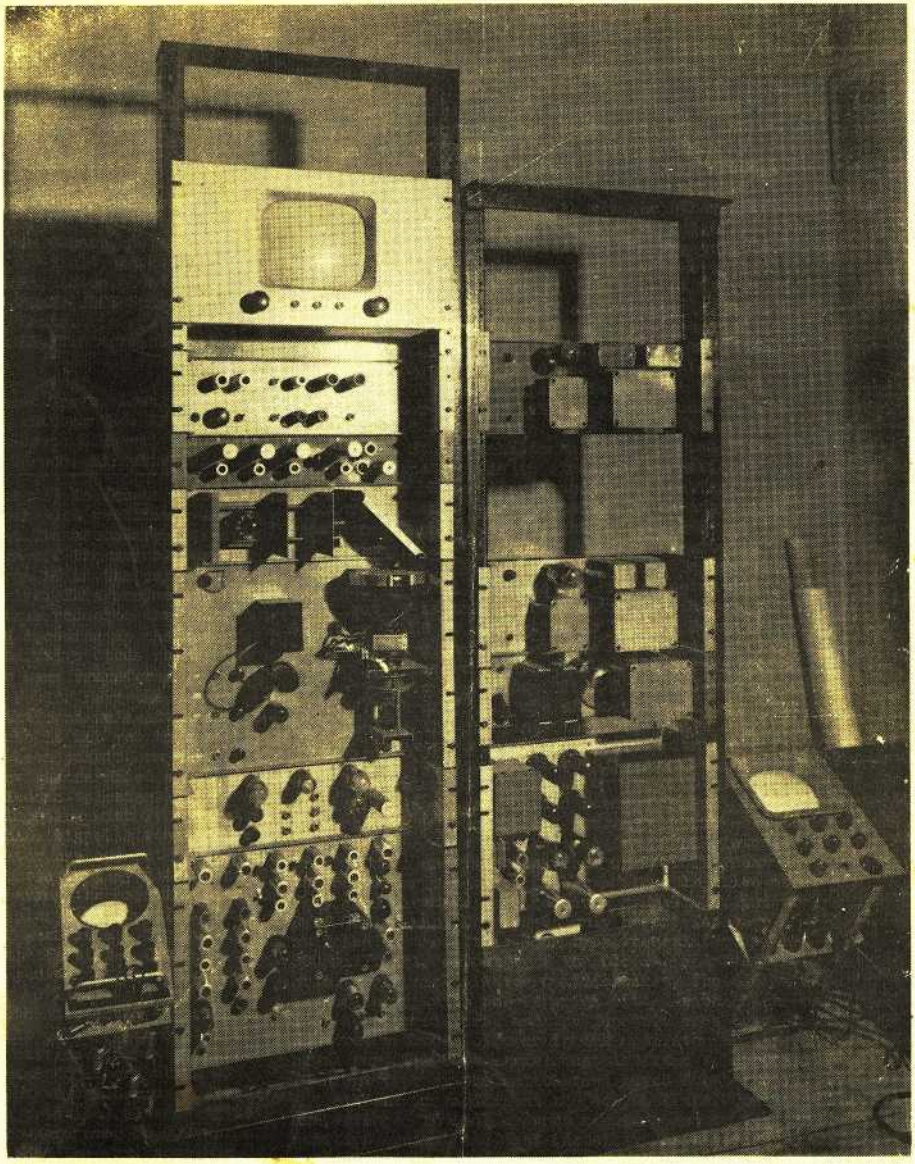

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Editorial

As there is no RSGB Exhibition this year, we shall be holding the Third Amateur Television Convention on Saturday November 3rd at the Bedford Corner Hotel, Bayley St, Tottenham Court Road, WC1. As last year, the main accent will be on the exhib--ition of equipment, and we hope that as many members as possible will bring either their gear, or photos of it. Amongst those members who hope to be bringing equipment are G2DUS (staticon, monoscope, telecine, mobile transmitter), G5KOK/T (Image Orthicon camera chain), the High Wycombe group, G3AST, G3CVO and the Chelmsford group. Grant Dixon, G2WJ, and G5KKD hope to bring something, and we expect a large contingent from Birmingham. If possible we shall be comparing telecine results via staticon, jump-scan and polygon methods, provided John Adams and G3KBA/T can manage it. No doubt several other members and groups have been asked to give demonstrations this summer, and we would ask that they keep the gear in running order until November.

Members coming from the same area may like to start thinking in terms of hiring a coach to bring them and their gear. In particular it would be most valuable if each group could arrange that at least one of its members attends to see the latest results and general trends. Members who want overnight accom--modation should contact Don Reid at 4, Bishop Rd, Chelmsford at once, and he will endeavour to make suitable arrangements with London members. We should be pleased to hear of any spare beds that might be used.

Those members who will not be able to attend, and overseas members, might like to contribute 2-3 minutes of tape recording ($3\frac{3}{4}$ ips) to be played to the assembled crowd after lunch. Even better, photos or 16mm cine film would be very welcome to accompany the tape. May we remind you that 50' of 16mm mono--chrome costs about 30/- including processing, and lasts about 2 minutes - ample to show your equipment and results.....

Final arrangements have still to be made, but it is expected that the cost and opening times will be much the same as last year. We should be grateful for any suggestions concerning the Convention, particularly with regard to 16mm technical films for the film show. Don Reid is very kindly organising the show again, and correspondence should be addressed to him.

Please note that you have really very little time to get equipment and transport organised!

M.Barlow

M.Barlow, Hon Editor.

HAVE YOU received your copy of "An Introduction To Amateur Television Transmission" yet? 5/6 incl. post from G3CVO, 10 Baddow Place Ave, Gt. Baddow, Essex.

Exposed 10 mins (!) Ilford N30 $\frac{1}{2}$pl f4 from VCR97.

OUR FRONT COVER

This shows the two 19" racks used by John Plowman G3AST of Luton. The left-hand rack contains (from top to bottom) the 9" MW22-14C monitor, a blank panel for the G8SK-type 70cm transmitter, bootstrap modulator and mic pre-amplifier, video amplifier panel, 931A and optics (f3.5) for 2" x 2" slides, 5FP7 scanner and time bases, cathode followers for feeding scanning waveforms round the shack, and the interlace generator. The right-hand rack contains a 500V PSU, 325V PSU, 5kV EHT PSU, and three 300V regulated supplies. A double-beam waveform monitor is seen on the left, and a VCR97 or 517c portable picture monitor at the right. All rack units are made on pan-type chassis, and are also mounted on runners.

The photo at the left shows results from a photographic negative.

BFTW

COMMENT

Are any members working on the recording on tape of video signals? This has been successfully accomp--lished by several firms without using high speed tape running. By scanning the tape laterally as it moves along, a television picture can be built up in the form of a long thin "raster" on the tape. At 15" per second, scanning 10 lines across the width of a standard ¼" tape, and using a recording area 5/1000" in diameter, it should be possible to record about 2Mc/s without too much difficulty. With such a small recorded area, of course, signal/noise ratios will be low by comparison with sound recording, but this should not matter too much for our purposes. The biggest snag is in scanning the tape effectively. Several methods come to mind: two contra-rotating helices of Ferroxcube with their axes at 90° to the direction of tape travel; the use of magnetostriction in nickel wires across the tape; a rotating wheel with its axis parallel to the tape, with a series of recording heads round the periphery (a French firm have tried this), and so on. The problem is to track a small area of magnetisation across the width of the tape in, say, 1 millisecond. A pointed series of pole-pieces on the periphery of a wheel might do, but the recording head itself must also respond to 2 Mc/s signals, indicating the use of Ferroxcube or similar materials. If anyone has a good idea, it might be mentioned that the Ampex video tape recorder costs about 54,000 dollars, so there is room for an amateur model! In passing, it might be mentioned that you may be surprised at the results obtained with very low definition TV: G2WJ has put quite reasonable pictures through his Williamson amplifier for instance. We look forward to having Club lecture tapes with video accompaniment.

An interesting note in the April 1955 "Electronics" tells of the use of a 723A/B klystron as a direct detector of microwave signals in the 10,000 Mc/s region. The klystron is mounted on a waveguide fed from the aerial, and by screwing in a suitable plunger, the klystron stops oscillating at one particular frequency. This frequency is amplified by regeneration, some 16dbs of gain at 20Mc/s bandwidth being obtained. The output is fed into a crystal diode and audio/video amplifier in the usual way. No doubt the same process could be applied to klystrons for the 13 cm amateur band.

SOS: The Club lecture tape on Telecine Scanning has inadvertently been sent out before being copied and overhauled. Would whoever has it at the moment please return it immediately to M.Barlow?

Australasian members can obtain a copy of "An Intro--duction to Amateur Television Transmission" from Jack Mason, 627 Manakau Rd, Epsom, Auckland, N.Z (3/6d).

Club badges can be obtained from G3EKE for 3/6d, or 5/- with callsign: 154 Charminster Rd, Bournemouth.

BATC Lecture tapes "Getting Started" and "Flying Spot Scanning" for overseas use have been sent out to Armstrong (BWI), Collins W4MS, Mason ZL1QS (NZ), and Cornelius VK6EC. May we remind these members that it is a condition of loan that you let Grant Dixon know when and to whom you despatch the tapes.

Your contributor recently had the pleasure of visiting the High Wycombe group of the BATC, and, since the organisation of a successful group can cause some headaches, the points noticed are passed on.

The group was started by Ken Cooper, in whose workshop the majority of the constructional work is done. It is necessary, therefore, to limit the number of members on the active list to 10 or so. Each member pays 2/6 per week into the kitty - 1/6 if unable to attend meetings. This money is used to buy components and to subscribe to any journals that the group feels to be useful; 5/- a week is put aside for the purchase of the camera tube. Each member has an allotted job, and on the wall of the communal workshop is a chart showing Name, Job, and How Far It Has Progressed! This chart acts as a great stimulant, of course. Circuits and ideas are contributed by all members. Liaison is maintained with local cine and radio clubs, and the group have set themselves a target for the completion of the equipment by undertaking to televise local football games over a closed circuit to a local hospital later in the year. In addition to the constructional side, certain members have taken over other jobs. There is a Treasurer, who collects the 2/6s, and a Publicity Man, whose job is to keep information about the group flowing to the local Press, CQ-TV, and the various radio journals. The result of this organisation is a closely-knit group, all highly enthusiastic, which in a few months has built most of a complete camera chain and has plenty of ideas for the future. More beer to your elbows, men! M.B.

The second Edition of the "Proceedings of the London UHF Group" is now available price 2/- from G2FKZ, 105 Underhill Rd, London SE22.

Congratulations to R.L.Buchanan (engaged), Fred Steed (married) and Pluff Plowman (new daughter). Please note that G3CVO expects a reinforcement for the BATC around August 3rd, so do not expect mail at this time.

Mike Cox points out that Proops have some APQ9 jammer units containing 931A, 6AC7 video amp, 807s and 8012s for £5; also some 5FP7s @ 30/-. Alpha Radio at Leeds have BC929A 3BP1 triggered CROs for 65/-. These can be used directly as line freq. CROs.

Phil Thorogood G4KD of the London UHF group invites BATC members to use the LUHFG meetings on the first Thursday in each month at the Bedford Corner Hotel, Tottenham Court Rd, as a London area BATC meeting. Amongst BATCs regularly attending are G2WJ and G2FKZ. This is also a good opportunity for meeting 70 and 25cm enthusiasts of course.

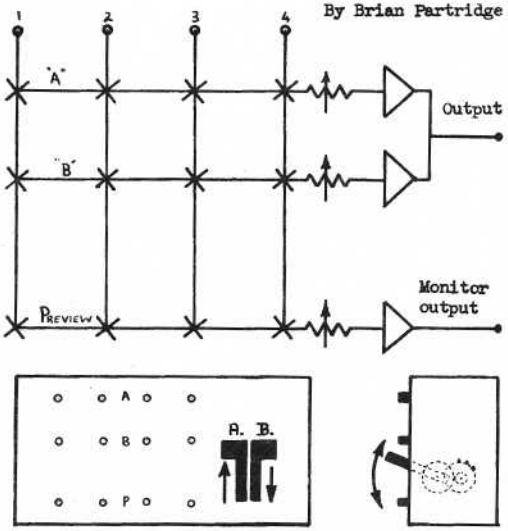
We have some new Club notepaper 10" x 8" price 2/6 for 50 sheets, or 4/- with your own address at top.

References: "Wideband Microwave Links" and "Microwave TV Transmission Systems": Marconi Review 118, 1955. "Simplified TV For Industry" Electronics June 1947. "Versatile Wideband CRO" Radio-Electronics Jan 1955.

PAoZX should now be back in Groningen so that the Saturday afternoon TV sked on 3750kc/s can continue. Chelmsford's Sunday sked on 1980kc/s at 1100 should be audible to BATCs within 40 miles or so.

A VISION MIXER CIRCUIT

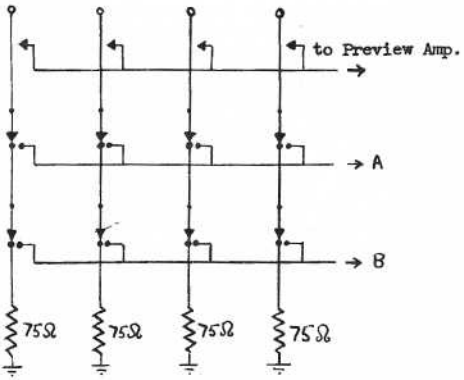
By Brian Partridge G3KOK/T and Eric Lawley.



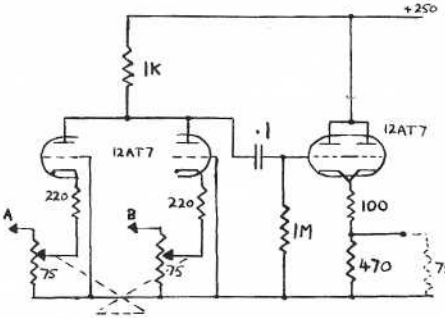
Another type of vision mixer is that known professionally as the "A-B Fader". This has a greater operating ease than the first type describ--ed, but not quite the same facilities. In the first place, only two inputs can be mixed simultaneously, rather than all possible inputs; in practice, however, it is rare for more than two to be needed anyway. Normal "cut" facilities are included, but in addition the fade-up-A-fade-down-B is made very easily, making for easy "dissolve" mixes.

Reference to the layout and circuit shows that each input is brought to two sets of cut buttons (marked "A" and "B") and a set of preview buttons. The preview amplifier is a high-impedance device which is switched across the input lines. A suitable circuit was given with an earlier vision mixer circuit in CQ-TV 22. The input lines then pass through the A and B buttons in turn to 75 ohm termin--ations; each button is a changeover device so that A buttons always override B buttons, and cutting must be accomplished on A buttons rather than B. (If high impedance amplifiers were used, A, B and Preview bttons could all work the same way). A and B outputs are terminated in 75 ohm potentiometers, which must be linear law if proper mixing is to occur. If 75 ohm potentiometers are not available, 100 ohm pots shunted by 330 ohms will be near enough.

The outputs of the A and B amplifiers are commoned, but their inputs are fed from lever-operated faders. The levers are geared to the pot--entiometers in such a way that the sliders travel over the whole track as the lever is varied. The two levers are arranged vertically in such a way that when both levers are up, (i.e alongside A buttons), amplifier A is at maximum gain and B is at zero, and vice versa when the levers are down. Thus by operat--ing both levers together, a smooth dissolve from A input to B input, or back again, can be obtained. By using the levers separately, normal fades can be accomplished. With the levers in the extreme positions cutting is accomplished on the buttons in the normal way. To mix inputs 2 and 3, say, cut to 2 on A, press 3 on B, and advance both levers to the mid-position. the preview buttons merely punch up the various lines no facility for preview mixing being employed.



(Above): Push-button Arrangement



Circuit of the A-B mixer and Cathode Follower

The circuit is quite straightforward, and is arranged to feed a 1 volt signal out into 75 ohms. Any other arrangement would be just as satisfactory. Extra contacts on the A and B buttons are arranged to complete the cue-lamp circuits. Four inputs are shown, but any number could be used; four is quite enough for the average amateur studio. It is suggest--ed that all the valves and components and plugs and sockets be mounted behind the panel of the mixer, leaving only the buttons, lights and levers projecti--ng. This will make for much more comfort for the mixer operator, and less wrong buttons punched up at vital moments.

SETTING UP COUNTER CHAINS

By Tony Sale.

Difficulties are sometimes experienced in getting counter chains to perform satisfactorily, and this is especially so when some deviation from a published circuit has had to be made. The three most common faults are: incorrect count when switching on from cold; insufficient "pull-in" range on the AFC system; change of count after the unit has been running for some time. All of these points can be cleared up by attention to details, as will be explained.

All counter chains consist basically of a master oscillator, divider chain, discriminator to compare the counted-down 50 c/s with the mains or other reference source, and some form of feed--back circuit to control the master oscillator frequency from the error signal. This circuit is usually a DC amplifier fed from the smoothed output from the discriminator, and is working as a Class A amplifier. For this stage to work as a voltage amplifier, its bias must be correct. Now most discriminators are arranged so that at balance the output voltage fed to the DC amplifier is zero, or earth potential. Shorting the grid of the amplifier to ground therefore gives the same voltage conditions, but of course removes the feedback, or "unlocks" the counter chain. If valve characteristics are not to hand, short the grid to ground, and measure the voltage at the anode; this should be about 2/3 of the HT voltage if the cathode bias resistor is the correct value. Now remove the short on the grid, and upset one of the counters so that the chain runs slowly through lock; the anode voltage should vary by <u>at least</u> 50 volts up and down as the pulses slip through lock. If not, the output from the discriminator is too small, or the gain of the amplifier too low. In the latter case increasing the anode load will help, but the cathode resistor will also need to be raised. Check with the CRO that no mains hum is reaching the anode of the amplifier; if it is, more smoothing must be added to the discriminator output. Note that the amount of smoothing determ--ines the "sponginess" of the lock, and that a long time constant may mean many seconds or even minutes before the counter locks in.

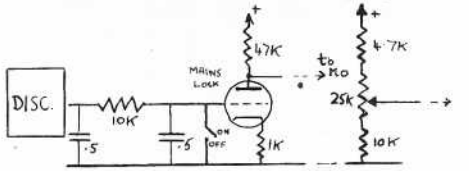


Fig. 1. Typical AFC circuit in a Sync Generator

The next point is to ensure that the MO stage does not misbehave over this range (50V or more) of control volts. Disconnect the feed from the DC amplifier anode, and put in its place a potentiometer across the HT line; suitable values are 4.7K-25K pot - 10K (remember the watts). The variable element can now be varied to give the same range of output volts as was delivered by the DC amplifier as the system went through lock, and the output from the MO should be carefully watched on the CRO for spurious effects. At mid-range the MO frequency control can be set to 20250 c/s if means are available for checking this.

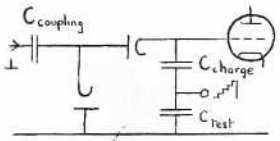


Fig. 2. Skeleton step counter circuit

Now look at the check point on the first counter. Again vary the potentiometer and see if the counter changes count. If it does, try and balance it by resetting the divider control. If this cannot be done, then alterations must be made to the counter. The nature of the alteration will depend on the type of counter in use, but for the common step counter, look for the following:
i. Sloping top to the steps, indicating too low a back resistance in the diodes, or a leaky condenser.
ii. Exponential flattening of the step waveform due to too small a charging condenser.
iii. Unclear trace, due to hum or spurious trigger pulses somewhere, particularly on the HT line.
Assuming that these points are all in order, then the fault is probably due to insufficiently large steps. The charging condenser should be reduced, and/or the coupling condenser increased, until the divider ratio remains constant over the whole range of the potentiometer on the MO. This procedure is repeated for all the counters in turn, AND IT IS USELESS TO PROCEED UNTIL IT <u>HAS</u> BEEN DONE. A further point to watch is that the HT line remains steady, as variations in this will produce variations in pulse height, and therefore in step height and counter stability.

This routine is a little tedious, but need only be done once. Thereafter, reconnect the MO-DCA link, and the counter should lock perfectly. Check that as the MO frequency control is varied, the relative phase of the last counter output (50 c/s) and the mains can be varied without the lock slipping.

Having reached the right count-down, now is the time to tune-up any L-C resonant stabilisers; 12.5mH and 0.001 mfd in parallel in series with the R in one anode of a master multivibrator will exercise quite a hold. With the CRO across the tuned circuit, adjust it until maximum SINEWAVE output is obtained at true lock; any other shape will indicate tuning to a harmonic. From now on, by switching off the lock, one can be sure that at least the MO will be running at about the right speed, so enabling the counters to be set up approximately. If the above procedure has been carried out, a true lock should be obtained very quickly.

RF Equipment (Contd from CQ-TV 27 P6)

9.9 Higher Power with the 4X150A

If higher power is required, perhaps to permit the use of a less directional aerial array, the most likely valve to use is the 4X150A, or QY1-150A. This is a forced-air cooled valve of disc seal construction and is relatively expensive by amateur standards. It can be operated in a coaxial line assembly, or in a trough line, and details will be found in the literature. This valve will give almost 200 watts of RF with 300 watts input, but at the 150 watt rating (the maximum permitted by the GPO), some 80-90 watts only are available. As this is only 2-3 times the power given by a QQV06/40, it may be worthwhile considering whether the extra cost and complication of using the larger valve is justified. The 3dbs gained here might more profitably be obtained by improving the aerial or feeder arrangements.

Table 9.2 gives design figures for this valve, and Table 9.3 compares the valves so far discussed.

V_a	1200	1000	800	750	600	600
V_{g2}	250	250	250	200	250	250
R_l	2700	1980	1250	2000	1200	750
B-3db	4.3	5	8	5	8.4	13.4
Drive $_{p-p}$	120	124	126	140	136	150
V_{mod} SB	-140	-142	-145	-150	-155	-148
PW	-80	-80	-80	-80	-80	-80
W_{in} PW	300	250	200	150	150	150
W_{out} PW	192	136	90	88	82	49

Table 9.2 Some figures for the 4X150A Tetrode (It will be noted that bandwidth is a limiting factor with the high loads necessary for high power).

	- 4X150A -		QQV06/40	QQV03/20	
V_a	1200	600	500	300	V
W_{in}	300	150	88	55	W
B	4.3	8.4	9	13	Mc/s
W_o PW	192	82	62	23	W
Drive	120	136	65	60	V_{p-p}
V_{mod} SB	-140	-155	-25	-20	V
PW	-80	-80	+7.5	+10	V

Table 9.3 A Comparison of the popular 70cm PA Tubes. (Note that although the 4X150A requires a much greater modulation swing, no grid current ever flows, so that the modulator can be predominantly a voltage amplifier).

9.10 The Complete 70cm TV Transmitter

Having decided the driving power required by the modulated stage (assuming grid modulation), the remainder of the transmitter is concerned with generating this power at the desired frequency. This "drive" section usually consists of a crystal oscill-ator-multiplier chain, but a master oscillator at the carrier frequency is not impossible. At 430Mc/s it is possible to obtain very good stability from a cavity oscillator using valves such as the 6J6/ECC91 or 12AT7/ECC81, or the special VHF valves developed for the purpose. It is best to use a buffer amplifier between oscillator and PA, and also to run the oscillator at fairly high level and to load it very lightly. For amateur television use, a stability of ± 50 kc/s is ample, but care should be taken that unwanted frequency modulation of the carrier cannot occur.

The advantage of using crystal control is that the carrier frequency is known within fairly precise limits, and is very stable. There is no reason why the carrier should not be sufficiently stable for use as a CW transmitter, and this is often done for communications and setting-up purposes. Although more valves may be required than in the MO BA PA case, these are often small types, and, using modern techniques, may number only three or four. One disadvantage of crystal control is that harmonics of the crystal frequency (which is often in the 6, 8 or 12 Mc/s region) may be produced, which will cause spurious signals to appear on receivers, etc. In any case, great care should be taken to prevent RF getting into the mains, or picked up by the video equipment.

The design and construction of VHF equipment is a continuously expanding subject that is dealt with in detail in many amateur radio magazines, and will not be dealt with further. Some complete circuits will now be given as a guide, but it is emphasised that in case of difficulty, the reader should contact his nearest VHF enthusiast for further information.

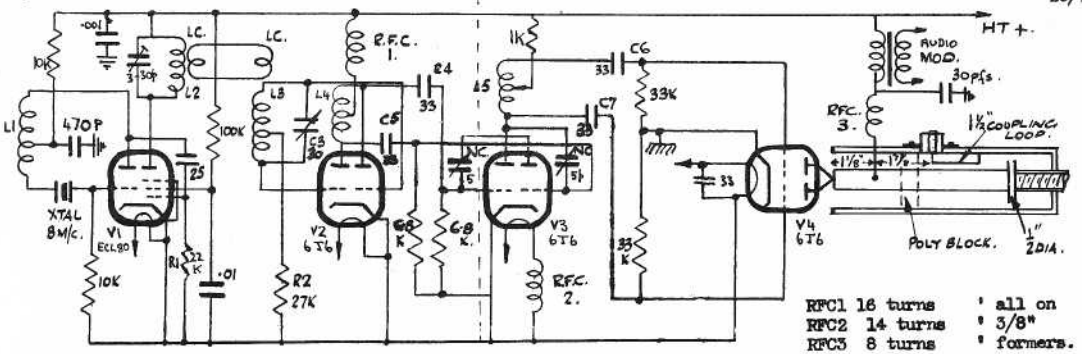
9.11 A Low-Power Transmitter using a 6J6 PA

Although designed primarily as a CW-sound transmitter, the following little transmitter has proved extremely popular as a low-power vision transmitter, besides its obvious use as a sound transmitter spaced 3.5 Mc/s from the vision transm--itter. Over a good path, a range of 40 miles has easily been covered, first class pictures being resolved. The original design, by G3EOH, is based on a 216Mc/s transmitter shown in the ARRL Handbook, and this has been modernised by G8SK. The description is reprinted from the Proceedings of the London UHF Group, No1, by permission.

"The circuit consists of an ECL80 triode-pentode overtone oscillator using the popular 8 Mc/s crystals that many VHF enthusiasts already possess. The triode anode circuit is tuned to 24 Mc/s, the pentode to 72 Mc/s; this is followed by a 6J6 tripling to 216 Mc/s, another 6J6 as a neutralised buffer amplifier at 216 Mc/s, and a further 6J6 as a power doubler with a trough line anode circuit. The buffer stage was found to be necessary to obtain sufficient drive to the PA.

The construction is fairly simple. A piece of 16 swg aluminium 12" long by 8" wide is bent into a "U" with sides 2½" and top 3". The holes for the valve sockets are cut out as shown in Figure 9/8; the trough, of brass or copper, is fairly easy to bend, requiring only the minimum of workshop facilities. The spacing between the 6J6 valve sockets should be strictly adhered to, but other dimensions are not critical.

If possible, PTFE holders should be used for the last two stages, but ceramic is a good second.



RFC1 16 turns ' all on
RFC2 14 turns ' 3/8"
RFC3 8 turns ' formers.

Coil Data:

L1 19 turns 22 SWG closewound on Aladdin former. Tap 5 turns from grid end.

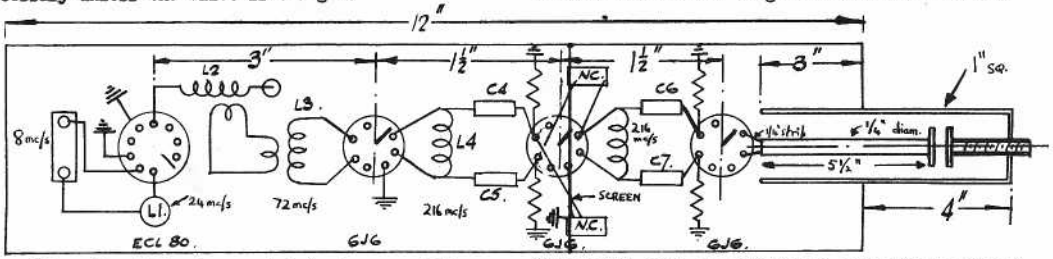
L2 6 turns 18 SWG 5/8" diam spaced wire diam.

L3 8 turns 18 SWG 5/8" diam spaced wire diam. 1 turn link from L2 to L3.

L4,5 3 turns 18 SWG 1/4" diam.

The first two holders are not so important. The constructor can, of course, use his own particular way of building, but it is best to start with the heater wiring and any small components going to earth (chassis); the metal screen can then be fitted across the neutralised amplifier base, and the trough screwed in position. L1 and the crystal holder are added, and then L2 and L3; tuning of the latter is by means of Philips 3-30pF trimmers either across the coils or from anode to earth in the case of L2. Once the trimmers are set no further change is necessary unless the valve is changed.

following method: since the resonant frequency of L4 and L5 will be somewhere near 216Mc/s, connect a grid current meter between the junction of the PA grid leaks and earth, and put HT on L4 and L5. Open and close the coils until maximum grid current is obtained (3 - 5mA). Now remove HT from L5, and leaving the grid current meter in circuit, adjust each neutralising condenser in turn for minimum PA grid current. This will be about 30µA; a lower value will be difficult to obtain due to leakage through the valve. Reconnect HT to L5, and peak coils further until 5-8mA of grid current is obtained.

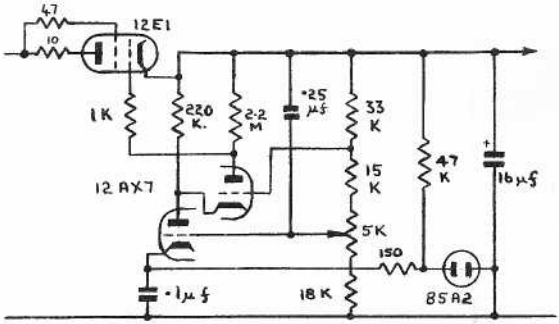


When the wiring is completed, tune as follows: with HT applied to L1 only, check with a receiver or wavemeter tuned to 24 Mc/s that the stage is oscillating on its third overtone correctly. Fit temporarily a milliameter between the 22k grid leak of the pentode section and chassis; the grid current here should be about 1.5mA. Note that the coupling condenser of 25pF should not be increased, or the oscillator will not function correctly. Next apply HT to L2; with the values shown this circuit will only resonate at 72 Mc/s, giving about 1.8mA of grid current through the 27K grid leak of the next stage when the single turn link is pushed in. Adjust link and tuning for maximum grid current. With HT connected to L4, and an absorption wavemeter or looplamp indicator, open or close the turns of L4 with an insulated prod until maximum RF at 216 Mc/s is obtained. If no suitable 216Mc/s indicator is available, the final stages can be tuned by the

Remove the grid current meter, apply HT to L6 and tune for maximum dip in anode current. The HT to V4 should not exceed 200V, although 250V can be used on theother stages. Touch a 60mA on the inner of the output co-ax socket, and tune for max RF output. It does not follow that this will co-incide with the anode current dip position.

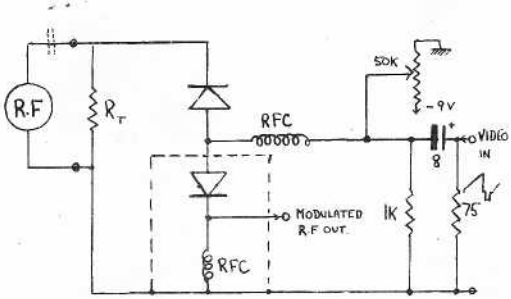
If a lid is made for the trough, the HT can be increased to 250V and 30mA with no colour showing in the 6J6 plates, but care is necessary when the stage is modulated. It is recommended that the audio level does not exceed 5 watts. An EF91 driving a single 6V6 from a crystal microphone has proved perfectly satisfactory. CW keying is accomplished by breaking the HT line to V4 with a relay; cathode keying tends to cause instability due to long leads. In operation the transmitter has consistently proved the equal of a larger transmitter using an 832 tripler driven by another 832 with much greater HT consumption."

USEFUL CIRCUITS



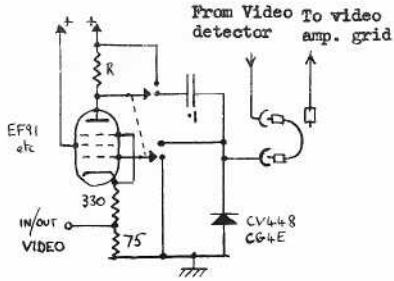
Here is a most useful stabiliser circuit for television power supplies. It was described by Atrree in the April 1955 "Electronic Engin--eering" under the title: "A Cascode Degenerat--ive Stabiliser". The output impedance is only 0.2 to 0.5 ohm, and for input voltages in the range 525V to 390V the output voltage remains at 300 for a maximum load of 150 mA per 12E1. The lead from the potentiometer slider to the triode grid should be short, or well stoppered, and the HT+ ends of the 16mfd and 0.25mfd condensers should be strapped together, this point being used as the output terminal. The 12E1 is rated at 300V max heater/cathode volts, so the two valves can run off the same heater supply, especially if the output is dropped to 250V.

After the "Five Minute Mixer", we have the "Five Minute Modulator", which can be used at any RF frequency (fed in from a Signal Generator) with any video system (at about the 0.1V dap level) of either polarity output (just reverse the diodes). The RF chokes are chosen for the RF frequency in use, and the crystal diodes must also be suitable. For Band 111, and 430Mc/s, for instance, use CS2A/CV102 silicon cartridge diodes. At lower freq--uencies, CV448/CG4E or GEX66 are suitable. The output section is screened from the input to prevent direct RF breakthrough. The bias is adjusted to give cut-off at sync tips (positive modulation); for negative modulation, the bias polarity will also need to be changed as well as the diodes. R_t is the terminating resistor for the signal generator, which is assumed to be AC coupled. Circuit developed by M.Drayson.

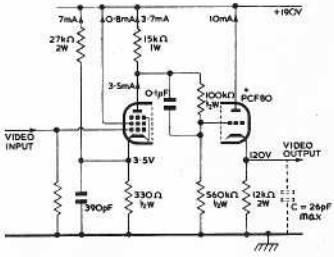


The Five Minute Modulator

ARE YOU COMING TO THE CONVENTION?



Do you remember that little "outboard" video amplifier for feeding local video into the domestic TV set, described in CQ-TV 27? By adding a double-pole switch as shown, and fitting a U-link across the two sockets, the valve can be used in reverse as a cathode follower to feed the HBC or ITA - or anything else - out to local video gear! It is advisable to check with the receiver circuit diagram that there is no tricky circuit or potential around that may mean slight modification to the scheme.



Here is a high gain video stage useful for modulating viewfinders, CRTs, klystrons, etc. With an ECF80 the stage gain is 22, 3dbs down at 5Mc/s, rise time 0.1µSec, and a maximum output of 80V dap. With an ECF82/6U8 similar results are obtained. If a DC connection is not required, the cathode follower can be AC coupled in the usual way.

This circuit was given in Mullard's "Outlook".

CHAPTER THREE:

TELECINE SCANNING

The hobbies of radio and photography often seem to go hand in hand, and it is not surprising to find that many cine enthusiasts have attempted to build equipment for televising their cine films. From their point of view, this has several advantages over more orthodox projection: pictures appear on the screen of the domestic television set (or the neighbours') without re-arrangement of the furnit--ure, blacking out the windows, erection of screens, and so on. Any number of television sets can be linked up, so that space and viewing-angle limitat--ions no longer exist. Negative film may be used, so that newly edited amateur films can be viewed before a positive print is produced. In some systems of telecine working there is no need for any form of projector as such, and the cost of the cine screen is also saved.

From the point of view of the television enthusiast, a telecine scanner is the simplest device capable of producing moving television pictures. This is especially the case at one-man TV stations, since there is then no need for a camera crew. If a telestill slide scanner is already to hand, it can easily be converted for cine work for a cost measured in shillings rather than pounds. A Flying Spot telecine unit is probably the only practicable means of producing amateur colour television moving pictures on any simult--aneous system of colour TV.

3.1 Telecine Systems

Telecine systems are broadly divided into those using "live" camera tubes and those not, and further into intermittent- or continuous-film-motion systems. The majority of systems must be run in synchronism with the television signals, so that it is necessary to speed films up to 25 pictures per second. This is not noticeable on sound films shot at 24 pps, but is a decided snag when silent films are shown.

If a studio camera is to hand, and also a normal cine projector, telecine results of surpris--ingly good quality can often be obtained by merely pointing the camera at the projector (with suitable focussing and stopping down of the lenses), with no form of synchronisation between the two at all. The success of the method depends on the storage prop--erty of the camera tube; tubes with shorter storage times may give excessive flicker and pronounced strobing bars unless the projector speed is synchronised to the frame frequency of the television system. The most usual scheme is to time the projector shutters, or to pulse the projector lamp (if a suitable type), so that the camera tube is exposed to the projected picture only during frame flyback periods. The picture is then scanned off whilst the projector is blacked out and is pulling down the next film frame. The whole of the film frame is therefore given the same exposure, and there is plenty of time for the projector to pull down, so that no modification to the actual mechanism is needed. The short exposure time is ample considering the amount of light available, in fact care must be taken not to damage the camera tube by exposing it to excess heat.

Photoelectric cells have no storage property, and therefore cannot be used in this way. If a standard cine projector is used, with its lamp replaced by a photocell, facing a scnning CRT, again quite good pictures can be produced, but synchronisation of the film and scanning speeds is essential. If interlaced scanning is to be correctly performed, the problems of film shrinkage and scan stability are formidable, but fortunately this need not worry the amateur too much. An alternative method is to immobilise the motion of the film as far as the photocell is concerned by the use of rotating mirrors or prisms, in the manner of a simple film editor. No synchronisation is neede, no intermitt--ent motion is required, and a picture is produced at all speeds, or from stationary film.

A great deal of research has been done on telecine units over the years, but only those which are felt to be within the capabilities of the average amateur to construct will be described.

3.2 Film Standards

The three most common amateur film sizes are 16mm, 9.5mm and 8mm. 35mm cine film is very rarely used, but the techniques described are, of course, just as applicable to 35mm as to other sizes. The size of film for which the telecine unit is to be designed will often have already been decided on other grounds. However, it might be as well to point out that the definition available on 8mm film is better than that of a 405 line television system, whilst the film cost is approximately one quarter that of 16mm for the same running time. Most instructional and technical films are in 16mm, however, and 16mm film libraries are undoubtedly more comprehensive than other sizes. 8mm sound films are not at present available, although 8mm sound-stripe (magnetic recording) is a possibility. On 16mm and 9.5mm there are a wealth of sound films, and sound-striping equipment is readily available for the amateur who wishes to add his own sound-track. Colour film of many makes is available in all three sizes; it will normally be reproduced in monochrome, of course, if put through a telecine unit. For further information on the cinematographic side, the reader is referred to journals such as the "Amateur Cine World".

The choice of film size does affect the television side insofar as the smaller gauges mean closer tolerances on mechanical construction, vibration, lens quality, and so on. The actual size of the picture on the film for the various gauges is given in Table 3.1; note that projector apertures are very slightly smaller, to allow for slight errors in film gate alignment and so on.

AROUND THE CLUBS

BIRMINGHAM

The Midlands group now numbers over 25 members, with Frank Rawle G3FHZ as Hon. Sec, and Bill Bates G3EJO as Editor of the group newsletter "A.T. Views". Recent monthly meetings have been on: "A 16mm Tele--cine Scanner" by G3KBA/T; "Basic Principles of TV" by G3DFL and E.Foulds, and a visit to Sutton Coldfield TV Station. Membership has outstripped accommodation and meetings are now held at the White Swan Hotel. The group has been asked to provide an exhibit at a Scout Jamboree next year, and so work is proceeding at high speed on a staticon camera chain to reinforce the telecine, telestill and RF equipment. Several G3KOK/T type converters are being built but so far no reception reports have been confirmed. Amongst the visitors, Grant Dixon gave a talk and demonst--ration of the famous colour gear, and Ivan Howard has promised to pay a visit later in the year. Plans are afoot for closer liaison with the Wolverhampton group.
Hon. Sec: F.Rawle see New Members for address.

CHELMSFORD

Recent meetings have been on: "Video Amplifiers (D.Pay, D.Reid); "RF Feeder Units" (G3KOK/T); "G3CVO /T"; "A New 16 element Aerial" (delivered over the air by G2WJ/T); "16mm Staticon Telecine Equipment" (G2DUS/T); "Amateur Colour Television" (CGD - with over-the-air demonstration from G2WJ/T); "465 Mc/s TV Links" (Mr Morgan, late of Cintels); "Television Camera Tubes" (the Vice President, of Cathodeon Ltd), and "70cm Transmitters" by G3VI. The July meeting will consist of a Sunday outing to G2WJ/T and G2DUS, and there will be no meeting in August. Next Season's meetings will be held on the second Thursday of each month as usual. The Sunday morning meeting on 1980 kc/s continues to be popular. G3KOK/T has been on the air, making the fourth active TV station of the group. Two films of group activities are being made by G2DUS and G3CVO for addition to the Club Newsreel.

HIGH WYCOMBE

As explained on P5, membership is limited by the workshop accommodation available, as every member has a constructional job to do. The Club is building a closed circuit staticon chain, and has as yet no intention of going on the air, although G3KFX/T at Maidenhead is a possibility. Pulse generator, PSUs, monitor and camera are all well advanced. G3CVO gave a talk on his own equipment and that being built by other Chelmsford members, and it is hoped that G2DUS/T will be able to give a lecture. The group hope to interest the High Wycombe amateur cine Club in their activities, and to produce a short film of their activities. The group hope to have their camera chain on view at the Convention.
Hon. Sec: K.Cooper, Hayreed, Gallows Lane, Sands.

Club reports for next issue by October 1st please.

We have Members in:

LANCASHIRE
Morecambe, Preston, Poulton, Liverpool 9 (2), 12, 15, 21,22,23, Royton, St. Annes, St. Helens (3), Southport, Blackpool, Rochdale, Stockport.

YORKSHIRE
Bempton, Leeds (5), Bradford (10), Beverley, Sheffield (2), Rotherham, Halifax.

The photograph above is taken from a 9" TV screen, and shows results from a 5FP7 scanner over a closed circuit. The equipment, built by Geoff Hill and Ernie Foulds of the Birmingham group, runs at 405 lines. On the original print, the grain on the screen of the 5FP7 is distinctly noticeable, and a 9" scanner is now being tried. Photo: 1/10th at f4.5 on HPS; microcord reflex camera with supplementary lens 18" from screen.

Many members have enquired for data on the photography of CRT screens, and where possible we are including the necessary information. Here are some tips from Ivan Howard, Grant Dixon and Peter Burrage for a start.

The average camera will not focus at short distances from the CRT screen, and it is necessary to fit a supplementary lens. Spectacle lenses are often quite satisfactory, and the focussing can be checked by removing the back of the camera and inserting a piece of tracing paper in place of the film. When the CRT screen fills the film frame and is in focus, make a note of the camera focussing distance and the actual distance from camera to screen. Do not attempt to use the camera viewfinder, but measure the position of the camera lens to be opposite the centre of the screen, and align by eye. To prevent surface reflections from the front of the screen, turn out the room lighting, or build a giant lens hood extending from camera to screen. This has the advantage of automatically lining up the camera and setting it at the right position without any bother.

Exposures vary from film to film, CRT screen to CRT screen, and so on. Exposures must be longer than 1/25th sec in order to film one complete TV picture; longer exposures in the order of seconds will integrate out any noise on the picture, so that the final print will appear better than the observed TV picture. Typical exposures have been 10 seconds at f8 on Super XX, and 1/10th sec at f4.5 on HPS. For colour results, CGD used 20 secs at f3.5 on Pakocolour film. For cine recording, shoot at 12½ frames per second, and try to find a screen with a longish persistence; strobing bars will not be too apparent then.

WHAT THE OTHER CHAP IS DOING

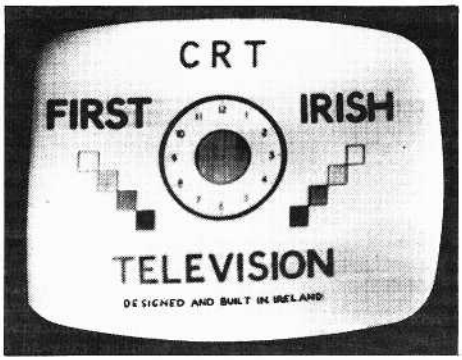
By Shelley T. Woofensnicker.

A tape from Jack Mason in New Zealand gives news of the happenings there. The Auckland Tech College, at which Jack is an instructor, now has a vision transmitter on 96.4 Mc/s, with sound on 99.9 Mc/s. A QQV06/40 is used in the PA, screen modulated. An experimental licence is held (no advertising, no entertainment) allowing a max power of 200W; they hope to have a QY5-250 in action soon. A temporary aerial gives reasonable results; apparently many people out there have receivers brought from the UK, and fix them up with converters for JM/TV. For cameras they have 5527 and 1849 iconoscopes, and a staticon. A 16mm telecine rig is on the way using a Philips 5" crt for scanning, or the staticon. All the camera control gear and monitoring equipment is built; Jack finds the Banthorpe counter circuit very stable indeed (as do others). He now wants to find a source of suitable 2 x 2 slides for the FSS - architecture or Marilyn Munroe or Test Cards - he's easy! P.Harrison (Sheffield) is trying an MW6-2 in the FSS, but gets poor results (afterglow?). A surplus US industrial camera is on the way; shall we hear of G3MY/T soon as the first station on the air in the North?

Max Benyon (Stafford) has had some results from his FSS unit, but suffers from non-linear TBs. He found that stray light getting into the 931A brought the noise up a lot, and put a blue filter all round the cell to help. Max hopes to work in with the other Midlands lads soon. G.Shapley, of Manchester, has sent in a photo of his 5FP7 FSS (we can only print CONTRASTY photos, oc!) which takes standard 2 x 2 slides. With 3.5 kV EHT, the results are most encouraging, and G.L.S is waiting for his demob at Xmas with interest... As far as we know, he is the only active BATC member in the whole of Lancashire and Cheshire. What about that?

Dick Forge G3FRG (Worthing) writes that he was about to 'frame' a protest about not'receiving' CQ-TV via the usual 'channel', when a 'fly-back' through the chequebook, 'scanning' the counterfoils, showed that he had 'blanked-out' instead of paying up! Ouch! Graham Goodger ZL2RP at last has his new workshop built, and hopes to be able to do some TV work again, garden permitting. Ron Smith G3JGV of Acton is also settling in and will then build a 405 line pulse generator. G3KFH/T at Worthing has been putting out experimental transmissions, but as he is getting married later this year, expects to have to give ATV a rest.

Walter Smith G2CBC is at Peterborough, keen to build a TV transmitter, and en route from G3KKD/T to Birmingham... George Wynn at Metz (France) was having some troubles with the camera due to a 4.7M load resistor being in place of a 4.7K - and losing him all his HF response. A slightly doubtful CRO did not help the faultfinding, but results now are very encouraging. George expects to be back in the UK for a while in July, but before then hopes to look up some of our French members.



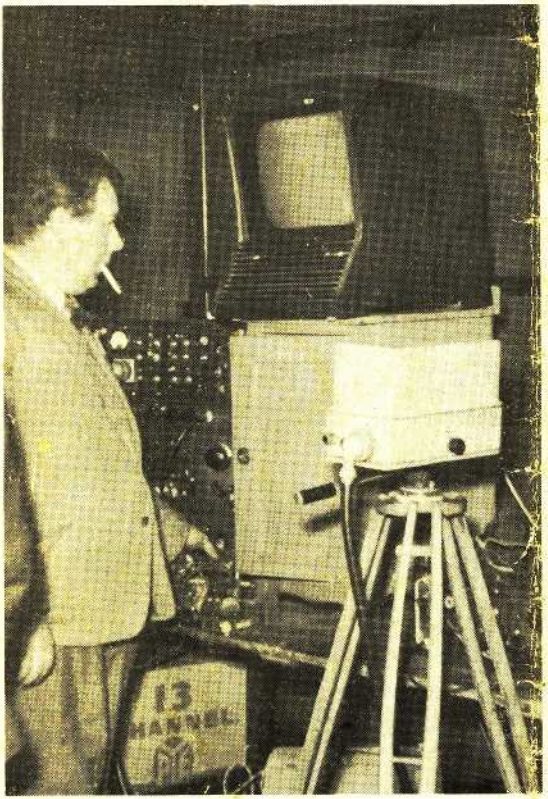
Dublin Challenges The Rest!

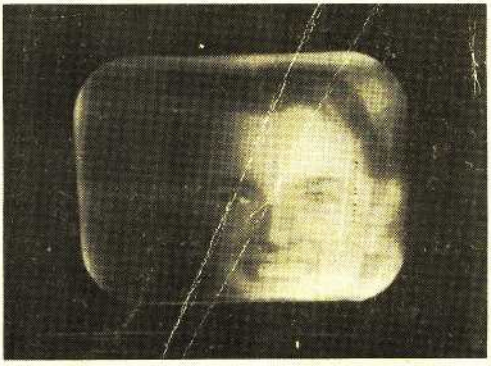
Bill Stapleton at Dublin has now finished his very good work of making two copies of every Club lecture tape, so that these may be circulated abroad. The Resistron (a German vidicon) has arrived with its coils, but is not yet in service. The 1846 Ike is giving good results, and Bill sends the above photo to prove it, plus another outdoor scene. The picture is 405 line interlaced, and was taken with a time exposure from a Philips 17" TV set.

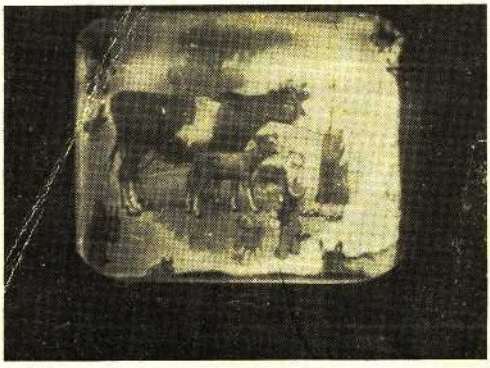
W.G.Storm PA0SW at the Hague has now started regular TV transmissions on 145.5Mc/s, with the sound on 144.1Mc/s (low bandwidth, or sound-on-vision??). Negative modulation is used, 312 lines 50 pictures per second free-running. 60W peak sync to a QQE06/40, and horizontal polarisation are used. Transmission times are Fridays 2030 to 2230 BST and Sundays 1100 to 1200 BST. Note that under good conditions these transmissions will be beamed towards G2WJ for the first cross-channel TV QSO! F8MX and F9CQ are also hoping to collaborate with our old friend Pat Lebail to send TV pictures from France to England, South Coast members please note. There have been several enquiries from Germany as a result of an article in DL-QTC by G3CVO, but we have no news of any real activity. Italy too has stirrings.

Roy Martyr at Chelmsford has started work on a 13cm microwave link using surplus CV67 klystrons. ECF82 amplifier-cathode follower modulators are being used, with double-V aerials. By spacing the transmitters 45 Mc/s apart, only one klystron is needed at each end of the link. First tests will be with AM signals, but if this is not satisfactory a change will be made to FM, since the 10 set IF strips are easily modified. Unfortunately Roy has been whisked off to the ITA site at Bolton working 1 week on, 1 week off, so ATV, including the sync generator, is at a standstill.

Grant Dixon is trying out a new circuit for colour disc motor control. An error signal between frame pulse and tone generator (toothed iron wheel







G2DUS/T: Ivan adjusts the monoscope panel, above which are the mixing and RF panel and the Camera control and sync generator panels. The Staticon camera is at the front right. A series of photos taken from the monitor screen is shown at the right. The horizontal shading is due to shutter strobing, and is not visible on the original picture. The picture at the bottom R. is a book cover. Photos- Lawley.