CQ — TV

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THE BRITISH AMATEUR TELEVISION CLUB

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THE EDITOR Andrew Hughes, 17 Woodside Avenue, Weston Green, Esher, Surrey, KT10 8JQ

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Letters to the Editor

Dear Sir,

In the latest issue of C Q - T V No. 91, I noticed a letter from G8DLX suggesting that 144.23MHz be used as the two meter SSTV frequency.

Further on in the book, an article by G3YQC (TV on Air) calls for a two meter TV calling channel.

How about combining the two? 144.23 MHz could be made an any mode tv calling channel; people could then QSY to 70cm for fast scan, or 144.5 MHz or whatever for slow scan. At least, as John Wood mentions, it would take some of the "miss" out of the present hit-and-miss situation - anyone interested in tv would know where to look for others of a simialr interest.

Incidentally, my own tv activity is currently non-existent due to living in a small city-centre flat with a "no outside aerials" stipulation. However, I shall soon be moving to a new QTH on one of the highest spots in Worcester (sheer coincidence, I assure you...!) where I shall be able to put up some beams. TV gear consists of 12" GEC dual-standard set with Mullard 70cm convertor. I have no transmitter or camera yet, due to lack of space for building or storing at resent QTH. However, at the new location I shall have a reasonably sized shack, and so I shall soon be on the air, if only watching for the time being until finances permit purchase of a camera.

There shouldn't be too much XYL-QRM either - she hopes to take the RAE next May! (If you can't beat them, join them).

Keith Ballinger G8BBP
Flat 7 Waterloo House,
East Street, Worcester.

Dear Sir,

I am a fairly recent member of B.A.T.C. and joined becsuse of my interest in FAX, having done a lot of private experimental work on a system which aims to print out colour prints on ordinary paper or similar by scanning the original or a negative and printing in three colours.

I did make a receiver for the old mechanical transmissions, but must hasten to add, I am not an electronics engineer, it is only spare-time hobby stuff.

My main reason for this letter is that I have often though about this matter mentioned by Lewis Elmer in C Q - T V 91, of seeing the slow scan pictures with some type of long afterglow screen or conversion and read some time ago about a new radar system which uses the Thorn image retaining panel, to store an image for some time, which is then scanned, I suppose, by a sensitive pick-up tube and displayed on an

normal tv screen.

It happens that I purchased several of these panels from Thorns (at a fairly high price) and have done some elementary work with them and put them on one side for now.

The image is not very bright and has to be viewed in the dark or with a suitable hood and filter to keep out active light but resolution is good, as is contrast.

As a non-transmitter I cannot take much active part in B.A.T.C, but am willing to give one of these panels to the Club for experimental work in connection with image storage.

A.J. Quinton
403 Woodgrange Drive,
Thorpe Bay, Essex.

POSTBAG

Mike Berry in Ashton in Makerfield left B.A. T.C. to aquire a wife, and now a child and has celebrated by rejoining the Club. He is starting to rebuild his gear from scatch, and although not yet licenced, would be happy to look out for other's transmissions; he has a clear view all round the QTH but very few vision contacts. At the moment he is building a scope whils getting together bits and pieces for an SPG, pattern generator and vision mixer. The receiving side is an Ultra 1400 and varicap tuner.

.....

JohnWill G6OTA/T of 161 Preston New Road, Blackburn, Lancs., has started offering a new service of QSL cards. They are individually made and as they incorporate a photograph are of particular interest to /T stations. John writes that they are reasonably priced due to a special process and is offering samples to members who would drop him a line enclosing a SAE.

.....

TV ON THE AIR

By John L. Wood G6AHT/T G3YQC

Well, that's the International ATV Contest over for another year. It's a bit early to tell what overall turnout was like, but if the Midlands are typical it was a fairly ;ow one. This is rather unfortunate, as for some it is virtually the only time in the year when they get a contact.

G6ACT/T in Cabworth had no vision contacts at all, despite being active on both two and seventy.

G6AMB/T took his station out portable to a site 15 miles North of Manchester, he climbed to 1555ft, had his vision transmitter damaged on the journey, set up both on two and seventy, and got frozen into the bargain. Despite this effort he didn't make a single vision contact, this was most dosiappointing, but he hopes to have better luck next time.

There was a B.A.T.C. stand at the Upton-on-Severn mobile rally in July which drew a good deal of interest. The stand was manned by Grant Dixon G8CGK and Mike Crampton G6AHJ/T G8DLX. Club magazines and publications were on sale along with items of tv equipment.

There was a closed circuit television display, with demonstration recordings from a video tape recorder. Several tv amateurs also visited the stand.

Now a few more stations active on 70cm tv: G6NOX/T Saffron Waldon, G6AMB/T (G8HBR) Manchester, G6AAD/T Newcastle-under-lyne, and F5VA in BK26E.

I would like to add some more to this list, perhaps active stations would drop me a line.

Mike Cook G6AMB/T (QTHR) has suggested that as portable sites for tv work take

something like eight weeks to be cleared by the Home Office, it would be a good idea to keep a list of such sites for future reference. If you have a site cleared for portable television, would you please let Mike have the details.

Anyone planning a portable expedition would be advised to check with Mike first to see if there is a suitable 'cleared' site available.

As suggested before it seems essential that a two meter calling channel be nominated for tv purposes. It is difficult to choose such a channel which will accomodate everyone but it seems that 144.75 MHz is a reasonable choice, it is therefore proposed that this frequency be adopted. Any mode of emission can of course be used.

Let us sincerely hope that bringing everyone together on one channel will lead to many more video contacts and will encourage those amateurs wishing only to receive pictures to come on the air.

Finally the last postbag was a bit thin so any information of tv activity would be most welcome.

The address for correspondence is 54 Elkington Road, Yelvertoft, Northampton, NN6 7LU.

NOTICE

Pressure on space recently has prevented C Q - T V from publishing many of the articles which have been submitted to the Editor. The reason for this all comes down to one single cause, finance! Postal charges are now so high that a weight limit has to be imposed on each issue of the journal; even if this limit did not apply, we quite frankly could not afford the printing costs of an enlarged magazine.

Whilst apologising to those contributors we do not wish to inhibit members from sending articles for publication. Everything is printed in the end, and perhaps when the subscription is raised, or inflation stops, or postal rates go down, a bigger magazine will be possible. So keep it coming.

It is still only November, but Christmas is nearly here, so the Editor would like, on behalf of the Committee, to wish all members the season's greetings and every wish for a prosperous New Year.

BATC SSTV Convention

B.A.T.C. SSTV CONVENTION

Report by Lewis Elmer
Photos by Malcolm Sparrow

The first SSTV Convention organised by B.A.T.C. and held at Aston University on October 11th was undoubtedly a success with over 100 people attending. We had visitors from most parts of the country including the North of England and Scotland and one visitor, DL2RZ, from Germany.

Commercial Displays were given by Lowe Electronics who demonstrated the Venus equipment and by Western Electronics who demonstrated the Hamgear monitors from Japan. Our thanks to both of these firms for attending.

The amateur room contained a mixture of home-built and commercial equipment on both static and working display. Richard Thurlow, G3WW, brought along his Robot gear and also hisWOLMD designed key-

board titler. A similar keyboard was displayed by Keith Clarke, G3KRC. There were no less than 4 of the W6MXV designed fast to slow scan converters on display and Grant Dixon, G8CGK, was demonstrating his WOLMD designed fast to slow converter, along with other gear. G3RGD had brought along his flying spot scanner which was shown working into his home-built monitor. Perhaps the most interesting display of all was the WOLMD designed slow to fast converter brought by Volker Wraase, DL2RZ, from Germany. Many thanks, Volker, for the effort involved.

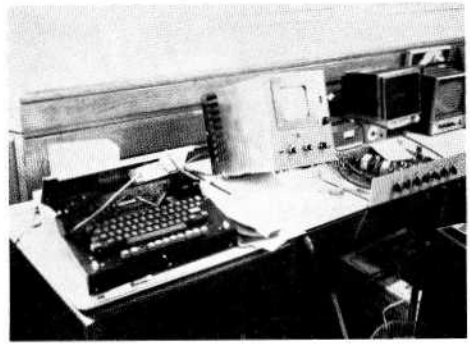
Lectures were given by Gordon Sharpley on the History of SSTV; by Keith Clarke on the W6MXV monitor and by Lewis Elmer on the motorola microcomputer. In addition we had a number of lecture tapes from the Dayton, Ohio Convention which were played and the lecture tape by WB9LVI was also accompanied by his slides.

Once again our thanks go to those who organised it and to those who attended and helped to make the Convention a success. Next year is our normal bi-annual convention and it looks as if the amount of SSTV gear to be displayed at this event will be greater than that of the previous years. With the development of slow/fast converters the demarcation lines between slow and fast scan is disappearing. The fast scan boys who have not seen these things working don't know what they are missing. Look forward to see you all, both fast and slow at the next convention.

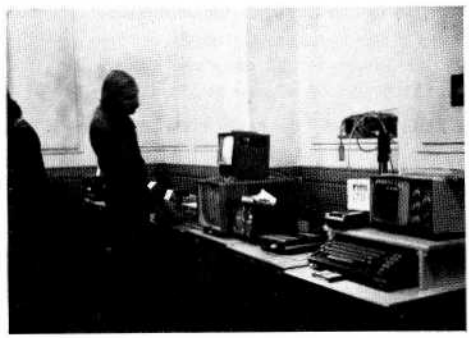
During the Convention reprints from the March and May 74 "QST" on the WB9LVI slow to fast scan convertor were made available. Members who took copies may like to know that corrections were published in a later "QST" and reprints of this article are available from C. G. Dixon (address on page 1) to those sending an S.A.E.

COVER PHOTO off screen photo of G3KRC Keyboard, based on a WOLMD design.

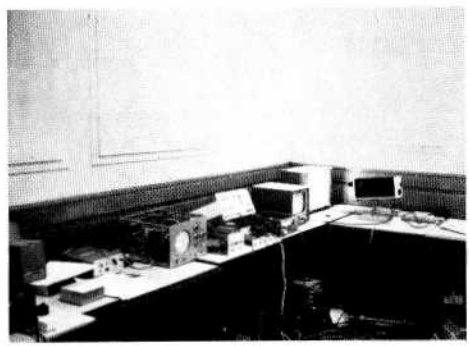
RIGHT Display of equipment by Grant Dixon G8CGK.



ABOVE SSTV Keyboard by Keith Clarke G3KRC. Design by WOLMD with modifications by G3KRC and W3GKW.



ABOVE Volker Wraase DL2R2 and his demonstration of SSTV to fast scan conversion. In the foreground a keyboard by G3WW.



NOTES ON VISION MIXER LOGIC

Peter Delaney

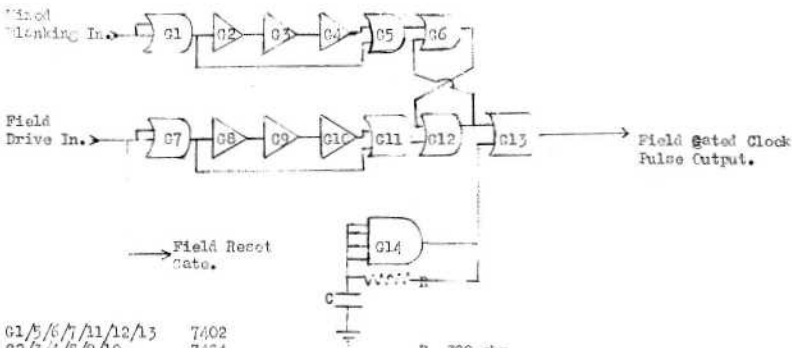
Whilst planning the switching logic for a vision mixer based on the G6ADK/T design shown on pages 15 and 16 of C Q - T V 80, I found it necessary to make a couple of circuit changes, and to design some additional circuits.

First the changes:-

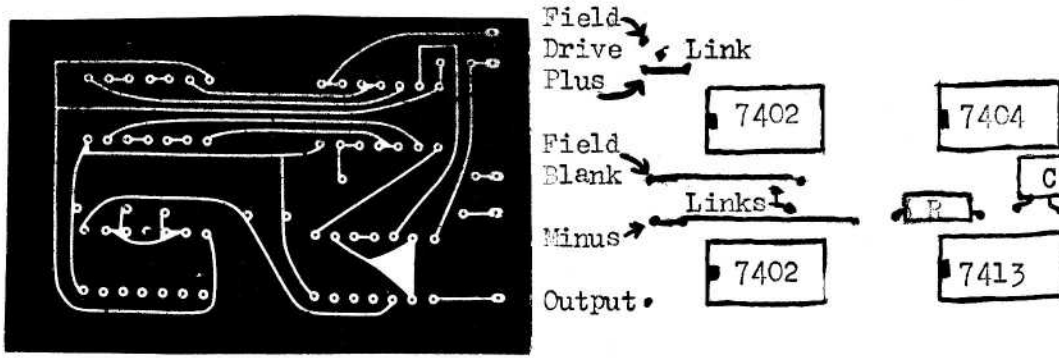
a) The slave switcher circuit diagram, Figure 3, should have the pin 8s connected to earth, in the same way as in Figure 1.

b) The NOR gate used as an invertor between the clock input and the pin 1s should be deleted, as the slave circuit will not count properly in its state as shown - in fact it does not count at all!

Now the additional circuits. Firstly, in order to produce the pulse timings, as shown in Figure 2, p17, I used th circuit shown below. This uses just four cheap ICs, and standard tv pulses to drive it. Operation is as follows:- Gates G1 and G7 act as invertors, G2,3,4,5 and G8,9,10,11 then produce narrow pulses from the trailing edges of the input pulses, which are used to reset and set the bistable G6,G12. The output from the bistable then is used to gate the output of a Schmitt oscillator, G14, in G13, to produce field gated clock pulses. Field reset gating is just straightforward field drive pulses. I suggest that the easiest way is to use a printed circuit board - a suitable pattern is shown below.

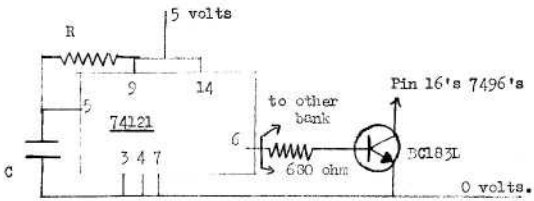


Circuit for field gated clock pulse generator.



Second circuit:- when the power is connected, the shift register can adopt a random, even multiple output. This could overload a power unit trying to run all the power and indicator lamps at once, and if all the register states are 'on', then pressing any of the switches will not clear it. The solution is fairly simple - cause the turn off of the power supply to operate the register reset. This is done using a 74121 monostable, to produce a short pulse when pin five rises due to the charging of the capacitor on switch on. The output is taken from pin six, driving a separate transistor for each switching bank. The circuit is shown below.

The values of R and C are not critical - I used 15 k ohm and o.68 uF, as they happened to be handy at the time. The 74121 does not need a timing resistor or capacitor, as the in built resistor (pin 9 to pin 11) and stray capacity produce a pulse long enough to operate a bistable or shift register.



I also have printed circuit layouts to suit the master slave switch circuits from C Q - T V No 80, or the combining unit in C Q - T V No 79, if anyone would find them of any interest.

Two further thoughts - Brimar produce a crt with a 14cm diagonal, 70° deflection, 184mm long, and 11v, 75mA heater, for which deflection coils are also available. It is ssid to be suitable for camera viewfinders, with low "scanning power requirements within the capabilities of low cost transistorised circuitry". Type number is M14-100. Price unknown - maybe the Club could get a bulk price if enough people were interested. Chess board pattern could be generated by 4 x line frequency and 3 x field frequency square waves applied to a 7486 gate. Drive from C Q - T V 85, page 12, C1 being about 5uF for field pulse, and the 7490 pin 1 'a' output being used. Not tried this - yet.

A slow scan fm-am converter.

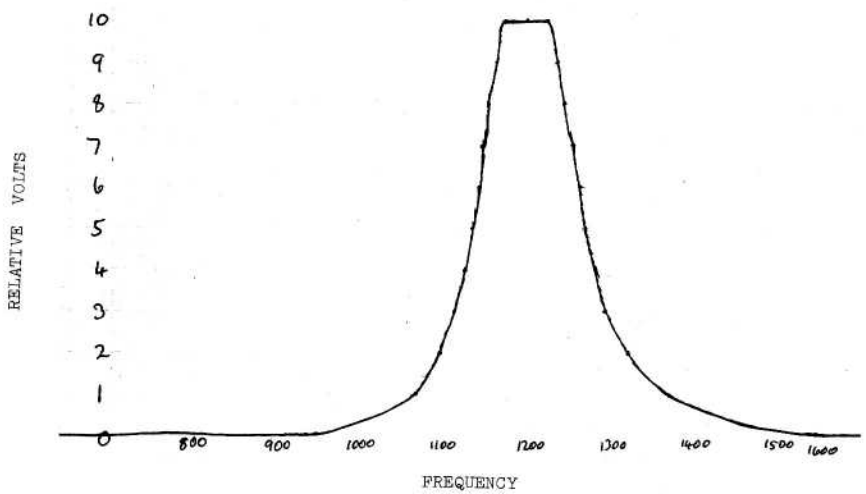
By Peter Helm G8AEN

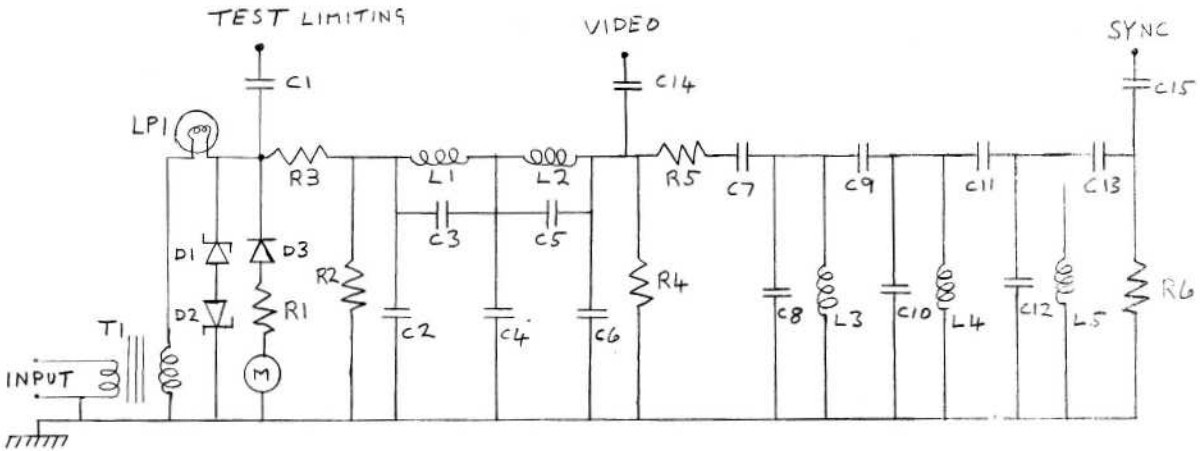
This slow scan FM to AM filter was made to improve on the single coils that I had been using. The video filter was designed, but the final capacitor values varied from design to obtain a straight line FM/AM graph.

The sync filter was just three coils out of the junk box tuned to 1200 Hz. As the value of the output voltages did not matter the two filters were put in series to gain extra attenuation of the video before it went into the sync filter.

If the video filter only is required, the point where the 15K resistor meets the 480 mH coil is the input to the filter. The ouput point is obvious - just remove the 2K2 series resistor that goes to the sync filter, and of course, the 15K resistor.

FIGURE 2 OUTPUT FROM SYNC SOCKET





C1	0·5μf	C8	62700pf	C15	0·5μf	R1	TO SUIT METER
C2	11500pf	C9	13600 pf			R2	6K8
C3	6800pf	C10	4700 pf	LP1	12 VOLT	R3	15K
C4	9100 pf	C11	13600pf		LOW WATTAGE	R4	2K2
C5	1000pf	C12	193600pf	T1	LOUD SPEAKER	R5	2K2
C6	6900pf	C13	13600pf		TRANSFORMER	R6	4K7
C7	13600pf	C14	0·5μf	M	μA METER		

L1	480 mh	D1	12 VOLT ZENER
L2	480 mh	D2	12 VOLT ZENER
L3	200 mh	D3	IN914
L4	1·6 H		
L5	90 mh		

FIGURE 1

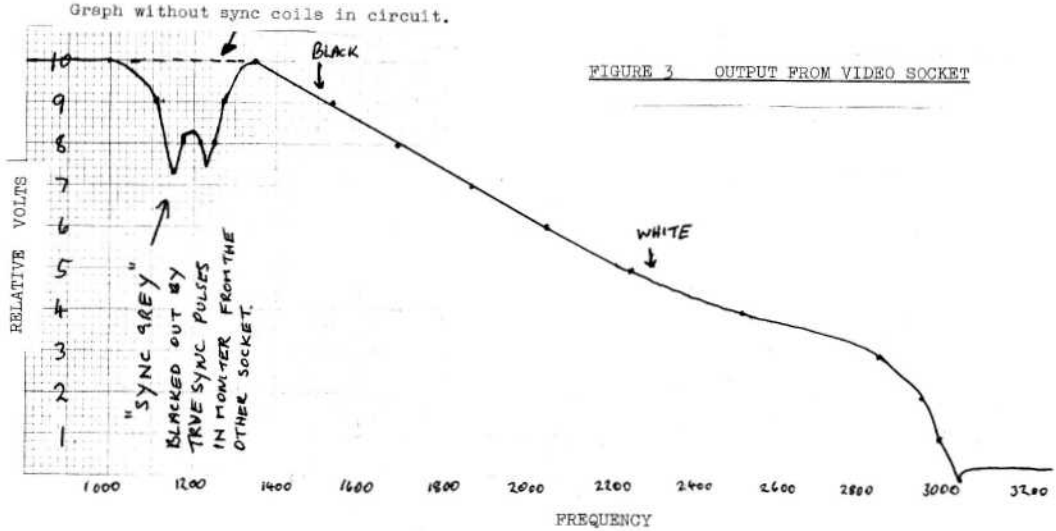


FIGURE 3 OUTPUT FROM VIDEO SOCKET

If video filter only is used, the kink at sync frequency is removed and the output maintained at black level.

Slow Scan and world scouting

W. Livens G2CKB

It was going to happen eight hundred miles away in another country and we were not going to be there - so why should we be excited? Because for the Gilwell Scout Amateur Radio Group there promised to be something quite unique and special about the Fourteenth World Scout Jamboree at Lillehammer.

It was not the first time that a Scout amateur radio station would be operating from inside a jamboree, even transmitting its signals by way of satellites, nor was it the first time we had arranged an extensive display of radio and electronics equipment at the Gilwell radio hut. But there was to be something different, something new. It was while we were making the final preparations for our display (which was to include video tape recording, radio control, treasure hunting, station monitoring, electronic items made by our Scouts, as well as opportunities for visiting Scouts to try their hand at soldering) that we heard the four letters which were to be the cause of our great excitement - "SSTV". Yes, for the very first time ever, the Jamboree amateur radio station would be transmitting SLOW SCAN TELEVISION. This is a method by which a television picture of low definition can be sent in the band width of the normal audio range of frequencies - which means that not only can it be transmitted by an amateur to any part of the world, but it can also be recorded on an ordinary domestic tape or cassette recoder.

In our hut at Gilwell we have a great deal of personal transmission and receiving equipment, but when we heard the news about SSTV we certainly did not possess either the monitor or the ancillary equipment needed to deal with the pictures which were to be transmitted from Nordjamb - nor did we know very much about the process itself!! However, in such circumstances it is not unknown for another radio ham to come to the rescue, and on this occasion it was Ron (callsign G3GRJ) who provided a crash course in SSTV, produced on tape a set of pictures for us to transmit to Nordjamb and even loaned us his personal equipment for the week. We owe him a great debt of gratitude, for without his generous help our "Jamboree week", and this description of it, would have been quite different.

The Jamboree was about to begin. With a feeling of eager anticipation, two of our younger members wound aloft the aerial tower. Our borrowed SSTV monitor and equipment was all set, the rotable aerial was carefully directed towards Norway and then - pictures! As we gazed intently at the little screen of the monitor and realised that those pictures were being transmitted by our brother Scouts about 800 miles away we did not try to disguise our jubilation. At Norjamb they knew we were receiving their visual transmissions and in their enthusiasm they used a Polaroid camera to photograph the clouds, instantly transmitting the picture to Gilwell for us to interpret the Jamboree weather at the time as being $\frac{8}{8}$ cumulus. Our hut was a hive of activity: Ken Stubbings (Gilwell staff Scouter) was busy photographing the monitor screen while at the same time we were recording the slow scan pictures on a cassette recorder so that we were later able to provide "action replays" for our many visitors.

We were very fortunate in being able to arrange a regular 'sched' at 9.30 GMT each day with Hans, the Norjamb radio operator. Every morning we exchanged greetings and news with him, in both sound and pictures, and thus he quickly became to us not only a friendly voice but also our 'eyes' in Norway. He worked extremely hard and with great enthusiasm, bringing us and other Scouts throughout the world closer to each other during the days of the Jamboree. We ourselves enjoyed radio contact with many Scouts during Norjamb (frequently relaying information to those who were unable to contact the Jamboree because of atmospheric conditions). One of our contacts was Alvar, a British Scouter who had been at last year's Gilwell Reunion and who was now transmitting under callsign VQ9SS/C from Diego Garcia: he explained that he was in the Royal Navy he would be unable to attend the next Reunion. But, of all contacts, our particular delight was the daily 9.30 sched. with Hans.

We erected a blackboard and each morning displayed the Jamboree news for everyone at Gilwell - which included Scouts from nine other countries and a Wood Badge course. How often our little hut was crowded with Italians, Koreans, Japanese, Dutch, Americans or others - and how often we had to ask them to leave in the early hours of the morning so that we might have just a few hours sleep.

Our final contact with Norjamb was on the last Wednesday at 14.30 GMT - a prearranged time at which all Scout stations in the World had been encouraged to be "on the air". However, atmospheric conditions were poor and only GB3GP (Gilwell Park) was able to make contact with LC1J (Norjamb). What a delight it was for us when we heard, loud and clear; "Hullo Gilwell Park, this is the Chief Scout of the United Kingdom addressing you from the amateur radio headquarters of the World Jamboree in Norway....." After listening to the Chief's descriptive account of the happenings at Norjamb we replied, sending greetings from all at Gilwell, and were somewhat taken aback to hear another voice from Norjamb say: "This is the King of Sweden..."

His Majesty's message received a somewhat shaky reply from Gilwell, though we did think afterwards that, having conversed directly with King Gustav, we might now legitimately call ourselves the Royal Gilwell Scout Amateur Radio Group!

We made tape recordings of messages from the Chief and from the King of Sweden and these tapes were soon being played to everyone. These messages and our daily sched. made us feel that we were perhaps closer to Norjamb than some of those actually taking part in the Jamboree. Whatever hopes or dreams we might have had about our radio involvement with Norjamb certainly came true, and so when it became possible for us to make someone else's dream come true we quickly grasped at the opportunity..During the week we had enjoyed several radio contacts with Shelly, a New York Scouter (callsign W2GQN/P LA) who was at Norjamb, he told us that he had been at the last two jamborees and that although he was a Wood Badge Holder he had never been able to visit Gilwell. He sent a special message to the Scouters on the Gilwell Wood Badge course, which we recorded for them. During our conversation, we had learned that on his flight back to the USA Shelly would touch down at London Airport at 10.30 am. and take off again at 6pm. on a particular day, so, as a surprise for him and with the co-operation of North London commissioners, we arranged for Shelly and his family (all of whom are in Scouting) to be met at the Airport and taken to Gilwell for lunch, a guided tour and visit to our radio hut, and then return to London Airport in time for their homeward flight. Many people talk about World Scouting, but Ham Radio is World Scouting.

When Norjamb came to an end, a sombre quietness descended on our hut, which momentarily suppressed the joy we had experienced from the events of the past week. It was during that brief silence that I found myself thinking about the real significance of what we and our brother Scouts at Norjamb had been doing. Strangely my thoughts drifted away from the Jamboree and I recalled the joy on the face of a little deaf cub when we had turned up the volume through his headphones to ear-splitting level and he had actually heard what his friends were so excited about - a Scout speaking from another country: how that Cub would have enjoyed SSTV pictures if he had been there to see them. Those afflicted with blindness have long been able to enjoy making amateur radio contact with others throughout the world, but now with SSTV the deaf will also be able to 'talk' and 'listen' worldwide.

We enjoyed Norjamb but that enjoyment is nothing compared to the ecstacy of deaf Scouts worldwide who in the future will be able to take part in SSTV communication. We at Gilwell Scout Amateur Radio Group now set ourselves the task of making an SSTV monitor and equipment: It will be a slow process because our funds are very limited, but when we have finished will bring your deaf Scouts or Cubs to Gilwell - and make another dream come true.?....

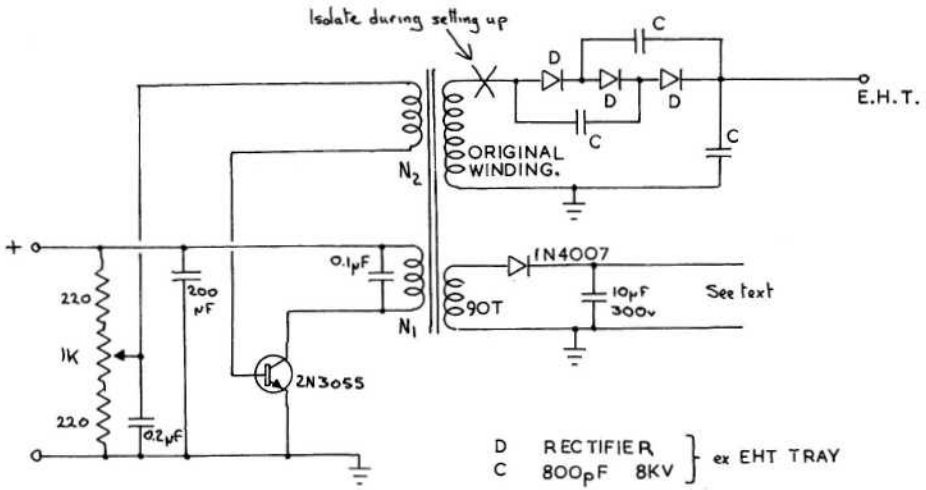
Contact with Norway was regular for 8 days, and the pictures were great.

A TRANSISTORISED E H T UNIT

J. Brown G3LPB

With Slow Scan being enjoyed, thoughts turned to digital readout, this meant a larger tube and probably more EHT as a 7BP7A tube was to be used. A good DC power supply was available, this meant transistors were envisaged. Varied ccts had been tried in the past but one was needed where anyone could copy and get the EHT without too much trouble. The answer seemed to be in the normal EHT line o/p transformer as used in household tv. There is usually an abundance of these at the dealers, s/h shops, even jumble sales. We also wanted to use something to derive the oscillator setup easy, having built inverters and A to D and D to A convertors in the past, some experimentation was carried out. The results were well worth while and can be repeated by anyone, all types of transformers have been tried, and all work as well. The transistors can be almost any type even OC26 have been used, (but these don't like it much). The best was the 2N3055 in the cheaper range. BU105/8 works fine but more expensive.

Obtain some line output transformers, carefully take them to bits, some will not come adrift as they are internally adhered. Usually the ones with bolts or clamps will come to bits easily. Discard all but the overwind, this is the large winding one end going to the EHT rec, setup the other to the cct.

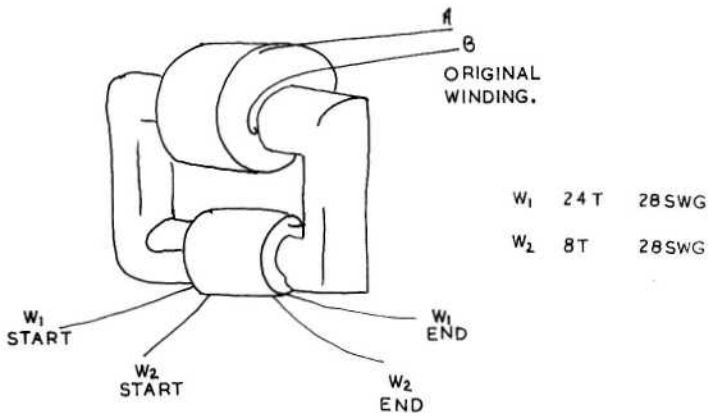


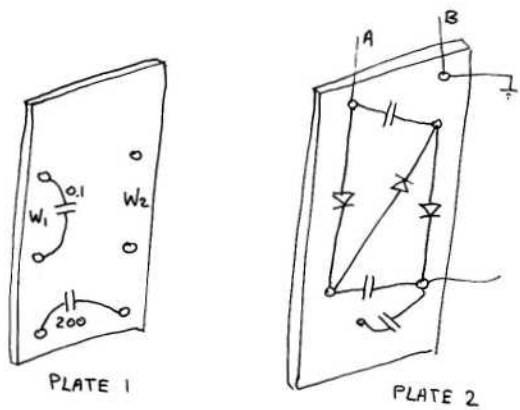
Normal currant at 6KV: 80 - 120mA

Assemble the core and winding again, ensuring there is a gap between the ferrite core ends where they go into the winding. A very thin paper inserted here is O.K. One the other side of the ferrite former, wind on insulating tape, then wind on 24 turns of 28SWG enamelled wire, this is one secondary. Sleeve each end with sleeving, preferably wipe "Araldite" over the winding this adheres it together. When dry, again insulate on top of this more tape, then wind 8 turns of 28SWG enamelled wire, this is Sec. No. 2 and is the base winding.

Again "araldite" the 2nd winding and cover with insulation. Preferably spray with EHT sealer the whole of this setup.

With plain PC board (PC board with the copper etched frm it) make two end plates one side holds the EHT rectifiers, the other is the termination points for the transistor. Fig. 1 shows the general setup.





The EHT rectifiers were again from scrap EHT trays with their capacitors, most dealers will give these to anyone. The BRC EHT trays will scrap down very fine. The metal clamps can be cut with a small hacksaw carefully.

The setup is now ready for testing, connect as shown, with a current meter in the power lead, carefully switch on power i.e. 12 volts, if the meter reads over 1 amp, switch off, adjust pot and trys again. If the current is still over 1 amp, reverse one of the windings i.e. the base two wires, change over. The frequency of the oscillator should now be heard. The intensity can be varied by the POT in the base cct. We can now connect the EHT windings to the board and wire the rectifiers and associated capacitors. Using tags. (solder or turret types.)

Many of these have been made and tried, the best EHT available was 9KV from an 18volt supply, this is a real nasty beast, SO KEEP HANDS CLEAR WHEN IN USE. All components are easily available.

The fre-uency can sometimes be a nuisance to the ear, if so try tightening the clamps, as the ferrite formers will resonate to the oscillator frequency quite easily. Better still put the setup in a metal box i.e. die cast box, well insulated. There need only be three leads; two power leads in and one EHT lead out.

Reversing the rectifiers give a NEGATIVE output. This can be done by reversing the diodes. We can then use the EHT on ELECTROSTATIC tubes which require usually a negative supply. In passing winding 90 turns of 30SWG we can also get a winding that when rectified will give us 250 volts dc to drive the brill setup.

Regulation was acceptable, but if needed, normal regulation can be used.

TICKERTAPE TELEVISION

A proposal by Edward H. Mitchell with later comments by Douglas Pitt

In March Edward Mitchell wrote to B.A.T.C. with a suggested form of "Tickertape Television", asking if any Club members would find this of interest. He was asking for his advice, and his letter was sent to many active LDTV enthusiasts. His system is described here.

TICKERTAPE TELEVISION - A single line message moves across the screen from right to left, at a comfortable reading speed.

Mechanical scanning: 12 x 36 line interlaced frames per second, (24 x 18 line fields per second).

Picture aspect ratio: 3 to 1. There are 12 picture elements to each line, which produce a fundamental picture frequency of 2592Hz.

The scanner is a 3½" Nipkow Disk containing two sets of 18 light apertures (Fig.1). The disk

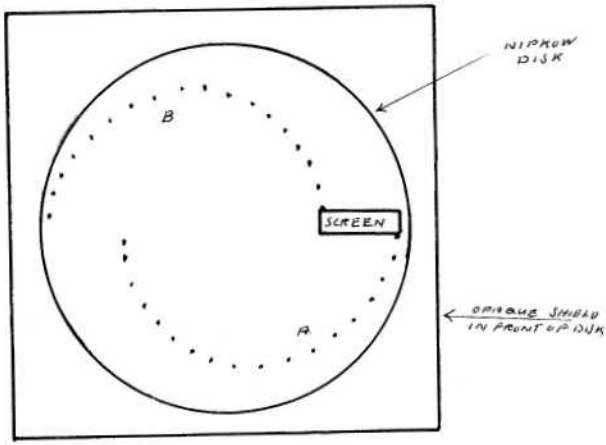


FIG. 1.

THE NIPKOW DISK COULD BE PRODUCED PHOTOGRAPHICALLY

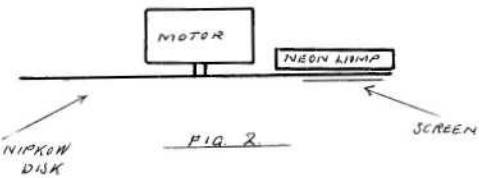


FIG. 2.

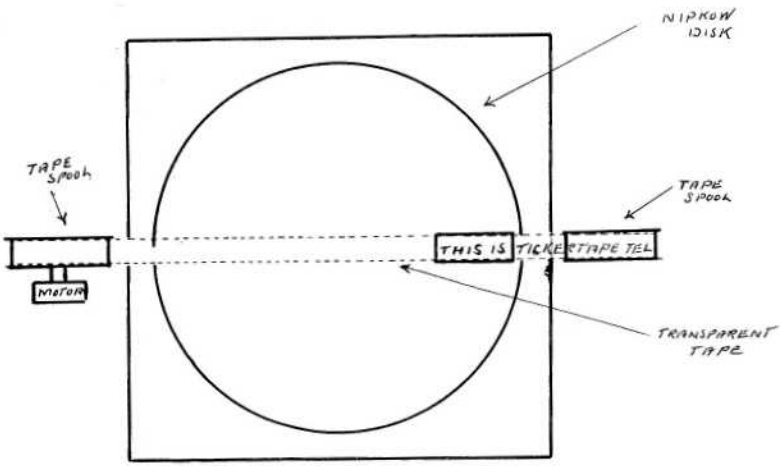


FIG. 3.

is rotated by a motor at 720 r.p.m. in an anticlockwise direction. The apertures in section 'A' scan the odd numbered lines, and the 'B' apertures scan the even numbered lines.

An opaque shield containing a glass screen measuring $\frac{3}{4}$" x $\frac{1}{4}$" (screen measurements) is placed in front of the disk (Fig.1). A neon lamp which is modulated by the incomming signal is placed behind the disk opposite the screen(Fig.2).

The transmitter is of identical construction but also includes two tape spools (Fig.3). The message is composed of Letraset characters which are affixed to transparent tape. This tape is moved slowly across the screen from the right hand to the left hand spool. A photocell is placed in front of the screen, which passes onto the scanning light pulses to the radio transmitter.

Synchronisation can be achieved by the methods used in the days of mechanical television. The neon lamp can be replaced by a more powerful lamp for transmitting purposes if this should be considered necessary or desirable.

Although the screen is very small, I think it would suffice to enable the message to be easily read as it continuously passes across the screen.

.....

Doug Pitt read this in June and now offers the following comments on Mr. Mitchell's system.

In a letter written earlier this year, Mr. E.H. Mitchell of Thornton Heath proposes the use of a disc of the Nipkow type for the transmission and reception of alphanumeric information. No doubt because "Nipkow disc LDTV", the letter came my way for commentary. The proposals are interesting and, in my opinion, deserve a wider appraisal than one person can give them. Since I have ventured to add some criticism, it is only fair that I offer some counter-proposals for other people to knock down. Mr. Mitchell calls his idea "Tickertape Television".

The mechanics of this is identical to that of the Baird LDTV system, including the method of synchronisation and the use of a modulated neon lamp for illumination at the receiving end. (However, since the message, presumably, contains no half-tones, the neon lamp would require no biasing arragements).

The small ($3\frac{1}{2}$" diam.) disc gives 36 vertical lines (18 + 18 interlaced) and rotates at 12 r.p.s. producing a fundamental picutre frequency of 2592 Hz. The picture aperture is 3 units horizontal by 1 unit vertical so that several letters, numbers, etc. can be displayed at any given moment. At the transmitting end, the message, printed in a single line in the manner of tickertape, is moved across the picture aperture at a comfortable reading speed. The tape itself is transparent, and Mr. Mitchell proposes the use of Letraset characters for the message. The prepared tape os spooled and during transmission is wound slowly onto a take-up spool. A lamp and photocell complete the transmitting unit. Since the disc is small it could well be produced photographically from a master design.

COMMENTS Current LDTV practice suggests that the system is quite feasible. It has the advantage (like LDTV) of being cheap and readily home-made from available materials. The ability to

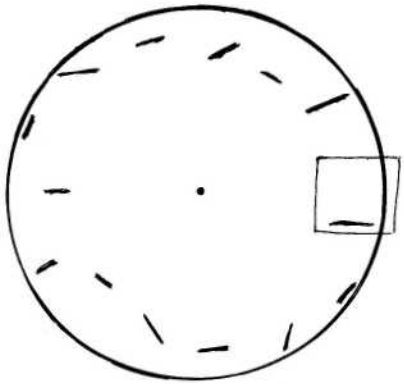
display several characters simultaneously is a real advantage in reading. It can display any captions in any alphabet, including handwriting, shorthand, and ideographs (Chinese etc.). The bandwidth required is as narrow as present SSTV so it might well be accepted on the same amateur bands.

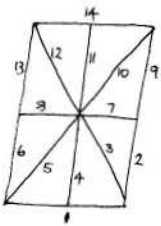
BUT It uses an essentially subtle technique (LDTV) for a fairly crude purpose, like harnessing a Grand National winner to a dray!! What Mr. Mitchell proposes using is genuine Television, capable of producing living photographs in a range of half-tones for no extra bandwidth. This is very wasteful. Many of the advantages listed above are really luxuries. Even Chinese is often Romanised these days before transmission. Besides English for better or worse, is rapidly becoming the accepted world medium for amateurs. All we really need is the Roman alphabet as inherited, plus the numerals, plus some mathematical or punctuation signs. Lastly, the preparation of the message on a transparent tape as proposed seems a very tedious process and my own laziness demands a keyboard of some sort like the one I am using at the moment to type this article. There are at least two alternative approaches to the problem of disc transmission which, in some degree answer the questions raised.

TELESEME This solution makes use of the fact that printed characters are largely composed of distinct parts of limited number. These segments or 'semes' can be displayed in various combinations to give tolerable representations of letters, numbers etc. as, e.g. in the 7 segment calculator display (Nixie tubes are available to this standard) then almost any alphanumeric character or mathematical sign can be represented. For the purposes of disc transmission, the various semes chosen needn't be straight lines; they can be any shape we like, so the representations can be quite good, but straight lines are probably most versatile. These shapes are arranged in an agreed order round the edge of the disc and the neon lamp behind them switches on at the right moments to build up the character required by persistence of vision, e.g. "I" followed by "-", followed by "I" builds up to "H". In practice this works very well, and at 10 r.p.s. the characters hold together firmly enough to be easily read. This is not television of course, as the transmission requires no analysis of a picutre, merely a system of rotary preferably optical switches, but it serves to same purpose as the previous system described, only giving one letter at a time. The fundamental picture frequency is however, much lower, only 140 Hz, so accomodation in the amateur bands is no problem. Keyboard design for easy operation is not likely to raise any serious problems either.

The above system as described may seem to offer everything, as it covers all characters likely to be needed at a very low cost in bandidth. But it is not perfect. Characters, read one at a time, need to be very swiftly recognised and some characters built up in the way described are a bit caricatured, as might be expected. And although highly efficient in terms of information per unit bandwidth, some of the potentialities can't be realised. For instance, of the 195 possible shapes to be made from a 14 segment display, only about a quarter correspond recognisably to a conventional sign in general use, even using Cyrillic and other alphabets.

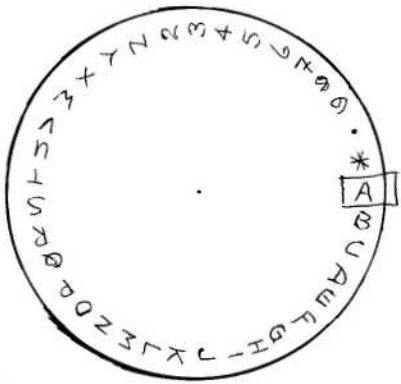
ALPHABET DISC A straighforward alternative to the Teleseme disc is the Alphabet (or Alphanumeric Disc). This simply accepts that fair communication can be achieved with a certain minimum of characters (witness telegrams) and uses a disc with these printed clearly round the edge in the most easily read form. For my experiments I have used the upper case letters in alphabetical order, followed by 2,3,4,5,6,7,8,9, then . (fullstop) the * (asterisk). The full stop is useful to save writing "STOP" and the asterisk serves as a space sign (i.e. end-of-word sign). Because each letter appears as a unit instead of in a rapid sequence of 'bits', lower disc speeds are





TELESEME DISC

ALPHANUMERIC DISC



possible, and 4 r.p.s. is not too hard on the eye. This gives a picture bandwidth of 144 Hz which just about matches the Teleseme system. Because no 'combinations' are needed, a keyboard can be very easily be designed and in general, this disc is comparable in simplicity to the Nipkow disc. Surprisingly, I have never heard of this idea being put forward for amateur communication, although of course, it is a well established method in ultra high speed type-setting in the printing industry.

I should like to thank Mr. Mitchell for his interesting letter and would appreciate C Q - T V readers comments on the ideas raised in this article.

NOTE:
4.166 r.p.s. synchronous motors, capable of turning a light disc, are available from The Radio Shack under the title "250 RPM 50c/s locked frequency miniature mains motor". See adverts in Radio Constructor.

MAINLY FOR SSTVers BUT APPLICABLE TO AUDIO

J. BROWN G3LPB

I am sure that sometime in our past we have had misfortunes and may have them in the future. A lot of us without cameras have to thank the chaps with cameras for helping us by making CQ tapes etc., but sometimes on our arrival we find they are "not what we thought". Lots of these troubles are NOT the tapes but our bad mismatches between our recorders used on playback and the monitor input or tx mike sockets.

Thinking about this and also that we should at all times during transmission monitor our own transmissions, a fair bit of experimenting went on. The outcome is by no means original and is not claimes as such, but a great added advantage for the little expenditure incurred. Reel to reel recorders offer a great deal of combinations of inputs and outputs whilst the "now familiar" cassette is limited by the type, and price paid. Some are very mean with inputs and outputs, these are catered for in this article. Some of the more expensive ones have auto record facilities whilst the cheaper ones have visual indications of input during recording. It is quite in order to suppose that if the recorder has NO INDICATOR for record, it is auto controlled, that is, immaterial of the amount of input within reason the level of record is always the same. Most cheap cassette recoders have 1.Mic. input with rem control and 2. AUX input this allows higher impedance to be used i.e. 600 ohms as the microphones usually are about 200 ohms with transformer in the case. The output is almost always ext. speaker this is about 3 to 12 ohms, in some cases 25 ohms. The units described have been used with a great many varied cassettes from the £6 ones to the £190 setup all with good results and will be found a great asset. Even used for audio great fun can be had. The transformers used were scrap output transformers from small radio sets, however probably suppliers have equivalents. i.e. Radiospares Type TT2 and TT7 have been used successfully.

FIG. 1

This shows the matching sections required to connect the receiver speaker socket to the monitor and recorder so we can monitor the actual video being recorded. T1 is a transistor type output transformer used in reverse VR1 allows us to control somewhat the gain whilst R2/3 help with matching.

Connecting A to the receive speaker
B to recorder aux input
C to monitor input.

We can record from the received signal plus the facility of monitoring at the same time. Hence a drifting signal can be quickly seen so that we can retune. Fortunately SSTV is FM so the amount of audio is not really relevant. This will be found to be a great asset to the chap who records from "off air".

Again, using two recoders, one for playing with A in the ext speaker socket, B can go to the recorder No. 2 on which the recording is to be redone and C to the monitor input. Or even after the level is monitored we can make 2 recordings by using B and C to two recoder inputs. This unit can be made up and fitted in a metal "pill" container or a film cassette, wires soldered on and the container filled with pitch or some epoxy resin, and all connections be brought out on screened lesds with 3.5mm jack plugs for easy use.

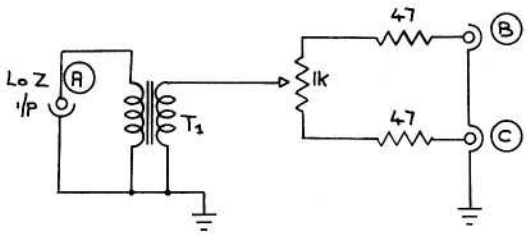


FIG. 1.

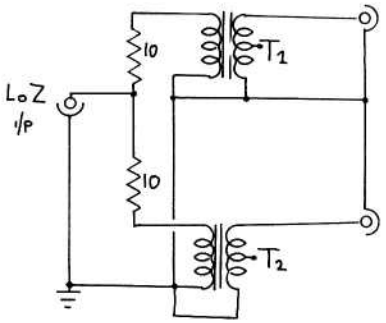


FIG. 2.

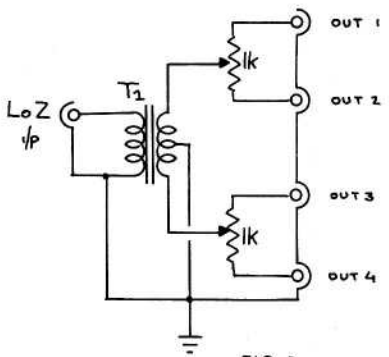


FIG. 3.

FIG. 2

This shows a different setup, as we now have to transfer an impedance to two equal ones; the way it was approached was two transformers back to back. i.e. the high winding to A the two low windings connected back to back and the high winding of No. 2 to two outputs. Again the two output transformers were used. It was found necessary to earth as shown to stop hum loops and RF getting in from the TX during playback.

PLAYBACK

Fig. 1 will allow playback from recorder to mike socket plus monitor facilities to see how progress goes on. We can at all times MONITOR OUR VIDEO during transmission and see at all times the content of the transmission. We can also see if any RF is present and entering the recorder. This appears as bars sometimes verticsl sometimes slanting.

Fig. 2 allows playback from any source other than the low impedance source of a speaker etc.

So we can call this a MED to MED impedance unit, and will suit gram/tape sockets or 600 ohm output lines.

These two units whilst being simple allow a normal chap without gear to make up his own tapes, play his own tapes, record decent tapes from "off the air" recordings, even mix video

continued on page 25

A LOW COST TV LINEAR RF AMPLIFIER

by P. Johnson G6AFF'T

SPECIFICATION

50 Mw input, FRQ 436 MHz Nominal, 0.5 watt output. Stabilised base bias line 9.1v, Class A, Stable operation.
12 - 13.8 DC WKG. Max. RF input 0.02w, min. 0.001w

INTRODUCTION

This linear RF amplifier was designed to provide a cheap low power output for the Modular ATV transmitter, Ref, VHF Communication Editions 4 x 5 Volume 5 May 1973. The output is more than adequate to drive higher powered linear amplifiers.

DESCRIPTION

The VHF Communications ATV Transmitter has an output of 0.1 - 0.01 w dependent on modulation level. The circuit described here assumes the input will average 0.05 w, with maximum and minimum inputs as stated in specification approximate cost £6.00.

The input stage T1 consists of a series feed base i.e. current driven, coupling to the input tuned circuit is a simple single turn loop tightly coupled, the collector circuit consists of a Pye series tuned inductor, impedance matching accomplished by variable capacitors. The connection from T1 to T2 is by way of the 20pF capacitor, this allows the best compromise in coupling imedances. No close tolerance components other than base bias resistors are required. A heat sink must be fitted to T1, type 5F.

Silver plated wire for the coils is preferred but turned copper is just as good, although Q values will be slightly lower. No apparent degredation has been experienced with this amplifier.

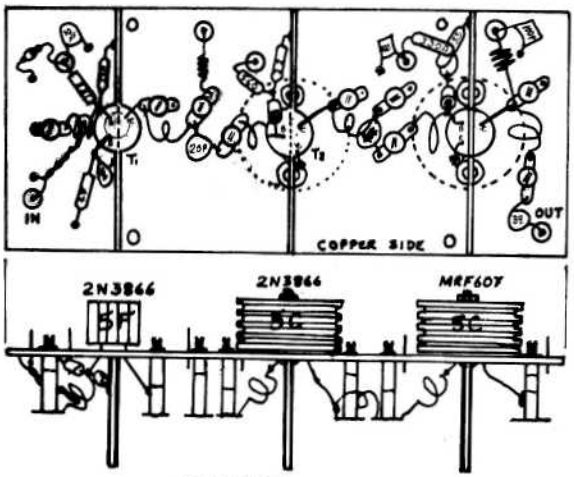
T2 and T3 develope greater power dissipation in Class A conditions, thus when driven with RF they get quite hot, therefore a larger heat sink type 5C is required fitted tightly to each transistor. Shortest possible wires on all decoupling capacitors is essential for stable operation of T2 - T 3.

The same basic circuit as for T1 is used for each stage and all stages operate in the same mode. The base bias supply line at 9.1volts is zener stabilised and must be decoupled at RF and AF frequencies. Each stage will be held in check by the bias line independant of the supply voltage to the collectors of T1, T2 and T3.

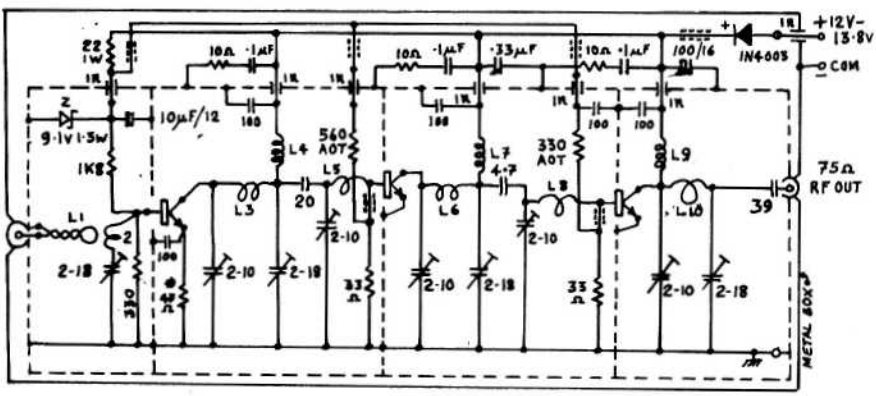
CONSTRUCTION NOTES

A single sided printed ciruit board (drawing 1) is used as a ground plane, a screen made from double sided PCB is used between each stage, this is assembled after all holes are drilled and trimmers fitted, feedthrough capacitors etc. When all trim capacitors, FT Capacitors, and decoupling capacitors are fitted, solder the screens into position halfway across hole where

DWG 1 — UNDERSIDE VIEW SHOWS GENERAL LAYOUT OF EACH STAGE (NOT TO SCALE)



SIDE VIEW



T1 2N3866 + 5F H/SINK

T2 2N3866 + 5C H/SINK

T3 2N5913 OR MRF607 + 5C H/SINK

436 MHZ RF CLASS A AMPLIFIER FOR TV TX

transistors are to be fitted. Finally fit heat sinks to each transistor and sloder each transistor and solder each transistor into its place. Place the base bias resistors to match the positions of the transistors, connect the coupling capacitors and coils into positions convenient to shortest possible routes. Check the circuit very thoroughly before attempting to apply an ohm meter to various parts of the circuit to establish order of values and connections. If you are then satisfied make sure the reverse polarity protection diodes are wired into circuit.

TEST PROCEDURE

1. Establish correct level of RF drive with a diode probe connected to a meter or scope.
2. Establish correct DC 12v polarity before connection.
3. Do not touch the base coil or base connections with any metal object when dc volts applied as this may damage the base of the transistor by applying a change in impedance thus causing base to collector breakdown.
4. Tuning tools should be non-metallic or brass insert type which have very small amount of metal.

Proceed by applying 50mW of RF sine wave modulated or sawtooth triangular waveform at frequency of tv carrier 436MHz to input, tune T1 input and output for maximum signal on diode probe placed either side of 20pF coupling capacitor to T2 when done continue to tune up T2 with diode probe placed at junction of 4.7pF coupling capacitor and finally T3 with diode probe on output socket terminated with 75 ohm 1W resistor.

When output is approximately 2 volts p - p from diode probe make adjustments to trimmers for maximum signal consistently. Finally if serious non-linearity exists the AOT vaules may need some adjustment when doing this meter the collector current of each stage it should not be less than 10mA, not more than 40mA under NO DRIVE condition i.e. no RF at input. (Excess drive will also cause non-linear output assuming the input signal is linear.)

DRAWING 2 Finally, when the amplifier is tested O.K. it is recommended that it shall be fitted into a suitable aluminium box. A box constructed out of single-sided or double-sided PCB is also a good solution.

Input and output sockets are Belling-Lee type.

COMPONENTS

Resistors

3 x 10ohm ¼w or ⅛w 5%
1 x 22ohm 1w 5%
*1 x 47ohm ¼w or ⅛w 5%
2 x 33 ohm ¼w or ⅛w 5%
*2 x 330ohm ¼w or ⅛w 5%
*1 x 560ohm ¼w or ⅛w 5%
1 x 1.8Kohm ¼w or ⅛w 5%

*Possible AOT Values

Capacitors

3 x 0.1uF 50v DISK
5 x 100pF 100v DISK
1 x 20pF 500v DSK
1 x 4.7pF 500v DSK
1 x 39pF 500v DSK
1 x 10uF 12vElectroltic
1 x 100oF 16v
1 x 0.33uF poly

6 x 1n (1000pF) Feedthrough solder type.
1 x 1n Bolt type feed through

HARDWARE

1 x Heatsink 5F
2 x Heatsink 5C } MARSHALLS
2ins x 6 ins PCB Single sided
2ins. x 6 ins. PCB Double sided.

TRANSISTORS

2 x 2N3866
1 x MRF607 T.Parr. Radio Communications Small ads.

TRIMMERS

2 - 18pF Mullard tube types of 2pF min. capacity nut fixing
2 - 5.6 pF or 2 - 10pF Mullard tube types of 2pF min. capacity nut fixing.

Coil wire 36 ins x 20 swg silver plated (amateur bulk buying group)
6 ins x 14 swg tin plated.

COILS

L1, 22swg plastic covered tin plated hook-up wire 1 turn loop. Twisted to terminal point.
L2-7 1.75 turns 20swg SPC 6mm dia. 5mm long 3mm leads
L4 3 turns 3mm dia. 26swg enamelled copper
5mm long, leads 5mm. (RF Choke)
L8 and L10 1.5T 14swg tin cop 13mm dia.
L9 5T 22swg enamelled copper 6.5mm dia (RF choke)
Close space

continued from page 21

i.e. patterns with CQ calls, greyscale with CQ calls etc, there is really no limit to the doctoring up that can be done. Two monitors can be checked at the same time, two recordings can be mixed, using cct No. 3. I even made 3 copies of the tape (Borrowed recorders and tape HI) This needs so little but is food for thought.

I know of one S.Scanner using stereo recorder one track for video and one for a sound commentary. This was an excellent way of telling someone of the setup. Still one of our greatest enemies is the non-compatibility of the alignment of tape heads. Could we not have a tape made as a standard to be kept by the librarian and loaned for head alignment. Naturally the ideal would be a cassette with the "record bits" removed thus allowing it to be played, but no chance of erasing it. We could then play each others tapes, thus allowing the chaps who own cameras etc. who are making CQ tapes to exchange tapes of video or chat tapes.

CIRCUIT NOTEBOOK No 23

J. Lawrence GW6JGA'T

Cathode-ray tube phosphors

The Cathode Ray Tube is till the most suitable medium sized display for television pictures and graphic information.

Many types of screen phosphor are available to suit particular types of display and also for use in flying spot scanners, for picture generation.

Some surplus C.R. Tubes are particularly suitable for slow scan tv, both for scanning and for display.

In many instances the type number of the C.R. Tube incorporates information on the screen phosphor e.g. 5FP7 has a P7 phosphor. In other instances it may be necessary to consult the maker's data.

The chart given in Fig 1 has been compiled from several sources and more detailed information may be obtained from the references quoted.

References

1. R.C.A. Phosphors. Booklet No. TPM 1508B from R.C.A. Ltd., Sunbury on Thames, Middlesex.
2. Mullard Valves and Tubes. Quick reference and equivalents guide 1975-6. Mullard Ltd., Central Technical Services, New Road, Mitcham, Surrey, CR4 4XY.
3. English Electric Electro-Optical/TV abridged data booklet. 1975-6. English Electric Valve Co. Ltd., Waterhouse Lane, Chelmsford, Essex, CM1 2QU.
4. Ferranti Short Form Catalogue on Cathode Ray Tubes. Ferranti Ltd., Gem Mill, Chadderton,

Phophor Colours - Pro-Electron System

First letter	Colour
A	Reddish-purple, purple, bluish-purple
B	Purplish-blue, blue, greenish-blue
D	Blue-green
G	Bluish-green, green, yellowish-green
K	Yellow-green
L	Orange, orange-pink
R	Reddish-orange, red, pink, purplish-pink, purplish-red, red-purple
W	White
X	Tri-colour screen
Y	Greenish-yellow, yellow, yellowish orange

Persistence

Description of Persistence	Time to decay to 10% of initial brightness
Very long	1 sec and over
Long	100mS to 1 sec
Medium	1mS to 100mS
Medium short	10 μS to 1mS
Short	1 μS to 10 μS
Very short	less than 1 μS

CATHODE RAY TUBE PHOSPHORS

EUROPEAN PRO-ELECTRON	OLD EURO-PEAN	EEV	GEC	OLD GEC	EIA JEDEC	FLOURESCENCE	PHOSPHORESC-ENCE (AFTER-GLOW)	PERSISTANCE (APPROX)	TYPICAL USE
BA	C	C	22		P16	Purplish - blue		Very short	Flying spot scanners
BC	V					Purplish - blue		Killed	Flying spot scanners
BD	A					Blue		Very short	
BE	B	P	08	E	P11	Blue	Blue	Medium short	Photographic recording
BF	U					Blue		Medium short	
GB	M		44		P32	Purplish - blue	Yellowish-green	Long	Medium and short range radar
GE	K	A	15	U	P24	Green	Green	Short	Flying spot scanners
GH	H	H	24		P31	Green	Green	Medium short	General purpose oscilloscopes
GJ	G	G	01	B	P1	Yellowish-green	Yellowish-green	Medium	Projection and oscilloscope
GK	G					Yellowish-green	Yellowish-green	Medium	Used in projection tubes
GL	N	N	25		P2	Yellowish-green	Yellowish-green	Medium short	Wide speed range oscilloscopes
GM	P	X	46	M	P7	Purplish - blue	Yellowish-green	Long	Radar and slow speed oscilloscopes
GN	J					Blue	Green (Infra - red excited)	Medium short (flourescence)	
GP					P2	Bluish - green	Green	Medium short	Slow speed oscilloscopes
GR		E	29		P39	Green	Green	Long	Medium and short range radars. Anti-flicker displays
GU						White	White	Very short	
KA					P20	Yellow-green	Yellow-green	Medium	Oscilloscopes
LA	D	T	26			Orange	Orange	Medium	Anti-flicker displays
LB	E	S	27			Orange	Orange	Long	Medium and short range radar
LC	F	Z	19	T	P26	Orange	Orange	Very long	Long range radar
LD	L	Y	23	J	P33	Orange	Orange	Very long	Medium and short range radar
W	W	W	18	G	P4	White	White	Medium short	Television monitors
X	X				P22	Tri-colour screen			Colour television
YA	Y					Yellowish-orange	Yellowish-orange	Medium	
		V	02		P28	Yellowish-green	Yellowish-green	Long	Short range radar
			28			Orange	Orange	Long	Medium range radar
	U	B	30			Blue	Blue	Medium short	Projection
		D	31			Yellow-orange	Yellow-orange	Long	Short range radar Alfa-numeric
		U	33		P12	Orange	Orange	Long	Short range radar
		S	34			Red	Red	Medium	Projection
		F	47		P40	White (Med. short)	Yellowish-green	Long	Anti-flicker displays
					P14	Purplish-blue (Med. short)	Yellowish-orange	Medium	Low speed oscilloscopes

CMOS again

Following on from the experimental Pulse Generator in Circuit Notebook No. 22, here is a 625 line line sync and line blanking stage. the circuit uses five CMOS i.c.s and is shown in Fig 2. It is not a complete sync pulse generator.

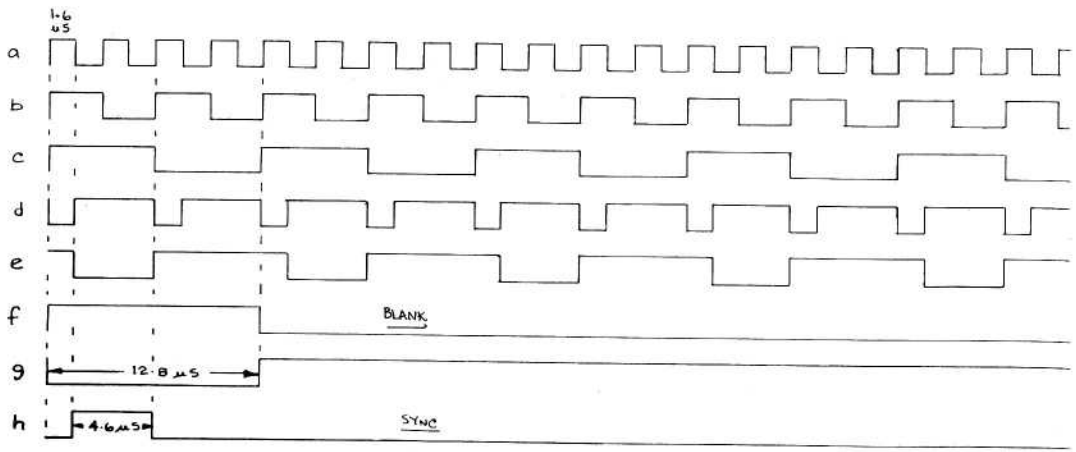
The Master Oscillator runs at 20x line frequency (312.5KHz) and consists of a dual input NOR gate connected as an inverting amplifier with C1, C2, C3 and L1 providing the feedback and determining the frequency. L1 is a 470 KHz IF transformer winding and C1 is chosen to suit; about 200 pf suits the usual transistor transformer.

The next NOR gate cleans up the waveform and drives the divide by four counter (4013 dual D-type flip flop). The waveforms in various parts of the circuit are shown in the diagram below. The waveform at 'd' is formed by gating 'a' and 'b' and the waveform at 'e' is formed by gating 'd' and 'c'. The waveform at 'c' is at 5x line frequency and is divided by five down to line frequency by the 4027 (dual J/K) and ½ 4013 (D type) flip flops and the linking NOR gate.

The output of the final flip flop 'f' is at line frequency and forms the line blanking pulses, these are inverted, ie positive going. Negative pulses 'g' may be obtained from the $\overline{Q}$ output if required.

The output at 'h' consists of line sync pulses provided by gating 'e' and 'g', (these pulses are also inverted). Negative pulses may be obtained by using an invertor stage, not shown. Part of a 4009 Hex invertor would be suitable. CMOS devices are not suitable for driving into 75 ohms directly, and a buffer stage similar to that shown in Circuit Notebook No. 22 would be suitable.

Any unused inputs on CMOS devices must be connected to either +ve or earth as appropriate. This means that the unused half of the second 4013 must have pins 8, 9, 10, and 11 connected to earth.



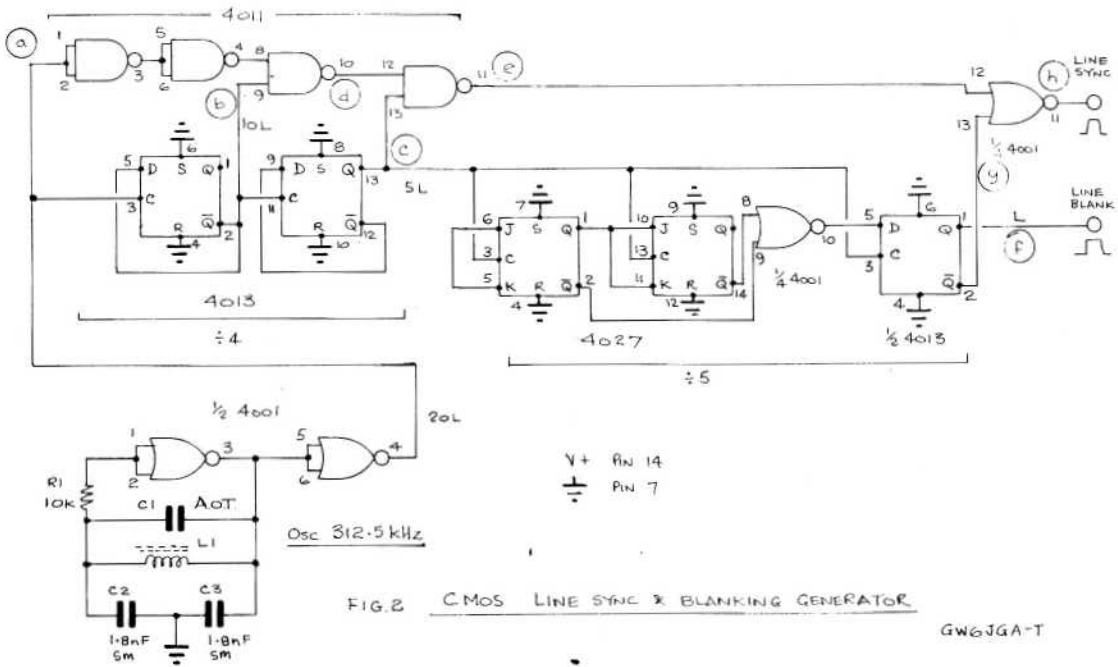


FIG.2 C.MOS LINE SYNC & BLANKING GENERATOR

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