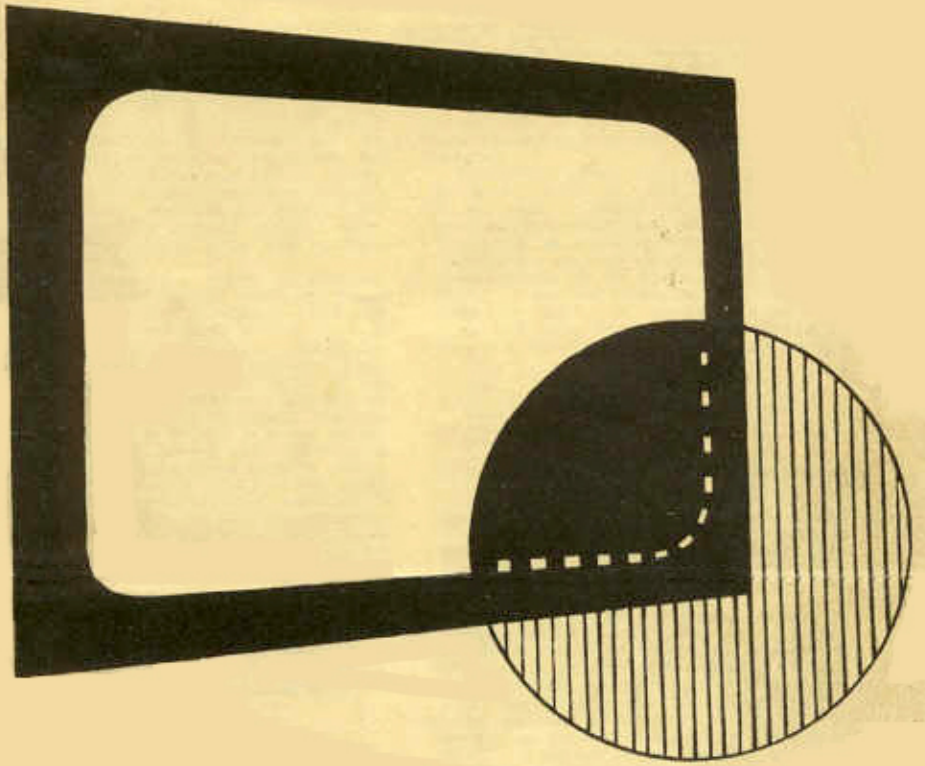


cq-tv

CQ-TV 25

Number Twenty-Five

Summer 1955.

Sixth Year

At least five shillings per annum

Published for the British Amateur Television Club at 10, Baddow Place Avenue, Gt. Baddow, Essex.

Editorial

The big news of the month is that in view of the response to the suggestion that we hold a meeting this year, we have gone ahead and organised the SecondAmateur Television Convention. This will be held at the Bedford Corner Hotel, Bayley St, just off Tottenham Court Rd, and about 100 yards from Tottenham Court Rd tube station. Don Reid is doing the donkey work, and the proposed scheme is as follows:

10 am Exhibition of equipment. Everyone is asked to bring what they can; BATC standard power supplies will be available for anyone needing them, or 230V mains is available.
1.00 pm Luncheon
2.15 pm Short lectures on ATV subjects. Film Show.
4.30 pm Tea (Cup of).
6.00 pm Disperse.

We hope that everyone who possibly can will come; an application form for tickets will be found on P6, but tickets will also be available at the door (not for the luncheon, probably). Non-members and friends will be admitted for 5/- in addition to any lunch charge.

There will be in operation a monoscope unit, a camera and various items of test gear at least; films of the Dagenham group and the RSGB group will be shown; you can hear excerpts from the club lecture tapes - all club items will be on sale, too. But mainly we hope you will come and meet other members; we hope that each district in the country will send at least one representative - accomodation can probably be fixed up with London members if required.

Remember the date OCTOBER 1st, a Saturday, (plenty of excursions), and please, if you can, let Don Reid know as soon as possible how many of you are coming. We hope to have at least 100.

In GLASGOW, Mr. J.W.Bruce wants to start a local group. He points out how "out of the way" they are up there, and is willing to organise regular meetings and lectures. If sufficient support is forthcoming, he hopes it will be possible to build the first ever GM/T station. Will anyone interested please contact him at 15, Downanhill St, Partick, Glasgow W1. We know of at least three members in the area, and Mr Bruce knows of several others who may be interested.

We should like to remind other members and group secretaries of the various services that the Club can provide. We have a 16mm silent film (400') of the Dagenham Town Show ATV exhibit, and another being edited of Ian Waters camera at an RSGB Show; the first set of lecture tapes is now complete. "Getting Started on Amateur TV", by Dixon and Barlow, is a tape that we feel every single member of the Club should hear, especially before going on to the more technical tapes "Flying Spot Scanning" (Pemberton), "70cm ATV Converters" (Sale, Royle, Martyr, Barlow), and "Amateur Colour Television" (Dixon). All of these tapes are intended for newcomers to the field, and are ideal for early meetings of new groups. They may be borrowed from C.G.Dixon at any time. In addition, lecture notes and photos are always available from G3CVO, and in many areas a demonstration of equipment can be organised by the nearest BATC Committee member.

On the subject of back copies of CQ-TV, which are always in demand, we are very pleased to announce that microfilmed copies of the first 20 editions are now available at 17/6d the set from C.G.Dixon at 23 Wye St, Ross on Wye. Each page of CQ-TV fills one 35mm film frame, and either a filmstrip projector or a proper film reader is required for best results. We anticipate a large demand for these filmstrips, especially from overseas members wishing to have a complete set of CQsTV, so there may be some delay in supplying.

For the particular benefit of newcomers, and to give everyone a starting point, we hope to publish in time for the Convention "An Introduction to Amateur Television". This will be a short booklet mainly of reprints from the RSGB "Bulletin", and will probably cost 3/6d. This is not intended to replace the complete booklet we have in mind for the future, but merely to serve as an introduction and guide.

The idea of a Club Lending Library received some support, including an offer from Robert Torrens GI3FWF/T Braidhjle House, Drumbo, Lisburn, N.I to organise things. A tentative suggestion is that members wishing to make use of the Library should send in 10/- as a deposit on the books, the money so collected going towards the purchase of new ones. Would anyone interested please communicate with Mr. Torrens or myself, together with a list of suggested books - periodicals may be included later.

I hope to meet as many of you as possible on October 1st - Convention time.

G3CVO

SHORT ODDS

BOOK REVIEW:

"Television Engineering" by Amos and Birkinshaw. A BBC Training Manual, published by "Wireless World". Volume 1; 300 pages, 188 illustrations. 30/- net.

This first volume deals with fundamentals, scanning, the vision waveform, and a discussion of the BBC waveform. Four chapters are then devoted to camera tubes, including all the modern types and the Vidicon. The last chapters are concerned with Optics - including optical viewfinders and projection tv - and Electron Optics.

The chapters on camera tubes are very clear and complete, without being mathematical; definitely worthwhile for anyone with a camera. The optics and electron optics sections are likewise put over in a very lucid and interesting way. The authors admit to having written the book for the benefit of BBC students, and the result is a book that is very easily read by an amateur. Conclusion: well worth borrowing from the Library; a must for any member intending to enter TV professionally. (Volume 2 is in preparation). Mathematical appendices and a short list of references are at the end of the book.

M.B

CURRENTLY ACTIVE:		Freq &		Freq &	
Station	QTH	Vision	Power	Sound	Power
G2WJ/T	Dunmow	436Mc/s (3kW ERP)	60W	432.5	10
G2DUS/T	Baldock	427Mc/s	5W	144.4	15
GI3FWF/T	Belfast	437.75	40W	-	
		2350Mc/s	½W		
G3FNL/T	Upminster	445Mc/s	25W	-	
G5ZT/T	Plymouth	427Mc/s	5W		
G3BLV/T	Sunderland				
G3OTS/T	Norwood	427Mc/s	30W	423.5	25W
G3KFE/T	Birmingham				
G3KBA/T		436.8	6W	436.8	6W
G3BAY/T	Leicester				
G3JVO/T	St Albans	445.5	20W		
Under construction:					
G3CVO	St Baddow	430.4	50W	426.9	5W
A.Sale	Rayleigh	438.8	60W		
(G9AED	Croydon	194.75	1kW erp	191.27	

FOR SALE

Projection tube and all parts incl. TBs and optics £25 o.n.o E.Butcher, 33 Southview Rd, Rettendon, Essex.

P.Burrage, Goldings Lane, Leiston, Suffolk, hopes to be able to supply 35mm and ½pl transparencies and prints of test cards C etc in the near future.

RCA 5527 iconoscope unused; 350mA reg PSU 3 KL37s o/p between 200 and 400V; f2 3" lens + iris; VCR97 and EMV 9" tubes; sundries incl. divider and shaper chassis need overhaul. Offers? J.Starbuck, 45 Lancaster Rd, Nottingham tel 247066.

MSS Disc recorder complete with amps mics and pus, VU meter, mic stand etc £25 ARN4 chassis 5/-, 320 0-320 and 525 0 525 + 0-1500V Kformers heaters too shrouded 30/- pair. Houseman 28 Gilbert St Alvaston

The Editor apologises for the various mixups in the layout of the last edition; the only actual error, I believe, is the omission of a square-root sign on P6, where the formula should read:

$$C_{max} = \frac{500}{\pi f}\sqrt{\frac{i^2}{v^2} - \frac{1}{R^2}}$$

Mr. E.Butcher G3CUH points out that the time constants of the AC couplings to the grids of the right hand 12AT7 in Fig 6 P2 would be better equal; make R6 1M. Further apologies for the change in precise size of cover which has varied considerably. We expect to be this size for at least the next 12 editions.

George Wynn is using magnetised focus or shift plates from Pye receivers instead of alignment coils on his station.

Several readers have kindly pointed out that there are now equivalents to the QQV0 series of tubes: QQV03/10 = Amperex 6360; QQV03/20A = American 6252 or Amperex AX9010; QQV06/40A = 5894 or AX9903. UK prices are 45/-, £8 and £7-10 respectively.

This Months References from Don Reid, and others. "The Flying Spot Scanning System, by means of the MC13-16" by Valeton and van der Poel. Phillips Electronic Application Bulletin Vol 14 No 6/7 1953. "Propagation on 144 and 420Mc/s" RSGB Bulletin November 1954. "Review of 460Mc/s" Hamer "WW" Feb 52; Nov 1950; Propagation at 460Mc/s Bullington Proc IRE Oct 47; "Tests of 450Mc/s transmission" Aikens and Lacy Proc IRE Nov 1950.

Dave Hudspith recommends "The Principles of Television Reception" by A.W.Keen, and "Cathode Ray Tubes" edited by M.G.Say. which contains information on camera tubes and monoscopes as well as crts.

For useful information on TV transmitters etc the Newnes "Radio and Television Engineers Reference Book" edited by Molloy and Pannett is very useful.

"Proceedings of the London UHF Group" edited by Charlie Newton G2FKZ is a must for anyone working on 70cms or higher. Price 1/3 from G2FKZ, 105 Underhill Rd, SE22.

We have 47 current overseas members in 19 countries. Cathodeon wish to make it clear that they cannot supply monoscopes or staticons outside the UK.

County Corner:

Lancs and Ches: Messrs Fox, Atherton, Attwood, Baker, Howarth, White, Macwhirter, Whitty, Wilkes, Woodfield, Worthington, Proctor, Reid, Cook, Crowe, Curtis, Fielding, Moulson, Critchley, Lewis, Casey, Charlton, McGuffie, Whittaker and Coker. For news of lectures and meetings contact G.Higgins, 9 Corkland Rd, Chorlton cum Hardy.

Two files of Back Copies of CQ-TV are in circulation, the normal ration being 14 days per person. Unfortunately some members have spoilt the scheme by keeping the copies far beyond the time limit. With the issue of the microfilmed sets of copies (see P1) these files will no longer be circulated except by special request.

The Hon. Treasurer reports that he has NO RECORDS of having received ANY money from Messrs. Bendall Bernon Newton Powell Taylor (SSE) Warner Wright F., or Young. Would the gentlemen in question please contact G3EKK.

WHAT IS GAMMA ?

Gamma is a greek letter used to represent the power to which a figure is raised in the formula:

$$I = kV^g \quad \text{(using "g" for gamma).}$$

This formula is a general one connecting an electrical unit (in this case voltage) with a physiological one (in this case Brilliance). The eye reacts in a logarithmic manner to stimulus, that is if a series of illuminated panels are displayed side by side, the changes from one to the next will appear equal when the ratios of their brightness, and not the increments, are equal. Put another way, if a slide is made up of strips of equal density material, with the strips being 1,2,3,4 etc layers thick, the slide will appear to have a logarithmic increase of density, wheras a tv camera output waveform would show equal electrical steps. If the layers were 1,2,4,8 etc thick, the slide would appear to have even steps, although the camera would show a loga-rithmic progression. This phenomenon is of no importance in television provided that nowhere in the chain camera to monitor tube is there anything whichcan upset the law. Unfortunately, the curve of output against modulator volts for the average CRT is not a straight line (see Fig 1), whilst for many types of camera tube it is. This means that in the absence of correction the whites and blacks of the picture will be upset, only the middle tones being rendered correctly. A linear curve indicates that g = 1, and we say that the device has "unity gamma". From the amateur point of view, it is most important to note that the 931A photocell, and most types of camera tube, have unity gamma, and that some correction can be used to improve picture quality. This is most noticeable with Flying Spot Scanners.

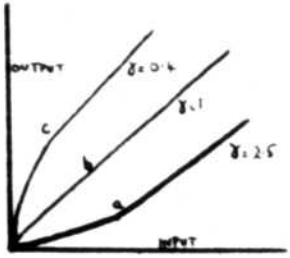


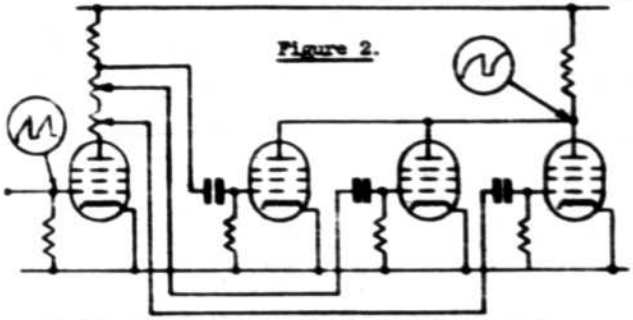
Figure 1: (a) shows a typical input-output curve for a CRT; (b) a linear characteristic (unity gamma); (c) the amplifier response required to convert (a) into (b).

Referring to Fig 1 again, it is clear that if the output from a unity gamma device (b) is passed through an amplifier with characteristic (c), and is then displayed on a CRT with characteristic (a), a true reproduction of the original tones will be produced. As a matter of interest, g for a normal CRT is about 2.5, so g for the correction circuit must be 0.4. In Flying Spot work a further point arises in that the transparency processing may have already altered the gamma, so that by making the correction circuit of variable gamma from say 0.3 to 0.8, a truer reproduction can be obtained on the display screen than was ever there on the transp-arency.

The characteristic of Fig 1 (c) is that of an amplifier having a high gain at low signal inputs and less gain with larger inputs

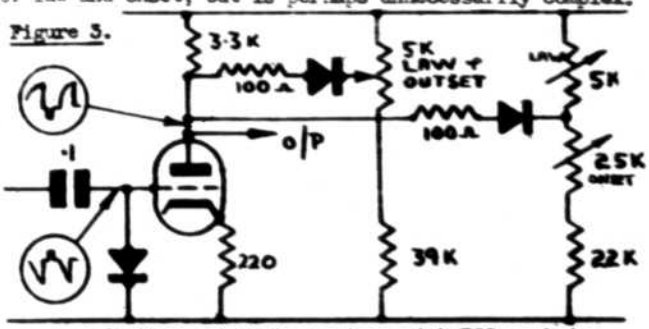
There are a very great number of ways of obtaining the necessary response. A simple way is to use a variable-μ valve in the amplifier chain, or a triode at low voltage (an EC91 with 100V HT and 2V bias is recommended). One most useful feature if it can be incorporated is to arrange that as the gamma is varied the total signal output is kept constant. If this is not done, it makes the circuit very difficult to adjust, since changes in gamma are hidden under general picture level changes. One way of doing it is to use three amplifiers arranged so as to conduct in succession (Fig 2). A more economical

Figure 2.



way not having the constant level facility is to arrange diodes to shunt the loads on an amplifier at suitable times. Fig 3 shows such a scheme; two diodes are used - crystal for preference since they have a sharper threshold - but more can be used if required. The 100 ohm series resistor helps to round off the transition. The two diodes are shown with two different connections. The first is a simple potent-iometer; moving the slider varies both onset and law together, and some adjustment of current in the pot. may be necessary to get the right result. The second gives separate, but not entirely independent, control of law and onset, but is perhaps unnecessarily complex.

Figure 3.



A further point that arises with FSS work is what happens when a negative is being transmitted. In this case it is essential to gamma correct BEFORE phase inverting, unless separate gamma correctors are to be used. Setting up of gamma correctors is done by eye, preferably with a linear step waveform giving vertical bars on the monitor CRT. Attention to gamma correction will improve pictures considerably, giving them considerably more "life" and "sparkle".

The Design of Television Transmitter Output Stages.

The PA stage of a transmitter is normally run in one of several possible conditions: grounded cathode or grounded grid, straight amplifier or frequency multiplier, with or without grid current.

The available systems of modulation for normal valves in normal circuits are:

i. Absorption modulation. The transmitter delivers constant output power to the aerial and a dummy load, the proportions of the two being governed by the modulation. Although good in theory, this system is poor in practice.

ii. Plate, or plate-and-screen, modulation. This is quite possible but requires high HT supplies, isolated low-capacity heater supplies, and the modulator must provide a large amount of video power.

iii. Cathode or grid modulation; this is the most convenient from the moduation point of view, since only a few volts of video signal are required, and these can be supplied by a simple cathode follower arrangement. The peak transmitter power, however, is only one quarter of that of an anode modulated stage under similar conditions.

Since grid modulation is most usually employed, the following design methods are aimed at that condition.

At sync bottom, the transmitter must be shut off as completely as possible, whilst at peak white it must be delivering its full power to the aerial. With constant drive volts, the PA grid voltage is varied by the modulator; the variation in V_a and power output with grid volts is illustrated in Figure 9/2. It will be noticed that there is a straight part to the curve, and it is over this linear part that the picture content is arranged to lie. At the lower end, the curvature of the characteristic means that a greater voltage is required to cut the valve off; hence the need for "sync stretching", detailed in Chapter 8. The upper bend is due to grid current saturation, and if it occurs can also be overcome by "stretching" peak white signals in the modulator.

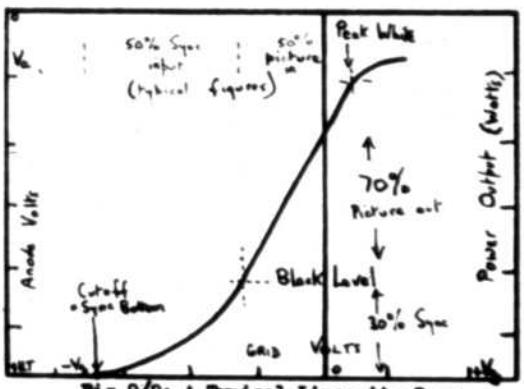


Fig 9/2: A Typical Linearity Curve

If grid current never flows even on peaks, the design of the driver and modulator stages is much simplified, but the PA RF efficiency is reduced. This is particularly so in the case of power multiplier stages. Modulation of a power multiplier is intrinsically bad, the non-linearity introduced being almost impossible to correct. With a straight PA, of course, any tendency to self-oscillation will also ruin the linearity of the system.

9.3 Choice of PA valve

The valve used must satisfy the following points:

i. Will it work at this carrier frequency?

ii. Has it sufficient dissipation and emission to cope with output peaks?

For low power TO on operation, the choice is limited to valves such as the QQV06/40 and QQV03/20. It can be shown that the constant product for any valve of power output and bandwidth (in terms of peak cathode emission) is given by:

Eq 1 $$P_o \times B = \frac{I^2 k}{16\pi C}$$

where I is the maximum available emission in amps;
C is the total output capacity of the valve, including strays and the tuning capacity, in farads;
k is a constant depending on the output coupling circuit (=1.414 for the usual double tuned circuit);
P_o is the power output of the valve, not including tank circuit losses, in watts, and B is the bandwidth to the 3db points measured in Mc/s.

With black-level set to the bottom of the linear portion of the characteristic, the valve is running in what is generally termed Class B. Under Class B push-pull conditions, each valve is conducting for half the total period, and the mean current in each valve is $2I/\pi$ amps. This must not exceed the makers' rated maximum continuous cathode current for the valve in question. As the transmitter never runs normally at peak white for any length of time, it is permissible to exceed this figure somewhat under ICAS conditions.

$P_o \times B$ products for the two valves mentioned, using the makers' figures, are 10.5×10^2 and 2.9×10^2 Watt-Mc/s respectively, when C is taken as 4pF and 3pF respectively. These figures give the maximum bandwidth available at given power outputs, where cathode emission is the limiting factor. In most low power valves used by amateurs, anode dissipation is the limiting factor, but a notable exception is the QQV03/20, where under certain conditions cathode emission limits the output before the plate overdissipates. In high power TV transmitters, cathode limitations are more frequent, since the plate is normally air or watercooled.

9.4 Choice of PA valve operating conditions:

The operating conditions for Class B TV service can quickly be determined by answering the question: is the transmitter to give maximum bandwidth, maximum power output, or maximum efficiency? Next, on the

V_a-I_a curves for one valve, draw in the dissipation curve for twice the rated maximum anode dissipation for the valve (since it is conducting for a maximum period of half the total time). (see Figure 9/3)

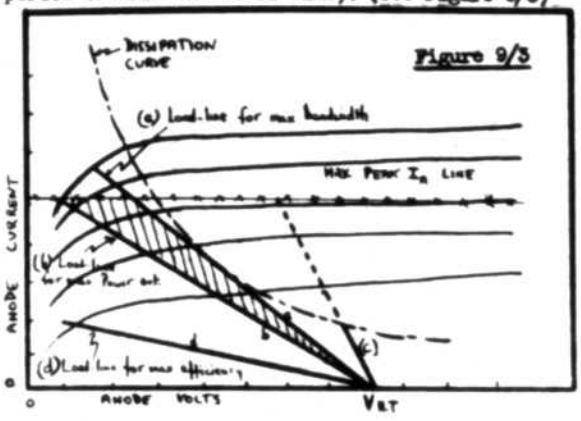


Figure 9/3

For maximum bandwidth at a given HT, draw in a load-line that is tangential to the $2W_a$ curve. The load resistance R_l for this line is equal to one quarter of the total impedance R_p across the tank circuit, since each valve is only conducting for half the time. Estimating the total tank circuit capacity C_p, the tank circuit Q is found from the usual equation:

Eq 2 $$Q_p = R_p . 2\pi f . C_p$$

It can be shown that, for optimum coupling between tank and aerial circuits,

Eq 3 $$Q_p = 2Q_s = 1.414\ Q_o \quad \text{where } Q_o = \frac{f_o}{B}.$$

Therefore the maximum bandwidth obtainable if anode dissipation is the limiting factor is given by:

Eq 4 $$B = \frac{1.414\ f_o}{R_p 2\pi f_o C_p} = \frac{1}{1.4\pi R_p C_p}.$$

To determine the power output, or to design for maximum power output (the usual amateur requirement) draw in the line of maximum continuous anode current $I_a$max, and also the line of maximum $I_a$peak (= $I_a$max x $\pi/2$). Maximum power output will be obtained when the load-line passes through the intersection of the $I_a$peak maximum line and the valve characteristic for the grid voltage at peak white.

Whichever of the two above load-lines is chosen, $I_a$peak is found, and hence $V_a$min. The RF power output at the valve anode is given by:

Eq 5 $$P_o = \frac{I_a pk \times (V_{ht} - V_a min)}{2} \text{ watts.}$$

Also, $I_a pk \times 2/\pi = I_m$, the mean anode current. The DC power input to the valve is $I_m \times V_{ht} = P_{in}$, and hence the valve anode efficiency is

Eq 6 $$E = \frac{P_o}{P_{in}} \times 100\%.$$

The valve anode dissipation will be $P_{in} - P_o$ watts.

If an attempt is made to obtain more bandwidth by reducing R_l still further, the load-line will cut the $2W_a$ curve, as shown in Figure 9/3c. The intersection represents I_m maximum, with $I_a$pkmax/2 times this value. In general, the power output and efficiency drop very considerably.

If more efficiency is required and there is bandwidth in hand (as there almost certainly will be in an amateur transmitter), a flatter load-line can be used. The curvature of the I_a-V_a curves at low V_a, plus heavy screen and control grid currents, prevent $V_a$min from being reduced indefinitely, and in consequence $I_a$pk, I_m, P_{in} and P_o are all reduced, although the efficiency is increased. The flatter load-line represents an increase in R_l and hence a decrease in B. (Compare the effect of increasing R_l in a video amplifier).

For most amateur applications, the loadline will lie within the shaded area of Fig 9/3, the precise line being chosen for maximum linearity of the V_a-V_g curve, as will be shown. Table 9.1 shows some typical figures for the QQV06/40 and QQV03/20 under various conditions. The values for B are for the valve alone, and do not take into account tank circuit bandwidth. Similarly, the values for P_o etc do not allow for transit time losses, nor for losses in the tank circuit and aerial coupling. The makers' figures for loss of efficiency with increasing frequency are plotted for Class C conditions, but nevertheless give a good idea of the drop to be expected. Thus at 450 Mc/s the efficiency is only about 80% of its LF value for either valve, and the power output will be modified accordingly.

	QQV06/40			QQV03/20		
Vht	500	400	400	300	300	V
Vg2	250	250	200	250	250	V
I_a pk	275	325	330	180*	180*	mA
V_a min	50	70	70	45	105	V
RF swing	450	330	330	255	195	V
P_o	62	54	55	23	17.5	W
I_m	175	205	210	110*	110*	mA
P_{in}	88	83	82	33	33	W
P_a	26	29	27	10	12.5	W
E	70	65	67	70	53	%
R_l	1.6K	1K	1K	1.5K	1.1K	ohms
Bvalve	9	14	14	13	17	Mc/s
V_{g1} pk	5	7.5	15	10	5	V
V_{g2} pk	30	25	25	20	20	V
V_{mod}	35	32.5	40	30	25	V
I_{g1} pk	10	12	22	-	-	mA
I_{g2} pk	110	55	75	-	-	mA

* Max. permissible figures.

Table 9.1

Once the load-line is chosen, draw it in on the I_a-V_a curves, and from the intersections with the valve curves draw the V_a-V_g curve. The output power delivered to the aerial is more nearly proportional to the anode voltage than to the anode current, so that this curve, rather than the I_a-V_g curve, is a better approximation to the true P_o-V_g curve, which can only be plotted experimentally. The V_a-V_g curve will be similar to Figure 9/2, and from it can be found the modulator swing required, the RF drive

HOME-MADE ZOOM LENSES

by Peter Burrage.

The value of having several lenses on a mera is that one can obtain a variety of different shots of the same scene without moving the camera at all. Such shots can vary from an extreme close-up, obtained with a lens of long focal length (a "telephoto" effect) to a wide-angle shot taking in most of the scene. Lenses so used are often mounted on a rotating turret for quick changing, but this means that the camera is out of service whilst the lens is changed and the scene refocussed. The sudden change in viewpoint may also upset the continuity of the scene - and a set of high-grade lenses is expensive. The answer to all this is the Zoom lens, a lens of variable focal length but constant aperture, capable of giving an infinitely adjustable range of viewpoint. With this lens, one can be viewing a scene in its entirety, and then close in on some point in it, bringing it "closer" until it fills the whole screen, doing so without ever going out of focus, and doing it smoothly.

Zoom effects can be produced electrically or optically. With a single lens, if the camera target is underscanned, the middle part of the image will be enlarged to fill the whole of the monitor screen, producing the effect of the viewer having been transported nearer to the object. Apart from the fact that it is inadvisable to underscan the majority of camera tubes for long periods, the definition obtained will of course deteriorate as the scan is reduced. Optically, a very rough Zoom lens can be made by using just a pin-hole in front of the camera tube; moving the pin-hole varies the "focal length" of the "lens", giving a Zoom effect. Unfortunately it also varies the aperture and the definition, besides which the scene illumination must be tremendous with the general run of camera tubes. The method is not seriously recommended.

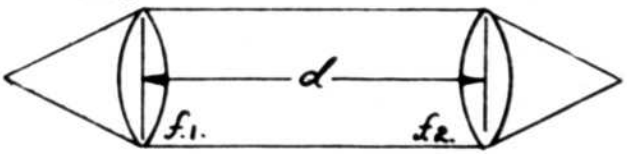


Figure 1: A Simple Zoom Lens System

The simplest practical Zoom lens is one comprising two positive (convex) lenses, the distance between which can be varied. The focal length of the combination is given by:-

$$f_{tot} = \frac{f_1 f_2}{f_1 + f_2 - d}$$

where f_1 and f_2 are the focal lengths of the two lenses, and d the separation between the optical centres of them.

Two disadvantages of this simple scheme are firstly that the effective aperture of the system varies with f_{tot}, making an adjustment of iris also necessary; secondly, the back focus (the distance between the back element and the face of the pickup tube) varies, and this means that the entire lens system must be moved to retain focus. This is extremely difficult to accomplish without causing picture jitter.

Consider such a lens for a Staticon. A useful range of focal length variation would be from, say, 1" to 4". The focal length of the system is a min--imum when $f_1 = f_2$, and d is a minimum. Substitut--ing in the formula gives $f_1 = f_2 = 2"$. For f_{tot} to be 4", d must be 3". Assume an overall aperture of f4. At $f_{tot} = 4"$, the effective diameter of the system must therefore be 1". For two identical lenses, the effective diameter of the pair is the same as for either lens; since each has a focal length of 2", each requires to be of aperture f2. (Note that any aberrations will be doubled).

Although this system is quite satisfactory, the lenses are of a higher quality, and therefore higher cost, than those that can be used in the alternative system to be described.

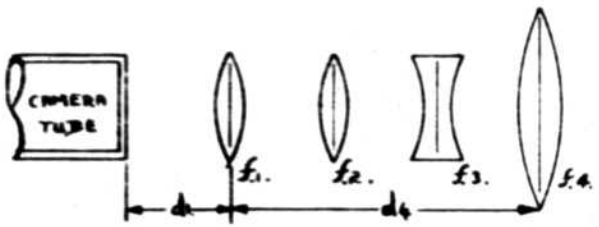


Figure 2: The Preferred Zoom Lens Arrangement.

The most practical and economical system, in the author's opinion, is that shown in Figure 2. This consists of three positive lenses of focal lengths f_1, f_2, and f_4, and one negative lens f_3. The fourth lens is fixed in relation to the camera tube; the first is varied to vary focus, and the second and third are varied together and mutually to produce a Zoom.

When the system is focussed on infinity,

$$d_1 = f_1 \quad \text{and} \quad d_4 = f_4.$$

Considering the second and third lenses, f_2 is chosen to be about 1/3 of f_3, so that the resultant of the two, f_5, is still a negative lens. This will vary in both power and position depending on the separation of the two. This "phantom lens" together with f_4 produces a virtual image in front of the system, which is focussed onto the camera tube by f_1. Such a system is entirely practicable for the Staticon, where the Zoom attachment will be only some 4" square and 9" long, but for a larger tube, such as a Photicon, the size would be about 1' square and 3' long, with a corresponding increase in unbalance.

(To be continued)

WHAT THE OTHER BLOKE IS DOING

George GOLDSMITH (Jersey) has now finished his 405 line pulser - 27 valves - and RF distribution unit. He takes his DC correction voltage from the discriminator to each pair of grid returns of each m/v counter as well as to the M.O, and finds it very stable. The 9" monitor is also complete and George is now after "hints on 16mm cine work". He also runs a 21 ele Yagi on Wenvoe at 165m with two pre-amps, and awaits the new low power TV tx with interest!

B.Furby (Wellington, N.Z) has brought enough gear out with him from the UK to build a complete station, but is pressed for time at the moment. Help wanted? Alan Ellis (Canberra) has passed on from the VCR97 and 112 to an all magnetic PSS with 5FP7 scanner and MW22-17 display. He wants a negative test card C for testing (see small ads). He is another wanting gen on telecine scanning.

J.Brett (Seven Kings) is now in the RAF at Yatesbury, and hopes his radar training will be of use in ATV! I.Scott (Southgate) is building a telestill unit to the design in CQ-TV 19 in between travels. R.Johnson expects to be demobbed this year, and to join MWT Co at Chelmsford on Radar. Another for the Chelmsford group! K.Lambert (Rotherhithe) sends in a kind bouquet..... J.Jefferies G8PX (Oxford) is still on the RF side, and is making his aerial matching section in a similar manner to G2WJ's. E.Butcher G3CUH (Rettendon) is now in line with the RF from G2DUS/T and G2WJ/T en route to Tony Sale at Rayleigh, and his PSS gear is well on the way. Brother A.W.B is now RSGB Rep for Danbury - and also up on a hill.

T.Thomas (Byfleet) is temporarily QRT due to lack of mains, but is not letting that stop him. N.Nathan (Broadway, Worcs) is building a 5FP7 PSS for 405 lines and wants to meet fellow members in the area. He is at Pembroke, Cambridge during terms. J.Gilbert ZL1RV is visiting England at the moment, and is taking the opportunity of seeing ATV on the way, so as to encourage the Auckland group when he goes back next year. Also paying flying visits is G.Wynn of the RCAF, who comes back to "base" at Brentwood most weekends. George has a complete mobile TV station which he can put in the car, but at the moment he is rebuilding. He expects to go to France Germany Belgium and Holland for long stays (with the gear) shortly, so overseas members pse note! He is also an HO and OO gauge railway fan. K.Dixon is ex G3IFY now resident at Dun Laoghaire and is awaiting an EI call. He is on an oil tanker and would particularly like to meet members when calling at Liverpool and Swansea in the "Irish Holly". (Have you met R.H.Shepperd on the RF "Balaena"??). B.Twist (Coventry) is shortly moving digs, and has to find a suitable landlord who does not object to 19" racks here and there. He asks if we could do a range of test patterns for the club (see small ads) and also suggests doubling the sub and increasing the number of editions. This last we cannot do, but if the money is there it is easy to increase the size of each edition to say 12 pages rather than 8, there always being plenty of material available.

W.Essinger is our first Israeli member - we now have members in Persia, Costa Rica, Yugoslavia and several other unlikely places! - and he has a 5527 camera under construction; the waveform units are puzzling him, so we have suggested Fink's "Television Engineering" to him. A.Bartholomew at Kirkaldy, has modified a Telequipment WG4 to take his own PSS pictures, and offers the details to anyone interested (SAE pse). The present PSS amp uses 6AC7 6AC7 6L6 but he is rebuilding with miniature types; news of a 5FP7 would be welcomed.

Warren Jacobs (Mt Hawthorn, W.Aust) is now obtaining satisfactory results with the PSS, and has a 5527 camera all built bar the tube itself. He would appreciate offers of a tube (see small ads). Please help him if you can, as there is no source at all of any TV components in his part of the world. J.Mason (Auckland) reports that the Tech College project there is going ahead well; pulser with Banthorpe type dividers complete and very stable; PSS with MC13-16 and gamma correction by negative picture feedback; vidicon on the way, and sound and vision tx to be built (Vision: grid mod QQE06/40 50 w PW pos mod 405 line on 96;4Mc/s, sound plate mod on 99.5Mcs - why non standard separation, oof). 8 14" and one 17" Pye sets have been built from kits on the course, and Jack is also after a camera tube for himself. Offers?

Ralph ROYLE G2WJ/T has put a beefier power transformer in the PSU feeding the vision tx. The signal he puts out is now several dbs stronger than before, as he can now modulate fully without getting trouble at peak white. The QQV06/40 is now running at 400V and about 150mA at PW, with 170V stab on the screen. The signal at G3CVO is now so great that it shows up the lack of bandwidth in the converter. Jeremy has built a push-button vision mixer unit on the lines suggested in CQ-TV No 22; fluorescent lighting is in use in the "studio" now without undue hum pickup. Several intriguing test cards have been seen on the regular Saturday night transmissions (an excerpt of which is heard on the Club tape on "70cm Converters"). Ivan HOWARD G2DUS/T now has a huge array on top of a 50ft climable mast; the monoscope unit is in a TV6B case, which with another similar case containing the pulse generator and RF oscillator, gives a complete 405 line interlaced picture out anywhere in Band 1. Test bars are available instead of the monoscope if required. Ivan very kindly offers to demonstrate these units to anyone interested. All he needs is a 250V point. The Staticon camera is very nearly complete and should be in action by now.

P.Burrage has been testing his home-made Zoom lens; M.Cole is building a stabilised power pack prior to trying some 13cm work. B.Partridge has built a test waveform generator (circuit coming up) giving sawtooth, cruciform, spike, step and bar patterns. R.Martyr has built a beautifully-made version of Tony Sale's converter (CQ-TV 24) and is busy building a new aerial, 4 6-ele Yagis at the corners of a square.

NEW MEMBERS All-time total = 411

J.Auld 137 Ballingry Cres, Ballingry, Lochore, Fife.
A.Bartholomew 28 Chapel Rd, Kirkaldy, Fife.
R.Bowler "Greenwood" Stonefield Rd, Naphill, High Wycombe Bucks.
J.. sey 124 Liverpool Rd, St. Helens, Lancs.
J.M.Cordova CN2AO 33 Goya St, Tangier, Morocco.
I.Crawford 9 Nelson Place, Stirling, Scotland.
J.Denton 94 Broadway Gdns, Peterborough, Northants.
K.E.Dixon 6 Crosthwaite Park East, Dun Laoghaire Dublin
W.Essinger Hatishby St 105, Mt Carmel, Haifa, Israel.
W.F.Evans 19 London Rd, South Stifford, Grays, Essex.
A.R.Eyles 326 Springfield Rd, Chelmsford, Essex.
C.P.Frost 6b, Radcliffe Rd, W. Bridgford, Nottingham.
J.Gilbert ZL1RV 76 Cranmore Rd, Chislehurst, Kent.
P.Harrison 17 Laughton Rd, Dinnington, Sheffield.
E.W.Lawley 70 Molrams Lane, Gt Baddow, Essex.
R.March 34 Bruce Grove, Chelmsford, Essex.
F.Mouraux 213 Chaussee de Mons, Tubize, Belgium.
D.J.Onions 25 Jubilee Ave, Rustington, Sussex.
C.M.Reyes 200 Varras sur Catedral, Av 8, San Jose,
B.H.Twist Coombe Abbey, Binley, Coventry. (Costa Rica.
L.C.Wallis 4 Garrison Hill, St Michael, Barbados BWI.
D.C.Wiltshire The Lodge, Godolphin Rd, Weybridge, Surrey.

Changes of Address:
G.L.Ashman 27 Gedeney Rd, Tottenham N17; J.W.Bruce 15 Downahill St, Partick, Glasgow W1; E.H.Butcher G3CUH 33 Southview Rd, Bettendon, Nr Chelmsford, Essex; B.Furby 336 The Terrace, Wellington C2, N.Z; G.Higgins, 9 Corkland Rd, Chorlton cum Hardy, Manchester; S.Horwood 4 Brunswick Close, Thames Ditton, Surrey; J.Keen, South View, Marlow Bottom, Bucks; J.Lobb, 93 Dunley Drive, New Addington, Croydon, Surrey; R.O'Connor 9 Woodthorpe Drive, Woodthorpe, Nottingham; G.Sutcliffe 19 Bell Hall Mount, Savile Park, Halifax; T.Thomas 17 The Cedars, Caravan Park, Byfleet, Surrey; H.Weston 16 Pitfold Rd, Lee, SE12; G.Wynn c/o Hill Cottage, Doddinghurst, Nr Brentwood, Essex.

SECOND AMATEUR TELEVISION CONVENTION

Cut this out, or copy the relevant parts, and send to Don REID, 4 Bishops Rd, Chelmsford, Essex.

Please send me .... tickets for the Convention-only/Luncheon-and-Convention to be held at the BEDFORD CORNER HOTEL, Bayley St (off Tottenham Court Rd) on Saturday, October 1st, from 10 am to 6 pm (Luncheon 1.00 pm).
TICKETS: Convention only, 10 a.m - 6 p.m 5/6d.
Convention and Lunch 10/6d.
(Non-members: Convention only 5/-.
With Lunch 12/6d.)

Name:
Address:

I hope to bring with me the following item(s) of equipment for show/demonstration:

For Office use: Cash Ticket No Lunch
D.R/L.B Date replied

John ADAMS at Iver has been assembling a garage for the "transport", but had time to build the ZL1QS pulser in CQ-TV 18. He can't get the mains lock to work (you did remember to reverse one diode in the discriminator, John??); any suggestions? He uses 12AT7s with minor mods, and a Blocking Osc as MO at 20250 cs with a resonant grid circuit and Plowman mains lock (no 20). John has skipped the ringing choke frame circuits, and uses multivibrators as in "Electronics" April 54 p138 to give "super syncs and really adjustable blanking". The shortcomings of the PSU are now becoming apparent, and a 12X1 stabiliser is on hand. Johns telecine scanner has been working on stills; the 5FP7 runs at 5kV, and John passes on the tip to increase the resistor between pins 11 and 1 by 50% to improve first dynode efficiency and reduce noise. A modified radar jammer strip makes a fine video amp (see no 5) provided the couplings are altered, and the screens and cathodes corrected. 100 mfds were also necessary on the HT+ to give a clean background. 7.5kV on a 7BP7 gave a terrific output but "Oh! the bulk!" The glass polygon mentioned last time has not materialised, so John is trying to make one from ¼" perspex. The mechanism gives a picture at all film speeds, and is continuous-motion, much kinder to the film and easing sound pick-off problems. The mechanics must be very accurate, but are at least fairly simple.

AROUND THE GROUPS

SOUTHAMPTON has a small group with E.Bassett doing the pushing with G2FJD. A Staticon is on the way, PSUs built, pulser (MO-CF, then m/vs 9,9,5 to 50c/s) complete barring some jitter in +2 stage. E.B did some work with 6SN7 B.Os and found the peak oath current was 3.3 amps, so make your freq. setting controls wirewound on Blocking Oscs! E.R.B.

HARLESDEN group under Dave Hooper has a camera and FSS under way, with G3JGV providing a 9" monitor. Dave's Receiver type 3iii is now on 70cms, but he is rapidly finding out that 430Mc/s is NOT 220Mc/s...!

CHELMSFORD continues with monthly meetings on the second Thursday at 7.30p.m at G3CVO's. A lecture on "Flying Spot Scanning" included a demonstration of a fast pull-down projector; the May meeting was on "Sync Generators", and the June one is to be a lecture and demonstration of G2DUS's monoscope unit. In July Mr R.Martyr will talk on "Television Testgear". The group now numbers some 30 members, with G2DUS and G2WJ licensed, and members at Bishops Stortford, Roxwell, Chelmsford, Baddow, Bettendon and Rayleigh building transmitters furiously - all within 5° of a straight line, so that bi-directional arrays will be the order of the day. (G3CVO)

WELLINGTON (N.Z) now has 7 or 8 members active, with the Wellington branch of the N.Z Electronics Institute also constructing gear. Lack of gear and components is a great handicap, but work is proceeding, and it is hoped to start meetings soon. (ZL2AGE)

We have no news from Groningen, Liverpool, Nottingham, Birmingham or Weybridge. See P1 for note about proposed GLASGOW group.

4.00c
L.Y