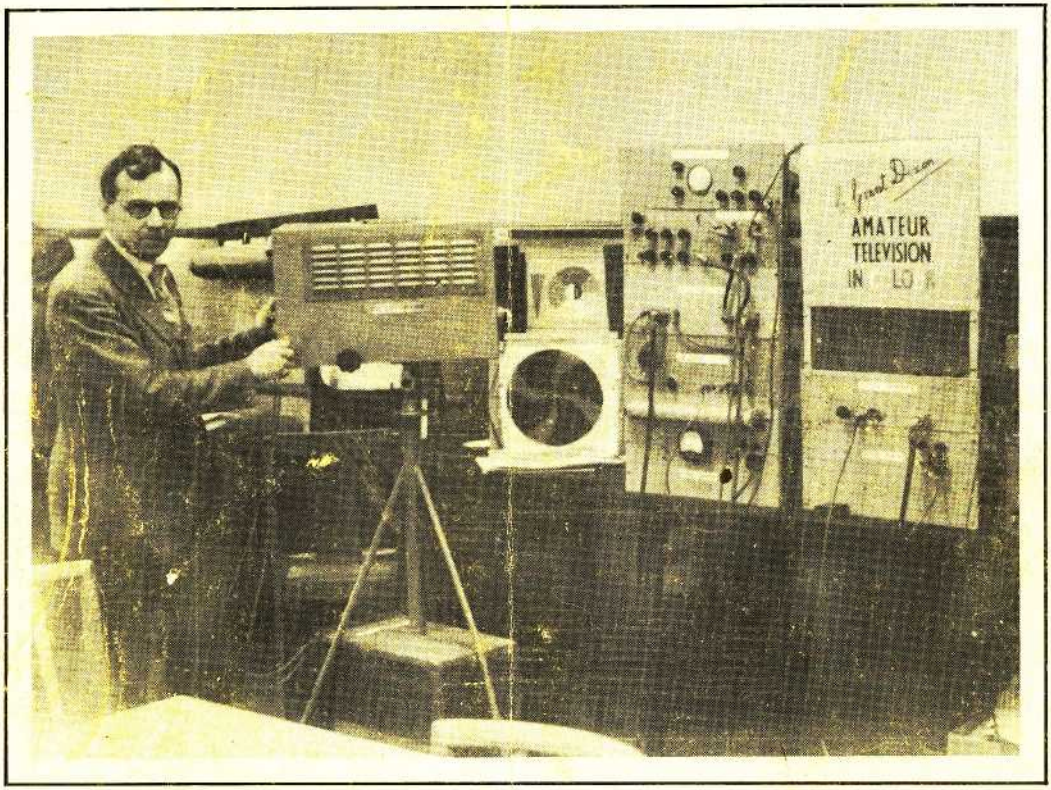


cq-tv

NUMBER 27

WINTER 1955-6

THE BRITISH AMATEUR TELEVISION CLUB

The British Amateur Television Club was founded in 1949 to co-ordinate the activities of amateur radio enthusiasts experimenting with tele--vision transmission, and to exchange information with other enthusiasts at home and abroad similarly engaged.

Experiments carried out by BATC members have been both over a closed circuit (i.e via a cable) and also over the air. Due to the complexity of the equipment required, very few members have the resources to build both sorts of equipment, and the majority are broadly divided into those who are interested mainly in obtaining as good a picture as possible over a cable, and those who are more interested in sending vision signals over the air. Naturally, many of the larger towns have groups of members each specialising in his own department, and some very successful results have been obtained. To permit the use of any member's equipment with that of any other member, certain Club standards have been recommended.

To transmit pictures over the air, members must hold a GPO transmitting licence costing £2 per annum. The qualifications required are the same as for the normal amateur sound licence, but no morse test is needed. A sound accompaniment to the vision signals is also permitted. Full details may be obtained from the Radio and Accommodation Branch, GPO, St. Martins le Grand, London EC1. Signals may be transmitted in the 70, 25, 13 6 and 3 cm amateur bands, with a maximum input of 150 watts peak white. Holders of normal transmitting licences must pay the extra £2. for the vision facility.

Camera tubes are not available in this country, but the Club has arranged for the supply of vidicon-type tubes, rejected for minor blemishes, at £25; monoscope tubes are available at £7-10-0. Application forms can be had from the Assistant Secretary. The offer only applies to the United Kingdom. Other tubes are occasionally offered in the advertisement columns of CQ-TV. Because of camera tube expense, flying spot scanning (FSS), both telecine and telestill, have received much attention. Using a 5FP7 scanner tube, a 931A photocell and half a dozen normal valves, it is possible to obtain excellent results at minimum cost.

Although not attempting to compete with the professional laboratories, there are various enthus--iastic research groups among members. The colour tv group have obtained some very good pictures over a closed circuit (and have their own list of suggested standards), for instance. Some Club landmarks May 1952 - the first ever two-way amateur TV contact (G3BLV/T-G5ZT/T); August 1953 - G2WJ/T received by G3GDR over a (then) record distance of 34 miles; December 1953 - first amateur colour tv transmission; 1954 cine films transmitted over greater Birmingham; 1955 complete television studio supplied to the RSGB at the National Radio Show, Earls Court.

As there is little literature available that covers amateur requirements, the Club issues a quarterly magazine "CQ-TV", free to members. A small booklet: "An Intorduction to Amateur Television" is also on sale, price 3/6. Back Copies of CQ-TV can be obtained at 1/6d each from the Hon Secretary, and earlier editions are available on microfilm. The Hon Treasurer carries a stock of sundries - lapel badges (3/6), notepaper, QSL cards, and so on. The Chairman looks after the Lecture tapes, which are recorded at 3¾ i.p.s twin-track; the titles are: "Getting Started with Amateur TV"; "Flying Spot Scanning"; "Amateur Colour TV"; "70 cm TV equipment"; "Pulse Generation" and "Telecine Scanning". All are loaned free of charge to members. Mr John Adams, of Colinton, Bangors Rd North, Iver Heath, Bucks is custodian of the "BATC Newsreel" (16mm silent or S.O.T). Club meetings are held on a local basis, and full details will be found in CQ-TV.

Membership costs ten shillings per annum, or the equivalent in local currency, payable on the first of January. New members are asked to pay 1/- per month remaining of the current year, plus 10/- for the next. First subscriptions are receipted directly, but thereafter receipts are sent out with CQ-TV.

As at January 1st 1956, the Club officers are:

President: Sir Ernest Fisk.
Vice-President: F.H.Townsend, esq. M.I.E.E.
Chairman: C.Grant Dixon, M.A. 23 Wye St, Ross-on-Wye.
Hon. Secretary: D.W.Wheele, Grad I.E.E, G3AKJ. 56 Burlington Gardens, Chadwell Heath, Essex.
Hon. Treasurer: L.A.F.Stockley F.B.O.A, F.S.M.C, G3EKE. 154 Charminster Rd, Bournemouth, Hants.
Hon. Editor; M.Barlow, B.A, Grad I.E.E G3CVO; 10 Baddow Place Ave, Gt Baddow, Essex.
Asst. Secretary: D.Reid, B.A; 4 Bishops Rd. Chelmsford.
Committee: F.Rose A.M.Brit.I.R.E G3BLV; 16 North Bridge St, Sunderland.
Ian Waters esq G3KKD/T. 14 St Mary's St, Ely, Cambs.
W.E.Hall esq. 11 Gransden Rd, London E8.

MEMBERSHIP APPLICATION FORM: BLOCK CAPITALS please.
To the Hon. Secretary, BATC:
I,.....(Name)

.....(Callsign, etc) of.....

.....

.....(Address) wish to join the British Amateur Television Club. I enclose 10/- for next year, plus ..... for the ..... months remaining of this year (@ 1/- per month). Please send me the next/current edition/any back copies of CQ-TV (@1/6) that you have, and I will remit the balance.

.....Signed.....Date.

OFFICE: G3AKJ/G3EKE/G3CVO Cash Mag

Please make cheques etc payable to the Club.

CQ-TV 27

Winter 1955-6

Ten Shillings per annum

Number Twenty-Seven

Seventh Year

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

Editorial

This edition, regrettably late, completes the four issues for 1955, and it is time to remind you that

ALL SUBSCRIPTIONS ARE NOW DUE

and that

NO OTHER REMINDER WILL BE SENT.

Please remember that this year the subscription is

TEN SHILLINGS.

Cheques, money orders, etc should be made payable to the Club, and sent directly to the Hon Treasurer at 154 Charminster Rd, Bournemouth, Hants. Receipts will be sent out with the next edition of CQ-TV, the Spring 1956 number. May we ask those overseas members whose subscriptions are now due to please send them in as soon as possible. Any currency, International Money Orders or Unesco coupons can be accepted. Please, if you can, send enough to pay your subscription to Dec 31st 1956; this makes the Treasurer's job simpler, and he, like the rest of us, is a volunteer of course.

An interesting feature of the ATV world is the recent enormous increase in tape recordings being exchanged amongst members. A leading light here is Bill Stapleton of Dublin, who has copied all the Club lecture tapes so that a spare set is available for loan to overseas members. These are being sent to New Zealand, Australia and the USA first. In addition there are several "Discussion" tapes going around - one on telecine problems - and several general tapes taking the place of long letters. There is no doubt that apart from the time problem, a recorded tape is far more satisfactory than on-the-air meetings of the Club, with attendant QRM. An exception to this is the local net, such as that held by Chelmsford group on Sunday mornings on Top Band.

As briefly noted in the last edition, Ivan Howard and Mike Cox did a fine job at the 1955 RSGB Exhibition. Mike had his slide scanner in action, with the invitation to "Televise Your Own Callsign", whilst Ivan brought his entire gear - monoscope, bar generator, staticon camera and 16mm telecine, plus sound and lighting. Whilst the equipment was not so complex as last year, when G2WJ-G3KKD laid on a large display, no doubt this wa something of a relief to the non-BATC visitors, who can easily be put off by the sight of large numbers of valves apparently doing very little. Taken all round, however, the year was a good one for ATV shows: the National Radio Show certainly brought the BATC to the public eye, and other demonstrations up and down the country have all been well attended.

As we go to press, we have no idea how the cover photos will turn out. Your Editor feels that if the quality is sufficient, we should continue to have the odd photograph in the magazine; better results could be obtained by the use of blocks, but the cost per photo is something like 20 times as much. We should be very pleased to receive photos for publication - gear, results, personalities. Please make sure the prints are high contrast and glossy, and preferably about 4"x 3". If you have a good one that would go on the cover, make it 12" by 10" please. We will pay for the print plus 6d per photo reproduction fee. Not very royal, but the 10/- subscription will not be felt until later in the year.

All the staff of the BATC wish to thank members for their kind wishes and cards at Christmas, and to return the good wishes. Once again we apologise for the delays in replies to your letters - but we have 452 members (all time) now! The Editor would like to thank those Chelmsford members who so kindly help to address the envelopes, tuck in the receipts, tuck in the flaps, sort into destination piles, tie up into bundles of 25, and finally take the CQ-TV suitcase to the Post Office; also the draughtsmen who produce masterpieces from scraps of members' letters in very short time with no complaints. We shall try and be more prompt with the next edition, but must first get the booklet out - and finish off the sync generator, transmitter, camera, monitor....

Yours sincerely,

M. Barlow

G3CVO/T.

ORDER YOUR COPY NOW! "An Introduction to Amateur Television Transmission", by M.Barlow, is just the booklet to give you a grounding in ATV. 32p - 3/6d; order from G3CVO. To be published in March.

SECOND BATC CONVENTION

On Saturday October 1st 1955, the second Amateur Television Convention was held at the Bedford Corner Hotel, Tottenham Court Road, London.

Long before the official opening time of 10 a.m, a variety of "transport" - many covered in BATC emblems- was arriving heavily laden with equipment. The Assistant Editor set up her "reception and Sales" counter just inside the door, complete with Vistors Book, membership forms, Back Copies of CQ-TV, Club badges, notepaper, QSL cards, microfilmed copies, etc. A backcloth showed various stages in the production of CQ-TV, whilst a relief map showed the location of every /T station and live camera in the country. Along the left-hand wall, Ivan Howard G2DUS set up his studio, with Staticon camera and monoscope units, spotlights, and a couple of Pye television sets as monitors.

The Television Society had a small stand in the corner, where they displayed their various publications. Along the far wall, Grant Dixon's colour camera and colour bar generator aroused great interest. The monitor, using a 7" white crt with a revolving colour wheel, was alongside. An amusing demonstration was given by Grant when he allowed the colour wheels to slip out of phase, so that green objects were red, and so on. Doug Wheele and the Romford group had their CPS camera in the corner, together with a display of valves, crts and camera tubes. The right-hand wall was occupied by the smaller exhibits: Roy Martyr's Grundig played extracts from the Club lecture tapes; Brian Partridge G3KOK/T showed his rack containing sync generator, mixers, pattern generator and RF distribution. Peter Burrage had a mains stabiliser on show next to Mike Cox's flying spot slide scanner (5FP7). G3CVO's rack, with monitor, modulator, vision transmitter, sync and pattern generators, stood amidst Staticon coils, various 70cm converters, a 70cm reflectometer (T.Sale), and a title card holder complete with a working clock-face. P.Burrage arranged a display of "Valves for UHF TV" ranging from the CV53 to the 4X150A. Alongside glittered a table laden with useful (?) raffle prizes, including a 1mA meter very kindly donated by Messrs Proops Ltd.

In the middle of the room, the "BATC Scrapbook" was anxiously scanned by members, and Frank Lee had his pulse generator on show. G3CVO's four-channel mixer console, and a 70cm mixer head of Tony Sale's were also displayed. Photographs of other gear, and of results over the air from G2WJ - the latter regrettably on holiday at the time - completed the exhibition.

The morning was devoted to a general chat and ragchew, but after lunch the Chairman opened the General Meeting. After welcoming members and visitors, he asked the Hon Editor to read the Financial Statement in the absence of the Hon Treasurer. (A report of this was carried in the Editorial of No 26). After a discussion on finance, and Mr. Townsend's memorable speech, a proposal by Mr Hall that the subscription should be raised to 10/- per annum was carried unanimously. A discussion on the facilities provided by the Club, and the use being made of them, followed, and then the Chairman proposed that Mr. Townsend should be asked to become Vice-President of the Club. This was carried unanimously. After thanking the Assistant Secretary for organising the Convention, the Chairman declared the Meeting closed.

After the meeting, John Adams very kindly projected the BATC Newsreel, a Mullard film on CRT manufacture, and a film contributed by G2DUS. The exhibition continued to 6p.m; tea was served at 4.30, followed by a raffle, and a "Spot the Advertisement" competition gave the winner a bowl of fruit.

73 members and friends attended, including members from Cumberland and Co. Durham. Guests of the Club were Mr. Townsend (Pye-Cathodeon Ltd), Mr. Thorogood G4KD (London UHF Group), and Mr. J.Rouse (RSGB HQ). Special thanks are due to those members who so kindly helped with transport, assistance and accommodation for the Convention.

SHORT NOTES:

The optimum length of pulse to be fed into a discriminator for comparison with the mains is 400µS. G3KKD/T is having great success using a simple 40µS pulse for frame sync, as in the French 819 line system. Red posters announcing "Amateur Television" are available from G3AKJ. Microfilms of copies 1-20 are available from Grant Dixon; 21-30 will be available at the end of this year. Congatulations to CQ-TV illustrators Fred Steed (engaged) and "Bing" Crosby (married). Has anyone got G3CVO's Army Set Type 10 circuit? The blue trace of the P7 screen has a decay time constant of 100µS. When paralleling big electrolytics with small mica condensers, put a few hundred ohms in series with the big one to prevent tuning of the stray inductance. CORRECTION: last edition, waveform generator, 10M to HT from junction of two CG4Cs should be 4.7K. GI3FWF is in Belfast not Dublin; "G3K??" is G3KOK/T. Please send in photos for publication, high contrast, glossy. Zoom Lens article held up for lack of a lens! msd.

BEGINNERS' PAGE

(Although most BATC members will have had lots of experience with wiring TV gear, perhaps a few notes will not be out of place).

Remember that in TV circuits you are often trying to pass frequencies from DC to 5, 10 or possibly 20 Mc/s even, that is, right up into the medium radio frequen--cies. The circuit must therefore be laid out and wired in such a way that the balance of these frequen--cies is not altered in any way.

At zero (D.C) and low frequencies, troubles arise in such things as the power supply. The reactance of the output smoothing condenser rises as the freque--ncy decreases, causing motorboating and the like. The power supply should have at least 100 mfds across it, or better still be electronically regulated. To pass LF waves without tilt, coupling condensers must have a very high leakage resistance; mica or good quality paper condensers should be used, but not normal electrolytics. To maintain accurate time constants, resistors may require to be high stability.

For the HFs, proceed as if designing an RF amplifier for the maximum video frequency, eg: screen stages, decouple heaters, run the heater wiring outside the chassis, decouple all stages, etc. Due to the low gain per stage in video amplifiers (because of bandwidth considerations), these precautions are not always observed, but care must be taken to keep input and output leads well away from each other.

Any R-C combination is 3dbs down when CxR=1/2πf. In a normal video amplifier, R is the anode load, and C is the sum of the valve capacities plus the STRAY wiring capacities. Thus keep the input and output leads well away from earthed objects, and keep these leads short. Keep the coupling condenser away from the chassis, and NEVER cableform video leads at high impedance.

The valves used invideo work often have a high G_m. They will therefore oscillate at the slightest opportunity, often at a very high frequency. Keep grid and anode leads SHORT and direct, and apart. Any grid or anode lead longer than 2" should be stoppered with 47 ohms right at the valve pin. Keep the components grouped around the valves; wire up as directly and as shortly as possible. Nothing except DC or low impedance wires should be of any length, or cableformed.

Take care with choice of components: inductive resistors and condensers, capacitative coils, almost anything running even slightly warm, all conspire to upset things. SO THINK. Beware of paxolin valveholders, ceramicon condensers with high temperature coeffici--ents being heated by circulating RF, noisy potentiom--eters, pick-up of broadcast programmes or hum on wiring or unscreened chassis, and interaction of valves not fitted with screening cans. Under-run high-stability resistors are less noisy in low level stages than normal types such as Erie type 8.

* * * * * * *

Whilst we are on it, a word about coupling condensers. If the following grid leak is large in value, the leakage of the condenser must be very small in comparison. So use a mica or paper or Superlytic condenser, but NOT an electrolytic. If the resistor is small, say 75 ohms, quite a low leakage resistance can be tolerated, and big electrolytic condensers can be used to get reasonable time constants.

This Month's References:

Co-axial Grid Circuit for 4x150A TV tx 70cms: QST Aug 53 and May 51; UHF PA Design: RCA Review June 55. TV Sync Generator: Proc IRE Aug 55. Sync Generators for Electronic TV, Applegarth, Proc IRE March 46. TV Sync Generator, Baracket, Electronics Oct 48 (also Fink P553-567). Effects Audio amp, Radio and TV News, Sep 1955. Colour Film Scanner, JSMPE Oct 48. Film Scanner for TV transmission tests, Proc IRE May 41. Continuous motion picture projector for use in tv film scanning: JSMPTE Jan 52. A new 35mm TV film scanner: JSMPTE Jan 54. Continous All-Electronic scanner for 16mm colour motion picture film: JSMPTE April 54. A continuous motion system for televising motion picture films: Proc IEE 111A No 17 1952; also Development of high quality 35mm film scanner, and Television Recording: ditto. Continuous motion film scanner for monochrome or colour: Electronics Aug 54; TV trans-cription by motion picture film: JSMPE Aug 48 also Electronics Oct 48. Continuous film scanner for TV: Electronics July 51; Flying Spot Microscopes, Electr--onics July 53. Flying Spot for Studio Scanning: Teletech, June 48. Application of HFB to Flying Spot Scanners: J.Brit.I.R.E June 52. - Don Reid.

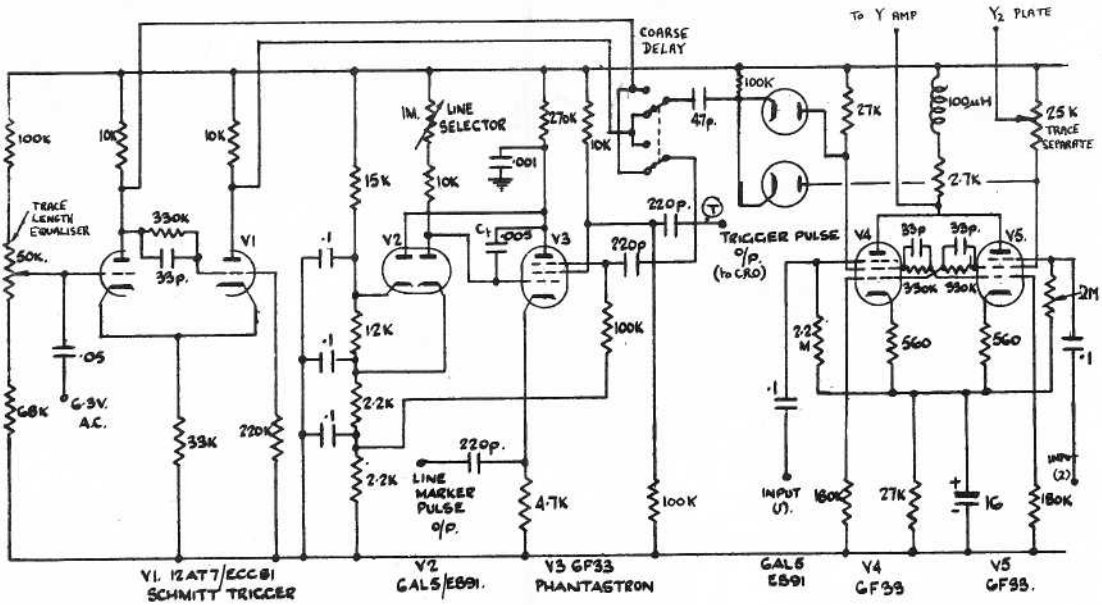
BATC MIDLANDS GROUP

With enthusiastic prodding by George Flanner G3KBA/T and Bill Bates G3EJO, the Midlands group is now flourishing. 17 members have signed on, and a technical committee of G.Flanner, G.Hill, E.Foulds and R.Yates has been formed to get out plans. Tom Douglas is Chairman, and Frank Rawle Secretary of the group. Recent lectures have included one by G3CVO, and a demonstration of Flying Spot Telecine by G3KBA. It is hoped to have a show of Colour TV. Please contact F.Rawle at 16 Kings Rd, New Oscott, Sutton Coldfield, Birmingham 23.

BACK COPIES OF CQ-TV At December 31st, G3AKJ had for sale the following: 20 (1); 21 (3); 22 (11); 23 (27); 24 (37); 25 (30); 26 (40). 1/6 each pse.

"BEWARE the Cathode Follower,
A Wily Bird is he:
When biassed to beyond cut-off
Doth change his Input C". (From 'Trials of a Sync Pulse Generator', translated from the original Yogi).
When dealing with wide bandwidths, mind your Cs and Qs.

A COMBINED LINE SELECTOR AND BEAM SWITCH



7.ii.d A Combined Line Selector and Beam Switch.

For television use, it is often extremely useful to be able to display the waveform of just one line in the picture; switching the time base to line speed normally shows all the lines superimposed, and similarly at frame speed, details of the frame sync period are obscured by superimposition of both odd and even frames. In order to display just one line, the CRO timebase must be triggered by a pulse that occurs at exactly the same time relative to frame sync pulses each time. One way of doing this is to generate a sawtooth from frame sync pulses, and to trigger the CRO timebase from some point on this sawtooth. For amateur work, assuming the frame pulses are locked to the mains, we can use the mains rather than frame sync pulses, so saving a sync separator circuit.

In Figure 7/4, V1 is a Schmitt trigger producing square waves from the AC input. Output from either anode selects either odd or even frames, and the differentiated pulse is fed to the phantastron sawtooth circuit, V2-3. The "Line Selector" control determines the run-down of the circuit, and hence the time at which the output pulse occurs. As shown, the control permits about 50 lines on either side of the frame pulses to be selected, but altering the timing condenser C_1 will enable any one of the 405 lines to be selected if preferred. The output pulse is fed into the "Trigger" terminals on the oscilloscope, which can then be run at any speed, as usual.

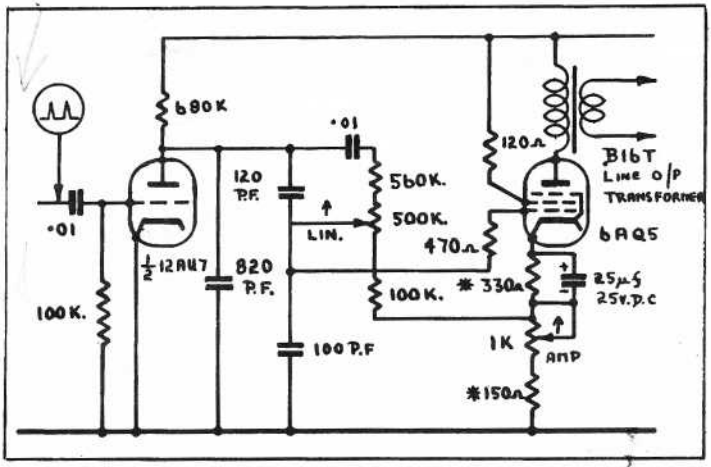
Sometimes it is useful to view the same line or lines in both odd and even fields simultaneously, and this is the basic idea of V4 and V5. Considered simply as a bistable circuit, a DC shift voltage will be produced which is fed to the Y plates of the oscilloscope, thus displaying odd and even frames together but displaced. Since, in effect, these valves are simply switching at 50cs, a simple beam switch can be made of them, and this facility can be run independently of, or in conjunction with, the Line Selector. In practice each input to the beam switch has its own attenuator (see 7.ii.a), and the common output feeds the Y amplifier. By this means errors arising in the amplifiers are kept to a minimum, since they are common to both inputs. For Line Strobing, the two inputs can be commoned and fed from the one video input.

The bandwidth of the unit is not as good as the Y amplifier, so switching should be incorporated to cut out the beam switch when not required. The Beam Switch is 3 dbs down at 2.4 Mc/s with the compensation shown.

USEFUL CIRCUITS

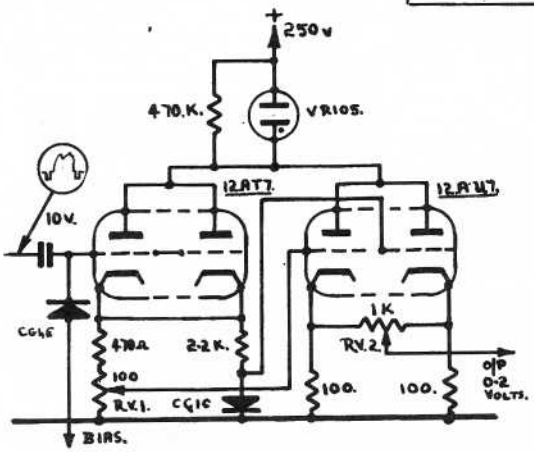
For the Staticon owners, here is a line output circuit contributed by Dave Hooper. A 6V6 could probably be used in place of the 6AQ5, and the use of the Pye B16T output transformer is merely for convenience. The timebase is not free-running, so the scans will fail if the input pulses disappear; the other half of the 12AU7 could be added to form a multivibrator type oscillator.

All resistors are quarter watt except those marked with an asterisk.



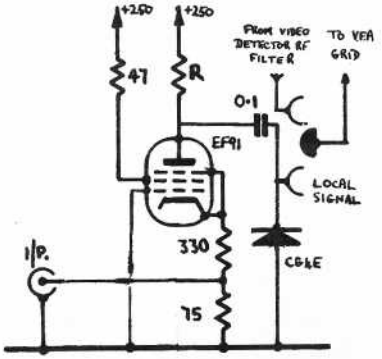
Mike Cox (Suffolk) sends in this circuit of a gamma corrector he is using on his FSS. This has the advantage that changing the gamma (i.e the contrast law) of the picture does not alter the overall PW to Black amplitude. To do this, though, it is necessary to introduce a loss of some 30 to 40 dbs, so that further amplification both before and after the circuit is required.

The input signal (10V p-p) is DC restored, as it is essential that picture Black be a fixed level. The grid bias on this stage is adjusted so that at Black, the valve is cut off and the cathode is at earth potential. (If blanking has just been added to the video signal, as in FSS work, variation of this bias gives a variable sit-up to Blacks = "Pedestal Level", at the same time clipping off spurious signals during blanking). RV1 is adjusted to give equal PW outputs at the grids of the 12AU7, i.e so that at either end of RV2 there is no change in white level. Note the use of a neon to drop the HT to 145V; a decoupled resistor could be used instead (2.7K & 32mfds).



Very often it is useful to be able to feed local signals into the domestic tv set. Whilst the best answer is undoubtedly to build a small RF transmitter for the purpose, a direct video feed is sometimes preferred. If a standard BATC 1v p-p signal is being used, this must be fed into the video amplifier of the tv set, and some futher amplification is usually required. The circuit shown can be bolted to the back of the tv set, taking its power from the latter; the lead from the detector to the video amplifier can be broken with a banana plug and socket, keeping the leads short and well away from the chassis to avoid stray capacity. A grounded grid amplifier is used with sets having a direct feed from the video amp to the CRT cathode. Grid driven CRTs need a normal grounded cathode amplifier - P.Blair.

R	Gain
1K	1.5
1.2	1.6
1.5	2.0
1.8	2.8
2.2	3.1
75Ω	.12



The Design of a 70cm TV Transmitter, Contd.

The curves show that R_1 = 820 ohms gives a more linear curve in each case; the power output (proportional to the anode voltage swing) is roughly the same at peak white in all cases; the grid drive required is less for the higher screen voltage, although the swing from black to white is much the same; the actual grid voltages corresponding to the various picture levels do undergo some changes, however. In practice this means that if the curves are to be more than a guide, a plot of output power against grid voltage must be taken, no easy matter at 70 cms. Alternatively, a line sawtooth test signal is transmitted, and the various controls (amplitude, sync stretch, white stretch, black level) are adjusted to give maximum output at peak white, and undistorted sawtooth, whilst the sync pulses are clipped by the valve curvature.

The loadline for 820 ohms is shown again in more detail in Figure 9/6. Assuming that "white stretching" i.e top-bend correcting circuits are not incorporated, peak white corresponds to the top of the linear part of the curve. The grid

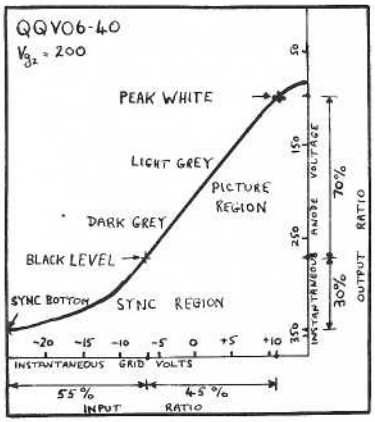


Fig. 9/6

voltage here is about +12V, giving an anode voltage of 105V. At Sync Bottom (SB) the valve is cut off, so that the anode voltage equals the HT voltage, 350V. The anode swing is therefore 245V; 30% of this excursion (74V) measured from Sync Bottom will be Black Level (BL). Black Level is therefore when the anode voltage is 350-74 = 276V, when the grid voltage is -7V. Cut-off occurs when the grid is at -30V, so we see that to get a 70:30 ratio signal out of the transmitter, the modulator output must be in the ratio (12+7):(30-7), that is 19:23 or 45:55. Any attempt to modulate with a 70:30 signal must be unsatisfactory, since if the syncs cut off the PA, then BL will be on the bottom bend; increasing the modulator output to bring BL back onto the linear part will push PW off the top bend.

Note that the "anode volts" and "grid volts" on the graph are instantaneous values. In the case of the grid volts, this means that they are the sum of the modulator output voltage (i.e PA bias) and the instantaneous drive volts. When the transmitter is at PW, the valve should be conducting for exactly half the time, whilst at SB it should be just not conducting. The peak amplitude of the drive should therefore be equal to the difference between PW and SB - which is of course equal to the modulator swing required. The drive in this case must be 42V peak, or 84V p-p. (The actual drive voltage can be measured by removing plate and screen volts from the PA, inserting a 22K grid leak and measuring the grid current in it when drive is applied. To a first approximation, the product $I_g \times R_g$ gives the RMS value of the grid drive, so that 2.8 times this will be approximately the p-p grid drive being applied). The modulator output voltages will be 42V less than the figures shown on the curve, that is PW = -30V, BL = -49V and SB = -72V.

Reference to the valve curves of I_{g1} and I_{g2} under PW conditions will give an estimate of the control and screen grid currents to be expected. At 105V on the anode and +12V on the grid, the screen current will be 25mA, and the grid current 13mA. These are peak values, of course, and the mean values will be much less, probably only one fourth of these figures, but they give an idea of the performance required from the screen voltage stabiliser, and the grid voltage supply. For instance, the 13mA of grid current flows to earth via the output impedance of the modulator; if this was as high as 1000 ohms, 13 volts would be developed across it - nearly the entire swing from Black to White. Obviously the modulator output impedance must be under 100 ohms if distortion is to be avoided. Similar considerations apply to all the power supply output impedances.

The loading on the driver stage is partly static - consisting of losses in the valveholder and glass, strays, etc - and partly dynamic. At PW the valve is conducting for roughly 1/3rd of each half cycle, that is 1/8th of the total time. The PW loading on the driver is therefore given by +12V/13mA x 6 kilohms, ie 5500 ohms. When the valve cuts off this disappears, and in order to keep the p-p drive voltage constant, the fixed loading on the driver should be of the order of 550 ohms. If this is not supplied by the circuit losses, a loading resistor should be added; it may already be required on bandwidth grounds (see Section 9.6).

The above requirements for stability in power supplies, drive voltage and so on may appear rather formidable, but fortunately in practice quite large variations can be accommodated without too great a deterioration in the picture. In most cases trouble arises only at PW, and this can often be overcome by judiciously stretching whites.

WHAT THE OTHER CHAP IS DOING

By Fauntleroy Happensnitzer.

John Watts (Clevedon) reports that he is still as keen as ever on the CPS camera, and is making improvements all the time. He hopes to go in for the transmitting side soon. Tony Colaluca is now with EMI, but is building himself an FSS unit; he complains that his existing pulser is hopeless!

In Wolverhampton, M.J.Sparrow is now G3KQJ/T, and he will be on 438.75 mcs vision and 435.25 sound. G3KMT is giving him a hand, and KQJ hopes eventually to put signals into Birmingham. Paul Wright G3JDM has had many months in hospital, and is now full of ideas once they let him out of his plaster jacket. The Weybridge group suffer from lack of time - this often occurs when several people in the Club are each responsible for some piece of gear; any answers to this one from other clubs? Sid Hook has the camera case and rack built, but the camera is by no means ready yet.

Bill Stapleton (Dublin) has taken to sending photos to illustrate his tapes which amplify his letters.... Tape BSE1 (unfortunately at 7½i.p.s) describes his equipment, and a small folder of photos goes with it. This is a good idea, and we'd be interested in similar tapes and photos from other members, particularly overseas. Bill is very kindly dubbing some of the Club tapes so that there will be spare copies for overseas use. His pulser is well on the way (24 tubes) and his VCR97 monitor, (described in the tape), has some novel features.

Mike Cox (London/Suffolk) has now bought an aged Cossor TV set for use as a monitor with his 5FP7 slide scanner. At the moment, picture noise is troublesome. G3AST (Luton) also runs a 5FP7 scanner with some first class results. At the moment John has only VCR97s or a 4' x 3' projection tv for monitoring! Photographic negatives come through the system extremely well, and the noise level is very low. Dave Hooper G3ICU (London) has finished the Staticon TBs, and has tested them with a 1CP1. The focus coil and current regulator are working, and Dave is trying 400t of 38swg for each alignment coil. A B16T line transformer is in use.

There was quite a telecine reunion around Ivan Howard's 16mm unit at the RSGB show, although this "cheats" insofar as Ivan merely points the staticon camera straight at the projector and fires away! The picture quality is surprisingly good, and Ivan can of course use either positive or negative film stock. One point to watch is that vibration of the projector and camera does not lose definition; Ivan has a stout stand made of Dexion. The staticon lens is taken out, and the projector lens brought forward (bad optical practice, but sufficient); the projector lamp is fed from a variac, and no synchro--nising is necessary at all. (See last issue). John Adams (Iver) brought his perspex polygon along; this has 24 sides milled at very high speed with a very sharp mill so as to reduce the amount of polishing required to a minimum. A touch of Bluebell and the polygon is made. His is about 3" in diam, with the top and bottom faces blacked out; a brass plate cemented on carries the driving sprockets, and the whole thing is trued up very accurately. This model does not have a central hole-plus-film-shrinkage corrector (Philco style, see JSMPTE last year) as John wants to see whether this is really necessary for amateur use. Jim Bramhill G2BMI (Uxbridge) brought his 6 sided polygon, copied from a standard 16mm film editor, so we expect to hear things soon. P.K.Jones (NW6) completed that party. G3CVO is starting a discussion tape on telecine, by the way.

Brian Partridge G3KOK/T (Bps. Stortford) has started work on his image orthicon camera, which will have hinged sides for maximum access. The 70cm tx is well on the way, and a very attractive 70cm TV converter is on the way; watery pictures from G2WJ/T have been received on it, and a shift of the aerial tap down the mixer line should improve things immensely. This converter will be described in CQ-TV later. Brian is also thinking of miniaturising his pulse generator; Grant dixon, however, agrees with Ivan James that it may be better to stick to "rugged" octal based valves in pulse circuits and leave the miniatures for the video work. G3CVO sticks to his all-EF91-or-12AT7 station, however. Recent jobs have included an outboard video amp for feeding BATC standard signals into the TV set, and much work on the main sync generator. An EC91 70cm pre-amp with a gain of 11dbs and a noise figure of 4 dbs is also on trial; this uses pi input and output circuits of silver plated copper strip. All G3CVO circuits are now being built with preferred values of components where possible, eg 1K, 4.7K, 10K etc. Improvements at G2WJ's transmitter now enable pictures to be received at G3CVO even with the aerial at its winter height of 20 ft. Over the better path to Abbotts Langley (32 miles) G3GDR can easily resolve 2.5Mc/s bars. The converter at G3CVO (by G3GDR) suffers from ITA-itis, in that the IF bandwidth is not sufficient to pass both sound and vision signals, so G2WJ puts out the sound on 2m.

Janko Vasilic (Belgrade) is highly enthusiastic and is busy working through Fink and old CQ-TVs. Mike Cole (Chelmsford) is now G3KRA/T, and is coming up with a G8SK all-6J6 type 70cm tx grid modulated by a Z77 cathode follower; carrier frequency 442 Mc/s. Ted Mitchell G3GZW (Basildon) is building a vidicon camera and 10" monitor; Eric Lawley has started on a 5FP7 scanner. The amplifier is 12AT7 phase splitter, EF91-EF91-12AT7 CF; 1V standard output, overblanking (high level mixed syncs actually) is inserted on the screen of the second Z77 as well as on the CRT grid. Roy Martyr is still bending his 14swg steel chassis for the sync generator! Peter Burrage has planned his 4X150A PA, and hopes to put 21 KILOWATTS ERP into a passive reflector atop the local water tower! G2WJ/T is concentrating more on a design for a simple 70cm converter. Pictures have been received by G2DUS, and efforts are being made to make it a two-way TV QSO. Ian Waters G3KKD/T (Ely) is building all his gear to

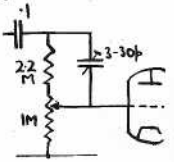
NEW MEMBERS

J.Bainbridge 31, The Terraces, Washington, Co. Durham.
F.G.Benzie 10 West Cairncry Rd, Aberdeen.
H.N.C ristianson W9QKN 1121 Moline St, Stoughton, Wis.
J.S.Glass 6 Woodside Drive, Castlepark, Rathmines, Dublin, Eire.
Esko Jokinen Pellavatehtaankatu 21, C45, Tampere, Finland.
S.A.Morley G3FWR 22 Old Farleigh Rd, Selsdon, Croydon.
M.W.Skinner 67 Roundwool Lane, Harpenden, Herts.
G.W.Smith G3HDK 84 Woodlands Rd, Sparkhill, Birmingham
R.Smith G3JGV 19 Blenheim Gdns, N.W.2. 11.
R.F.G.Thurlow G3WW North House, Wimblington, Cambs.
A.M.King ZL2AUE 14 Rata Rd, Hataitai, Wellington NZ.
M.Parker 38 Little Lane, West Bromwich, Staffs.
Janko Vasilic PO Box 906, Belgrade, Yugoslavia.
G.L.Williamson 40 Kingsley Rd, Hounslow Middx. (45s)

Changes of address:
E.Barrall G2BCB 40 d'Arcy Rd, Colchester, Essex; P.J.Bendall, The Manor, Barton Mills, Bury St Edmonds Suffolk; D.Bradford VQ4EV Box 83 Nairobi, Kenya; A.R.Eyles 115 Wembley Park Drive, Wembley, Middx; D.E.G.Goodger ZL2RP 90A Townsend Rd, Miramar, Welling-ton E4, NZ; R.W.Johnson 39 Waterloo Rd, Romford;(tel 9931); B.Sykes G2HCG 41 Booth Lane North, Moulton, Northampton; H.de Waard PA0ZX Van Houtenlaan 116, Groningen, Netherlands tel 05900.30350; M.J.Powell GW3LJE Lynwood, Park View, Pontypool, Mon.

fit on the rear seat of his Fiat. The G8SK style tx, and dual IF converter (45Mc/s for TV and 18 for fone) are completed; a 9" monitor fits alongside, and the staticon camera control unit beside that. A small petrol generator is carried on the passenger seat, and the 16 ele stack plus pole goes on the roof. The whole thing looks terrific! Ian has a 70' mast at home and since Ely is one of the few points above sea level in his neighborhood, he is line-of-sight for miles; tests with G3WW (Wimblington), Peter Bligh (Cambridge) and G2DUS are to follow when Ian is demobbed this month.

E.Bassett (Southampton) has almost finished the Staticon camera, and the pulser is also complete and very stable. A 70cm converter is to hand, and ERB now wants a vision tx within range!
Don Bradford VQ4EV (Kenya) is back in the UK as G3GBO for three months, and is getting fed with ATV prppaganda. Gerry Cleveland likewise has gone back to S.Rhodesia armed with microfilms of CQ-TV with intent to do business there. Alan Ellis at Canberra had quite good pictures with a VCR112 scanner, and is pressing on with a 5FP7. He sends this circuit for multiple correction:
The 1M pot allows LF response to be adjusted from one extreme of severe plastic distortion to the other extreme of streaking, whilst the 30p trimmer allows peaking of the high frequencies. Alan is very keen to try telecine work (tape coming up, om).



George Wynn is temporarily at 27, Place St Jacques, Metz, France, and has vidicon camera, amplifiers, sync generator and low power tx working well. He now wants a 70cm converter to loan the locals! Johnny Hogarth (Blyth) and Fred Rose (Sunderland) have been working "like mad" since the Convention. 3BLV/T has a QQV06/40 job finished, driven by an SCR522, but is thinking of driving it from a cavity tuned MO. A staticon and monoscope are on order, and Fred hopes to try colour soon. W.Essinger (Haifa) has the camera working now, and thanks BATCs for help. George Flanner is getting 3Mcs resolution from his 9.5mm telecine unit, and is transmitting it over Birmingham via a local link to G3EJO. PA is a QQV03-10 tripler. Graham Goodger ZL2RP has produced a nice callsign card from the cover of CQ-TV 21; he is not doing anything due to a move of house. F.G.Benzie (Aberdeen) says he is holding the fort up there. A pulser is under way, and components for a FSS are on hand. J.Glass (address above) urgently requires a 5FP7 or 7FP7; he is using an ACR8 at the moment, and has a regulated PSU using 4 EM4s as series tubes. He wants data on a 12AT7 70cm tx (see G2DD om). W9KQN is No 99 in the USATV Soc run by W4MS (How about a report??); he has another TV man 14 miles away and line of sight. The tx is an SCR522 driving an 829B tripler (!) and an 832 straight on 70cm. Harold is regularly on 20m SSB. Grant Dixon reminds colour enthusiasts that he issues a separate colour bulletin on receipt of proposed or actual CTV expts. Warren Jacobs and Erie Cornelius have made their 625 line gear interchangeable. Two cameras and pulsers are available. (Other news held over - no space!).

HIGH WYCOMBE

Under Ken Cooper's leadership, this very enthusiastic group has made good progress on the camera, pulse generator, monitor, and stabilised power supply. BATC standards are being used, and the camera will employ a staticon, in a streamlined case and mounted on a tripod successfully made from three broomsticks! Visitors are welcome, and they will find Messrs Bowler, Collins, Cooper, Hopgood, Lakeman North and Keen hard at it on Monday and Thursday evenings at "Hayreed", Gallows Lane, Sands, High Wycombe Bucks. R.L.

ROMFORD AND DAGENHAM

Ron Oakley is rebuilding the 5527 camera, and a complete rebuild and polish-up of the CPS camera is in hand. The group hopes to have both cameras ready for shows this summer. Recent meetings have included a demonstration of G3CVO's equipment.

CHELMSFORD

Mike Cox demonstrated his 5FP7 FSS to the group at the Novemebr meeting, and December was given over to a film show. Few films were found that dealt with TV, and G3CVO would be glad to hear of any more. Future meetings: Jan 12: "How Not to Wire Up Video Gear"; Feb 9th: Romford group demonstration; March 8th G2DUS: 16mm telecine demonstration; April 12th: "460 Mc/s TV links". Meetings are held on the second Thursday in each month, and a regular sked is held on Sundays at 11 a.m on 1980 kc/s for ATV topics only. M.B.

One of the simplest, cheapest and yet most satisfying pieces of ATV equipment is the Flying Spot Scanner. For a very modest outlay, quite good pictures can be televised, whilst a really good scanner will give results which cannot be bettered by the best live camera. Highly economical in construction, a Flying Spot Scanner is an ideal unit with which to start on Amateur Television.

The Flying Spot Scanner originated in the earliest days of television, when a flying spot of light projected by an arc lamp through a rotating Nipkow disc scanned the scene to be televised, the

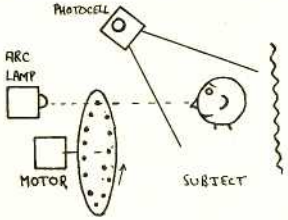


Fig 2/1: Early mechanical Flying Spot Scanner.

reflected light being picked up on a photoelectric cell (Figure 2/1). By using mirrors instead of discs and with various other improvements, the Flying Spot Scanner (FSS) was in regular use until the coming of high definition all-electronic TV in the mid 1930s. The greatest snags were in the mechanics, for high definition working, although for some years the process was popular for film scanning.

The biggest step forward was the use of a cathode ray tube rather than the lamp-plus-scanning device formerly used. Spot size was the only factor governing definition, and once flat faced CRTs with the right phosphors were developed, Flying Spot Scanning came to stay. At the present time, FSS is mainly used for televising slides and captions (tele-still), cinefilms (telecine) or in specialist applications such as Flying Spot microscopes; there is also a suggestion that high intensity CRTs could be used for studio work in colour with advantage. We shall discuss the two main amateur applications only, that is telestill and telecine working.

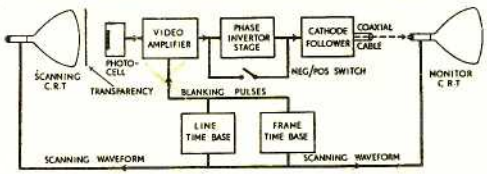


Fig 2/2: Block diagram of a complete FSS system

Figure 2/2 shows the main units of the complete Flying Spot Scanner, and we shall now go into some details.

2.2 The Scanner Tube

The function of the scanner tube is to produce a blank raster of constant size and bright-ness, and to this end it should have the following properties:

(a) a bright, finely focussed trace over the whole raster;
(b) a spectral output that matches the photocell in use;
(c) a flat face of constant glass thickness;
(d) a phosphor free from blemishes or coarseness;
(e) linear time bases;
(f) stable power supplies;
(g) an extremely fast phosphor decay time.

To these might be added the amateur requirements:

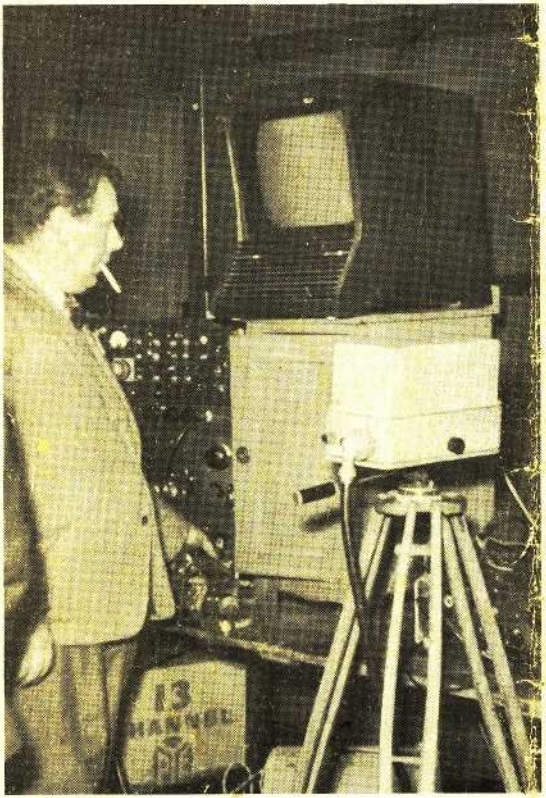
(h) a reasonable price;
(i) reasonable HT and scanning requirements.

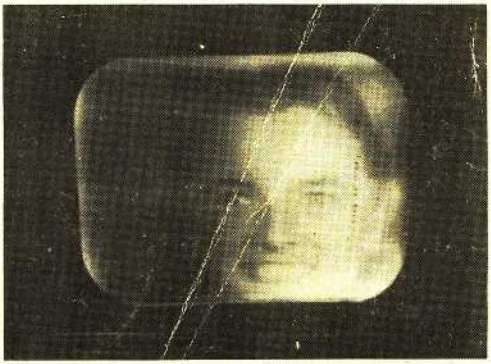
Of the above requirements, (g) is certainly the most important. This will be understood if one considers what the photocell sees at any time: the spot of light on the CRT (modulated by passage through the optical system) together with any residual light from the rest of the CRT screen, in particular those parts that have just been scanned by the beam. Any finite decay time has the effect of decreasing the resolution or definition of the picture. The decay can be compensated by electrical means in the amplifiers, but such compensation must be kept low to prevent noise becoming excessive in the picture.

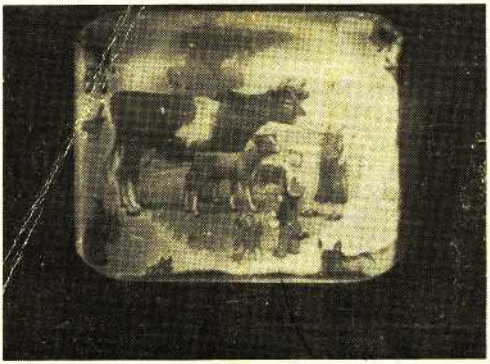
Specially designed CRTs for scanning are available from several manufacturers, in the price range £10 and upwards. These have decay times in the order of fractions of a microsecond, and the desirable features listed above. For amateur use, blue trace oscilloscope tubes are quite satisfactory since these also have a fast decay time. Unfortun-ately they do not always have a flat face, and the EHT on them must often be increased to obtain enough brilliance, but they are reasonable in price. There are also a number of Government surplus tubes that can be used, as shown in Table 2.1. Of these, the most popular is the 5FP7 electromagn-etic type. This is 5" in diameter, 12" long, has

Table 2.1 Cathode-Ray Tubes Suitable for Scanning

Army Tubes:	ACR1
Army Tubes:	ACR1, 2X, 8, 11,15, 19, 22.
RAF Tubes:	VCR84, 85, 87, 112, 140, 511, 518m, 524, 524A, 529, 530.
Others:	CV255, 269, 274, 300, 307, 836, 954, 958, 959, 962, 1112, 1379, 1380, 1383, 1391, 1511, 1518, 1529, 2786, 3774, 3776. VCRX97 VCRX156, VCRX530. V1020, 1023. (32)26J; NC5, 9, 10, 14; W1071, 1851. 1921, 6601; ZC0123, 0697, 3081, 3595, 13369; ZA 13075.
American:	any with P2, 4, 7, 11, 15 or 16 traces.







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.