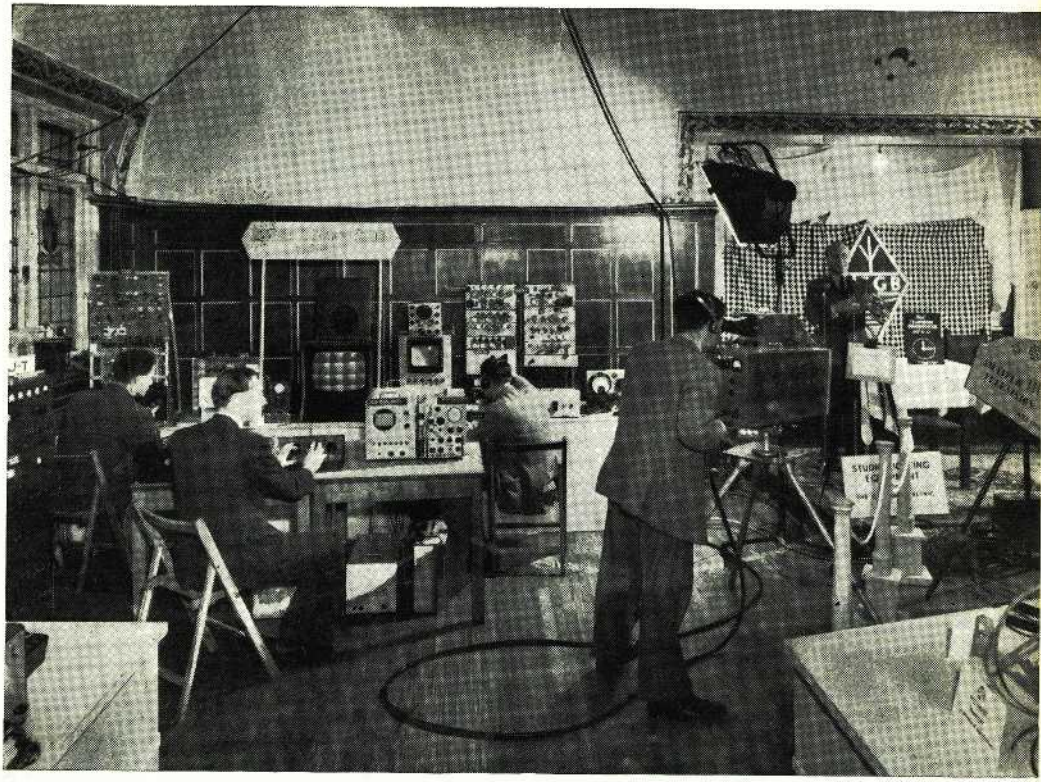


cq-tv

AUTUMN, 1956.

No. 30

CQ-TV 30

Autumn 1956

Ten Shillings per annum
(Free to members)

Number Thirty

Eighth Year

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

Have you your copy of the booklet yet?

Editorial

The intention is to publish this edition in time for the Convention, and so there is printed below a plan of the Convention hall. Some of the exhibits have not yet been confirmed, and extra ones may arrive on the day. As this is a pretty ambitious show, and we do not expect to hold another Convention for a year or so, all members are invited to make a special effort to attend. Besides the vision exhibits, a particular effort has been made to obtain examples of UHF gear so that members who are some distance from UHF amateur radio activity can see for themselves how the units should be built. Several commercial firms are showing items, including our good friends Messrs Proops, who are always willing to lend a sympathetic ear to the problems and requirements of BATC members. We are also glad to see that Mr. Banthorpe is to bring some parts of the Television Society transmitter G3CTS/T.

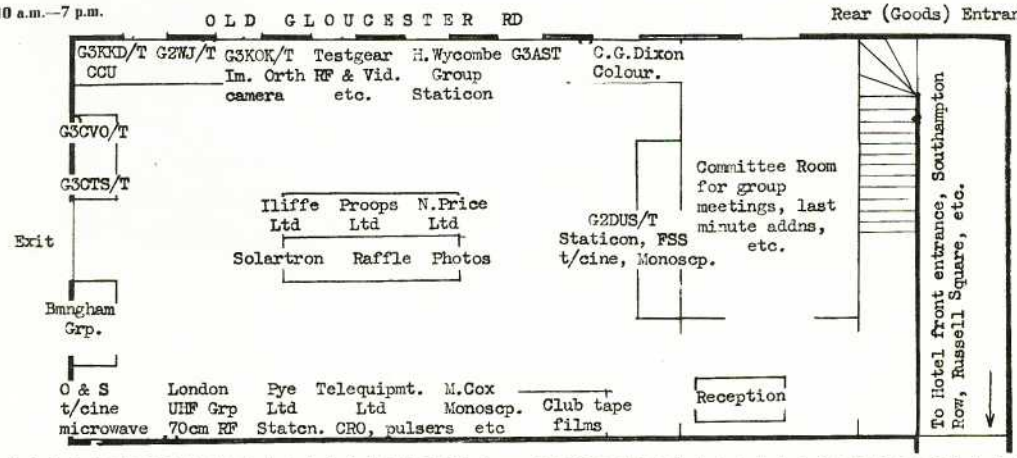
M.Barlow G3CVO.

THIRD

NATIONAL CONVENTION

at the **BONNINGTON HOTEL, SOUTHAMPTON ROW, LONDON, W.C.1.**

SATURDAY, 27th OCTOBER, 1956



Over 200 copies of "An Introduction to Amateur Television Transmission" have now been sold, and with each is being sent a copy of CQ-TV and a note giving the whereabouts of the nearest BATC member, group and transmitting station. Members being contacted by these "recruits" are asked to give as much help as possible. In several instances there have been enough to form new groups if the enquiries are followed up, and names and addresses will be supplied to area Committee members. Any member wishing to know of new enthusiasts in his area is invited to write to G3CVO.

Please note that the Hon. Treasurer has now moved to 4, Norbury Court, London SW16, and that money sent to his old Bournemouth address may go astray.

The Committee have had two postal meetings, and amongst business that may be of interest to members is the appointment of Frank Rawle to represent the Midlands; an additional standing rule that all BATC officials shall be fully paid-up members, but that the Hon Secretary, Treasurer, Editor and Asst. Secretary shall have their subscriptions remitted as an Honorarium. All ordinary members of the Committee will resign at the AGM to be held at 2-00 pm on Convention Day, and will be eligible for re-election.

- Michael and Margaret Barlow are delighted to announce the arrival of a new BATC member, Stephen Richard, on August 13th, and would like to take this opportunity of thanking all well-wishers. All three of us are fine! -

BOOK REVIEW

"TELEVISION ENGINEERING" Volume II, by Amos and Birkinshaw. 270pp, 156 illustrations; published for the BBC by Iliffes @ 35/-.

This is a most excellent book, of much greater interest and value to the amateur than Vol. I (reviewed in CQ-TV 25). Dealing explicitly with Video Amplifiers, these are dealt with in groups: HF response - simple RC amplifier - shunt correction - series correction - cathode correction - distributed amplifiers; LF response - intervalve coupling - anode-cathode-screen decoupling - DC coupling; Feedback amplifiers; Noise in amplifiers; camera head amplifiers.

This volume is more mathematical than Vol. I but nothing more than algebra is involved, and there are plenty of worked examples using, apparently, the EF91. Many helpful hints are included, and the whole text is presented in a most readble style. Certainly anyone building FSS or camera amplifiers will find plenty of value in this book, although it is a pity that the price is rather high. Included at the front are a series of photos of Test Card C demonstrating common video amplifier faults.

"TELEVISION TIMEBASE CIRCUITS" Principles and Practice. By C.H.Banthorpe. 64pp, 71 diagrams. Publ-ished by Norman Price Books @ 5/-.

Mr. Banthorpe here presents in a concise manner all the practical information required to build and service TV timebases. Using examples from current commercial practice, with all component values given, he deals with oscillators, output stages, linearizing circuits, HT boost, EHT generation and Flywheel circuits, giving a brief but sufficient explanation of the function of each component. This is a very useful book for anyone wishing to brush up their knowlege of time base circuitry.

There are errors in Figs 70 and 55, but these will be apparent to the careful reader.

"TELEVISION CIRCUIT REFINEMENTS", by C.H.Banthorpe. 80pp, 92 diagrams, published by Norman Price @ 5/-.

I found this book to be full of fascinating little circuits and ideas. Mr. Banthorpe states that he has written it to prevent some of the lesser known "gimmicks" of TV receiver design from becoming lost, and the result is a book full of circuits that can be applied to both receivers and transmitters by the amateur. This is a companion volume to that reviewed above, and is written in the same lucid and non-mathematical style.

M.B.

*Copies of the above books will be on sale at the Convention, together with other TV literature.

SHORT NOTES

We are pleased to note that Ian Waters G3KKD/T and Ivan Howard G2DUS/T have been awarded the Courtenay Price Trophy by the R SGB for "outstanding work in the field of Amateur Television, culminating in consistent transmission of live pictures over a 38 mile path using home constructed equipment".

The Television Society has very kindly issued an invitation to members to visit the studios of G3CTS/T at Norwood Technical College.

NEW GROUPS

It is proposed to form two new groups of the BATC in North and South London, with a view to collaboration in the construction of amateur TV equipment, the holding of regular meetings, lectures, demonstrations and visits, and general encouragement of and instruct-ion in amateur TV subjects. Anyone interested on a part-time, full-time or even inactive basis is invited to contact:

P.K.Jones 18 Burrard Rd, West Hampstead, NW6.

L.A.F.Stockley 4 Norbury Court Rd, Norwood SW16.

A nucleus of equipment is available already.

The Romford group is being revitalised by Doug Wheele, 56 Burlington Gardens, Chadwell Heath, Essex.

CAMERA TUBES WANTED: by G.Goldsmith, Strathcombe, Gorey, Jersey, C.I; by Alan Ellis, 3 Spencer St, Turner, Canberra, Australia (5527 preferred); by V.Cedar 9 North Drive, SW16 (5527 only); by L.C.Mans-field 131 Waddingtom Rd, Coulsdon, Surrey (5527). Cannot afford Staticons.

CAMERA TUBE FOR SALE: by D.Grant, Castlebar Court, Queens Walk, Ealing W5. 1850A RCA good condition. Offers?

SALE: 26 EF50 asstd, 829, 6J6s, RL18s, 726As (10-13 cm klystrons) all brand new, also two 18" paraboloids from APS3 radar. Must clear cheaply to BATCs as moving to flat: V.Cedar 9 North Drive, SW16.

SALE: 8012 triodes 15/-; or exchange for VCR517c or two 6AC7s. B.Twist 32 Thorpewood Ave, Sydenham SE26.

Bring your surplus gear to the Convention RAFFLE: prizes include 813s CV90s EF91s etc.

AUSTRALIAN-N.Z members - could we have our tape Newsreel 1955 Convention back please?

AMERICAN members - who has the Club lecture tapes now?

OVERSEAS MEMBERS: can pay their subscriptions etc by cheque, banknotes, bankers orders, international money order or Unesco Coupons. Consult your banker for the best way. Make cheques out to the Club; it is not necessary to state an "Office of Payment" as all monies go through the bank. Please do NOT send local stamps or postal orders which cannot be cashed here.

Reference: conversion of standard monochrome TV set to field sequential colour (disc) for reception of simultaneous (NTSC) colour: "Colordaptor" Jan 1956 Radio-Electronics. (Three parts).

Eric Lawley recommends the 27/6 vision/sound strips @ 27/6 less valves from Dukes, 621 Romford High St, E12.

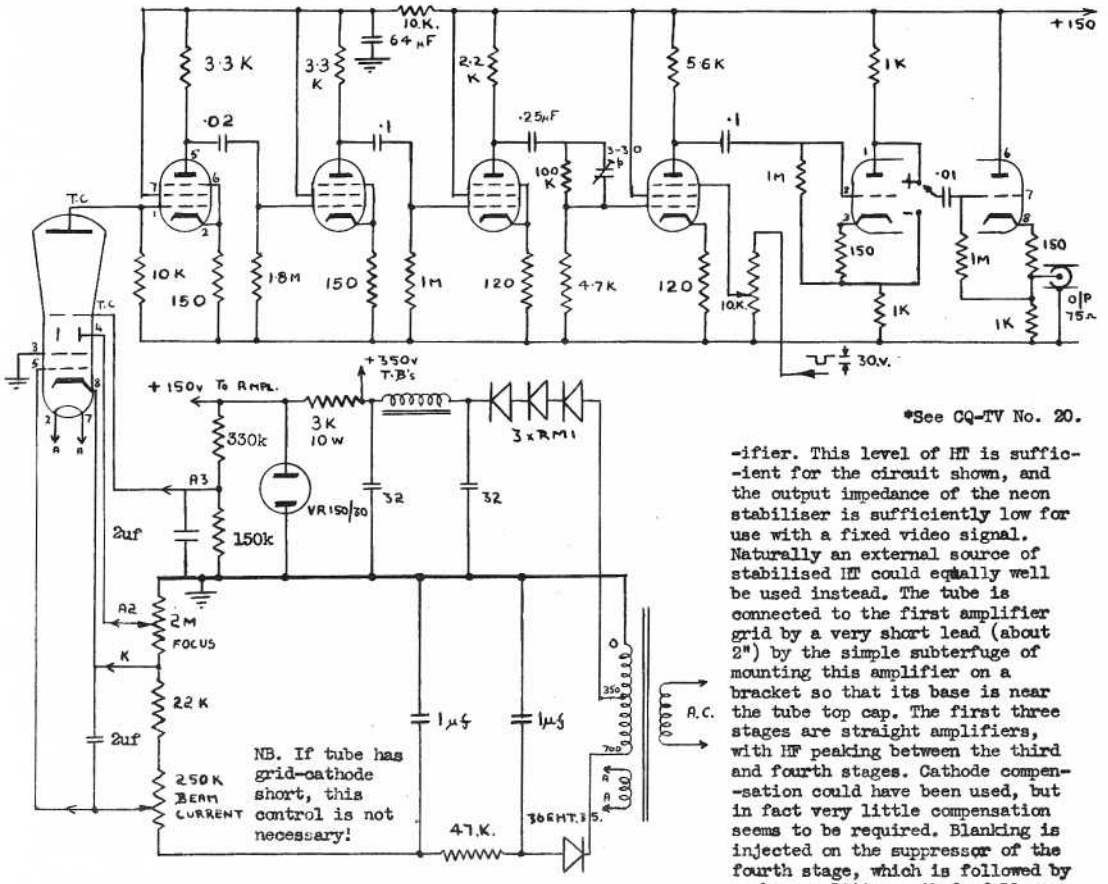
Ron Oakley recommends the series on Industrial TV Techniques appearing in Radio-Electronics, starting August.

G3CVO now has a Collaro tapedeck in action, and is prepared to swap tapes at 3¾, 7½ or 15 ips. Suitable snippets from these will be played on the Sunday morning BATC net 1100hrs 1975kc/s Chelmsford area. Another 160m net runs in Birmingham at the same time.

We regret to say that the Club lecture tape on "Tele-cine Scanning" has been lost and must be re-recorded before it can be lent out again.

Several members have asked for early copies of CQ-TV to complete sets. These are now only available on microfilm, one page per frame of 35mm. Any photographer will enlarge prints of pages for a small fee. The set of CQsTV Nos 1-20 costs 17/6d, from C.G.Dixon 23 Wye St, Ross-on-Wye, Herefordshire.

A SIMPLE MONOSCOPE UNIT



The circuit above shows the amplifier and power supplies for Mike Cox's monoscope. The tube is a C912 obtained through the Club scheme*, and is of Test Card G - similar to C but with additional information on it.

The unit is mounted on a standard rack panel; t the actual panel is of steel, and a large circular magnet is stuck to this to act as a centreing device, and also to buck out the earth's magnetic field and residual fields in the steel rackwork. Silver paper is wrapped round the target end of the tube to reduce stray pickup from the line time base valve. In any case the timebases and power supplies should be kept well away from the tube in normal oscillograph construction manner.

A single standard 350-0-350 transformer runs half-wave to give about 900V EHT for the tube, 350V for the timebases, and 150V stabilised for the ampl-

*See CQ-TV No. 20.

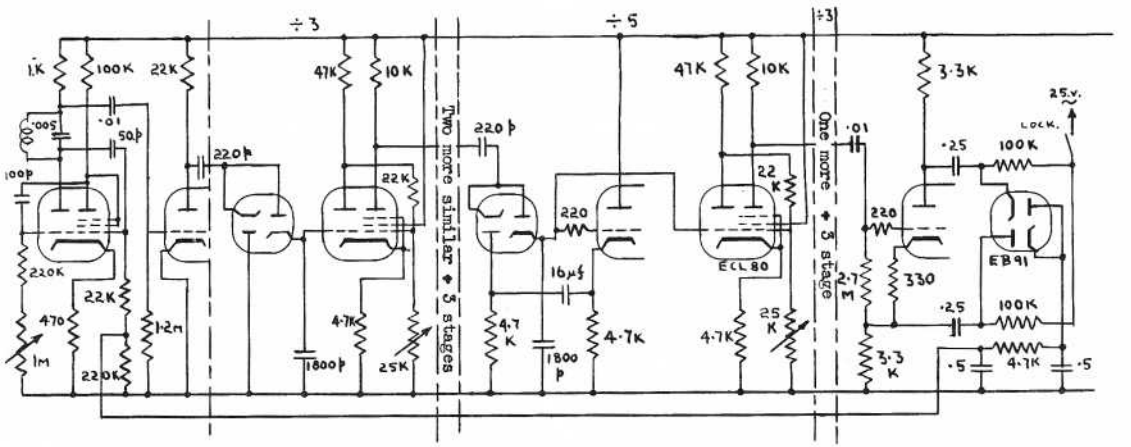
-ifier. This level of HT is suffic--ient for the circuit shown, and the output impedance of the neon stabiliser is sufficiently low for use with a fixed video signal. Naturally an external source of stabilised HT could equally well be used instead. The tube is connected to the first amplifier grid by a very short lead (about 2") by the simple subterfuge of mounting this amplifier on a bracket so that its base is near the tube top cap. The first three stages are straight amplifiers, with HF peaking between the third and fourth stages. Cathode compen--sation could have been used, but in fact very little compensation seems to be required. Blanking is injected on the suppressor of the fourth stage, which is followed by a phase-splitter cathode follower. This means that wrong polarity blanking appears at the output when switched to negative, but this can be overcome by suitable switching, further blanking, or putting the phase reversing stage before the blanking injector. The various component values are not at all critical, and any of the "usual" valves such as EF91, 6AH6, 6AC7, EF50 etc will work quite happily.

No timebase circuits are shown, as these are quite ordinary, and the ones being used are not very linear! As the tube EHT is under 1kV, very little scanning power is required, and once again the usual valves, or even relatively silly ones, can be used successfully. On the original unit free-running time bases were used, with provision for separate sync inputs at BATC standard levels.

This unit will be shown in operation at the Convention, or can be seen via G3CVO/T on 430.3Mc/s.

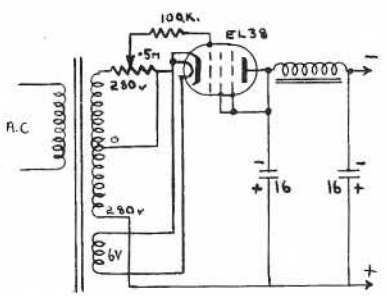
USEFUL CIRCUITS

By C.H.Banthorpe, F.T.S.



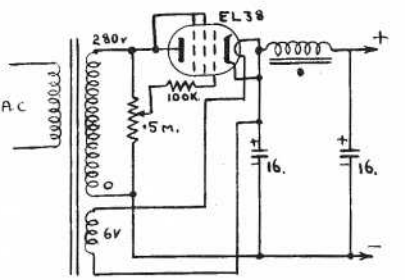
The circuit above, reproduced by permission of the Television Society, is that of a very stable and reliable 405 line counter circuit. All the valves are ECL80s - ECF82s or 6U8s would do as well - the spare sections being used for other purposes elsewhere. The master oscillator is stabilised with a tuned circuit at 20250 c/s, and is followed by a buffer stage. The step counters purposely count by small ratios in the interests of reliability, so that there is no need to incorporate counter monitoring points. In fact the unit will lock in perfectly from a cold start, and one model has never needed any adjustment over a period of months.

The outputs from the counters can be used for a step contrast waveform in the usual way; the last counter feeds a phase-splitter and discriminator, the output of which, after smoothing, is fed back to the MO stage to lock the whole thing to the mains. The unit is very tolerant of valve, component and voltage variations.



(Left) Negative variable supply.

(Right) Positive variable supply.



The next two circuits show simple positive and negative adjustable power supplies (NOT stabilised) which are useful where an adjustable supply is required and the thought of series resistors running hot is distasteful. Nevertheless the voltage controlling potentiometer should be of good quality, as there is a fairly high voltage across it.

The units will supply up to 40mA maximum using an EL38, and the output is adjustable from 28 to 270V (positive model) and 0 to -270V (negative model). It is not advisable to run other valve heaters off the same heater winding as the control valve.

Those of you with only one camera (!) may like to note a wrinkle being used by some American colour TV stations. Fit a periscope to the front of the camera, with the lower mirror operated by a solenoid; at the flick of a switch, the apparent viewpoint shifts up, down or from side to side as required. Saves a crane,too, for high shots.

Many thanks to F.Steed, T.Pegram and others for help with this edition. Sorry no photos - none worth it this time. Complain at the Convention. G.O.S

a flat face, and can be run at over 6kV. It has a double-layer screen, consisting of a yellow phosphor backed by the necessary blue. The presence of the yellow has no effect other than to introduce a rather noisy, grainy background into the picture, since the photocell used does not respond greatly to yellows. An electrostatic version of the 5FP7 is the 3FP7, a 3" tube with a slightly curved front face. Some figures on these tubes are given in Table 2.2.

Table 2.2

	Htr.	Va max	Vg c/o	Va_1	Va_2	Va_3	I_b
5FP7	6.3V	7.7kV	-45V	250	4kV	-	200μA
3FP7	6.3V	4.4kV	-60V	575	2kV	4kV	150μA

Deflectn.	Focus	Useful diam.	Rad. of Curv.	o/aL	o/a D
38°	400A-T	4.25"	24"	11¼"	5"
250&180V/"	e/s	2.75"	8"	10"	3"

Base:	1	2	3	4	5	6	7	8	9	10	11	12	t.c
	⏚	H	G2	-	G1	-	K	H	-	-	-	-	A2
	H	K	G	ic	A1	X1	X2	A2	Y1	Y2	-	H	A3

Although cheap and convenient on account of its small size, the 5FP7 is not satisfactory for advanced FSS experiments due to the graininess mentioned. Amongst the professional tubes, the American type P16 phosphor is especially designed for FSS work, and the 5ZP16 is the professional equivalent to the 5FP7, the MC13-16 by Philips-Mullard being the European equivalent. Ferranti, Cintel, EMI and GEC all make suitable tubes, but these are in the £10 to £30 region. Extremely good results can be obtained using standard blue-trace oscilloscope tubes, such as the GEC E4205 and E4412, and the Cossor 88 and 89. These may be obtained new for some £3 to £5, and are occasionally available surplus. Unfortunately most oscilloscope tubes have the final anode connection brought out through the base, which limits the EHT that can be applied, and are electrostatically deflected, calling for inconvenient time bases and supplies. Nevertheless, this type of tube is much to be preferred.

Post-deflection acceleration tubes (PDA tubes) such as the EMI 4EP11 avoid these inconveniences, but are about £10 - £15. Projection tubes such as the MW6-2 can be used for scanning, although excessive afterglow correction may be needed, but they are of more value for reflection scanning, the modern equivalent of Fig 2/1. Care must be taken to avoid X-ray radiation.

The effects of afterglow can be reduced by using as large a raster as possible, and thus many domestic TV tubes will give first-class results if the bulk of the FSS is no objection. Amongst the better ones are the MW22-14(9"), CRM71, 91, 121, 121B, 151B, Cossor 26J and 88J, and the GEC 6501, which has a very flat face. Many of these tubes can be found surplus with various faults for a few shillings only.

In general, the reader is advised to try the tubes he has available before buying one. As usual, the performance obtained will depend on the money spent, and results with a £15 scanner tube should be much better than with a 30/- surplus type. The actual results obtained will depend also on the density of the transparencies used, the sensitivity of the photocell, the amplifier and the optical system, and some experiment is inevitably called for.

2.3 Optics

Light from the scanning crt must fall on the transparency or object to be scanned. No lenses of any sort are required if the transparency is stuck onto the face of the CRT, but there are snags. Apart from purely mechanical difficulties of holding flat slides against possibly curved CRT faces, the raster size must be the same as the transparency. With small rasters, the spot size becomes too large for good definition, and there is also a possibility of the screen being burnt. Also, due to the finite thickness of the faceplate, parallax can occur, although this will not be serious if the transparency is very close to the screen. The emulsion side of the transparency should be against the screen, and the line scan reversed if necessary to bring the final picture the right way round. It can be shown that for 2mm of glass, a 4" by 3" raster, the photocell 10" from the tube, and 3.5Mc/s resolution (405 line standards), then spot size and not parallax is the limiting factor.

By using a lens to focus the raster onto the transparency, the raster can be kept as large as possible - a great help with noisy screens such as the 5FP7. Introducing this lens will cause a loss of light in the system, so to obtain the same output from the photocell, it is necessary to use a condensing lens to focus the aperture of the first lens onto the photocell cathode. The condensing lens can be a cheap glass of say 2" focal length, but the main lens must be a good one, bloomed for preference, as will be shown.

2.3.i Calculation of optics: transparency scanning

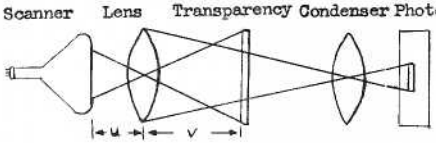


Fig. 2/3: Transparency Scanning

Figure 2/3 shows the standard arrangement. Note that since the photocell response is mainly monochromatic, chromatic aberration in the lens is not important. A spare camera or enlarger lens is ideal, but care must be taken not to exceed the maximum gathering angle of the lens; to be safe, use a lens designed for a camera or enlarger using the same size negative as the transparency.

The actual siting of CRT, lens and transparency can be determined by using the standard formulae

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$ where f is the focal length of the lens.

and $$M = \frac{u}{v}$$ where $M = \frac{\text{Raster height}}{\text{transp. height}}$.

Figure 2/4 shows a plot of v (film-to-lens) against M for various values of focal length. Since the curves are equally spaced along the v-axis, any other focal length is easily interpolated. Distance u (crt-to-lens) is also given, and so a quick estimate of the possibilities of any lens is quickly found.

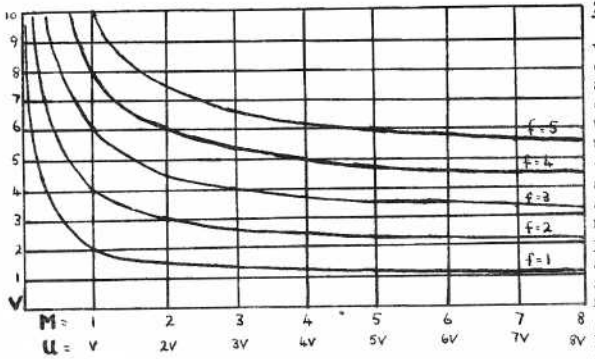


Fig. 2/4: Curves for Determining U and V given f and M.
(All dimensions are in the same units).

Examples: A 9" MW22-14 is to be used to scan photographic negatives 3¼" x 2¼". With a 2" f4.5 lens, what are the distances of CRT to lens and lens to negative?

The MW22-14 has a maximum raster size approx. 8" x 6". The value of M is therefore 2.67. In Fig. 2/4 the M = 2.67 line cuts the curve of f = 2" at a point where V = 2.75 ins. U = 2.67 x 2.75 = 7.3 ins. Ans.

A 5FP7 is to be used to scan both single and double frame 35mm slides (2 x 2). What are u and v in the two cases, and could a supplementary lens be used to keep the distance between slide holder and lens fixed?

The 5FP7 has a maximum raster size 4" x 3", and the transparency sizes are 24mm x 18 mm (35mm cine size) and 36mm x 24mm (still size). Both sizes are used in 2 x 2 standard slides (BATC standard).
For the two sizes, M = 4.2 (cine) and 3.2 (still).
For a 2" lens, v = 2.48" 2.63"
u = 10.4" 8.45" Ans.
If v is to be fixed at 2.48" in each case, then for M = 3.2 u= 7.95". The v = 2.48" line cuts the M = 3.2 line at a point where f = 1.88". As the principal lens has a focal length of 2", and

$$\frac{1}{f_p} + \frac{1}{f_s} = \frac{1}{f}$$

where f_p, and f_s are the focal lengths of the principal and supplementary lenses, we have

$$\frac{1}{2} + \frac{1}{f_s} = \frac{1}{1.88} \quad \text{whence } f_s = 31.5".$$

Thus the use of a supplementary lens of 31.5" focal length (a weak spectacle lens?) enables v to be kept constant, but the CRT must be moved from 8.45" to 7.95" from the lens as the size is changed.

A similar calculation can be performed if it is required to keep u constant. In general, where more than one size of transparency is to be handled, it is necessary to move at least two parts of the optical system. The overall length of the scanner will be least with the shortest focal length lens.

2.3.ii Calculation of optics: reflection scanning

Figure 2/5 shows the general arrangement. Since very little light is reflected even from white objects, the lens system must be of the best, and spurious light must be kept to the minimum. In place of condenser lenses, car headlamp reflectors may be used round the photocells, several of which may be used, and their outputs combined in various proportions to produce "lighting" effects. The simplest arrangement has the optical system vertical, so that a pad of paper say 4" x 3" is scanned, and upon which messages, cartoons etc can be written, or photographic prints can be used. Three-dimensional objects can be scanned, or the system can be used to televise live subjects. The limitation here is that the lenses must be used at wide aperture to give plenty of light output, but this in turn means that they have very little depth of focus. Thus a closeup view of a head and shoulders type may have the tip of the nose and the ears out of focus. Using projection tubes and banks of sensitive photocells, quite good pictures can be produced. The studio must be lit by a colour to which the photocells do not respond, or alternatively by lamps pulsed on only during frame flyback

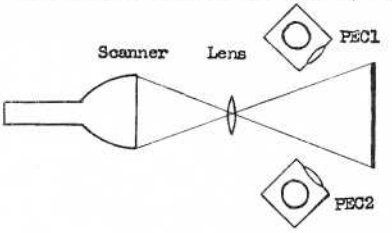


Fig. 2/5: Reflection Scanning of Opaque Subject

periods. Live simultaneous colour transmissions are possible by this method (Du Mont Vitascan process). No self-luminous object, such as a cigarette or a lamp, can be scanned satisfactorily. The system is ideal for a television-telephone demonstartion.

Figure 2/4 can be used again for fractional values of M.

Examples: An MW6-2 is to be used to scan 4" x 3" title cards and still photos. What is a reasonable lens to look for?

The MW6-2 projection tube has a 3" screen, with a maximum usable diameter of about 2.75", so that the maximum raster size is 2.2" x 1.65". M is therefore 0.55. Referring to Fig 2/4, a 1" lens will give v = 2.9", u = 1.6", but this means that the lens is covering a very wide angle - besides the difficulty of getting thick material under the lens.
A 2" lens gives 5.8" and 3.2", and a quarter-plate (4¼" x 3¼") camera lens would do, but probably a 2½" or 3" lens would be more practical. Ans.

A 5FP7 tube is to be used to scan "heads-and-shoulders" of subjects seated in a darkened studio. What is a reasonable lens to use?

Let the scanned area be 16" x 12"; therefore M = ¼. A 4" enlarger lens gives u = 20, v = 5. If the lens has an aperture of f4.5, depth of focus tables show that, focussed at 20", the depth of focus is just over 1". To obtain a depth of focus of

WHAT'S ALL THIS ABOUT IMPEDANCE?

There is a lot of talk about "impedance" in the pages of television literature, and it may be as well to confirm that we know what the subtleties are.

In the first place, impedance is measured in ohms, but is not resistance. This should make one stop and think, and remember that both capacity and inductance can modify a DC resistance at any particular frequency; the complex sum of reactance and resistance is called impedance.

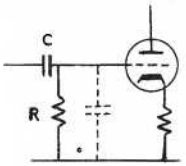


Fig. 1 (Left).

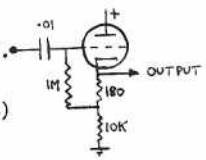


Fig. 2 (Right)

Consider the circuit of Fig. 1. At DC, the input resistance of the circuit, across which the signal is developed, is 1M, contributed by the grid leak. Across the 1M, however, there is also the input capacity of the valve (say 5pF), the stray capacity of the valve-holder and components (say 1pF each) - some 7pFs in all. At 10mc/s the reactance of 7pFs is about 25,000 ohms, so that at 10Mc/s the input impedance of the circuit is 1M in parallel with 25K - about 24,000 ohms only. This is many times larger than the reactance of the coupling condenser, so the higher video frequencies pass unattenuated. As the frequency increases, however, another phenomenon occurs in the valve itself. Due to the finite time taken by electrons to move from cathode to grid, an "input resistance" appears, and this may be only 5000 ohms at 45 Mc/s for an EF91. As long as the grid leaks are some 10 times as large, obviously the valve is going to be the determining factor. This input impedance appears across the input tuned circuit and thus at 45Mc/s the tuning will be fairly flat, because we have in effect already put a 5K damping resistor across the circuit. This is one reason why valves have an upper limit beyond which they will not amplify; the input impedance drops to such a low figure that the input circuit has no Q, and therefore develops no volts across it. (A similar point occurs in transmitters, where it is inadvisable to use grid leaks of less than 22K for fear of damping the previous tank circuit too much).

At low frequencies, the input impedance is predominantly resistive, and is approximately equal to the value of the grid leak. Now if we pass a low frequency f through a CR coupling as in Fig. 1, the output voltage will be 3 dbs down on its value for higher frequencies when $2\pi f = 1/CR$ (cycles, farads, ohms). Thus, the larger we make the product CxR, the lower the frequency we can pass without attenuation. Remember also that each coupling adds its own contribution to the overall attenuation, so it pays to keep CxR as large as possible. All valves have a maximum value of grid leak that is permissible; this is usually about 1M for small valves such as the EF91, 12AT7, etc, but is less for larger valves: the EL84 for instance will stand only 270K - and in general these values are reduced by 2 or 3 times if fixed external bias rather than cathode bias is used. If the grid leak is returned to a positive potential, it is permissible to increase its value.

Having fixed the grid leak value at 1M, a 0.1µF coupling condenser is a reasonable size to use, remembering to keep it away from the chassis to avoid stray capacity, and to use a good quality component whose leakage is very much greater than 1M. Some circuits require that the various couplings be staggered somewhat, but otherwise 0.1µF and 1M will do for all video couplings.

If a cathode follower is used as in Fig. 2, the apparent input impedance is increased about 10 times. Thus the coupling condenser can be reduced to 0.01µF with no loss of LF; at the same time the input capacity is reduced by the same factor, so improving the HF performance.

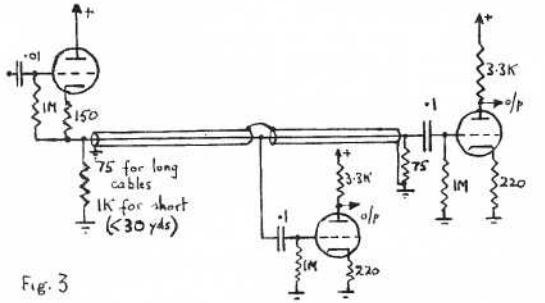


Fig. 3

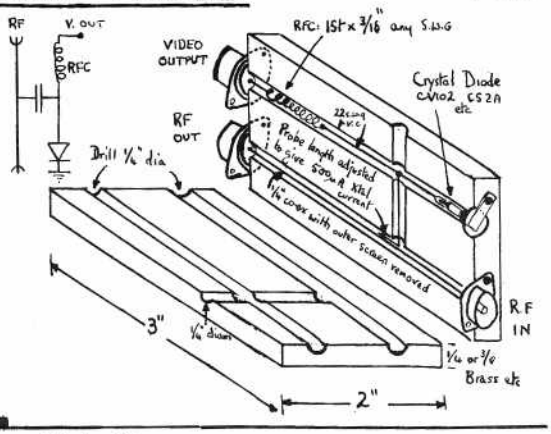
Now let us have a look at the applications of the foregoing. Suppose we wish to monitor a video signal without disturbing that signal in any way as it goes off to some distant point. In the first place, the signal will be sent down a low impedance co-axial cable of about 75 ohms impedance, because the effect of the cable capacity is negligible compared to 75 ohms, and so the higher frequencies are not lost. To feed into this low impedance from the higher output impedance of the video amplifier a cathode follower will be used; since this has a very high impedance input, the amplifier will not be affected by the cable being connected or disconnected. The far end of the cable will be terminated by a 75 ohm resistor to prevent reflections of the video signal back down the cable, and the voltage developed across the terminating resistor will be fed into the grid of an amplifier - a high impedance that will not affect the value of 75 ohms appreciably. Now any other grid circuit, or high impedance relative to 75 ohms, can also be connected across the cable without upsetting anything. If a one volt signal is being developed across the cable impedance, it will appear at any grids connected across the cable, and also across the terminating resistor, (Fig. 3).

In this way, any number of high impedance inputs cab be bridged across a single low impedance line, provided that the line is correctly terminated at the far end. Further low impedance lines can only be fed from further cathode followers.

AN RF FEEDER PROBE

This little probe unit is easily inserted in the feeder run to the aerial. If a microammeter is put across the output, the meter can be used to indicate maximum feeder current, i.e optimum aerial loading, but the reading will only be a relative one if there are any standing waves on the line. Do not exceed 500µA current; the probe can be bent to give a reasonable reading with the particular transmitter in use. If a 1V video signal is required, a cathode follower will be needed, or a CRO can be hung across the load resistor. The video output polarity will depend on the crystal polarity, and may be different with different makes.

Construction is simple, but it is recommended that the solid block be sawn in half first, then soldered or screwed together, before it is drilled, so that the parts mate together satisfactorily. If other size co-ax is in use, keep the ratio of inner and outer the same in the block.



THE APQ9 JAMMER UNIT

Several Type APQ9 Radar Jammer units have again appeared on the surplus market, and some members have asked whether they can be modified for use as 70cm TV transmitters. Whilst we have no knowlege of anyone actually using one, the following notes may be of interest.

1. RF Conversion As it comes, the unit consists of two 8012 UHF triodes in a high power push-pull oscil-lator circuit tuning approximately 500 to 600 Mc/s. A description of the original is given in "VHF Tech-niques" Vol 1 page 327. In order to reduce the operating frequency, move the valves out to the ends of the supporting limbs; release the gear shafting and remove it. Now either reverse the whole upper plate assembly so as to increase the spacing to the lower plate, if necessary adding a foil connection to the valve pins, or cut off the two outer and one inner fingers of the sliding contacts, and screw them right in. If this is not sufficient, lengthen and thin the side arms supporting the valves. For optimum performa-nce, switch on (the valves are bright emitters!) and apply HT; screw the cathode plungers away from the valve until maximum output on a loop lamp is indicated. The frequency is best measured with Lecher lines, as described in any radio textbook.

2. Video section conversion A simple 931A amplifier is fitted, but this has no LF response and cannot be used unmodified. A circuit has been given in "CQ-TV" No.5, but in general increase all intervalve couplings to 0.1mfd and 1M; bypass the 150 ohm cathode resistors with small condensers 0.001 - 0.01 mfd as required to compensate for the CRT decay time; insert blanking on the second 6AC7 suppressor grid; DC restore the 6AG7 grid and add syncs at the anode. Modulation by the two 807s fitted may be satisfactory; LF response may be increased by adding a 470 ohm resistor in series with the big RF chokes. Grid modulation is probably easier, in which case remove the 807s and the RF chokes, and use this space for a cathode follower feeding video to the grids of the 8012s.

Club News

HIGH WYCOMBE are bringing at least 29 people to the Convention, plus the staticon camera, pulse generator, monitors, etc. A new workshop has been constructed so that more members can take an active part in the engineering, whilst contact has been made with the local cine society with a view to making a short film for the BATC Newsreel.
Hon. Sec: K.Cooper, Hayreed, Gallows Lane, Sands, High Wycombe, Bucks. Meetings - twice weekly at least.

BIRMINGHAM started the new season's monthly meetings on Sept. 13th., and will hold them regularly at 7.45pm on the second Thursday of the month at the White Swan Inn, Edmund St. The staticon camera is almost complete, and further developments on the RF side are awaited. A coachload of members is coming to the Convention with items of gear.
Hon. Sec: F.Rawle, 16 Kings Rd, New Oscott, Sutton Coldfield. Regular Sked: Sunday 11 a.m 160m band.

CHELMSFORD had an open-air meeting attended by 28 members on Sept 13th when G2DUS/T described and demon-strated his flying spot scanner using an MW22-14. Pos--itive, negative, colour and even Cinemascope was shown to the great enjoyment of everyone. The Club "studio" improves nightly. Future meetings: October 11: "430 Mc/s Receivers" G3VI; Nov. 8:"Home-made Image Orthicon Camera" G3KOK/T; Dec 13: "High-grade CRO for ATV"G3GVO. Jan. 10 "405 line interlace generator" G2WJ/T.
Hon. Sec: D.Reid, 4 Bishop Rd, Chelmsford. 3 vans and 2 cars coming to Convention to occupy 8 stands.
See P3 about NORTH LONDON, SOUTH LONDON and ROMFORD groups. CAMBRIDGE are sending 12 members, and say the equipment will speak for itself!

We have members in:

HANTS
Southsea, Farnborough, Southborne, Bournemouth, (2), Ringwood, Christchurch, Southampton (2), Newport IoW.

NORTHANTS
Rushden (3), Wellingborough, Northampton, Peter--borough.

WHAT THE OTHER CHAP IS DOING

By Tobias Hartsploot.

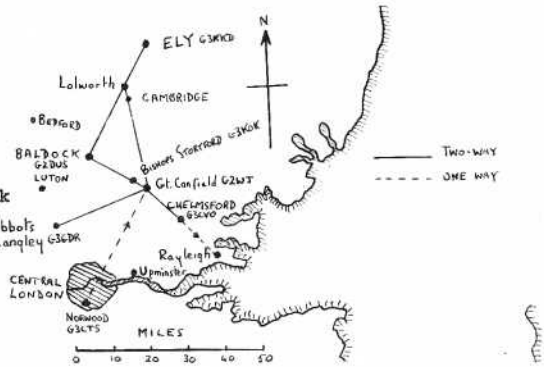
At the right we show a map to whet your appetites, showing the activities of the East Anglian TV net. Note that these are not relay links as yet, but that is one of the aims for the future. We shall be pleased to print similar maps for any other groups just as soon as you get more than one station on the air!

G2WJ/T now boasts a true 405 line interlace, although the difference is only noticeable in the shack or at G3GDR/T. Jeremy has built a new sync generator using 6SN7s with a genlocking facility; this enables him to generate his own syncs from incoming signals (or BBC-ITA of course) and so hold weak signals better. Over the path to G3CVO/T, Ralph finds that an extra 6ft of height on the 64 element array makes several dbs improvement in the signals.

Great things have been happening at G3CVO/T. Despairing of ever possessing a Rolls-Bentley, the garage has been turned over for use as a TV studio, and installed there now are G3KOK/T, G3KWD and Mike Cox, all of whom work at Marconis during the week. Between them they have an image orthicon camera, monoscope, slide and film scanners, two 405 line sync generators, and all the necessary power supplies and monitors. Full sound mixing and talkback gear is available, and two co-axs and 7 lines go from the studio to the transmitter hall (!) in the house. G3CVO is now free to concentrate on the TV tx without worrying about the video side. The big transmitter is due for an overhaul since it was found that the meter used to set the screen stabiliser STV240/80 was wrongly calibrated. Also the 250V regulated supply needs resetting owing to an oversight that a 375V rated transformer does not give 375V on load into a choke filter. A portable TV rig using 12AT7 Squier EF91 doubler 5763 (145 Mc/s) and QQV03/10 tripler is also running, and a CV67 has been slung under a small horn radiator for use as a grid-modulated AM microwave link. We can now say that the journey to Great Baddow is well worthwhile! Much of this gear will be shown at the Convention.

No less than 25 members work at Marconis, and Don Reid, who lunches with Eddie Barrall G2BCB, has persuaded him to start work on a new sync generator, whilst G3CVO, who lunches later with G3VI, is getting the latter to build some TV conversion equipment. The Butchers G3KPJ and G3CUH also have a TV converter and a FSS under construction, G3KRA/T is making a new transmitter, T.Pegram a sync generator.

Alwyn Stockley G3EKE is now installed in his new house at Norwood, complete with a large room on the top floor for TV meetings. He is anxious to get on the iar with TV, and asks whether anyone would collaborate by building the vision gear if he does the RF side. See also note about S.London group of the BATC. Alwyn will be on the phone soon, and will be along at the Convention looking for subscriptions! Capt. J.Spafford G4RB is temporarily in the I.o W but hopes to be active with TV soon. John Adams at Iver has been polishing up the BATC Newsreel for the Convention, and also recording a soundtrack. V.Cedar SW16 has a 17" monitor and 70cm converter, fitted with flywheel sync and AGC for ATV work. He has



scrapped the old FSS, and is now at work on a 405 line 5527 camera. H.Hyman G3IZQ points out that the Enfield RSGB group do a show each year, and would like N.London BATCs to exhibit. Don Miller W9NTP is an enthusiastic TV amateur in the USA; we could do with some news and tapes from the AATC, too. J.Boxall (Cambridge) wants to build a complete TV system. A.W.Hall (Westcliff) is wading through the lecture tapes, and Giacomo Vargiu (Asti) is going to translate the tapes into Italian. Jim Rackett has moved to Wembley.... E.R.Bassett (Southampton) has been having trouble with line time base ringing getting onto the staticon target, and has not had a chance to finish off the 5FP7 FSS unit. Ron may be able to bring some gear to the Convention.

P.Harrison (Sheffield) runs an MW6-2 projection tube in the FSS with good results, and promises to let us have further details. The 1850A camera is working, and the staticon is nearly complete. No RF equipment is contemplated as yet, but P.H is very willing to co-operate with any RF-minded members. P.F.Jones GW3FPF is at Rhyl, and possibly well situated to receive pictures from our old friend Bill Stapleton at Dublin, who has now applied for a /T licence with a view to transmitting from a site on the Dublin Mts. Robert Torrens GI3FWF/T has sent in a Strong Protest about that "First Irish TV" photo in the last edition! He says the EIs are 'way behind the GIs...

Ron Oakley (Dagenham) is now out of hospital for good, and has got married. He and Frank Brown were making a 5527 camera using G3AKJ's tube, but the finished bits have now been passed on to G3LCM/T. Ron says the bug is biting again, and he has 2 ACR8s for making colour monitors. Doug Wheele G3AKJ now has the house wired up for remote switching of coax etc using uniselectors etc. He is operational on 160m again, and also hopes to come up on 145Mc/s. With domestic chores settled, he proposes to re-organise the the Romford and Dagenham group again this autumn, and invites anyone interested to contact him at SEV 1051.

Paul Essery G3KFE/T now is in digs at Enfield, and so is confining himself to sound-only operation with a ZC1. He hopes to get a house in the area, and then the TV gear will follow, G8SK etc pse note.

Ken Dixon EI9AB (Dun Laoghaire) is at sea most of the time but hopes to contact Bill later. Robert is ready to use his portable 70cm gear on the Mourne or Carlingford Mts as soon as Bill is on the air. He adds the VCR516 and 517c as suitable for FSS work, but reckons the GEC E4205E/7 will give the beginner pictures of far more entertainment value than the usual run of surplus tubes. Price: £5.

Alan Ellis (Canberra) has been changing over to an interlaced picture, but finds his Blocking Oscs will only hold in for about 15 mins. He has had to ease up a bit on ATV to take a TV operators exam to impress the family! C.A.Rouse (Auckland) used to live in Croydon, and still has his 1931 TV set: flat plate neon, Baird light valve, Nicol prisms, Kerr cell, etc the lot! He and Jack Mason are building the 405 line equipment, staticon camera and 16mm t/cine. Graham Goodger ZL2RP (Lower Hutt) has moved into a new house, and is building a new workshop. The pulser is finished, and some 145 Mc/s gear is being built.

G.R.Goldsmith (Jersey) is recovering from the rush of work resulting from the BBC TV station at Les Platons, and is hoping also to receive the French 819 line tx at Caen on 190Mc/s. He hopes to get back to ATV again soon, especially now we have sold a copy of "An Intorduction to Amateur TV" to someone in Guernsey! Pat Lebail F3HK (Paris) has been pushing the Cause forward in Radio-REF and also at Stresa, where it was proposed that all amateur TV in Region 1 should be on 405 lines, partly as a gesture to the work performed by British amateurs in this field. (Many thanks for the compliment, OM). We also saw in Radio-REF that our old member Bernard Malandain F9MH is back in France again. What news, OM?

Al Bevington G5KS (Nr Birmingham) has also recovered from sickness, and is pressing on with the camera. He is most anxious to contact other BATCs in the area (see "Changes of Address"). Ivan Howard G2DUS/T (Baldock) has built a first-class FSS for the Convention. This uses an MW22-24 9" CRT (actually a surplus TV set for 50/-) with an 8" x 6" raster, a 2" f1.6 16mm projection lens (15/-) two 2" condenser lenses (1/6d each) 3 6AC7s (R_1 = 1.2K, R_k = 220, C_k = 0.001 approx) and a 6AG7. With 400V on the 931A (+250 to -150) exceptionally good pictures are produced, although the FSS is some 6ft long!

John Paul (Lymington) writes with news of the SRDE Radio Society's TV activities, and to send his 73 to John Nettell. They have 3 image orthicons of various manufacture, one being an 1840 for which they require information. John is making the counter and pulse circuitry, another member is making the monitors and a third doing the FSS. The power supplies are made, the camera is next, and the RF is last. John also has 70cm and 2m gear.

John Plowman G3AST (Luton) is operational on 2m and has a much modified G8SK transmitter for 70cms. He awaits a QQVo3/10 for more o/p, and is building a 5-over-5 x 4 array; as he has a 50' lattice tower in the clear on the highest spot in Luton..... Pluff hopes to bring at least some of the gear to the Convention, but is stuck for transport. Anyone passing through Luton?

W.J.Ellesmere (Edgbaston) is now G3LDW/T. The vision transmitter is under construction; the ERP will be about 25 watts on 434.7 Mc/s. He hopes to build a camera as well. Frank Rawle says that the other B'ham camera should be well on the way by now, and may be on view at the Convention. George Short (Lincoln) has got married, and has been inactive owing to illness. He is going to try and get down to the Convention, though, and sends his regards to all old friends, esp. Bill Stapleton.

Hendrik de Waard PAoZX writes in to say that the first two-way TV QSO in the Netherlands was made by PAoLAM and PAoSW, both in the Hague, over a distance of 2 miles, on June 11th. Well done, oms, now how about the DX record of 38 miles?? In Holland licences to receive amateur (NOT broadcast) TV are free. The new Groningen camera using a Philips tube is not yet finished. Hendrik is sending a tape to the Convention, and PAoLQ-TV is coming in person. Both he and Bill Stapleton hope to visit the Chelmsford group station on the Sunday after the Convention to see pictures from G2WJ/T.

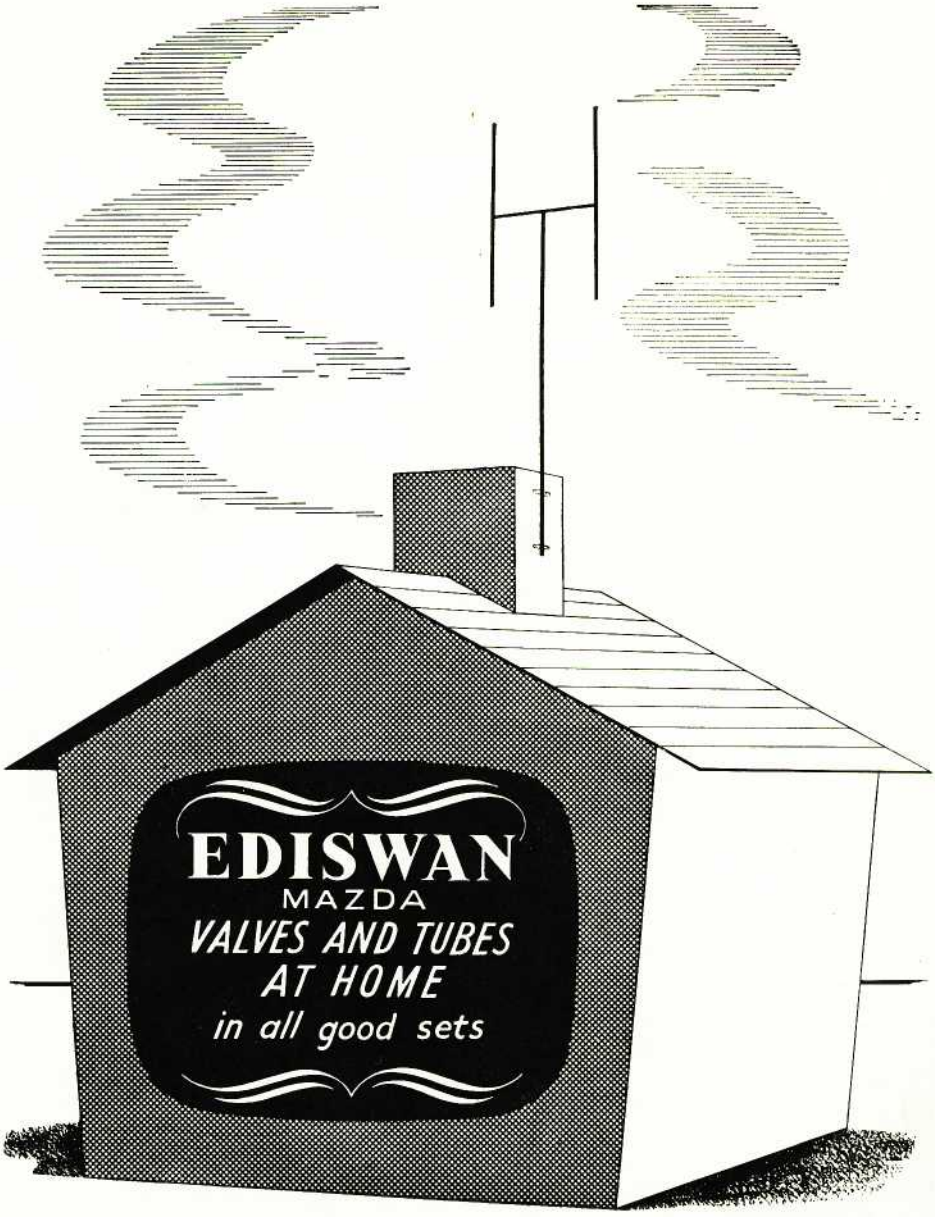
P.K.Jones (NW6) fell off his scooter and was in dock for a while, but he is hoping to get round and see everyone in range of a proposed North London group, to be run in conjunction with Bill Hall and Dave Hooper G3ICU. Pete suggests that anyone interested contacts him at the Convention. He also asks if anyone has made the ZL2RP pulser work unmodified?? (ZL2RP?) Arthur Critchley (St Annes) has ordered a Staticon after some hard work as a holiday bus conductor! This will be the first camera in Lancashire, please note you Northerners! Paul Wright G3JDM (Wolverhampton) is fit again (lot of injuries this edition; take care lads, you're precious. Well, your 10/- s are) and wants to meet the other Wolverhampton /T lads.

NEW MEMBERS

J.P.Arnold PAoAR Saenredamst. 4Aiii, Amsterdam Z.
Pollaro Elio I1BEM V.Bergamo 39, Cremona, Italy.
W.J.Ellesmere G3LDW/T 289 Gillott Rd, Edgbaston Birmingham 16.
S.J.Freeman Stud Farm, Dedham, Colchester, Essex.
G.R.Hill 45 Queens Ave, Dover, Kent.
J.Hunter G6HU 63 Aintree Cresc, Barkingside, Essex.
D.Jones G3IZI 34 Humberstone Rd, Cambridge.
P.F.Jones GW3FPF 123 Wellington Rd, Rhyl, N.Wales.
Gallo Luigi V. G.Griva 31, Rivalta, Turino, Italy.
L.C.Mansfield G3LCM/T 131 Waddington Ave, Coulsdon, Sy.
J.R.Paul Hopefield, Wainsford Rd, Lymington, Hants.
W.E.G.Smith G2CBC 5 St Marys Close, Peterborough.
S.D.Sood 53 Camrose Ave, Edgware, Middx.
J.Spafford G4RB c/o Officers Covalescent Home, Osborne, Cowes, I.o.W.
A.E.Thomas 59 Hook Lane, Welling, Kent.
Giacomo Vargiu V.Brofferio, Asti, Italy. 488

Changes of Address

A.C.Bevington G5KS 76 Causeway Green Rd, Langley, Staffs; D.Butler G3DKM 43 Grand Avenue, Hassocks, Sussex; A.W.Critchley 3 Haymarket, St Annes, Lancs; (also 5 Dammersey Estate, Watling St, Markyate, Herts). E.P.Essery G3KFE/T 63 Derby Rd, Ponders End, Middx; L.B.Leith ZL2LC 19 Kowhai St, Naenae, Lower Hutt, NZ; N.Rutherford 8 Burton Rd, Carlton, Notts; G.G.Short Routons Lane, Leggsby, Nr. Market Rasen, Lincs; L.A.F.Stockley G3EKE 4 Norbury Ct Rd, London SW16; G.D.Wynn No.1 Air Div HQ RCAF, CAPO 5052 c/o Home Postal Depot, London (also 13 Rue Baudoche, Metz, France); Pat Lebail F3HK 12 Bvd. Jean-Mermoz, Neuilly, Seine, France.



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