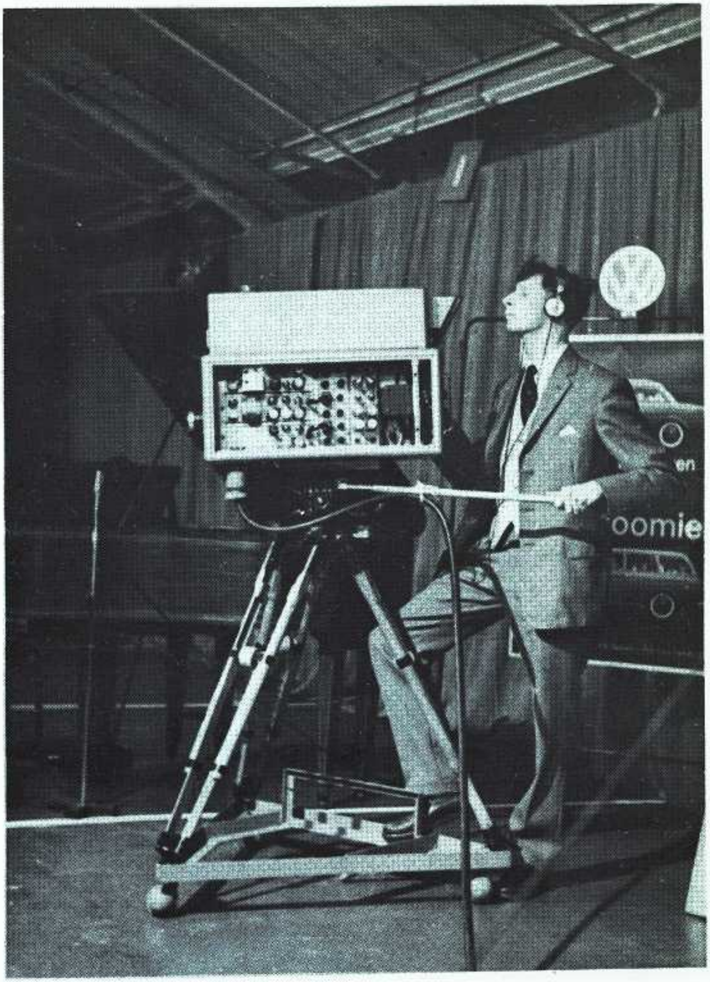
CQ-TV



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CQ - TV

Journal of the British Amateur Television Club

- **Free to Club Members**
- **Technical and Non-technical Articles**
- **Club News**

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THE BRITISH AMATEUR TELEVISION CLUB

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A letter from our President on the occasion of the 50th Edition:

The half century! Fifty issues of CQ-TV. What a fine achievement this is. I wonder if that little band of stalwarts who founded the club in 1949 (was it really in the bar on Victoria station) anticipated that their progeny would grow to its present stature? At that time the transmission of television in the amateur bands was not permitted, but in April of the following year Ivan Howard, G2DUS/T, gave the first public demonstration of amateur T.V. in the United Kingdom at Shefford, and a year later, after vigorous lobbying by the B.A.T.C. represented by the R.S.G.B. the P.M.G. finally agreed to the T.V. license. Now some 70 stations hold licenses for amateur television transmissions, and the B.A.T.C. can set up networks which rival those of professional broadcasters.

John Tanner tells me that the first edition of CQ-TV was published in November 1949 and had a circulation of 12. Now he prints 1,000 copies. This anniversary edition is his last. All of us owe him a debt for his splendid work during the six years of his editorship, which has culminated in this, the 50th edition of CQ-TV.

Building such a club as ours is a matter of teamwork, and everyone can feel proud of what has been achieved: perhaps it would be appropriate to especially mention the early work of Grant Dixon and Mike Barlow, which sucessfully laid the foundations for the growth of our club.

An issue such as this also gives me the opportunity to thank the Manufacturers for the help and encouragement they have given us over the years, and for the special equipment - such as pick-up tubes - which we could hardly hope to make for ourselves.

The achievements of members in the thirteen or so years of our existence makes impressive reading. The first two way TV contact in the world between G5ZT/T and G3BLV/T in May, 1952; first amateur colour pictures in December 1953; the B.B.C. 'Panorama' transmission from one of our amateur cameras - John Jull's - in 1957; slow scan pictures transmitted from WA2BCW near New York to G3AST in Yeovil, and the splendid colour demonstrations at the Radio Hobbies Exhibition, both in 1961.

And what of the future? I expect it to be even more exciting. I believe that we are now in the most interesting era that television has seen since the firt amateur produced his flickering pictures in that attic in Frith Street in 1928. The battle for choice of colour system in Europe is at its height, our domestic broadcasting is thrashing its way into a change of line standards and frequency bands, Telstar and Relay are in orbit, and television has shewn us the other side of the mood
other side of the moon.

Roll on the next 50 issues of CQ-TV.

Boris Townsend

Boris Townsend

DAGENHAM TOWN SHOW JULY 6-7th.

Martin Lilley of 25 Netherpark Drive, Romford, Essex, will again be organiser of the Amateur Television display at this Show. Anyone who can help either by supplying or operating equipment is asked to contact Martin. The standards which will be adopted are :-
405 lines. Drives, blanking and sync to be 2 volts in 75Ω. All video equipment to permit looping through of all pulses.
+250 volt "On Air" cues from vision mixer.
Communication system with programme sound and producer's talk-back inputs having input impedances preferably greater than 1 KΩ.
Signal sources should be able to provide either or both of the following outputs :-
(a) 1 V composite. 0·7 V picture, 0·3 V sync.
(b) 0·7 V non-composite.

INSTITUTION OF ELECTRONICS EXHIBITION to be held in Manchester in July. Would any members who can help with equipment or manning the stand please contact Gordon Sharpley, G3LEE,
14 The Crescent, Flixton, Manchester.

CHELMSFORD GROUP NEWS

The group suffered a setback in 1959 when Brian Partridge sold his camera channel, sync generator and transmitter. Since that time, some progress has been made towards getting the Studio operational once again.

A 405 line sync generator has been designed and built by Dick Crook. This uses blocking oscillator dividers, which have proved themselves very reliable. Terry Lane,G3RSG/T, has built a 3" image orthicon camera, which made its first public appearance at the 1962 Dagenham Town Show, producing reasonable quality pictures. When one or two snags in the camera have been ironed out, Terry intends to build a viewfinder.

Although still in the development stage, a FSS using a 931A photomultiplier and a short persistence tube running at 25KV has been giving some very encouraging results, the 3Mc/s bars in Test Card C being resolved with ease.

A transmitter is now operational at the studio. It uses a QQV03-10 output at 2 metres driving a QQV03-20A tripler to 70 cm which drives a QQV03-20A grid modulated P.A., giving about 15 watts peak white output into the aerial. The modulator output is taken from a cathode follower consisting of 2 EL84s in parallel, with black level established by a D.C. restorer. D.C. restoration has proved rather unsatisfactory from the point of view of bounce, and also the lack of independent control of sync stretch and peak white stretch. In view of these shortcomings, a new modulator is being considered which will incorporate black level clamping throughout.

The aerial is some 45' above ground level and consists of a stack of four 4 element Yagis. It is intended eventually to construct anther similar stack, which will be placed side by side with the existing array.

The R.F. side of the transmitter was built by Dick Crook and the modulator and aerial by Jack Terry, G3MFT/T. After some field tests in the Chelmsford area, pictures were exchanged with G3NOX/T (30 miles) on the 7th February 1963, good reception of the Chelmsford pictures being reported.

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BOOK REVIEW

"Physiology of the Retina and Visual Pathway" by G.S.Brindley, publ. Arnold; 298p, 35/-.

This is obviously not an electronics textbook, but it is so full of information on How the Eye Works that I am sure all of our members will be fascinated by it. After all, the whole of TV is based on certain facts about the eye, and the way the eye obtains colour and stereo information, for instance and how it is transmitted and processed, will give the experimenter much room for thought. This is a recent book (1960) and a great deal has been discovered in recent years since it was found that the optic nerve is working with digital pulses in groups, right up the computer boys' street.

The book starts out with some photochemical details of the eye, and proceeds to the electrical activity of the retina and the transmission system to the brain. Visual acuity and threshold, and the signal-to-noise ratio of the eye is discussed. Chapter VII is real meat for BATCs. Entitled "Colour Vision" it discusses the pros and cons of the possible methods of trichro--matic vision, and the steps that are being taken to determine the answer positively.

A knowledge of anatomy or physiology is not essential; there are lots of technical terms but they are explained in turn or can be inferred easily. The experimental details are not given - do you know how to fold the retina of a frog's eye in half? The author is very careful to distinguish between facts and hypotheses, and it is a thoroughly absorbing book. I class it with the TV Engineering series of BBC books. Please buy it or borrow it. -M.B

CAMERA TUBES

A small stock of Vidicon tubes at £5 each is now held by the club. These are used tubes but in good working order. They have all been rejected for minor defects such as spots or uneven background shading. Enquiries to John Tanner, c/o Editor CQ-TV,

4 Innwood Close, Shirley,
Croydon, Surrey.

London U.H.F. Convention, May 1963

Unfortunately inadequate time prevented suitable arrangements for aerials on the roof of the Kingsway Hotel for an off-the-air demonstration but the display of David Mann's TV transmitter and Mike Cox's transistor camera in operation aroused some interest. PAØCOB, G3NOX/T, OUO/T, OPB/T, OUH/T, NDT/T, G2WJ/T and G3GDR/T were there together with many others who enjoyed a most interesting day.

FRONT COVER photograph shows Chris Makins operating John Tanner's 3" Image Orthicon camera at the European Cars demonstration in March.

MEMBERS ARE REMINDED THAT ......

ALL SUBSCRIPTIONS SHOULD HAVE BEEN RENEWED

...... ON OR BEFORE JANUARY 1st.

SLOW SCAN TV STANDARDS

By M. Barlow

I may be unusually dense, or it may be that I have not read CQ TV with my usual care, but I seem to have missed some important points to do with Slow Scan TV. As this is such an interesting field, being concerned with video tape recording and bandwidth conservation, I think the bare bones of the notes by Messrs. Plowman and Macdonald should be expanded. In this way we can all understand what they are trying to do, and possibly be a bit more constructive about it.

Basically the problem is to find a way of compressing the bandwidths of a normal video signal so that it may be passed through audio channels, either in tape recorder or radio link equipment. Video bandwidth can be compressed in three general ways:

1. By elimination or information redundancy.
2. By sacrificing picture quality.
3. By exchanging bandwidth for time.

The first is very complex, since it depends on using the fact that there are only minor differences between successive lines and successive fields, and also that the brightness variations along a line are not random. A fair amount of circuitry is involved in removing the redundancies and in restoring the information at the receiver. It is possible to obtain a 7:1 reduction in bandwidth in this way.

The second method involves sacrificing definition in the interests of speed. Tests show that a 405 line signal of nominal 3Mc/s bandwidth is still usable when the bandwidth is reduced to 1 Mc/s; i.e., a factor of 3:1.

The third method, upon which the whole Slow Scan system is based, depends on slowing down the information rate in just the same way as slow-motion photography. If a given TV picture, originally scanned in 1/25 second, is slowed down to a repetition rate of once per second, then the bandwidth required will be reduced to 1/25 of its previous value. The picture speed can be doubled by interlacing if required at no cost in bandwidth.

How Much Bandwidth is Available?

Messrs. Plowman and Macdonald have suggested some standards, and it is instructive to repeat the calculations that they must have performed to reach these figures.

A normal amateur radio channel should have a bandwidth of 300 c/s to 3000 c/s to the -3 db points. Using a long-persistence CRT such as the 5FP7 to display the picture, the maximum picture repetition period usable is about once every six seconds. If the radio picture was recorded on a standard tape recorder at its slowest speed, it could be played back (on most recorders) at 4 times this speed; i.e., 3-3/4 ips to 15 ips, etc. The tape recorder bandwidth would have to extend to 12 Kc/s, which is easily obtained with modern recorders. The displayed picture would then be repeated once every 1½ seconds, which is of much more interest than the once every six seconds required for direct display of the radio picture. There is thus quite an advantage in recording the radio signal slowly and playing it back fast, and this helps determine the standards.

AM or FM?

Some tapes suffer from changes of level, or complete "drop-outs", and if an amplitude modulated system (normal tape recorder method) is being used, the picture will suffer. If the tape speed is high and the scanning rate low, the interference will be less apparent than might at first be thought. Mr. Plowman's results would be of interest here.

By using an FM system, changes of level can be overcome by amplifying and limiting in the usual way, although drop-outs will still be apparent.

Since signal-to-noise ratio is not likely to be a difficulty, it is possible to use a narrow-band FM system whose bandwidth is no greater than the AM system.

Choice of Standards

The available transmitter modulator bandwidth is 2700 cycles, starting at 300 c/s. However the actual video modulation contains components right down to D.C., and, because of the Slow Scanning being employed, the L.F. components are of even more importance than for fas-scan systems. Since no components below 300 c/s can be handled by the transmitter modulator, it is necessary to employ a subcarrier, and to modulate this with the video signal.

The middle of the base band is (300 + 2700/2) cycles; i.e., 1650 cycles. This should be the subcarrier frequency for normal double side band modulation or for FM of the subcarrier. The video band-width permissible would be 2700/2 = 1350 cycles.

Now for equal horizontal and vertical definition and a 1:1 aspect ratio,

$$\text{Bandwidth} = \frac{(\text{number of lines})^2}{2\text{x picture period}} \quad \ldots\ldots(1)$$

Taking B = 1350, picture period = 6 seconds, the number of lines per picture is about 127, and the required line frequency is 127/6 = 21 cycles/second. The precise picture period is unimportant, but it may be convenient to obtain the line frequency by simple division from the mains frequency. There is no compulsion about this, for it may be simpler to make a mechanical pulse generator. If we take 1/25 second as the line period (for 50 cycle mains) and 120 lines to the picture (non-interlaced) the picture period becomes once per 4.8 seconds, and the bandwidth required is 1500 cycles. There will therefore be a slight loss of horizontal definition if the bandwidth is restricted to 1350 cycles.

For 60 cycle operation and 1/30 second line period the loss of definition will be worse, but at 1/20 second full definition is retained at a picture repetition rate of once per 6 seconds. Note that equation (1) above is for definition equivalent to 3 Mc/s bandwidth on a 405 line system; i.e., extremely good. If we agree to divide the video bandwidth by 3, the picture repetition rate could be increased by 3 times, or the number of lines increased by 1.7 times.

This is presumably how Mr. Macdonald came to his round figures of 2 Kc/s sub-carrier, 1 Kc video bandwidth, 120 line picture every 6 seconds. The same figures apply to Mr. Plowman's FM system.

Vestigial Sideband Operation

For AM operation only, the video bandwidth can be considerably increased by moving the sub-carrier to one end of the modulator pass-band and using vestigial side-band transmission.

BBC 405 line transmissions are 3 dbs down at -0.75 Mc/s and +2.75 Mc/s for a 3.1 Mc/s nominal video bandwidth; i.e., from -25% to +90% of the video band-width. The total pass-band is therefore 115% of the video bandwidth. Taking the original 300 c/s to 3000 c/s pass-band, the video bandwidth available now becomes (100 x 2700) 115 = 2350 cycles, and the sub-carrier would be at 3000-(15 x 2700/115) = 2650 cycles (for vestigial upper side-band).

The bandwidth has been increased by 2350/1350 times = 1.74 times, so the picture period could be reduced by this amount, or keeping this at once per 6 seconds, the number of lines could be increased to 120 x 1.74 = 160 approximately. This improvement is well worthwhile, as 120 lines to the picture gives a rather poor result. By introducing the factor of 3 again, we could go to 275 lines to the picture.

It is suggested that a reasonable compromise would be to use a 180 line picture repeated once every 3.2 seconds for a line frequency of 50 cycles, and a 180 line picture repeated every 2.6 seconds for a line frequency of 60 cycles. The horizontal definition will be reduced by a factor of 2.1 (50 cycles) or 2.6 (60 cycles) relative to the vertical; i.e., the horizontal definition will be 85 lines or 70 lines. The sub-carrier should be at 2650 cycles.

For tape recorder only operation, the sub-carrier would be at 10600 c/s and the 180 line picture would be repeated once every 0.8 or 0.65 seconds, with reasonable entertainment value.

Writing down the derivation of these figures enables the reader to understand how they are obtained, and to perform his own calculations of picture and line speeds for various bandwidths. The use of bandwidth restricting techniques is of the greatest importance, and possibly the amateur may yet find an improved system.

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SECAM - A EUROPEAN COLOUR TELEVISION SYSTEM

by M. H. Cox.

1. A few years ago a novel colour television system was demonstrated by engineers of the Conpagnie Francaise de Television to an audience in London: the pictures originating in Paris. This system, called the Secam system, was invented by M. Henri de France, and with Gallic logic the name is short for 'SEQuence A Memoire'. The basic premise of the system is that only one piece of colour information is transmitted at any instant; and in fact the two necessary pieces of information are transmitted on alternate lines on a subcarrier. At the receiver these may be obtained simultaneously by means of a storage or delay line of time equal to the line period of the television system. The original system used amplitude modulation of the subcarrier, but the need of a large amplitude subcarrier to cope with the negative peaks of the modulating colour difference signals made the compatability of the system poor, coupled with the necessity of maintaining the unmodulated subcarrier amplitude constant to one per cent. Accordingly, frequency modulation of the subcarrier is now employed with all the advantages of F.M. operation, such as insensitivity to phase distortion, and amplitude frequency distortion. The present version of the system has been evolved with the co-operation of broadcasting organisations in Europe and will now be considered in some detail.

2. Encoding of the Signal

The gamma corrected primary signals are matrixed exactly as for the NTSC system to form the luminance signal and the two colour difference signals.

$$E'_Y = 0.30E'_R + 0.59E'_G + 0.11E'_B$$

where E'_R, E'_G, E'_B are the gamma corrected primary colour signals.

The transmitted colour difference signals are:

$$(E'_R - E'_Y) \quad \text{and} \quad (E'_B - E'_Y)$$

and in the receiver a green colour difference signal $(E'_G - E'_Y)$ is obtained from the relation

$$0.59(E'_G - E'_Y) = -0.30(E'_R - E'_Y) - 0.11(E'_B - E'_Y)$$

By adding E'_Y to the three colour signals, the original E'_R, E'_G, and E'_B signals are obtained.

The two colour difference signals are used to frequency modulate the subcarrier in a line alternation sequence such that line 1 will be modulated by the red colour difference signal, line two by the blue colour difference signal, line three by the red again and so on. In practice to reduce visibility of luminance components in the region of the subcarrier frequency, the colour difference signal $(E'_Y - E'_R)$ is transmitted. This merely involves reversing the polarity of the $(E'_R - E'_Y)$ signal before the sequential switching process.

After switching line by line, the colour difference signals are band limited to approximately 1.5 Mc/s, and undergo pre-emphasis of the form shown in fig.1 such that the response at 1 Mc/s is +14dB compared with the response at 30Kc/s. The signal is then amplitude limited and clamped to establish a black level before going into the modulator. The modulator has an undeviated frequency of 284 times the line frequency, which is 7.8125 Kc/s higher than the NTSC subcarrier frequency of 4.4296875 Mc/s. A phase discriminator is used to compare the undeviated carrier frequency with the local reference frequency. The deviation used is ± 350 Kc/s for 75% amplitude, 100% saturation colour bars, with a peak deviation of ± 750 Kc/s due to the pre-emphasis mentioned above, and such that positive signals increase subcarrier frequency.

In order to achieve good compatability, it is necessary to break up the dot pattern produced by the subcarrier. This can be achieved by reversing the phase of the subcarrier for one line in every three, and also every other field. This breaks up the field to the extent that SECAM is as compatible as NTSC. After phase switching, the subcarrier signal is band and amplitude limited before being amplitude modulated to reduce 'Cross Colour', that is components of luminance within the subcarrier or chroma pass band which give spurious colour components in the output of the discriminator in the receiver. If during the presence of such a component the subcarrier level is increased, the 'capture' effect in frequency modulation encures that only the subcarrier produces any output from the discriminator and the luminance or 'Cross Colour' component is suppressed. The modulating signal is derived by passing the luminance signals through a chroma band pass filter. The output consists only of luminance components within the chroma pass band. These components are rectified and the resulting envelope used to amplitude modulate the subcarrier. The order of increase of subcarrier is 6dB.
It is interesting to note that no such 'Cross Colour' reduction is possible with the NTSC system.

Yet another form of modification is applied to the subcarrier before it is added to the luminance signal. In order to achieve compatability a subcarrier amplitude of only 0.14v for a video signal of 0.7v (without syncs) is added to the luminance signal, but this amplitude is not sufficient to give good noise immunity for wide deviations, that is for saturated colours. A shaping circuit, picturesquely called the 'anti-cloche' or 'mise-en-forme' increases the subcarrier amplitude as the deviation increases and the law is that for ± 350 Kc/s deviation either side of 4.43Mc/s, the subcarrier amplitude increases by 6 dB, rising to a maximum increase of 10 dB for ± 750 Kc/s deviation. Fig 2 shows this characteristic.

It now remains to blank the subcarrier before adding it to the composite luminance signal. Because of the lower bandwidth of the chroma circuits there is a time delay through them and the luminance signal must be delayed by this amount before the subcarrier is added.

Before leaving the encoding side of the system, a word must be said about the synchronisation of the line switching sequence. An identification signal is transmitted during the vertical blanking interval on lines 11-15 or 324-328 and consists of modulated subcarrier, but no corresponding luminance signal. The modulation of the subcarrier consists of a positive going sawtooth signal during the line when blue difference is normally transmitted, and a negative going sawtooth signal when red difference is normally transmitted. The use of this signal will be apparent later.

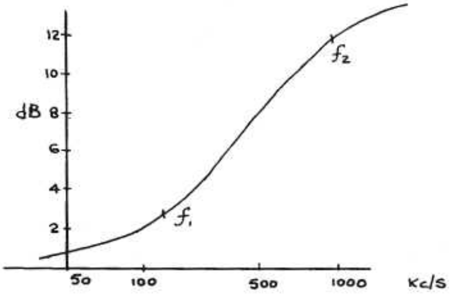


Fig. 1 Pre-emphasis curve.

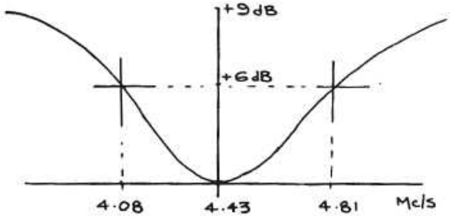


Fig. 2 Anti-Cloche curve, or mise-en-forme.

Fig 3 shows the block diagram for a SECAM encoder as is used on the assessment of the relative merits of SECAM and NTSC for a European colour system.

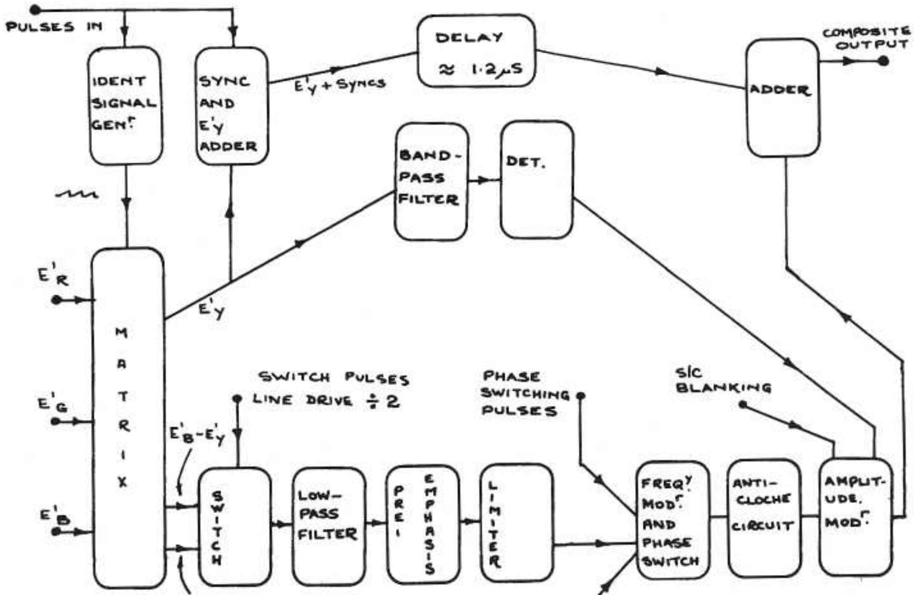


Fig 3a. SECAM CODER

3. Decoding

Of more immediate practical interest to the amateur is the receiver. It is proposed only to deal with the SECAM decoding circuits, that is, circuits to deliver a volt or so of ($E_R - E_Y$) and ($E_B - E_Y$). The rest of the receiver follows standard colour television practice and is well written up in the literature.

A low level composite signal is taken from the detector or first video stage of the receiver, and passes through a band pass filter, pass band 4.43Mc/s ± 1 Mc/s. The subcarrier signal is now subjected to the inverse of the 'mise en forme' characteristic; this time called the 'cloche' circuit.

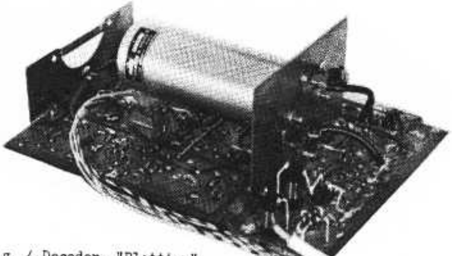


Fig. 4 Decoder, "Plattine" showing 64us delay line.

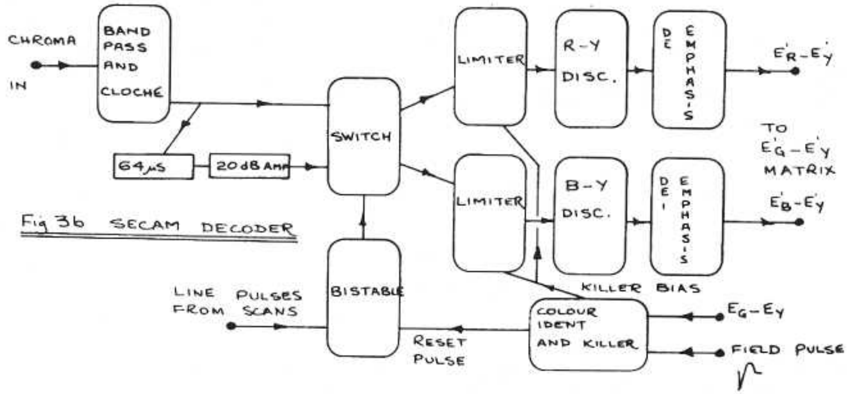


Fig 3b SECAM DECODER

After this the subcarrier is devided into two paths. One feeds one input of a commutating diode switch, while the other path includes a 64 uS ultrasonic delay line and an amplifier to make up the loss in the delay line, terminating at the other input of the diode switch.

The ultrasonic delay line is an extremely simple device - a slab of quartz or glass and two transducers - usually barium titanate. Originally the lines used internal reflections within the quartz but latest developments use a straight rod with a transducer at either end. The size is some 6" long and ¾" square, the bandwidth of the line is 4.43 ± 1 Mc/s and the insertion loss 20 dB between 50 ohm terminations. Development work is proceeding in many countries with a view to reducing the price of the line, which is now quoted at about £2-10-0d each in quantity. Fig 4 shows a 'chroma plattine' as these decoding modules are called; the aluminium can is an early line by Quartz et Silice. The amplifier used to make up the insertion loss of the delay line consists of a grounded emitter transistor amplifier and is consequently simple and reliable.

Consider how the direct and delayed paths are used to ensure that despite transmission of colour difference signals in sequence, they become available simultaneously at the decoder output, although the vertical resolution in colour is approximately halved. During the second active line, suppose that ($E_R - E_Y$) is being transmitted, then by definition of the line sequence, the previous line was an ($E_B - E_Y$) line.

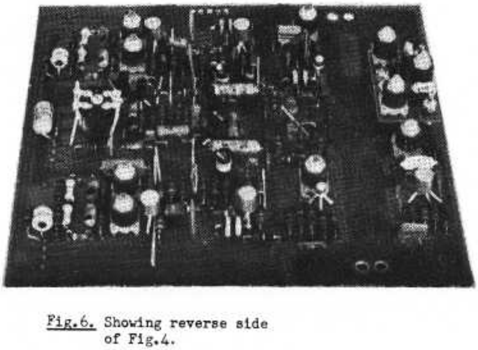


Fig.6. Showing reverse side of Fig.4.

Then during line 2, ($E_B - E_Y$) is emerging from the 1 line delay line. Hence at the inputs to the commutating switch, the two difference signals are present together. During the thirs line, ($E_B - E_Y$) is being transmitted and ($E_R - E_Y$) emerging from the line.

By operating the commutating switch at the end of each line during line blanking time, each colour difference signal is fed to its appropriate limiter and discriminator. The switch is driven by a bistable circuit which is triggered by pulses from the receiver line time base.

Some 20 to 40 dB of limiting is used on the subcarrier signal before the discriminator, which is usually of the Travis type . Each discriminator uses germanium diodes, and is tuned to give zero output at 4.43 Mc/s, with the peaks at least 1 Mc/s either side of this. The output of the discriminator is of the order of 1 volt peak to peak.

It remains only to consider the circuit which resets the commutating switch to the correct sequence The identification signal transmitted during the vertical interval has opposite polarity on red to that on blue colour difference lines. Thus, should the receiver switch connect the blue difference signal to the red discriminator, the polarity of the output during the inde
during the identification period will change. This is made to operate a reset circuit, and a colour killer circuit if no identification signal is present. It is necessary to gate out the identification signal, and this is simply achieved by using the vertical flyback to ring a tuned circuit. The first peak of the ring provides a gating pulse some ten lines after the start of vertical syncronisation. Fig 5(a) shows the identification signal and 5(b) the gating signals.

The gating signal and the signal from one discriminator are added together, and applied to the free base of a Schmitt trigger circuit. The bias on the Schmitt is adjusted so that the device turns over during the negative peak of the gating signal and back on the positive overswing. The output is a negative pulse of duration approximately that of vertical blanking. If the identification signal is negative going, it prevents the Schmitt going back after the negative part of the gating pulse

The potential at the output of the Schmitt remains negative, and this negative potential biasses on the transistors feeding the discriminators. If, however, there is no identification signal, the Schmitt produces a negative pulse at its output, which turns on the discriminators during the vertical interval but off during the active field time. If the identification signal is positive, then the Schmitt produces its negative pulse, and the trailing edge of this pulse is passed to the bistable which drives the commutating switch. This extra pulse switches the bistable over and sets the phase sequence right. On the next field the identification signal will now be positive and the Schmitt will give a continuous negative output which will turn on the discriminators and produce a coloured picture.

The description may make the SECAM receiver sound rather complicated, but the latest versions of the 'Plattine' shown in Fig 6 has only 11 transistors of the OC171 and OC44 type and some general purpose crystal diodes. Fig 7(a) shows the circuit of a liliter and discriminator, while 7(b) shows the circuit of a Schmitt identification and colour killer circuit. Fig 8 shows the circuit of a commutating switch and bistable circuit, and Fig 9 a band pass filter with a bandwidth of 2 Mc/s and centre frequency of 4.43 Mc/s.

The SECAM system is capable of giving extremely good colour pictures, and has the merit of being insensitive to differential gain and phase distortions in the transmission path. This means that standard monochrome inter city links, transmitters and video tape machines as used by the broadcasting authorities today may be used with little or no modification. Despite the apparent complication of the delay line, the receiver is a simple one, using standard techniques and the lay viewer should find it easy to tune in a good colour picture under home conditions.

This system is now under active investigation, along with the NTSC and PAL systems, by the European Broadcasting Union who are to recommend a colour system to the CCIR for use in Europe.

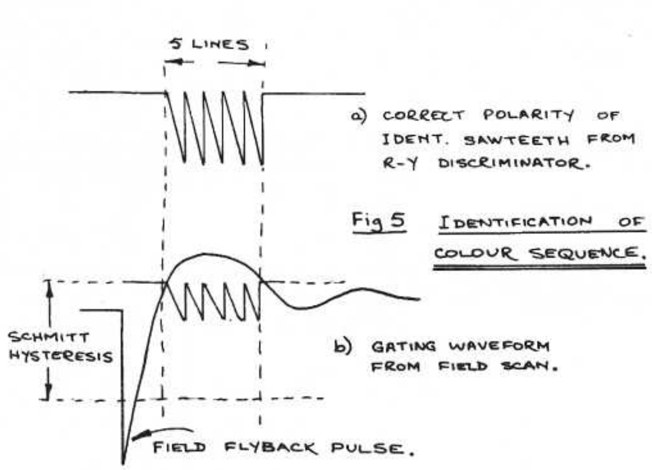


Fig 5 IDENTIFICATION OF COLOUR SEQUENCE.

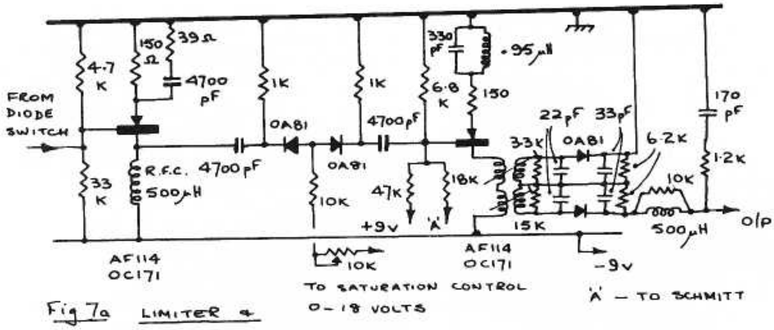


Fig 7a LIMITER & DISCRIMINATOR

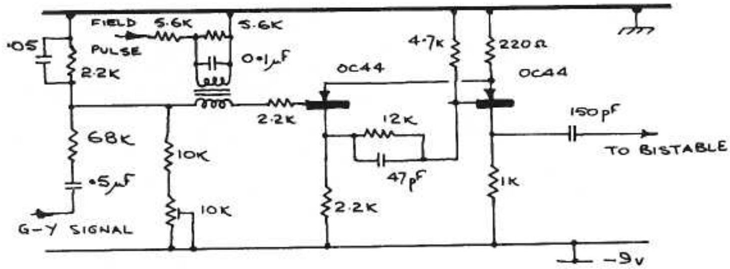
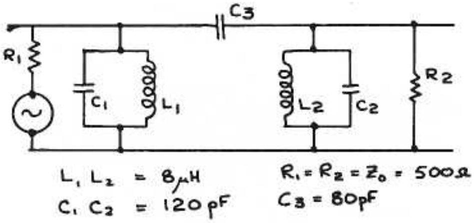
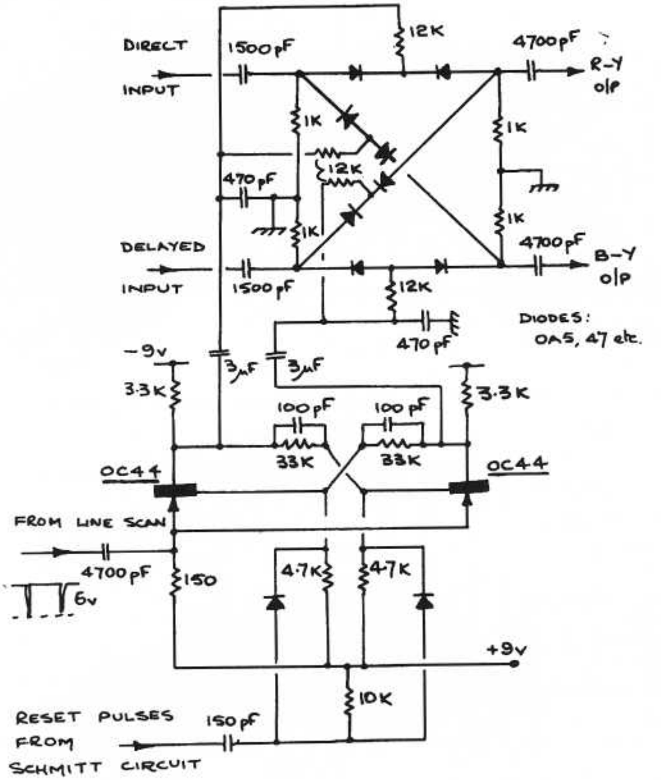


Fig. 7b. Colour Synchronising & Killer.

Fig. 9. Band Pass Filter,

f = 4.43 Mc/s ± 1Mc/s





Grateful thanks are extended to M. Henri Peyroles, Directeur General of C.F.T., Paris, for permission to describe the system and circuitry, and to ABC Television Limited for permission to publish this article.

European Cars Demonstration - March 1963

Four Image Orthicon and one Vidicon together with a Monoscope and all the associated monitoring, mixing and distributing equipment were in use at the special demonstration arranged by John Ware. The main workshop of European Cars Ltd. was taken over for two days and a complete studio set up - the idea being to show off a new car over the medium of Television, and thanks to Brian Brew and John Ware this was made into an opportunity for a BATC grand meeting. Perhaps for the first time cameras were used to put over a continuous show for 1½ hours, the programme containing various light entertainment features besides displaying the new car. John Tanner was producer with Martin Lilley handling technical arrangements, Mike Cox was floor manager assisted by Bob Tebbutt. Cameras in use were from Mike Cox, Jim Brett, Terry Lane, Martin Lilley and John Tanner. Jimmy Hunter handled the sound and the whole production was assisted by many other members of B.A.T.C. Final vote: a most enjoyable two days, but the effort in organisation and the sheer hard work made it an event unlikely to be repeated very often!

G3NDT/T

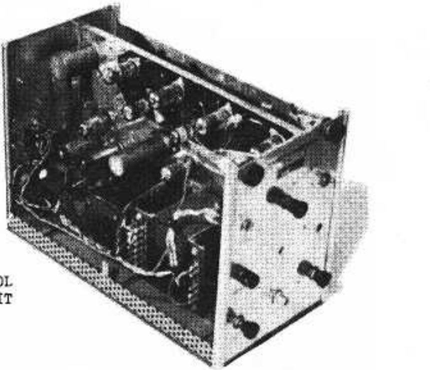
photo page 23

A FLYING SPOT SLIDE SCANNER

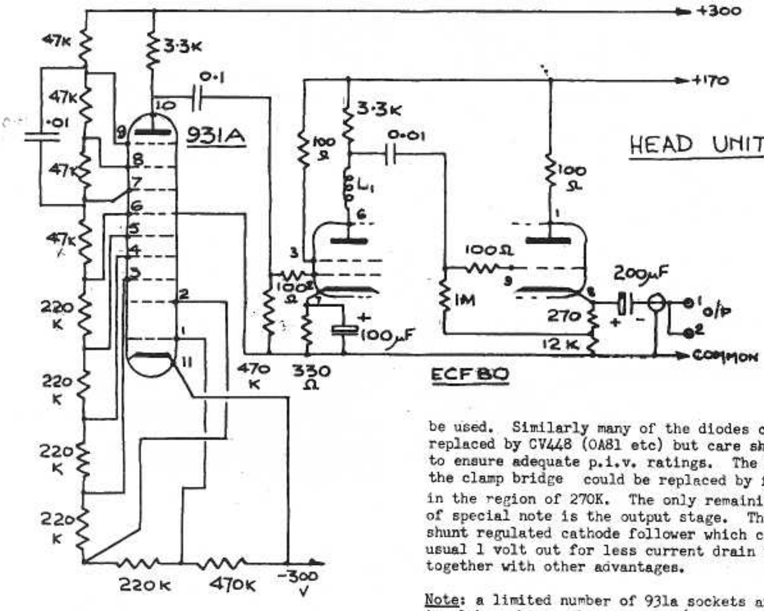
by M. H. Cox.

There seems little point in considering the circuit valve for valve since the system is straightforward and uses no special tricks. However, one or two general comments will outline the ideas behind the design and the method of using the unit.

To make a simple Flying Spot Scanner this unit was built to be used with a domestic TV set as the scanner with a second TV set as the monitor. To make the unit suitable for use with other picture sources standard syncs and blanking are used rather than rely on the random interlace system used in the well known Bill Still scanner. In operation two R.F. distribution units are needed if the TV receivers are to be used without modification. One of these is used to feed syncs alone to the 'scanner' set, the other feeds the output video to the picture display set. Separate channels must be used to avoid patterning!

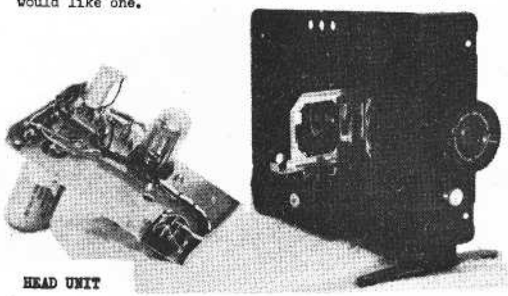


CONTROL UNIT

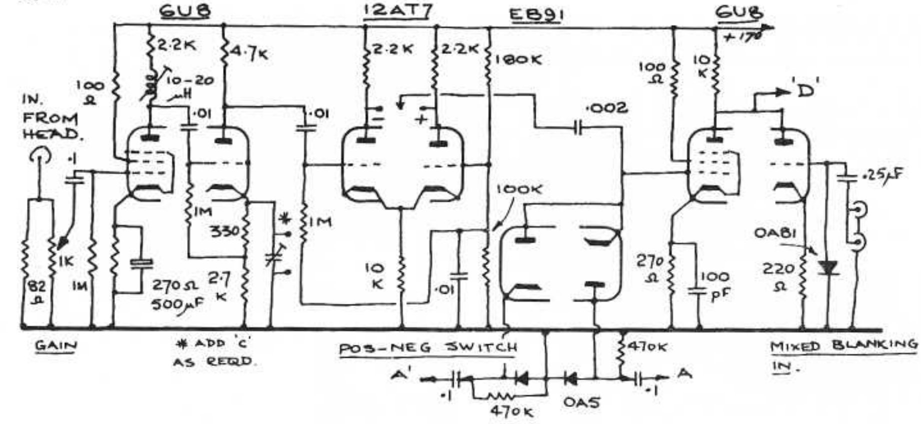


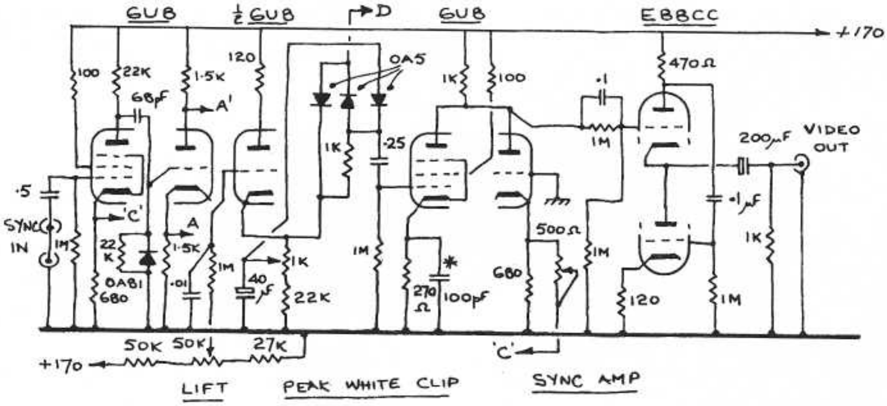
For simplicity in the optical system, and to enable standard 35mm slides to be used the head amplifier unit is built in to a 35mm slide projector used backwards - the lamp is replaced by the 931a and associated circuitry, and the lens used to focus the scanning raster on to the slide. The output from the head amplifier is sufficiently low impedance to allow at least 10 ft of cable to the control unit. The absence of sophisticated streak removing circuits and black stretch circuits limits the application of the scanner to captions or pictures with a limited grey scale, however, for captions the black and white clippers enable the unit to present very clean results. Positive and negative slides may be used - the switch being made between the anodes of a cathode coupled pair to keep the gain constant. Note that although OA5 diodes were used in the original there is no reason why EB91 valve diodes should not be used. Similarly many of the diodes could be replaced by CV448 (OA81 etc) but care should be taken to ensure adequate p.i.v. ratings. The OA5 diodes in the clamp bridge could be replaced by fixed resistors in the region of 270K. The only remaining feature of special note is the output stage. This uses a shunt regulated cathode follower which can give the usual 1 volt out for less current drain from the H.T. together with other advantages.

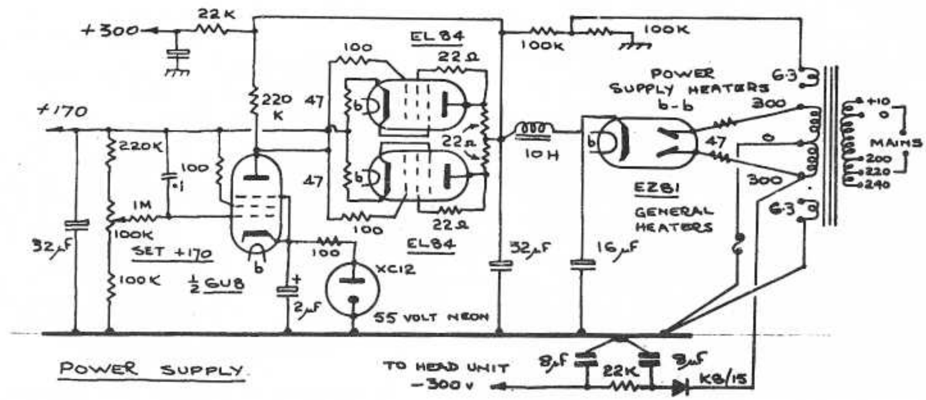
Note: a limited number of 931a sockets are available to club members. Please send 1/- to the Editor if you would like one.



HEAD UNIT


6U8
12AT7
EB91
6U8
+170
IN. FROM HEAD.
GAIN
* ADD 'C' AS REQD.
POS-NEG SWITCH
MIXED BLANKING IN.
'D'
OA81
OA5
A'
A
2.2K
4.7K
2.2K
2.2K
180K
100 Ω
10 K
10-20 µH
·01
·01
·002
·25µF
100K
1M
1M
330
1M
1K
1M
82 Ω
270 Ω
500µF
2.7 K
10 K
·01
270 Ω
100 pF
220 Ω
470K
·1
470K


6U8
½ 6U8
D
6U8
E88CC
+170
OA5
SYNC IN
VIDEO OUT
200µF
'C'
A
A'
LIFT
PEAK WHITE CLIP
SYNC AMP
+170
50K
50K
27K
100
22K
1.5K
120
68pF
1K
100
470 Ω
·1
1M
1K
·25
·5
1M
22 K
OA81
680
1.5K
·01
1M
40 µF
1K
22K
1M
270 Ω
100pF
680
500 Ω
1M
120
1M
·1µF
1K


POWER SUPPLY
+300
22 K
+170
EL84
EL84
100
22 Ω
22 Ω
22 Ω
47
47
100
220 K
220K
·1
100
1M
100K
SET +170
100K
½ 6U8
32µF
2µF
100
XC12
55 VOLT NEON
10 H
EZ81
POWER SUPPLY HEATERS b-b
GENERAL HEATERS
6.3
6.3
300
300
47
0
100K
100K
32µF
16µF
MAINS
+10
0
200
220
240
TO HEAD UNIT -300 v
8µF
8µF
22K
K8/15

A FLYING SPOT TELECINE SYSTEM FOR 16mm FILM.

Summary:- A system using a single lens combined with modified scan circuits to achieve the effect normally achieved with twin optical paths.

With any form of telecine it is necessary to "arrest" the motion of the film while the information on one frame is read off, then to move the next frame into position and then to examine this frame. In vidicon telecines this is relatively easy as it is possible to utilise the storage properties of the vidicon tube, i.e. by opening the shutter for a short period, then closing it and relying on the storage of the tube to retain the entire picture while it is read off by the scanning beam, and using this time that the shutter is closed to move the next frame into position.

In the operation of a flying-spot talecine there is no inherent storage property, (thus flying-spot telecines are refered to as non-storage systems). Therefore the only alternative is to use either continuous motion or to pull the film down rapidly in every other field blanking period. The latter of these two alternatives proves unsuitable due to the complex mechanics involved and sheer wear on the film if repeated many tines. Thus continuous motion must be employed in any successful flying-spot telecine equipment.

If then continuous motion is to be used some means must, therefore, be found of ensuring that the scanning raster is registered, on the continuously moving film, in the correct place. Of the methods for achieving this the Polygonal Prism method is undoubtedly the simplest, requiring neither motor control nor complex lens systems. The only problem is obtaining or constructing the prism required. If facilities are availabe it is true that one may be made of Perspex, but this gives only an approximation to the required refractive index of 2. The other system in wide use at present is to use twin optics and a shutter but again this requirees complex optic and mechanics if good results are to be obtained.

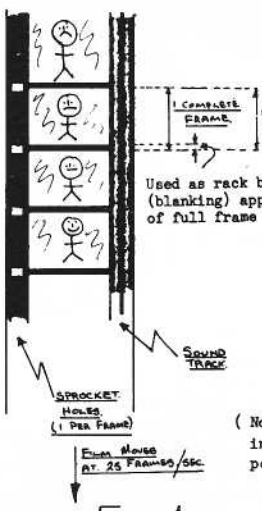
The system about to be described has one main disadvantage, in that it requires motor control circuits. Given the choice though many potential constructors of a telecine system would probably prefer the use of a few extra valves rather than the complex optics and mechanics mentioned above.

Before continuing with the description it is essential to realise the main thing that it is required to achieve, namely that as the film picture rate is 25 frames/sec and as the television frame of the same repitition rate consists of two separate fields, it is therefore necessary to ensure that each frame of the film is scanned by both fields of the television frame.

First consider a few of the fundamental parameters of both the film and the television waveform; these it will be seen are required latter.

Comparing the percentage of time used for field blanking and the amount of "space" used on a film frame (16mm film) as a rack bar (gap between frames), it is found that the ratio is approximately 7% and 5% respectivly. If therefore the film were pulled past a fixed point at a constant speed of 25 frames/sec. a diagram showing picture and blanking information against time could be drawn. (see Fig.1)

Frame Layout for 16mm. film.



The diagram shows the approx. layout of a 16mm film frame, and also indicates the % of space and time used for blanking.

(Note this diagram also indicates blanking as a percentage of frame length.)

FIG. 1

Similarly a diagram can be drawn indicating television waveform information against time. (see Fig. 2)

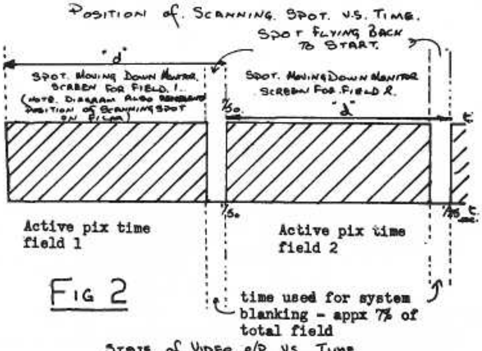
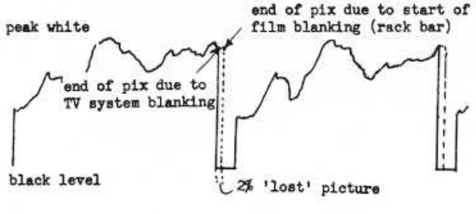


FIG 2

'd' represents the distance scanned in 1/50 sec and is made to equal height of a frame which is 19/64"

If now it can be arranged that each film frame was scanned completely by each field of the television frame, (i.e. each frame is scanned twice) that is the distance "d" in Fig 2 is such that the spot travels 12/64" on the film in 1/50 sec then the requirements of the system have been met, (see Fig 3) with the loss of some 2% of each complete picture due to system blanking.



Video output for two consecutive fields, (neglecting line components)

FIG. 3

Now since the film is moving at 25 frames/sec. it is quite a simple matter to ensure that the first film frame is scanned in its entirety by field 1 of the television frame, simply by having a raster of suitably adjusted aspect ratio (in this case a ratio of 4 : $1\frac{1}{2}$ is required see appendix A) thus at the end of scanof field 1 the resultant motion of both the spot and the film have suceeded in completely scanning the frame. It is now necessary to scan the same frame a second time. This is done in the twin lens systems by closing the first optical path and opening a second one which is aligned to project the second field onto the same frame. But considering what happens if the spot after completion of the first field continues on its course, instead of flying-back, it is found that the second field is laid down beside the first to give a complete scan (after 1/25 sec) of aspect ratio 4:3 and if flyback occurs at this point, the raster will have a repetition freq. of 25 cps. But what is more important is the fact that the second field will be positioned correctly on the same frame of the film. (see Fig 4)

(The diagram is best illustrated by cutting a strip of paper and marking on it lines spaced the same distanse apart as the width of the gate obove. Then sliding this piece of paper which represents the film along the dotted, keeping the paper vertical all the time. If at the same time a pencil is used to folow the point on the paper where the solid line (representing the scanning spot) intersects the the edge of the paper it will be seen that the pencil point traverses each frame twice ... as required.

The diagram above is a graph showing vertical displacement against time. Vertical displacement is shown on the left hand vertical axis, time is represented horizontally. All directions of movement are at the actual gate. The dotted lines sloping downwards from left to right represent the downward movement of the film, whereas the solid line sloping upwards from left to right represents the scanning spot movement. It can be seen that the scanning waveform is a 25cps sawtooth. For convenience consider the situation half-way through a scanning cycle. At this point the film is inserted in the gate such that the first film frame is half-way down the gate, the scanning spot proceeds to move off up the gate as the film moves down and at the end of 1/50 sec it will be noted that the spot has completly traversed the film frame once, and the spot is at this point at the very top of the gate, the spot now flies back to the very bottom of the gate and NOTE also at the top of the first frame again. The spot now continues to move upwards towards the centre of the gate as the film moves down until after a futher 1/50 sec. the spot reaches the centre of the gate and the bottom of the first frame after scanning frame 1 a second time, at this point the spot continues on its journey and starts to scan frame two for the first time. The above process is then repeated for fields one and two of film frame two.

The mention earlier of the fact that 2% of each film frame is lost in blanking could only be overcome by having a step in the scanning waveform and adjusting the height of each half of the scan and the separation between them, but to avoid loss of vertical resolution due to the effects of misregistration of the raster on the film, requires exceptional stability of the step in the waveform and the advantages attained by seeing this 2% do not seem to balance the extra electronics involved.

Notes: Observe at the following points.

1) spot is at top of first frame
2) spot is at bottom of frame 1 after 1/50 sec. spot now flies back to top of frame 1
3) spot now at bottom of frame 1 after scanning it a second time. spot now starts frame 2 from top
4) now at bottom of frame 2 spot flies back to scan a second time to complete the interlace. Then on to frame 3....

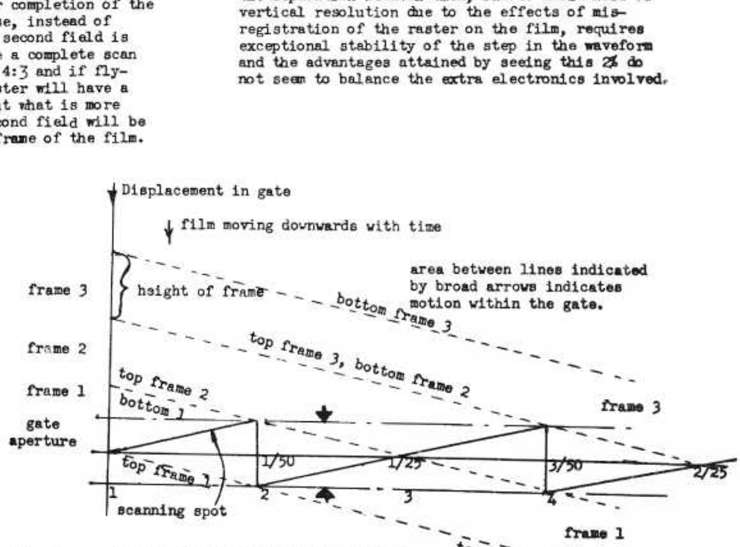


Fig. 4 Graph showing position against time of scanning spot and film in gate.

As can be seen from the rather long winded description above, the system relies on the accurate phase relationship between film and scanning motion being maintained. This is not so hard to achieve as it may sound at first, all that is requird is a source of 50cps accurately related in both frequency and phase to the speed of the film transport, and a second supply of 50cps at scanning requency and phase. These two reference signals are then compared in a phase sensitive detector so as to produce a D.C. output proportional to the phase error between the two signals, this error voltage is then used to operate circuits that will correct the error in film speed.

Since the rest of the electronics, with the exception of the 25cps field scan are the same as for a normal slide scanner, the rest of the article will be devoted to methods of drive motor control.

The method of detecting the phase error between the two above mentioned signals is to use a four diode gate which is opened by narrow pulses from one of the two signals and thus samples the instantaneous amplitude of a sine wave generated from the other source. Since we have already narrow pulses at field frequency in the form of field drives it would seem logical to use these as the gating pulses to sample a sine wave generated by, and related in phase to the film transport speed. (see. Fig. 5)

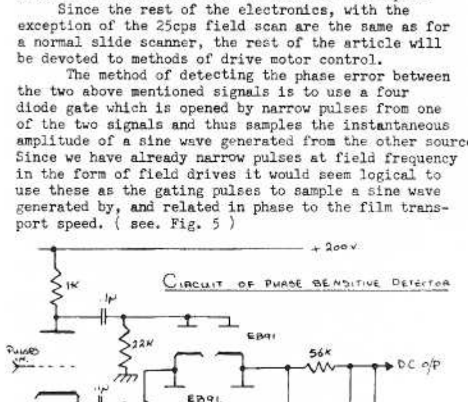
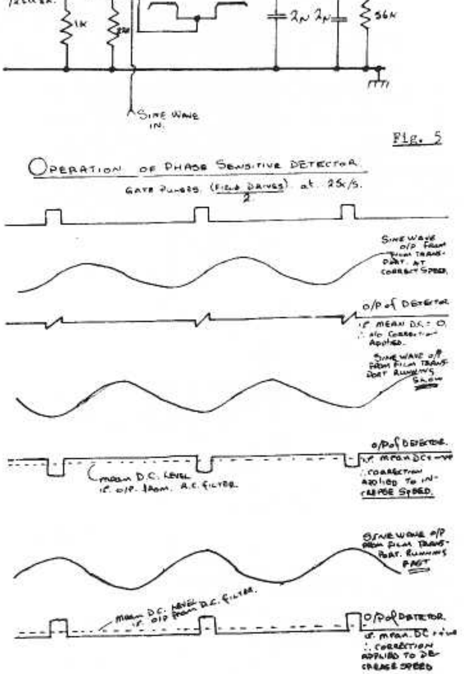


Fig. 5



Operation of four diode phase detector:- When paraphase pulses are applied to thepoints c & d in the polarity indicated above the four diodes conduct and thus connecting b to a and allowing the voltage present at a to be sampled by the point b. at b is a R.C. resivoir circuit which allows a D.C. potential proportional to the voltage at a to develop.

The problem is then that of obtaining 50cps (or as in this case scanning frequency is 25cps . a 25cps referencepulse supply will work just as well, therefore the gating pulses can be obtained from the output af the divide by two circuit driving the field scan circuit, see fig . 8.) this 25cps reference signal could be obtained from a small alternator driven from the main sprocket, but the chances are that a suitable generator will not be available. However all is not lost since with 16mm film there is a ready made source of 25cps in the form of sprocket teeth. The signal can be obtained by the use of a small pickup coil and a magnet. (the only proviso is that the sprocket must be of a magnetic material) As the tooth passes the pickup device the permeability of the magnetic is altered and thus so is the strength of the magnetic field and hence an emf. is induced in the coil, this after processing is the film speed reference signal. (this reference signal could also be obtained by the use of a half white half black disc and a p.e.c.)

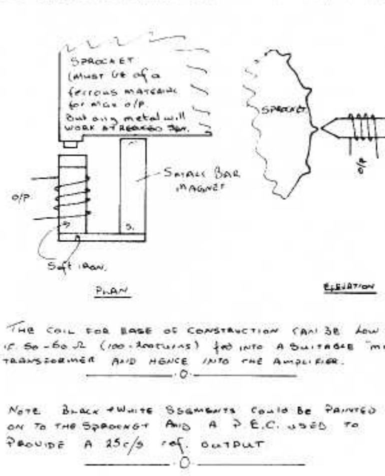
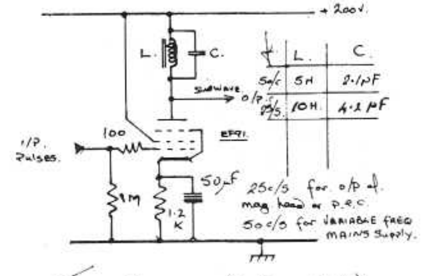


FIG 6

Since the output from the mag/headamplifier will be in the form of pulses it is necessary to convert the pulses to into sine waves for use by the phase comparator stage. This conversion may be accomplished by feeding the pulsesinto a tuned amplifier. (see Fig. 7)

The entire chain to obtain the D.C. control signal is shown in Fig. 8.



TUNED AMPLIFIER (50c/s – 25c/s).

FIG. 7

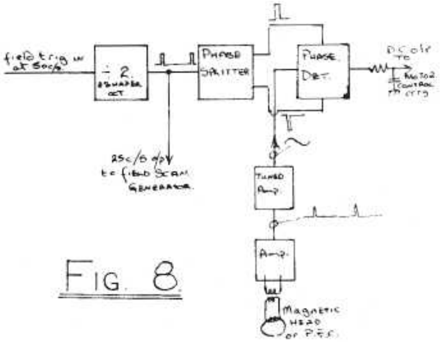


FIG. 8

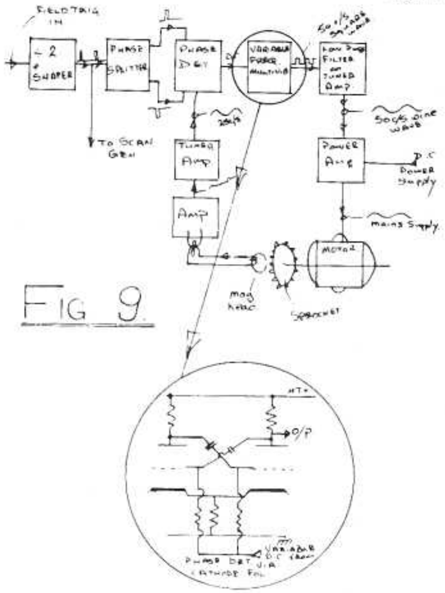


FIG 9

Complete arrangement of phase det and motor control variable freq mains supply

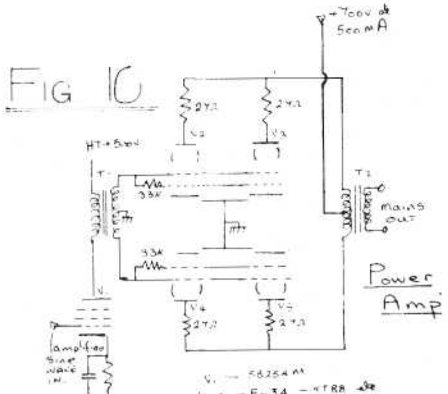


FIG 10

Power Amp

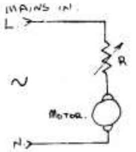
The above has enabled us to obtain a D.C. voltage dependent upon errors in the motor speed, and means must now be found of using this voltage to correct the motor speed. Of the ways of controlling the speed of a synchronous motor the most obvious is to vary the frequency of the power supplied to it. At 50cps the use of a reactor valve is precluded on the grounds that a large frequency swing is not possible. Fortunately the ordinary astable multivibrator can be frequency controlled by variation of the D.C. potential to which the grids are returned. The output of the multivibrator then has to be converted to a sine wave, and this can be done by passing the output via a low pass filter to remove all harmonics, or it could possibly be done by feeding the output into a tuned amplifier as described earlier .... the actual frequency swing is not very great so the tuned circuit could have quite a high Q and thus remove all harmonics. Having obtained the source of the variable frequency for the mains supply to the motor it must now be amplified to a sufficient voltage and power, and since for good film stability a reasonable size motor is required some 200 - 250 watts of power at 230 volts are going to be needed. This can be accomplished by the amplifier shown in Fig. 10 but, and here is the snag, all the output power is taken from the D.C. H.T. supply which means that one requires a "brute" of a power pack to run the motor. And it does seem a little futile to go from A.C. mains to D.C. and back again to A.C.

The output transformer could be a 350-0-350v mains transformer with the output taken from the original mains in terminals (the transformer must be able to handle the power involved) The input transformer could also be an ex-mains transformer.

So although the method works exceedingly well, for sheer economy if nothing else the system described below is to be preferred.

This second method works roughly on the principle that if the input power to a motor is reduced while the motor is on load it will inevitably slow down. Therefore before describing how the principle is applied it should be pointed out that the old motto " The Bigger the Better" does not apply here since if the motor is not operating near full load it will not slow down to the required extent when its voltage is reduced.

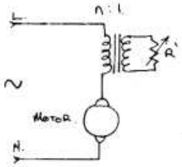
Fig. 11 shows the basic principles of the control system.



Increasing R causes a loss of power output from the motor and this if the motor is loaded will cause it to slow down.

FIG. 11

The same effect would be attained by the circuit shown in fig 12.



Z_{prim} = R in fig 11

$= n^2.R'$

n is made < 1

Fig. 12.

The R' of Fig. 12 is made electronically variable and is in fact a valve. The current flowing through the primary will induce a voltage across the secondary and this will cause the valve to conduct, when the anode goes +ve with respect to cathode and the current passing through the valve and hence the resistance offered by it will be a function of the voltage present between cathode and grid. Thus the effective primary impedance and hence motor power and speed can be controlled by the voltage on the grid of the valve.

ACTUAL MOTOR CONTROL CCT.

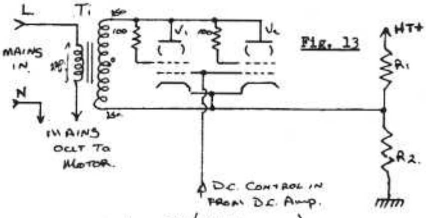


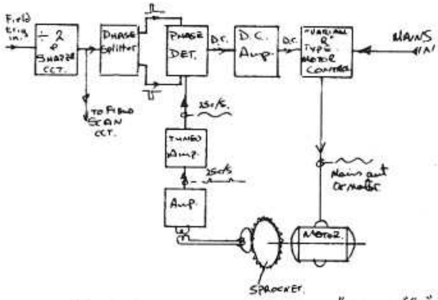
Fig. 13

V_1 & V_2 5B/254M.

R_1 & R_2 **Provide bias to V_1 & V_2 since the grids are D.C. coupled to the anode of the preceeding D.C. amplifier.**

T_1 is an old mains transformer.

Again the complete motor control system is shown. (see Fig. 14)



Complete arrangement using "VARIABLE R" TYPE MAINS Supply.

FIG. 14

DEREVATION OF COMPRESSED ASPECT RATIO RASTER.

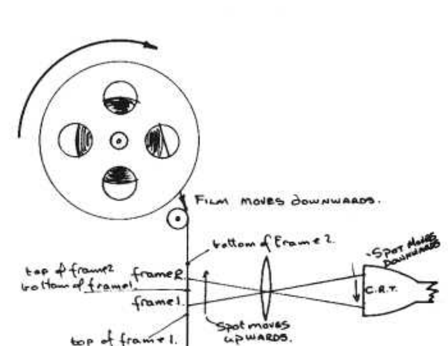


FIG. 15

Figure15, above shows the typical setup of the system. Consider for one field only; if suppose the raster consisted of a single horizontal line, since the film is moving at 25 frames per sec past the scan tube, then after 1/50 sec (when the entire frame should have been scanned once) only ½ of the entire frame would have traversed passed the scanning spot, thus it is necessary to impart some vertical motion to the spot ..... and it does not take any high powered mathematics to discover that it is necessary for the spot to travel ½ a frame height on the film in 1/50 sec and since the aspect ratio of the film frame is 4:3 then the aspect ratio of the scanned patch for one field 4 : 1½ (note with the two fields side by side as in the above system the overall aspect ratio for a frame of 1/25 sec is the normal ratio of 4:3)

G3RJO/T

What the other chap is doing....

We start this time with some splendid news from Gordon Sharpley, G3LEE, of Manchester ; he reports that the first pictures are now coming from his colour slide scanner. 931As are used in the green and blue channels, and a 6097F in the red. The red signal is quite useable although noisy, since the 6097F is not really a red sensitive cell. There are no optics as such, just the transparency stuck to the face of an MW13-35 5" viewfinder tube with the three cells as close together as possible, about 20" away. It is most important to put the cells as close together as possible, otherwise a permanent misconverged effect is caused by the thickness of the face-plate of the scanning tube. Strand Electric "Cinemoid" primary filters are employed. The cells feed pre-amps with 3 x EF91, then the signal is clamped and blanking introduced with variable set-up in a 12AT7 ; an N78 cathode follower then feeds the non-composite RGB signals to a colour monitor. Gordon is now in the market for some cheap dichroics. G3LEE also reports that John Jull G3MHZ/T has just become engaged (congratulations, om) and is not thinking about TV at all (shame) ; Bob Mayo, G3RAY/T, has just finished his BBC course at Evesham ; and Brian Green, G3KCB, has been bending ions through mass-spectrometers in Amsterdam.

70 cms activity is on the increase in the London area with several new stations and some of the older ones coming on again. John Tanner, G3NDT/T at Harrow has been exchanging pictures with G3OUO/T and has sent pictures to G3OUH/T and G3OPB/T.

David Mann, G3OUO/T, of Kingsbury, N.W.9, has transmitted vision to G3MCS at Goffs Oak, Herts. (18 miles) and to Michael Bues, G3OPB/T, at Epsom Downs, Surrey (19 miles) ; the paths to these two stations are very good. Also, signals were transmitted to G3NOX/T at Saffron Walden, a distance of 38 miles, during the period just before Christmas when propagation conditions were excellent. Unfortunately, the path to G3NOX/T is normally a poor one. G3OUO/T would like to conduct TV tests with any other members in the London area ; he can be contacted by letter (c/o the Hon.Sec.), phone or on the 70 cm band, to make the necessary arrangements.

The Television Society transmitter at Norwood Technical College is now in action, and regular weekly transmissions are being made. The operator is Martin Salter, G3RJO/T, who is a BATC member as well as belonging to the Television Society. Vision frequency is 430 Mc/s and sound is on 426·5 Mc/s. For further information, contact Mr. Rowlands (Senior Lecturer) or G3RJO/T at the College, Knight's Hill, West Norwood, London, S.E.27. (phone GIP 2268). Reports of reception will be most welcome.

Another word or two concerning G3OUO/T - the picture source is a vidicon camera with 405 line random interlaced scan. A bootstrap modulator employing three KT88s in parallel provides 100W peak white input to a QQV0640-A. The aerial is a 6 over 6 yagi array at 35 feet. Location is 150 feet above sea level and there is a clear take off from SW through S to NE. The vision frequency is 428·76 Mc/s.

Ian Waters, G3KKD/T, sends news of the East Anglia net. Bill Thacker, G3PGF/T, of Burwell, Cambs. is regularly active, and is building a new camera and telecine. G3BBY in Cambridge has a camera chain and hopes to be active on 70 cm soon. G3NOX/T has made three phone/cw contacts on 23 cm. H. Neale, G3REH/T, Sutton St.James, had his station featured on Anglia TV ; pictures from G3NOX/T were on the screen. G3REH/T is building a new 256 element stack to go on the 87' tower ! He is also building a new transmitter, and will be on the air very soon. Mike Bryett, G3OAT/T, is now at R.A.F. Marham, King's Lynn, and hopes to rejoin the Fens net soon. G3RIZ/T in March, Cambs. intends to transmit TV as soon as possible, when his new transmitter and camera are finished. G3KKD/T is completing a grand rebuild of the station on the basis "either it goes, or it goes out", prior to the possibility of moving QTH to another part of Ely, where it is hoped a proper aerial with turning motor can be put up. He has worked DL65V, PAØLWR and ON4HN, and heard SM4BAE (Malmo) in the December opening. G3KKD/T points out that some items in regular use in his station are now 12 years old. His letter closes with a useful map of activity in the area ; the stations noted are : G3REH/T, G2FNW, G3RIZ/T, G3OAT/T, G3KKD/T, G3NJO/T, G3PDO/T, G3PGF/T, G3PEI, G3BBY, G2DUS/T, G3NOX/T, G2WJ, G3LQR/T, and G3GDR/T.

Mike Barlow, Montreal, sends us the following news item : Bruce Robinson at 297 Yonge St., Kingston, Ontario, announces that his VE9OX licence is valid for a 6J6 transmitter into a dummy load only ! To change the regulations, he engaged in a singlehanded battle with the DoT, sending out pre-stamped addressed cards to 202 hams and 92 radio clubs to poll their opinions. The majority agreed that the licence first issued for transmission on passing 10 wpm morse and a technical test should be good for TV. At present, one year's operation on cw is required, followed by a 15 wpm test ! Meanwhile ARRL are pressing for an "Advanced Technicians" licence requiring a stiffer technical test and 5 wpm morse (why any morse at all ?? MB) This would cover speech operation on 2 m and up, and TV on 420 Mc/s and upwards.

News of the High Wycombe group comes from Rex Lakeman ; unfortunately, the recent cold weather has slowed down their activities, but coils are being wound for their Mark 3 camera. Ken Copper demonstrated their latest camera intercom system ; the quality is so fine it is almost good enough for studio sound ! Bob Tebbutt gave a most impressive lecture-demonstration of his telecine equipment, which was well received by the Chiltern Radio Society. Julian Baldwin and Dave Buck, G3PJE/T are planning a series of across London transmission tests ; Dave has a 4X150A operating, but the camera is still under construction. We're sorry to learn that Ian Milne, G3RRO/T broke his leg a few weeks ago, and hope you are fit again now, om.

Roger Oldfield, now in Hamilton, Bermuda, has had success in tracking the NASA Mercury Capsules with home built equipment, and his next venture is slow scan television, in addition to a conventional vidicon camera. G.H. Francis, Appt. 129-5 Southern Hills, Carbondale, Illinois, U.S.A., has a 5820 orthicon (3") which is fairly new. He is most anxious either to obtain suitable circuitry so that he can build up a camera around this tube, or alternatively, to exchange or sell it. Dennis Hodges, G3MXY/T, Smethwick, Staffs, has had to restrict his activities because of the cold weather, but will be out in his shack again as soon as conditions improve. Bill Hipwell, Wickford, Essex, hasn't much spare time, but has completed a regulated power supply for his sync gen, and the SPG itself is coming along slowly. Tony Spittle, Pinner, Middlesex, has been building up slow scan circuitry, and has almost completed a 70 cm transmitter. He has plenty of work in hand, a receiver and aerial being next, and then a 405 line scanner. Most of his slow scan equipment is now transistorised. The line up in the transmitter is 12AT7 at 72 Mc/s, followed by a 6BQ7 doubler, QQV02-6 power amp. at 144 Mc/s. He hasn't yet tested the completed QQV02-6 tripler and QQV02-6 P.A., which is expected to give 3 or 4 watts output. This should be ample to start with, as he is working with a friend who lives half a mile up the road. He has a regulated power supply using transistors. Grant Dixon has completed the Mike Cox pulse generator, converted to 625 lines, and is now working on the VSB mixer and grating generator.

Grant Dixon's 7 valve vidicon camera was on display at the Science Masters Association Exhibition in Manchester, at the beginning of the year. The camera was set up, focused on a mercury-in-glass thermometer, and the $1/10^{\circ}$ divisions could easily be seen on the monitors (a 9" Ecko portable, and a 14"). This would be an appropriate point to welcome the dozen or more school physics teachers who have recently joined us, as a result of seeing Grant's demonstration. We are interested to hear news of the educational uses of amateur television - and don't forget there is a fine opportunity for distributing BATC application forms to the pupils !

A.P. Harding, Nicosia, Cyprus, has a vision transmitter of local design (sorry about the incorrect information in CQ-TV 49) running 60 watts, with FM sound at 15 watts. Two industrial cameras are available as picture sources; one is sequential and the other is a far superior 625 line interlaced one. The VSB mixer by G3KOK/T has been constructed and works well, and a vision mixer is planned, when the bugs have been ironed out of the SPG. Our attention is drawn to the 5" tubes RKM6 and RKM12 at about £4 each, available from Messrs. Diamond Electronics, Siram Works, 96A Wellington St., Manchester, 18.

Pete Johnson, Dublin, has completed his camera, SPG and transmitter, and is awaiting his Irish licence from the GPO. His next job is to erect an aerial, and he anticipates that he will be on the air by May 1st with 35 watts of R.F. on 434·17 Mc/s, sound being 3·5 Mc/s away. Pete thinks he may be the only one in Dublin with a complete vision set-up. Graham Goodger, ZL2RP, Lower Hutt, N.Z., is thinking of getting a vidicon to build the 7 valve camera in CQ-TV 47. Clive Dixon, Cleethorpes, has built a simple flying spot scanner and plans are on the drawing board for a vidicon camera in due course. Alan Sherman, Chelmsford, has his vidicon camera working, giving about 2 Mc/s definition so far. His future plans include some colour work. Dave Quarrington, G3KSL, Strood,Kent has finished his 7 valve vidicon camera, and after some initial teething troubles, it now resolves a good picture. F.C. Singh, G3KOM, is preparing to build the Don Goodyear 7 valve camera, also.

John Huntingford, New Malden,Surrey, is very interested in the reception of DX signals in Band I, and would like to correspond with any other members with similar interests. He intends to build the Bill Still scanner in a month or two, but is at present spending six weeks in Sweden. Speaking of Sweden, John Keeley, Haywards Heath, would like to correspond with amateur television ehthusiasts in either Denmark or Sweden.

Laurie Hunton, G3ILD, Heighington, Co.Durham, is on the air, and his vision signals have been received by G3NOX/T (200 miles), G2BDQ (30 miles) and G3KJX (19 miles). G3ILD is building his vidicon camera as quickly as possible. He reports that there is quite a lot of activity in the Newcastle-upon-Tyne area. Michael Bues, G3OPB/T, Epsom Downs, has a 4X150A on 70 cm, and a 2C39A tripler on 23 cm. When the weather permits, he intends to increase his aerial to two 8 over 8 slot fed yagis, and to replace the co-ax by some low loss type.

A.K. Barns, London, E.17, is very pleased with his 7 valve camera, which has proved most successful. He is now building a FSS, monitors, and mixing units. His monitor unit consists basically of an ex-army 110 QB 13 indicator - two 5FP7s complete with all the coils etc for 35/-. Richard Grindley sends news from Carlisle - the progress of amateur TV plods on slowly ! G3MTV/T and G3MNL are about 1/4 mile apart and are working in close co-operation ; G3MNL has a 70 cm receiver for both vision and sound, at 432 Mc/s. G3MTV/T has a 4X150, and is building a high power P.A. J. Tyblewski, Shrewsbury, intends to start work shortly on the 7 valve vidicon camera.

G. Dale, G3MFH/VS6FB has moved out to Hong Kong ; gear is not plentiful, particularly RF equipment, as the local TV programme is piped. John Ambrose is visiting Australia again this year, and was in Sydney in December 1962. He will be in Australia until the end of 1963. A new member is David King, VK2ZDK, at present in London. He is visiting this country from Australia, where he has heard of the Club from Dennis Wheaton. Nigel Nathan, now in Brookline, Massachusetts, has no activity to report as he is very busy at work. However, he has a large store of ideas, and when time permits, he will be trying them out in practice.

C. Beekman, PAØCOB, in The Hague, has been receiving pictures from G3NOX/T. PAØCOB has his TV licence, being permitted to run at 75 watts input. He has built a transistor pulse generator, using 27 transistors and about 60 diodes ; he is using binary dividers. By the time these notes are published, Graham Marshall G3RJW/T of Mitcham should be on the air, on 70 cm, running 25 watts into a QQV06-40 - mainly beaming North from Mitcham, Surrey. He has completed the Bill Still scanner as his picture source. E.R.L. Bassett and B. Healey are both working at the University of Southampton. They are in the process of producing a transistor SPG to be used with Ron Bassett's camera and FSS. Graham Roe G3NGS, Herne Hill, S.E. 24, is a member of the City & Guilds College Radio Society ; he reports that there is quite a lot of interest in amateur television amongst the members of this Society.

Bob Mangold , K3BWW, Pittsburgh, is pressing forward with his new high definition image orthicon camera. The amplifier bandwidth is 15 Mc/s so the performance is limited solely by the camera tube and not by the circuitry. He mentions that USA amateurs are now permitted to run 1 KW on 420 Mc/s, so Bob's next project is to build a 500 or 1000 W transmitter for this band. Bob has completed a vidicon slow scan camera, and states that there are about 15 amateurs in Pittsburgh building cameras and related equipment. Roger Davey, G3PGJ, of Plymouth, paid a visit to Dave Jones, G3LYF/T a couple of months ago, to give his station "the once over". Dave had a look at Roger's CRO which had a fault, but the trouble was not cleared on that occasion because of lack of time. H. Howard, of Isleworth, is building an oscilloscope, to a design in Radio Constructor.

Mike Day, Deptford, S.E.8, says that his interest in amateur TV started when he was given the circuit of a pattern generator ; he built it up in six months, although the step counters were the biggest headache. His aim is to build a vidicon camera.

The Club will be represented at the Institution of Electronics Exhibition in Manchester, and at the Dagenham Town Show ; both these events are expected to take place at the end of June or early July. Gordon Sharpley and Martin Lilley will be the organisers at the respective shows, and they would be most grateful for the support of the local members. Anyone who can assist in any way (even an hour or two of stand duty would be welcome) is asked to contact Gordon or Martin, via the Hon.Sec.

Through the kindness of Committee member Malcolm Sparrow, G3KQJ/T, all CQ-TV envelopes (apart from those of a few new members, or those who have recently changed their addresses) are now machine-addressed. If you find that your name and address are not shown quite clearly and correctly, please advise me,and,we will make up a new address plate. If you have a /T call sign which is not shown beside your name on the envelope, it probably means that we have no record of it - so do please let us know.

While we are on this topic, may I remind everyone to be sure to inform either John Tanner or myself when you change your address. Not only do we keep our records straight, but it makes sure that you don't miss a copy of CQ-TV.

I wonder if any member knows what has happened to J.M. Cordova, CN2AO, of Tangier, Morocco ? He was a member for a few years, until one day, his copy of CQ-TV was returned to me stamped "Retour a l'envoyer" together with some picturesque squiggles which presumably meant the same thing in Arabic. For the past two years, we have heard nothing from him, so his address remains unknown. I think we owe him a couple of CQ-TVs for which he had paid, so any information will be welcome.

Two money orders have been received in payment of subscriptions ; unfortunately, we aren't sure who sent them. One was sent to John Tanner from Philadelphia, U.S.A., and the other to me from Noordwyk B. Post Office, Holland. Would the two members who sent these money orders please advise us, so that receipts can be sent.

With 73 to all members, and keep those progress reports rolling in.

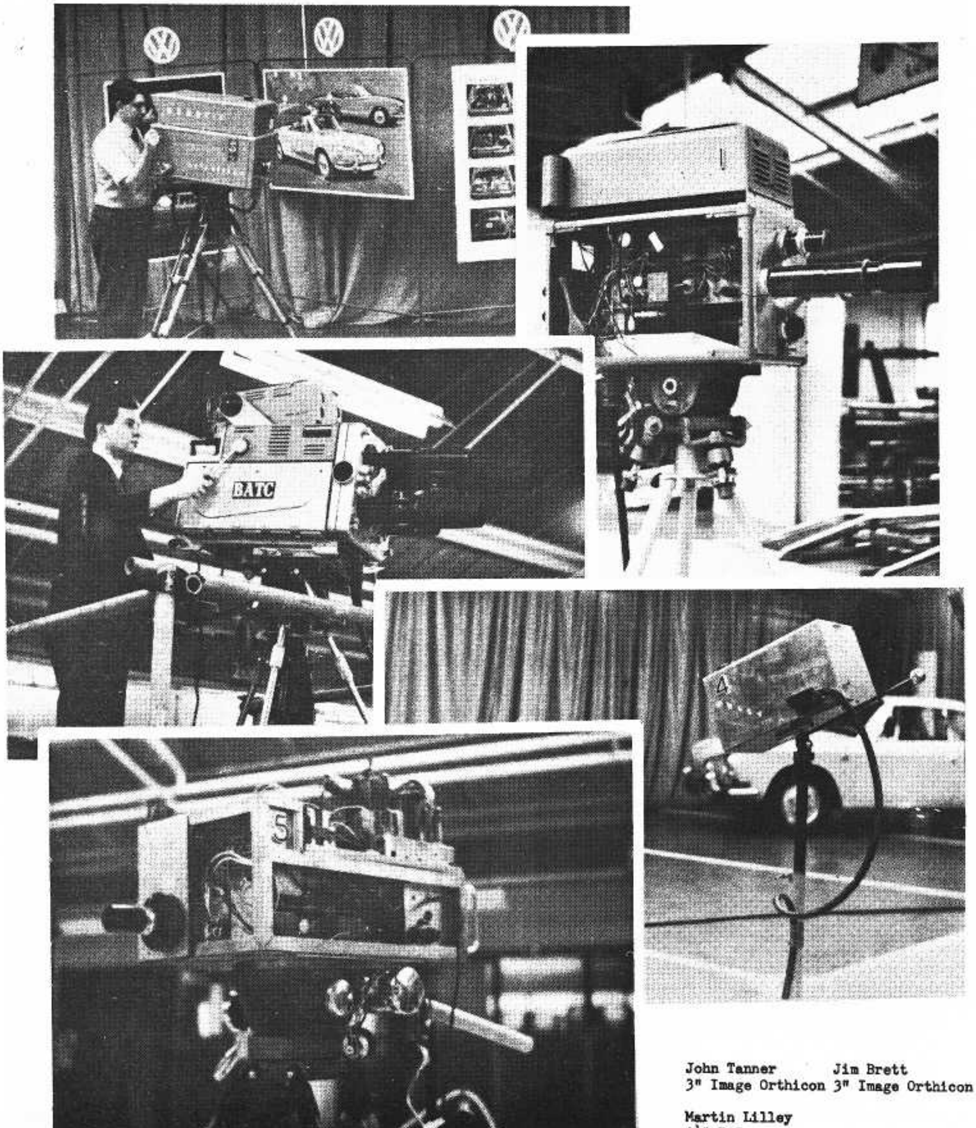
— Bn Reid

CHANGES OF ADDRESS for CQ-TV 50

Sqdn.Ldr.R. Bishop, Officers Mess, Steamer Point, Aden.
J.W. Black, W3DDK, 805 Bradford Avenue, P.O.Box 5, Arnold, Maryland, U.S.A.
F/Lt. M.J.A. Bryett, G3OAT/T, 140 O.M.Q., R.A.F. Marham, Kings Lynn, Norfolk.
D. Butler, G3DKM, 18 Belle Vue Gardens, Brighton 7, Sussex.
J.E. Chalwin, 7 Oval Road, East Croydon, Surrey.
F.E. Chapman, G3PUV/T, 43 Lathe Court, Lakefield Road, Wednesfield, near Wolverhampton,Staffs.
P.F. Cone, 38 Gould Street, Wakefield, Massachusetts, U.S.A.
G. Dale, VS6FB, 1st Floor, 11E Wang Fung Terrace, Tai Hang Road, Hong Kong.
Capt.E.D. Fieldson, Miraflores, Troutstream Way, Loudwater, Rickmansworth, Herts.
J. Foye, ZS5JF, Flat 10, "Harleigh", 182 Brand Road, Durban, Natal, South Africa.
Groupement Experimental D'Emissions TV, c/o H. Mégard, 10 avenue de Thônex, Chêne-Bourg, Geneva, Switzerland.
K.L. Hutchings, "Whitehaven", Mill Lane, Danbury, Essex.
I.A. Jackson, 19 Bowen Road, Rugby, Warwickshire.
F.T. Lawrence, 119 George Street, Oban, Argyll.
C. Lees, 3 Evelyn Grove, London, W. 5.
N.H. Nathan, 20 John Street, Brookline 46, Massachusetts, U.S.A.
B.G. Pilcher, 35 Outram Road, Southsea, Hants.
D.G. Quarrington, G3KSL, 11 Mill Close, Strood, Kent.
D.J. Taylor, "Crestwood", New Rowley Road, Dudley, Worcs.
B.H. Twist, Canadian Marconi Co., R.C.A.F. Station Knob Lake, P.O. Box 1007, Schefferville, P.Q., Canada.
J. Tyblewski, 3 Marton Drive, Mount Pleasant, Shrewsbury, Shropshire.
R. Villiers, Redlands, Nantgarn, Caerphilly.

. . . .

We regret to annouce the death of Don Bradford, VQ4EV and ex-G3GBO, in a flying accident in November. An early member of the BATC, Don was a great enthusiast for VHF radio work and acted as a stimulant for many of our members. It was a small press cutting about his construction of a VCR97 TV receiver at the age of 15 that led Mike Barlow to become interested in radio and TV, and 15 years later Don was still bringing them in. He will be much missed.



John Tanner
3" Image Orthicon

Jim Brett
3" Image Orthicon

Martin Lilley
4½" I.O.

Mike Cox
Vidicon

Terry Lane
3" I.O.

Photographs of the 5 cameras in use at the demonstration in March.

NEW MEMBERS LIST FOR CQ-TV 50

W.J. Allisett, GC3NDX, "Springbank", Les Ozouets Road, St.Peter Port, Guernsey.
P.J. Andrews, Watford Grammar School, Rickmansworth Road, Watford, Herts.
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G. Eaton, 54 Yoxall Road, Shirley, Solihull, Warwickshire.
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G.R. Gaiger, 132 Westbourne Street, Hove 3, Sussex.
L.W. George, 40 Hawarden Grove, London, S.E.24.
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J.F. MacMahon, Allted Drive, Derrychara, Enniskillen, Northern Ireland.
C.F. Makins, The Green, Selsley, Stroud, Glos.
Malvern College Amateur Radio & Television Society, c/o L.G. French, School House, The College, Malvern, Worcs.
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Dr.P.C. Merriman, Holbache House, Welsh Walls, Oswestry, Shropshire.
H. Neale, G3REH/T, Bells Drove, Sutton St. James, Spalding, Lincs.
L. Ogborne, 18 Long Cross, Felton, Somerset.
R.G. Olsen, "Lynton", 53 Middle Road, Higher Denham, Bucks.
G.J. Powell, Weald Rise, Litmarsh, Marden, Herefordshire.
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G.P. Shirville, 94 Copse Avenue, West Wickham, Kent.
F. Singh, G3KOM, 14 Queensway, West Wickham, Kent.
A.D. Smith, 89 Eton Road, Ilford, Essex.
J.E. Smith, G3JZF, 53 Woolmore Road, Erdington, Birmingham, 23.
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G.A. Sturdy, 125 Manor Court Road, Nuneaton, Warwickshire.
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W.A. Sunderland, 22 Chestnut Avenue, Leeds, 15, Yorkshire.
D.J. Taylor, 265 New Birmingham Road, Burnt Tree, Dudley, Worcs.
D.P. Thomas, 165 Portland Road, London, W.11.
Mr. Thompson, Rock Aerie, Milton Hill, Weston-super-Mare, Somerset.
A.L. Thurley, 50 Bruce Road, Mitcham, Surrey.
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L. Toth, 1242 East Fair Avenue, Lancaster, Ohio, U.S.A.
G. Trice, Police House, Cythorne, near Dover, Kent.
A. Tucker, 6 Maltese Road, Chelmsford, Essex.
F. Turner, 11 Link Way, Denham, Bucks.
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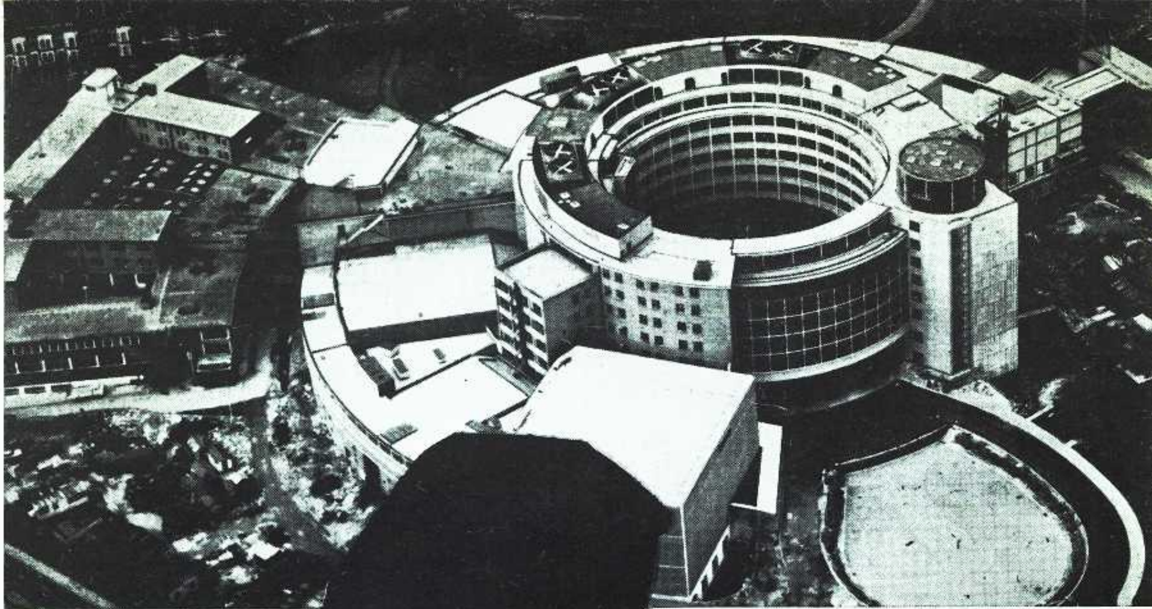
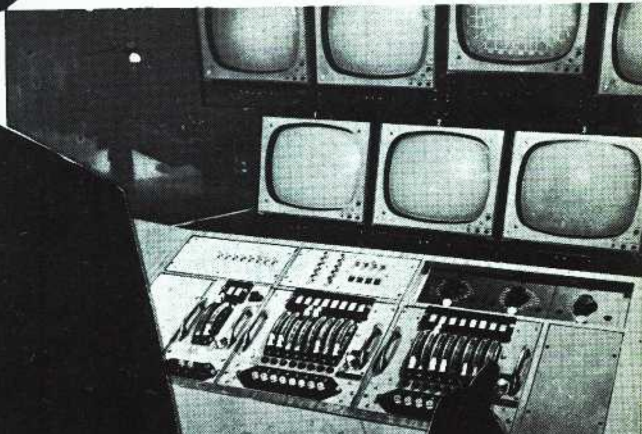
R. Wallace, 15 Southdown Park, Hayward Road, Drayton, Berkshire.
P.J. Walters, 112 Windsor Avenue, Penn, Wolverhampton, Staffordshire.
D. Watkins, 6 White Street, Coventry, Warwickshire.
T.L. Westwood, c/o Mr. Bird, Lower Landywood Farm, Great Wyrley, Staffs.
R. White, 34 Mount Ararat Road, Richmond, Surrey.



PAINTON FADERS AT B.B.C. TELEVISION CENTRE

Quadrant faders of a new type, specially developed by Painton in conjunction with the B.B.C., are now at work at the B.B.C. Television Centre on Vision Mixer Control Panels in Studios 3 and 4. These faders incorporate printed circuitry techniques and the new Painton sub-miniature type 70 resistor in order to meet the stringent size limitations imposed.

Special research and development techniques were called for in producing these instruments. The same techniques are always available to customers requiring special-duty components which fall outside the normal.



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